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Determinants of profitability:

Effect of non-performing loans-ratio, capital adequacy ratio and bank size on the profitability of commercial banks in Suriname

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Paramaribo, December 2021

Preface

The focus of this thesis is to ascertain what "The effect of Capital Adequacy Ratio (CAR), Non-Performing Loans (NPLs) and bank size is on the profitability of commercial banks in Suriname during the period 2009-2018. This thesis is submitted to finalize my study and obtain the degree of Master of Science (MSc) at Anton de Kom Universiteit van Suriname.

Before transferring to the official research, I would like to thank several people who have contributed to the creation of this thesis. I want to thank my thesis supervisor and my dear friend Shenita Mathoera MSc., for her professional guidance. Despite her pregnancy and delivery during this period, she always gave quick feedback and so I was able to complete this thesis in four months. I would also like to thank my co-supervisor, Drs. Ansjela Bhagwandin, for her professional guidance and support during this process. Sincere thanks to the coordinator of Master Accountancy Drs. A. Sheoratan and the coordinator of Economics Varun Ramdin MSc., for their hard work and valuable time. Furthermore, I would like to thank all my lecturers and fellow students for passing their knowledge, support and at sometimes patience.

Special thanks goes to my department head and colleagues from the Financial Stability Department of the Central Bank of Suriname for their continuous encouragement and support. This study was a challenge for me as a mother of two young children. Nevertheless, I took on this challenge thanks to the help of several people close to me. Sincere thanks to my family, especially my husband, my children, my parents, my in laws, my sisters, brother–in-law, my nieces and nephews for keeping me motivated.

My husband, my children and my parents deserve a particular note of thanks. They had to make the most sacrifices during this study. They deserve my deepest gratitude for their unconditional love and support every step of the way. Therefore, I dedicate this thesis to my husband, my children and my parents.

Nancy Amritpersad

Paramaribo, December 2021

Abstract

The purpose of this study is to examine the effect of Non-Performing Loans (NPLs), Capital Adequacy Ratio (CAR) and bank size on the profitability of commercial banks in Suriname. The independent variables used in this study are NPLs, CAR and bank size, while profitability is the dependent variable. The hypothesis in this study were developed based on prior research regarding determinants of profitability. The data for this study is manually collected from annual reports which were downloaded from the webpage of the commercial banks in Suriname during the period 2009 – 2018. The T-test is used to test the hypotheses and determine whether NPLs, CAR and bank size have an effect on the profitability of the commercial banks in Suriname. The results state that NPLs, CAR and bank size do have a significant effect on profitability.

Key words: NPLs, CAR, Bank size, ROA, banks in Suriname

List of Abbreviations

CAR   Capital Adequacy Ratio

NPL   Non-Performing Loans

ROA   Return on Assets

CBvS   Centrale Bank van Suriname

BCBS   Basel Committee on Banking Supervision

FX-Rate   Foreign Exchange Rate

RWA   Risk Weighted Assets

ROE   Return on Equity

SRD   Surinamese Dollar

USD   United States Dollar

EUR   Euro

IMF   International Monetary Fund

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1. Introduction

1.1 Non Performing Loans

During the last two decades, a significant increase of credit growth provided by financial institutions was recorded (Cingolani, 2013). This growth is attributed to the deregulation process of financial markets and the development of information technologies in the banking industry, which led to the enhancement of financial intermediation (Panopoulou, 2005; Rinaldi & Sanchis-Arellano, 2006). One of the most common indicators that is used to identify credit risk is the level of Non-Performing Loans (NPLs) (Makri, Tsagkanos & Bellas, 2013). In 2008, followed by the global financial crisis, the levels of NPLs have significantly increased (Makri, Tsagkanos & Bellas, 2013). An increased level of NPLs may threaten the stability of the banking industry and the financial system as a whole (Bishop, 2018). Although valuable efforts were performed to control and reduce NPLs, the ratio is still in the spotlight for both regulators and banks, as it was linked to bank failures and financial crises, especially in the decade of the '90s (Makri, Tsagkanos & Bellas, 2013).

Considering that low asset quality is one of the main reasons for the 2008 global crisis, these can be defined as toxic assets (Kadioglu, Telceken & Ocal, 2017). Measuring NPLs, analyzing their effects and producing required economic policies have significant importance for the whole economy as well as for the banks (Kadioglu, Telceken & Ocal, 2017). Using the NPLs as the key unity to measure loan losses, Keeton & Morris (1987) examined a sample of 2,470 commercial banks in the United States (US) for the period 1978-1985. They found that local economic conditions in combination with the low performance of various economic sectors are responsible for differences in loan losses recorded by different banks. Therefore, the banking institutions that undertake greater risk show greater losses. Keeton (1999) found that the surge in the credit growth of banks is associated with the low credit standards for loans set by the banks.

1.2 Capital Adequacy

The major concern of bank regulators worldwide remains the safety of depositors and the biggest achievement in the financial sector has been the upward review of the of the capital base of banks (Agbeja, Adelakun & Olufemil, 2015). Capital adequacy determines whether a bank has enough capital to support the risk on its balance sheet i.e. it is used to mitigate bank solvency problem (Agbeja, Adelakun & Olufemil, 2015). Disregarding the profitability measures, most of the

banking studies have noticed that capital adequacy is an important factor in achieving high profitability (Agbeja, Adelakun & Olufemil, 2015).

1.3 Bank Size

The relationship between bank size and bank profitability has been studied in various countries, but the results remain controversial. Studies of Redmond & Bohnsack (2007) have stated that large banks are facing more threats from information asymmetry. Nevertheless, research of Bourke & DeYoung (1997) showed opposite relationship between bank size and bank profitability, explaining that with the larger pool of capital, banks can make better investment and avoid bankruptcy cost.

1.4 Profitability

Banking sector performance is usually reflected in an increase in the profitability ratio of a company which shows that the ability of banks to obtain very high profits according to Kasmir, Manajemen & Perbankan (2017). The level of bank profitability can be measured by return on assets (ROA), which illustrates the power of banks to generate profits by utilizing assets effectively and efficiently (Kingu, Macha & Gwahula, 2018). Kingu et al. (2018) explains that one of the factors that most strongly influences a bank's profitability is the NPL-ratio that measures a bank's credit risk. According to Boudriga, Taktak & Jellouli (2010) having a high level of NPLs may threaten the stability of the banking industry individually as well as of the financial system as a whole. As the NPLs reveals the asset quality, it plays a critical role and acts as an indicator of the financial stability of banks (Ranjan & Dhal, 2003).

1.5 Research Question

Banks play an important role in the development of a healthy economy. Banker et al., (2010) revealed that the volume of NPLs exceeding projected levels might create lower profitability in the banking industry. Experiencing a high level of NPLs may threaten the stability of the banking industry and the financial system as a whole (Bishop, 2018). Importantly, the management of credit risk on banks is mandatory as this risk affects the financial intermediary role of commercial banks, and ultimately, the financial stability of an economy (Bishop, 2018). Kingu et al. (2018) stated that the NPLs ratio is one of the factors, which strongly influences a bank's profitability.

Profit has always been the top priority of commercial banks (Do, Ngo & Phung, 2020), as profit reflects the bank's progress and, at the same time, test the efficiency of such progress (Vinh, 2017; Krakah & Ameyaw, 2010; Karim et al., 2017). Lending has long been the conventional means for banks to make profit, and it has become the core of the banking business, generating the majority of operational revenue (Do, Ngo & Phung, 2020). However, banks can be exposed to many levels of risk as a result of providing excessive loans (Do, Ngo & Phung, 2020). Though there are some creations of adequate provisions to ease these risks, when the NPLs ratio is high, risk becomes weak (Do, Ngo & Phung, 2020).

Purpose of this study

In banking literature, the determinants of profitability are empirically well explored, although the definition of profitability varies among studies (Agbeja, Adelakun & Olufemil, 2015). This research will focus on the relation between NPLs, capital adequacy, bank size and profitability of commercial banks in Suriname. Commercial banks play an important role in the financial system in Suriname and hold 76 percent of the total financial system assets (CBvS, www.cbvs.sr, 2016). Therefore, it is important to measure the performance of the commercial banks in terms of profitability. It is also important to examine which variables effects the performance of commercial banks in Suriname. This study will examine the effect of NPL-ratio, Capital Adequacy Ratio (CAR) and bank size on the profitability of commercial banks in Suriname. Therefore, the following research question is formulated:

Does non-performing loan-ratio, capital adequacy ratio and bank size effect the profitability of the commercial banks in Suriname?

The purpose of this study is to investigate to which extent NPLs-ratio; CAR and bank size affect the profitability of the nine commercial banks in Suriname. To accurately answer the main question, the following sub-questions are developed:

1. What are Non-Performing Loans?
2. What is Capital Adequacy in commercial banks?
3. Which factors affect the profitability of commercial banks?
4. What role do NPLs, CAR and bank size play in commercial banks?
5. Which are the developed hypothesis?

1.6 Motivation

This study investigates the relationship between NPLs, CAR, bank size and the profitability of commercial banks. Since bank's play an important role in the operation of an economy, the stability of banks is of paramount importance to the financial system position (Agbeja, Adelakun & Olufemil, 2015). This research specifically focuses on the nine commercial banks in Suriname. Many prior studies are based on data from Nigeria (Agbeja, Adelakun & Olufemil, 2015), Vietnam (Do, Ngo & Phung, 2020), Europa (Makri, Tsagkanos & Bellas, 2014), Ghana (Nyarko-Baasi, 2018), India (Ranjan & Dhal, 2003) and Bangladesh (Adhikary, 2006). In this study, data from the nine commercial banks of Suriname are used, due to the fact that prior research does not contain results from similar researches done in Suriname.

1.7 Relevance

This study contributes to the acquaintance of NPLs, CAR and bank size of commercial banks in Suriname. Next, this study contributes to insight about the determinants of profitability of commercial banks in Suriname. Since this is the first study that isdone on this topic, the outcome will contribute to mitigate the risk within the financial sector in Suriname, since banks play an important role in the operation of the economy as well as in achieving financial stability. The outcome of this study can help the commercial banks and the Central Bank of Suriname, as supervising authority of the Surinamese financial sector, to understand the relation between NPLs, CAR, bank size and profitability.

1.8 Limitations

As mentioned above, this study tries to find a relation between NPLs, CAR, bank size and profitability of the nine commercial banks in Suriname. However, this study does have some limitations. Despite the fact that the Surinamese financial sector contains of commercial banks, insurance companies, pension funds and credit unions, this study only uses the data of the nine commercial banks in Suriname due to the important role of commercial banks within the financial system. Secondly, the period of examination will be from 2009 to 2018 since this is the only available data.

1.9 Structure

The structure of this thesis is focused on answering the main research question. Chapter 1 contains the introduction, research question, motivation, relevance, limitations and structure of this thesis. The next chapter gives an insight in the background information of NPLs, CAR, bank size and profitability and the related theories. Chapter 3 highlights the commercial banks in Suriname. Chapter 4 focusses on prior academic research done on the topic of the determinants of profitability and chapter 5 discusses the elaboration of hypothesis development. Thereafter, the research model of this study is widely discussed in chapter 6, followed by chapter 7 that includes the empirical results. Chapter 8 is the last chapter of this study and contains the conclusion.

2. Background information

2.1 Introduction

The second chapter of this thesis contains background information of NPLs, CAR, bank size and profitability. The paragraphs contain the history of NPLs, CAR, bank size and profitability and the definitions. These paragraphs are followed by theories and prudential regulations related to NPLs, CAR, bank size and profitability.

2.2 History of Non-Performing Loans

Bank insolvency has been a significant problem in many parts of the world in the last 30 years (Campbell, 2007). There have been waves of bank failures in developed and developing countries and in countries with transitional economies (Campbell, 2007). The deterioration in the quality of the loan portfolio of banks was the main cause of failures in the banking system and in financial crises in developed economies (Jouini, 2013). Between 1997 and 2002, banks had to be ceased in more than 50 countries (Campbell, 2007). One of the most common indicators that is used to identify credit risk is the ratio of NPLs (Makri, Tsagkanos & Bellas, 2013). The theme of NPLs has attracted more attention in recent decades (Jouini, 2013). Several studies examined bank failures and find that asset quality is an indicator of insolvency (Demirguc-Kunt, 1989; Barr and Siems, 1994). The theme of NPLs has attracted more attention in recent decades (Jouini, 2013) Thus, NPLs are likely to hamper economic growth and reduce the economic efficiency (Hou, 2007).

Since 2008, the year of the beginning of the global financial crisis, the levels of NPLs have significantly increased (Makri, Tsagkanos & Bellas, 2013). In fact, according to analysts, the number of NPLs is expected to increase extremely in the forthcoming years, affecting the liquidity and profitability of banks and thereby the financial stability of the banking system (Makri, Tsagkanos & Bellas, 2013). The minimization of NPLs is a necessary condition for improving economic growth (Jouini, 2013). Although valuable efforts were performed to control and reduce NPLs, the index is still in the spotlight for both regulators and banks, as it was linked to bank failures and financial crises (Makri, Tsagkanos & Bellas, 2013). When NPLs retained permanently, these will have an impact on the resources that are enclosed in unprofitable areas (Jouini, 2013).

2.2.1 Prudential Regulation for Non-Performing Loans

Asset quality is the seventh out of the twenty-five core principles of effective banking supervision as directed by the BASEL Committee on banking supervision in 1997 (Lucky & Andrew, 2015). Sustaining sound assets quality involves careful granting of loans that must be examined and compliance to banking rules. Banking regulation continues to attract both theoretical and empirical debates around the world (Ozili, 2015). The debate intensifies as the world witnessed the unintended consequences of Basel II banking regulation which contributed to the 2008 financial crisis (Ozili, 2015). The Basel Committee on Banking Supervision (BCBS) is the primary global standard setter for the prudential regulation of banks and provides a forum for regular cooperation on banking supervisory matters (Basel Committee on Banking Supervision, 2015). After the global crisis, the Basel Committee has issued supervisory guidelines on accounting for Expected Credit Loss (ECL)[1] provisioning with the objective to decrease credit risk (Hulster, 2015).

2.3 History of Capital Adequacy

The knowledge that capital adequacy influences the financial sectors profitability is essential not only for the managers of banks, but also for numerous stakeholders such as central banks or other supervising authorities, bankers associations, governments, and other financial authorities (Olalekan & Adeyinka, 2013). Capital adequacy refers to the amount of equity capital and other securities, which a bank holds as reserves against risky assets, as a hedge against the probability of bank failure (Agbeja, Adelakun & Olufemil, 2015). Capital adequacy is used to determine whether a bank has enough capital to support the risk on its balance sheet i.e. it is used to mitigate bank solvency problems (Agbeja, Adelakun & Olufemil, 2015). However, the assessment of capital adequacy for precautionary purposes is problematic at best due to rapidly changing economics and financial services industry (Agbeja, Adelakun & Olufemil, 2015). The capital adequacy ratio (CAR) measures a bank's solvency and ability to absorb risks (Skinner & Wood, 2018). It is used to protect depositors, and to promote stability and efficiency in the financial system (Skinner & Wood, 2018). Banks with high levels of CARs may pursue opportunities more aggressively, which means increased risk taking, leading to riskier credit portfolios (Demirguc-

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[1] IFRS 9 requires that credit losses on financial assets are measured and recognised using the 'expected credit loss (ECL) approach. Credit losses are the difference between the present value (PV) of all contractual cashflows and the PV of expected future cash flows. Is an estimation of potential losses that a company might experience due to credit risk.

Kunt and Huizinga, 1999). Conversely, via the moral hazard argument banks with low capital may be inclined to engage in risky lending, thus resulting in increased non-performing loans (Skinner & Wood, 2018). Adequate capital in banking is a confidence booster (Olalekan & Adeyinka, 2013). It provides the customer, the public and the regulatory authority with confidence in the continued financial viability of the bank (Olalekan & Adeyinka, 2013). Furthermore, it provides confidence to the depositors that their money is safe; to the public that the bank will be, or is, in a position to give genuine consideration to their credit and other banking needs in good as in bad times, and to the regulatory authority that the bank is, or will remain, in continuous existence (Olalekan & Adeyinka, 2013).

Shrieves & Dahl (1992) investigate the relationship between capital and risk partial adjustments using a sample of U.S. commercial banks over the period 1984–1986. The three main variables employed to explain the relationship between bank capital and risk-taking behavior are:

1. the risk that is apprehended by the bank's assets weighted according to risk levels divided by the total banking assets (RWA),
2. the capital, which is defined as the ratio of equity capital reported to total assets, and
3. the quality of loans, which is approximated by the amount of non-performing loans.

2.3.1 Prudential Regulation for Capital Adequacy

Regulatory judgments are required for deciding whether one capital measurement should be applicable to all types and sizes of banking institutions (Norton, 1989). As the bank regulators became more aware of the general deterioration of capital levels, capital adequacy went beyond the examination level and was transformed into a core regulatory banking objective to insure the prudential supervision of banking institutions and the safety and soundness of the banking system itself (Norton, 1989). A uniform framework for internationally acceptable capital adequacy standards (particularly a risk-based system), in one sense encourages transparency for and among the regulators, because it gives a visible concentration to the banking activities in a risk context (at least for regulatory accounting purposes) (Norton, 1989).

2.4 History of bank size

The too big to fail hypothesis (TBTFH) as postulated by Mishkin (1999) argues that banks that are larger in size, complex and with greater market power are always systematically important to a

country's economy. Hence, such banks are always guaranteed of government support in case of bankruptcy (Odundo & Orwaru, 2018). With this in mind, the managers of these financial intermediaries usually engages in risk taking activities, therefore making them unstable (Odundo & Orwaru, 2018). On the other hand, the charter value hypothesis (CVH) as modelled by Marcus (1984) asserts that banks that are larger in size, complex and with greater market power tend to have higher charter values. This in turn increases their opportunity cost of becoming bankrupt hence, deterring them from taking risky activities (Odundo & Orwaru, 2018). Thus, such commercial banks are always profitable, sound and stable (Odundo & Orwaru, 2018).

2.5 Profitability

Profit has always been the top priority of commercial banks (Do, Ngo & Phung, 2020). Profit can reflect a firm's progress and, at the same time, test the efficiency of such progress (Vinh, 2017; Krakah & Ameyaw, 2010; Karim et al., 2017). Profit is sometimes defined as the difference between total revenues and total costs over a period of time (Do, Ngo & Phung, 2020). There is also an universal agreement as about the definition of profit. According to this agreement, profit can also be defined as a residue or a surplus of prices over the costs of production (Do, Ngo & Phung, 2020). Overall, the definition of the term profit is still open to controversy over the meaning of terms that are included in the definition, namely; price, costs, expenses and so on (Do, Ngo & Phung, 2020).

Lending has long been the conventional means for banks to make profit, and it has become the core of the banking business, generating the majority of operational revenue (Do, Ngo & Phung, 2020). However, banks can be exposed to many levels of risk as a result of excessive loans (Do, Ngo & Phung, 2020). Though there are some creations of adequate provisions to ease these risks, when the NPLs ratio is high, risk becomes weak (Do, Ngo & Phung, 2020). Banker et al., (2010) revealed that the volume of NPLs exceeding projected levels might create lower profitability in the banking industry. Experiencing a high level of NPLs may threaten the stability of the banking industry and the financial system as a whole (Bishop, 2018). Importantly, the management of credit risk on banks is a mandatory as it affects the financial intermediary role of commercial banks, which is a core source of income to banks and ultimately, the financial stability of an economy (Bishop, 2018). Kingu et al. (2018) stated that the NPLs ratio is one of the factors, which strongly influences a bank's profitability.

Many indicators can be used to measure the profitability of a bank. According to Goudreau and Whitehead (1989) and Uchendu (1995), return on assets (ROA), return on equity (ROE) and net interest margin (NIM) are the three best indicators for measuring profitability. The return on assets is considered as an important indicator of profitability of an entity relative to its total assets (Do, Ngo & Phung, 2020). The ROA gives analysts the idea of how efficient the management is spending its assets to make earninsgs (Do, Ngo & Phung, 2020). According to Do, Ngo & Phung (2020), ROA tends to tell us how effectively an organization is taking earnings advantage of its base of assets. This used to be the most popular way of comparing banks to each other — and for banks to monitor their own performance from period to period.

2.6 Foreign Exchange rate

A foreign exchange rate (FX-rate) is the relative price of two currencies. (Lothian, 2001). The nominal FX-rate is simply the actual rate in the foreign exchange market (Lothian, 2001). The real FX-rate, in contrast, is the rate at which a market basket of goods in one country can be exchanged for a market basket of goods in the country of comparison (Lothian, 2001). According to Gilchris (2013), FX-rate changes impacts the performance of banks whose role in an economy is to allocate economic resources from depositors to investors. FX-rates affect interest rates and have an indirect impact on profitability through cost of loanable funds (Keynes, 2006).

Changes in FX- rates can generate significant gains or losses, which could end up in the income statement resulting into a distorted impression of what is happening to the concerned financial institution (Watkins, 2014). There are three ways in which exchange rate fluctuations affect the domestic prices: first and foremost is by import prices, which directly impacts the local prices, secondly, is by the intermediate imports prices which impacts the local production costs.

2.7 Theories related to NPLs

2.7.1 Introduction

Two theories are relevant in risk and NPLs management and are therefore discussed in this chapter. These theories are the new institutional economics theory and the stakeholder theory. First, the theoretical base of each theory will be discussed, followed by secondly the link that can be formed between NPLs and each theory.

2.7.2 New Institutional Economics Theory

Given that credit risk is the major risk that banks face, several studies have investigated the causes of credit risk in the banking sector (Mpofu & Nikolaidou, 2018). In the relevant literature, credit risk is usually proxied by NPLs, which are loans and advances overdue by 90 days or more from the due date (Mpofu & Nikolaidou, 2018). As Reinhart and Rogoff (2011) claim, NPLs are considered as a major source of bank failures and can mark the beginning of a banking crisis. High NPLs leads to increased credit risk (Scott & Timothy, 2006). The goal of credit risk management is the process by which managers identify, assess, monitor and control risks associated with a financial institutions activities (Scott & Timothy, 2006). The complexity and range of financial products have made risk management more difficult to accomplish and evaluate (Scott & Timothy, 2006). A different perspective on risk management is offered by new institutional economics[2]. According to Klein (1998) the new institutional economics combines economic-, law-, and organization theories, political science, sociology and anthropology to understand the institutions of social, political and commercial life.

According to Williamson (1998) the focus of the new institutional theory is shifted to governance processes and socio-economic institutions that guide these processes. This theory offers an alternative explanation of corporate behavior (Williamson, 1998). Namely, it predicts that risk management practices may be determined by institutions or accepted practice within a market or industry (Williamson, 1998). Moreover, the theory links security with specific assets purchase, which implies that risk management can be important in contracts to which bind two sides without allowing diversification, such as large financing contract or close cooperation within a supply chain (Williamson, 1987).

2.7.3 Stakeholders Theory

The other theory that offer explanation to this study, is the stakeholder theory. Stakeholder theory, developed originally by Freeman (1984) as a managerial instrument, has since evolved into a theory of the firm with high explanatory potential. Stakeholder theory focuses explicitly on equilibrium of stakeholder interests as the main determinant of corporate policy (Akehege, 2009).

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[2] In 1997, the International Society for New Institutional Economics was founded. Ronald Coase, Douglass North and Oliver Williamson were the driving force behind this development. New institutional economics (NIE) is an economic perspective that attempts to extend economics by focusing on the institutions (that is to say the social and legal norms and rules) that underlie economic activity and with analysis beyond earlier institutional economics and neoclassical economics

In the relationship between moral hazards and NPLs, two types of moral hazards can be identified: management investment in 'pet project' resulting in poor monitoring of loans and the conflict of interest between shareholders and creditors (D. Zhang et al., 2016). Such conflicts may be possible where the board is only seeking the interest of shareholders, but not under stakeholder theories (D. Zhang et al., 2016). Stakeholder theories minimize risk-shifting incentives of managers and shareholders (D. Zhang et al., 2016). Board of directors have a duty to safeguard the assets of shareholders and minimize the utility maximizing tendencies of the agent through effective monitoring (Fama & Jensen, 1983; Shleifer & Vishny, 1997). Board functions should not over-emphasize the interest of ordinary shareholders to the neglect of other stakeholders whose interest (direct or indirect) equally need to be protected (Aguilera, 2005; Williams & Conley, 2005). In their study of financial institutions worldwide during the period of the 2007-2008 financial crisis, Erkens, Hung and Matos (2012) were dissatisfied with the one-sided protection of debt-holder rights to the neglect of long-term shareholder rights. Shareholders may be interested in risky loans and shift the risk to depositors (Erkens, Hung & Matos, 2012).

2.8 NPL and accounting

The 2008/2009 global financial crisis has renewed researchers' interest on the causes of banking crises given the devastating effects they have on the entire economy (Mpofu & Nikolaidou, 2018). Given that credit risk is the major risk that banks face, several studies have investigated the causes of credit risk in the banking sector (Mpofu & Nikolaidou, 2018). During the financial crisis, the delayed recognition of credit losses on loans (and other financial instruments) were identified as a weakness in existing accounting standards (Bholat et al., 2017). In IFRS 9, a harmonized approach to NPLs recognition is mentioned, for which a new accounting standard on loan loss provisioning is required starting from January 2018 (Bholat et al., 2017). IFRS 9 changes the relationship between NPLs and provisioning (Bholat et al., 2017). According to Bholat et al. (2017) improved provisioning leads to lower asset quality risk and lower asset quality risk leads to better performance. Within accounting, profit is considered the most crucial test of a bank's performance (Berger & Humphrey, 1992).

3. Suriname Specialization

3.1 Banking Size

The banking sector in Suriname consists of eight local banks and one foreign bank. The Surinamese banking system is regulated and monitored by the Central Bank of Suriname based on the Banking Supervision Act 2011 as approved by the Parliament of Suriname. The Act has regulations, which guide the activities of all banks and other financial institutions in the country. Commercial banks play an important role in the financial system in Suriname and hold 76 percent of the total financial system assets (CBvS, www.cbvs.sr, 2016). The banking system assets increased to 58 percent of Gross Domestic Product (GDP) in 2014 (2013: 56%) (CBvS, www.cbvs.sr, 2016). The Surinamese banking system is highly concentrated, as the three largest banks account for more than 80 percent of total commercial banks assets. The Central Bank of Suriname (CBvS) monitors the vulnerabilities of a concentrated banking sector through a number of indicators, such as the size of the banking sector as a proportion of the GDP and sectoral concentration as well as interbank exposures. The total assets of commercial banks are SRD 22.0 billion as of December 2018, a balance growth of SRD 2.0 billion compared to 2017.

3.2 Performance of commercial banks

A range of financial soundness indicators (FSIs) is calculated to measure the soundness of the banking sector. CBvS has issued guidelines for the financial institutions for how the monthly financial reporting must be executed. The employees of CBVS-Supervision Department calculated the FSIs and test these against international standards. FSIs for 2018 made clear that the banking sector had strengthened their capital position in 2018 compared to 2016 and 2017 in order to be able to achieve economic recovery through responsible credit growth support. While banks' financial positions have been shored up, there has been a significant rise in NPLs and the economic recovery remains with high uncertainty.

3.2.1 Capital Adequacy

For the purpose of prudential requirements, banks must comply with certain statutory solvency requirements which is 10 percent (capital levels). Since September 2014, banks began to report based on the new capital adequacy regulation, which in turn had an impact on the ratios of the banks. With the revised directive, the CBvS aims to govern the banks to strengthen their capital, also known as Tier 1 capital, which primarily consists of equity capital and general reserves.

Overall, the combined CAR of banks was above the respective regulatory minimum during 2009 – 2015, except 2016 when there was a recession (CAR 2016: 5.5%). After a downfall of the CAR in 2016, the CAR increased in 2018 to 9.5 percent, which is 0.5 percent beneath the required minimum of 10 percent as stipulated in the Capital Adequacy Regulation. It can therefore be determined that the higher the ratio, the more the likelihood that banks are withstanding negative shocks to its balance sheet.

3.2.2 Asset Quality

According to guideline two of CBvS - Credit Classification and Provisions Directive- an internal norm of 5 percent is maintained for the NPL-ratio. The credit quality of commercial banks has been steadily improving during 2009-2014 with the ratio of non-performing loans to total loans falling from 7.8 percent in 2008 to 6.2 percent in 2014. Since 2015, asset quality of banks slightly deteriorated relative to the years before because of weaker business volumes. The percentage of NPLs has increased, and the number of loans with increased credit risk has risen. The NPLs-ratio has increased from 6.2 percent in December 2014 to 12.0 percent in December 2018, which in percentage is double, the internal norm of 5 percent of the Centrale Bank van Suriname. Although most banks meet the minimum requirement for provisions, some still need to make additional provisions to their loan losses. The amended Classification of Loans and Provisioning became effective in July 2014. As aforementioned, banks must ensure that these provisions deficits are eliminated by improving the quality of their loan portfolio (e.g. additional provisions category doubtful) as well need to take necessary measures.

3.2.3 Earnings and Profitability

The internal norm for ROA, according to CBvS guidelines is 1 percent. The ROA has declined since 2009, although the gross income has been increasing. The decline in these returns is the result of the relatively stronger increase of the average assets in comparison with the increase of gross income. As a whole, the banking sector remained profitable during 2009 – 2018, except for 2016 due to the recession. The profitability, as measured by return on assets stood at 0.1 percent in 2018.

3.3 Foreign Exchange Rate

The exchange rate for USD was SRD 2.710 in 2009 and then adjusted to SRD 7.396 in 2017. The official exchange rate for the U.S. dollar and euro against the Surinamese dollar was adjusted as a

result of a floating exchange rate that was introduced by CBvS in 2016. The USD and EUR exchange rates were adjusted to respectively SRD 7.396 and SRD 8.461 in 2018.

4. Prior Research

4.1 Introduction

The fourth chapter of this thesis discusses prior academic research done on the topic of the effect of NPLs-ratio, CAR and bank size on the profitability of commercial banks. The focus will be on the main research question, the main hypothesis and the results of each research discussed.

4.2 Prior research regarding the effect of NPLs-ratio, CAR and bank size on the profitability of banks

Abedin (2020)

The paper of Abedin (2020) aims to investigate the status of NPLs in the banking industry of Bangladesh, since NPLs are the burning problem for the banks in Bangladesh during the last two decades. Lata (2015) has examined a time series data and revealed that NPL is one of the key influences that stimulate banks financial performance and it has a noteworthy inverse consequence on Net Interest Income (NII) of SOCBs in Bangladesh. The study of Abedin uses the sample of 59 bank's data from the year 2008 to 2019. Abedin used a panel data regression model for this research.

Agbeja, Adelakun & Olufemil (2015).

The broad objectives of the study is to determine the effect of CAR on bank profitability and the effect of NPLs on profitability. The hypothesis for this study are: (1) "there is no significant relationship between capital adequacy and bank profitability'; (2) "there is no significant relationship between loans and advances and bank profitability"; (3) "there is no significant relationship between capital adequacy ratio and bank's exposure to credit risk". Secondary data from Central Bank of Nigeria Statistical Bulletin and Annual Financial Reports of the selected five banks during the period 2010-2014 was used for this study. Agbeja, Adelakun & Olufemil used a multiple regression for this study. The results of this study indicates that there is a significant relationship between CAR and bank's profitability. The higher the CAR the more the profitability of banks. Further, this study indicates there is a significant relationship between NPLs and bank performance.

Baasi (2018)

Baasi (2018) examines the effect of NPLs on profitability of four of the major banks listed on the Ghana Stock Exchange (GSE) as this could contribute to a healthy financial system. Previous studies in Ghana are few and studies in general were inconclusive. Motivated to fill this gap a descriptive statistics and panel data regression analysis was employed to establish the relationship between NPLs and profitability in order to account for heterogeneity among selected banks. The study used secondary data collected from five commercial banks listed on the Ghana Stock Exchange for a period of 10 years (2006 - 2015).The study finds that CAR has a positive significant effect and profitability and NPLs has a negative significant effect on profitability

Dao & Nguyen (2020)

This paper investigates the factors affecting the profitability of commercial banks in Asian developing countries. The authors used panel data regression of four entities: ten banks in Vietnam, eight banks in Malaysia, nine banks in Thailand and all 27 commercial banks from the period 2012 to 2016. The most controversial result from this paper comes up with the negative relationship between CAR and profitability indicators as well as the positive association between NPL and banking profitability.

Do, Ngo & Phung (2020)

The paper of Do, Ngo & Phung (2020) investigates the impact of non-performing loans on the ability to make profit of Vietnamese commercial banks in the period of 2008 to 2017. Based on the results of prior studies, the authors used the fixed and random effects model, as well as the feasible general least square method to construct the test with panel data. With the panel data of 15 Vietnamese commercial banks from the period of 2008 to 2017, this research is conducted with 150 observations, which suitability meets the requirements. The hypothesis for this study was: "the NPLs ratio has a statistically significant and negative relationship with bank profitability". The results are in line with the hypothesis, concluding that when NPLs increases, the bank's ROA will decrease, meaning that the bank profitability will be lowered. The hypothesis proposed by Berger and DeYoung (1997) also supports the above findings stating that the better the bank at managing their credit risk, the more profitable the bank is.

Haron (2004)

During the last decades, investigating the determinants of profitability has been one of the more popular topics among researchers in banking studies. The study of Haron (2004) is a modest attempt to establish the first empirical evidence on the determinants that contribute towards the profitability of Islamic banks. The data used are panel data of 14 banks and it is assumed that all behavioral differences between individual banks are captured by the intercept. The formulated hypotheses for this study is: "average level of profit is not the same for each bank". As other studies, similar results were found for this study concluding that interest rates, inflation and bank size have significant positive impact on the profitability of banks

Hossin & Fazlu (2020)

The study of Hossin & Fazlu (2020) aimed at investigating the effects of exchange rate fluctuations on financial performance of commercial banks in Bangladesh. The study reviewed theoretical and empirical studies on exchange rate and financial performance. A multiple linear regression model has been employed, where ROA was the dependent variable and exchange fluctuations variables as the independent variables. Target population for the study comprised of all financial institutions operating in Bangladesh as on December, 2019. Secondary data was collected from the banks' consolidated financial statements as well as World Bank database website. The study found that exchange rate fluctuations and financial performance had a weak negative association.

Irawati et al. (2018)

The study of Irawati et al. (2018) sought to find out the effect CAR, NPL and bank size on the performance of banks listed on the Stock Exchange Indonesia. The sample of this study consist of 30 banks that quoted on the Indonesian Stock Exchange for period of 2010–2015, by applying panel data regression analysis. The study aimed to test the following hypothesis: (1) "there is a significant effect of CAR on ROA"; (2) "there is a significant effect of NPL on ROA"; (3) "there is a significant effect of Institutional Ownership on ROA". The results of the study showed that CAR has a significant effect on ROA. The study also showed that high NPLs-ratio would reduce the financial performance of the banks since NPL has a statistically negative significant on ROA.

Kadioglu, Telceken & Ocal (2017)

This study investigates whether NPLs effect the profitability of banks in Turkey. The study applies a panel regression method to the quarterly data set including 1809 observation from 55 banks in Turkey during the period from 1st quarter of 2005 to 3rd quarter of 2016. Three hypotheses were formulated in for this study: H1: (1) "non-performing loans effect bank profitability negatively"; (2) "provisions for non-performing loans effects bank profitability negatively"; (3) "non-performing loans effect bank profitability negatively". Despite counter findings by other studies, Kadioglu, Telceken & Ocal (2017) found that there is a significant negative relationship between NPLs and bank profitability, which is measured by the ROA. Higher NPLs, thus lower asset quality, leads to lower ROA and lower NPLs, thus higher asset quality, leads to higher ROA according to Kadioglu, Telceken & Ocal (2017).

Kasimodou et al. (2006)

Kasimodou et al. (2006) tested the banks effectiveness of UK using the bank size as a key factor. The results of their study revealed that, small banks showed higher performance in comparison to large ones.

Kasmir, Manajemen & Perbankan (2017)

The main aim of the paper of Kasmir, Manajemen & Perbankan (2017) was to analyze the recent trend of NPLs in banking sector of Bangladesh. Their study showed the same results as Akter & Roy (2017), which revealed that NPLs are one of the major factors of influencing banks profitability and it has a statistically significant negative impact on net profit margin of banks. Furthermore, Kasmir, Manajemen & Perbankan (2017) revealed that the profitability of the bank gets upward trends if there is downward movement of the NPLs in the bank and vice versa.

Lester (2016)

Because no "determinant on profitability of banks of Trinidad & Tobago" study has been done yet in this country, Lester decided to do a study on this topic. Annual reports of five banking groups (Consolidated data) from 1994-2015 are used in this study. Macroeconomic variables were obtained from the World Bank World Development Indicators. A multiple regression model was

used for this study. The results indicated that bank capital and the growth rate of GDP positively affects profits. According to Lester, bank size does not affect profitability.

Mohammad (2015)

The study of Mohammad (2015) aimed on investigating the effect of bank size on profitability for Jordanian listed commercial banks. The effect of assets size on profitability continued to be a controversial issue during the last years. In some studies, no conclusive evidence had been found to prove the relationship between bank size and profitability. Girardone (2004) for instance, did not reached to any conclusive relationship when investigating the Italian banks assets size and profitability of the banks. Similarly, in a study conducted by Isik and Hassan (2002), asset size was found not highly related to profitability. Primary data of the model were gathered from annual reports of 15 commercial banks, listed on the Amman Stock Exchange for the period of 2007-2012. Secondary data were collected from journals. A panel data regression was used for this study. The hypothesis for this study were: (1) "Return on Assets has significant relationship with bank capital ratios (Capital adequacy, Liquidity and Efficiency/Quality of Management); (2) "expenses have significant impact on return on capital". Mohammad (2015) found that size effect exists. This author revealed that small and medium sized banks exhibits higher overall performance compared to large banks. These results support the initial hypothesis of this paper that the smaller the bank assets, the higher its profitability.

Olalekan & Adeyinka (2013)

The study of Olalekan & Adeyinka (2013) sets out to examine the effect of CAR on profitability of deposit-taking banks in Nigeria. The paper used primary data collected by questionnaires involving a sample of 518, distributed to staff of banks with a response rate of 76 percent. Besides, published financial statement of banks from 2006 - 2010 were used. The hypothesis formulated is this thesis were: (1) "there is no significant relationship between banks capital adequacy and their profitability in domestic banks in Nigeria"; (2) "there is no significant relationship between banks capital adequacy and their profitability in foreign banks in Nigeria". The results of this study rejects the first hypothesis: *'there is no significant relationship between banks capital adequacy and their profitability in domestic banks in Nigeria.'* The results indicated a positive impact of capital adequacy on profitability of banks in Nigeria.

Ochei (2013)

This paper has attempted to find the relationship between bank capital adequacy and performance in the Nigerian banking industry specifically commercial banks during the period 1986-2006. The objective of this study is to determine to what extent the CAR affects the performance of Nigeria's commercial banks. The sample (of 14 commercial banks) was drawn from both the old and new generation banks using the Stratified Sampling Technique based on simple random sampling supported by Judgment Sampling. The hypothesis for this study were: (1) "Return on Assets has significant relationship with bank capital ratios (Capital adequacy, Liquidity and Efficiency/Quality of Management)"; (2) "operation expenses have significant impact on return on capital". The results show that CAR has a negative impact on ROA. This implies that the regulatory authorities in Nigeria should put in place measures to raise the level of the CAR to avoid future bank collapse.

Owoeye & Ogunmakin (2013)

This study investigated the impact of unstable exchange rate on the performance of commercial banks in Nigeria. Exchange rate plays an increasingly significant role in any economy as it directly affects domestic price level and allocation of resources and investment decision (Owoeye & Ogunmakin, 2013). Annual time series are used for this study. Data for exchange rate, real gross domestic product are sourced from the International Monetary Fund (IMF), while data for interest rate and government expenditure are sourced from Central Bank of Nigeria's Statistical Bulletin. The regression results for the two models revealed that there exist a positive relationship between exchange rate and loan loss, which may explain the decreasing performance of banks as a result of fluctuating exchange rate.

Wood & Skinner (2018)

This paper examines the bank-specific and macroeconomic determinants of non-performing loans of commercial banks in Barbados over the period 1991-2015. Multiple regression model was utilized, which included a number of macroeconomic and bank-specific variables. The empirical results indicate that the bank-specific factors: return on equity, return on assets, capital adequacy ratio and loan to deposit ratio are significant determinants of non-performing loans, while the

macroeconomic variables exerting significant influence are GDP growth, unemployment and interest rate.

Yuksel & Zengin (2017)

The aim of this paper is to define the influencing factors of profitability in the Turkish banking sector. The data was obtained from the Turkish Banking Association, OECD, Central Bank of Turkey and Turkish Statistical Institute during 2003-2015. Moreover, all banks of Turkey were included in the study. The major finding in this study is that profitability is negatively related with NPLs because the banks have lower interest income in case of high NPL, net interest income will go down. Exchange rate is also another variable that affects profitability for Turkish banks negatively. This paper demonstrates that increase in the volatility of the exchange rate leads to unfavorable results in banking sector.

5. Hypothesis development

5.1 Introduction

This chapter focusses on the hypotheses that are developed to answer the main research question of this thesis. The hypothesis, generated in the following paragraphs of this chapter, are based on the analysis of prior research, the concepts of prior theories and background information discussed in the previous chapters. The second paragraph discusses the development of the first hypothesis based on NPLs. The third and fourth paragraph discuss the development of the second and third hypotheses regarding CAR and bank size.

5.2 NPL

NPLs are a measure to assess the credit quality commercial banks (Bankir, 2016). According to Kasmir, Manajemen & Perbankan (2017), the higher quality of loans given by banks can reduce the risk of the possibility of bad credit. According to Do et al. (2020), a high NPLs-ratio seriously threatens not only the financial soundness of commercial banks, but also the entire national monetary security system. When NPLs-ratio exceed the permitted limit (normally 5%), commercial banks will lose a large amount of capital. This affects cash flows and banks becomes illiquid, leading to possible bankruptcy, which will threaten the sustainable development of banks as well as its profitability (Do, Ngo & Phung, 2020). NPLs are calculated by using the ratio of non-performing loans to total loans (Yuksel & Zengin, 2017). In Suriname, the NPLs ratio for the aggregated banking system was 13.5 percent in 2020 (CBvS, 2020); almost three times the permitted maximum norm of 5 percent.

Kadioglu, Telceken & Ocal (2017) found that there is a significant, negative relationship between NPLs and bank profitability, which is measured by return on equity (ROE) and return on asset (ROA). According to Do, Ngo & Phung (2020), the bank's ROA will decrease when the rate of NPLs increases, meaning that the bank profitability will be lowered. The study of Kumar, Hossain & Islam (2020) finds that the profitability of a bank increase if there is downward movement of the non-performing loans in the bank and vice versa. Abedin (2020) found default Loans has a negative influence on the profitability of Banking Business. Irawati et al. (2018) found that NPL has a negative significant effect on profitability of banks. The study of Baasi (2018) found that NPLs have a negative significant impact respectively on profitability of commercial banks.

The study of Wood & Skinner (2018), about the determinants of NPLs in banking sector of Barbados, indicates that return on assets, capital adequacy ratio and loan to deposit ratio are significant determinants of non-performing loans. The study of Letter (2016) showed that Because no "determinant on profitability of banks of TT" study has been done yet in Trinidad & Tobago, Lester decided to do a study on this topic. Annual reports of five banking groups (Consolidated data) from 1994-2015 are used in this study. Macroeconomic variables were obtained from the World Bank World Development Indicators. A multiple regression model was used for this study. The resuls indicated that bank capital and the growth rate of GDP positively affects profits. According to Lester, bank size does not effect profitability.

Several other studies Abata, 2014; Pasiouras and Kosmidou, 2007; Adebisi and Matthew, 2015; Bace, 2016; Bhattarai, 2016; Kiran and Jones, 2016; Taşkın, 2011; Miller and Noulas, 1996; Duraj and Moci,2015; Etale et al., 2016; Hashem, 2016; Ongore and Kusa, 2013; Ozurumba, 2016), expelled that there exists a negative relationship between NPL and profitability, as non-performing loans leads to decreased the asset quality as well as the bank profitability. Based on this information the first hypothesis is formulated:

H₁: Non-performing loan ratio has a negative effect on the profitability of commercial banks in Suriname

5.3 Capital Adequacy Ratio R

Capital adequacy is used to determine the solvency of a bank to determine whether a bank has enough capital to support the risk in its statement of financial position (Agbeja, Adelakun & Olufemil, 2015). It is expected that the higher the ratio, the lower the need for external funding and, therefore, the higher bank profit (Ozili, 2015). CAR is calculated by using the capital of commercial banks to the number of risk-weighted assets (RWA). In Suriname, the CAR for the aggregated banking system was 11.7 percent in 2020 ((CBvS, 2020), above the minimum norm of 10 percent.

The study of Letter (2016) showed that bank capital positively affects profitability of commercial banks in Trinidad. The study of Wood & Skinner (2018), about the determinants of NPLs in banking sector of Barbados, indicates that capital adequacy ratio is an significant determinant of non-performing loans.

Agbeja, Adelakun & OlufemiI (2015) found that there is a significant relationship between the capital adequacy ratio and the bank's profitability. According to these authors, the higher the capital the more profitable banks are. Since CAR has positive effect on banks' profitability, it can be instrumental in promoting bank soundness according to these authors. The study of Olalekan & Adeyinka (2013) has examined how capital adequacy affects the profitability of deposit–taking banks in the Nigeria. Their study revealed that capital adequacy relates positively to profitability of banks. Their study also revealed that capital adequacy is an important factor when it comes to the determination of profitability of deposit taking banks. According to Ochei (2013) overall CAR has negative impact on the profitability of banks. The study of Irawati et al. (2018) found that CAR has a positive significant effect on profitability of banks. Based on this information the second hypothesis is formulated:

H2: Capital Adequacy Ratio has a positive effect on the profitability of commercial banks in Suriname

5.4 Bank size

The relationship between bank size and bank profitability has been studied in various countries, but the result remains controversial. Bank size will be measured by dividing the assets of an individual bank by the total assets of the banking system. Studies of Redmond & Bohnsack (2007) have stated that large banks are facing more threats from information asymmetry. Nevertheless, research of Bourke & DeYoung (1997) showed opposite relationship between bank size and bank profitability, explaining that with the larger pool of capital, banks can make better investment and avoid bankruptcy cost.

The results of the study of Kasimodou et al. (2006) concluded that, small banks showed higher performance in comparison to large ones. Furthermore, their study proved that the size of bank has an effect on profitability besides other factors such as liquidity. Murthy (2008) found a positive relationship between bank size and performance of banks. Contradictory results were shown in the case of Kuwait by Darrat and Yousif (2002). They found a negative relationship between bank size and bank performance.

Haron (2004) proved that, size has no significant effect on profitability of banks. According to Mohammad (2015), small and medium sized banks exhibits higher overall performance compared

to large banks. The study of Letter (2016) showed that bank size does not effect the profitability of the commercial banks in Trinidad & Tobago. Based on this information the third hypothesis is developed:

H₃: Bank size has a negative effect on the profitability of commercial banks in Suriname

5.5 Foreign Exchange Rate

Exchange rate is important as fluctuations in exchange rates has impact on a country's prices through import prices of consumption and intermediate goods (Wekesa, 2012). The main function of commercial banks is to mediate between supply and demand side of the foreign currency according to Mwirigi (2014). Any restrictions on how commercial banks go about their business would affect their financial performance (Mwirigi, 2014). Wekesa (2012) establishes that exchange rates fluctuations typically generate significant gains or losses for banks. The study of Wong et al. (2008) revealed that foreign exchange rate and bank performance positively correlates. Owoeye & & Ogunmakin (2013) investigated effects of exchange rate on performance of commercial banks in Nigeria. They found an insignificant relationship between exchange rate and bank performance. The study of Hossin & Fazlu (2020) investigates the impact of exchange rate fluctuations on financial performance of commercial banks in Bangladesh. They found a weak negative association between exchange rate fluctuations and financial performance. Based on this information the fourth hypothesis is formulated:

H₄: Foreign Exchange rate has a negative effect on the profitability of commercial banks in Suriname

6. Research design

6.1 Introduction

In this chapter, the research design of this study is discussed. The second paragraph starts with the research model, while the third and fourth paragraph focusses on the sample and the data used for this study. In the fifth paragraph, every variable is discussed.

6.2 Research model

Regression analysis is one of the most frequently used tools in research (Mooi, 2014). In its simplest form, regression analysis allows researchers to analyze relationships between the independent and the dependent variable. According to Mooi (2014), using regression analysis can have many benefits:

1. Indicate if independent variables have a significant relationship with a dependent variable;
2. Indicate the relative strength of different independent variables' effects on a dependent variable;
3. Make predictions.

There are two type of regression models: simple linear regression and multiple regression. Linear regression is a simple regression and shows the relationship between a dependent variable, Y, and an independent variable, X (Mooi, 2014). Regression models with one dependent variable and more than one independent variables are called multilinear regression (Guler & Uyanik, 2013).

For this study, a multiple panel data regression will be carried out to find out the significant effect of NPL-ratio, CAR and bank size (independent variables) on the profitability of commercial banks in Suriname (dependent variable). This research will be conducted using descriptive statistics, in which the data is collected from the nine commercial banks of Suriname and further elaborated in E-views by means of the T-statistic.

Now that the theoretical concepts, used in this research, are operationalized and the X and Y variables are identified, these can be fitted into the multiple regression model to test the underlying hypothesis. The regression model used in this study is:

$$ROA = \alpha + \beta_1 NPLs + \beta_2 CAR + \beta_3 Banksize + \beta_4 U.S\ dollar\ FX - rate + \epsilon$$

Where:

ROA = Return on Assets

NPL = Provisions for non-performing loans

CAR = Capital Adequacy Ratio

Bank size = Assets of the commercial banks

U.S. dollar FX-rate = A control variable that defines the exchange rate between the local currency SRD (Surinamese dollar) and the foreign currency USD (United States dollar).

Ɛ = Error term

6.3 Sample

The Surinamese financial sector contains of commercial banks, insurance companies, pension funds and credit unions. Due to the important role of commercial banks within the financial system, this research will only take data of commercial banks into consideration. The data of this study contains of the nine commercial banks and the period of examination will be from 2009 to 2018. The sample exists of 90 observations (n = 90). The data regarding the nine commercial banks will be obtained from the websites and annual reports of the commercial banks and the central bank of Suriname (CBvS). The data of one foreign bank has not been used because this bank only publishes consolidated data. The results including this bank gave a distorted picture of the reality that is why this bank has been removed from the sample to achieve better results. This sample is chosen, because credit risk is increasing in the world and so in Suriname. This research will make a substantial contribution to the Surinamese banking sector, as it never has been carried out in Suriname, in contrast to many other countries.

6.4 Data

To conduct this study, data regarding NPL-ratio, CAR, bank size, ROA and the US-dollar FX- rate is needed. The data will be obtained from the websites and the annual reports of the commercial banks and CBvS.

Dependent variable: Return on Assets (ROA)

In this study, profitability is measured by ROA. Data regarding the ROA will be obtained from the annual reports of the commercial banks and the website of the CBvS.

Independent variables (CAR, NPL-ratio, bank size)

In this study, CAR, NPL-ratio and bank size are the independent variables. The data regarding these variables will also be obtained from the annual reports of the commercial banks and the website of the CBvS.

Control variable (FX rate)

According to Wekesa (2012), exchange rates fluctuations typically generate significant gains or losses for banks. FX rate is defined as the exchange rate between the local currency SRD (Surinamese dollar) and the foreign currency USD (United States dollar).

6.5 Variables

To accurately apply the multiple regression model, the independent and dependent variables need to be identified. The independent variables in this study are NPLs, CAR and bank size. The dependent variable in this study is the profitability of commercial banks. To strengthen the research model one control variable is used, namely: US dollar FX-rate.

6.5.1 Independent variables

As mentioned earlier, there are three independent variables taken into consideration in this study

NPL

NPLs is also known as non-performing assets. This kind of loans refers to those that were unable to be repaid and financial institutions has to make provisions for such kind of loans. Usually, when a payment is late for 90 days, it will be classified as NPLs (CBvS, Guidelines: CREDIT CLASSIFICATION AND PROVISIONS). There are numerous ways to measure the NPLs, but according to the guideline 2 the supervision department of CBvS, the most common way is:

$$\text{NPL-ratio} = \frac{NPLs}{Gross\ Loans}$$

For many banks in Suriname, the NPL-ratio is not published in their annual reports or on the website due to confidentiality. To measure the effect of NPLs on the profitability of banks, provisions will be used instead of the NPL-ratio. When NPLs of banks increase, the provisions for these NPLs increase automatically. The expansion of provisions has an effect on the profitability of banks. Provisions is also a good instrument for measuring NPLs. The CBvS has guidelines for

the banks for making provisions (CBvS, Guidelines: CREDIT CLASSIFICATION AND PROVISIONS). There is no formula for provisions, the data of the provisions has been extracted from the profit and loss statement of the commercial banks.

CAR

CAR is a percentage ratio of a financial institutions primary capital to its risk weighted assets (loans and investments), used as a measure of its financial strength and stability. According to guidelines of CBvS (CBvS, Guideline 1: Solvency), the average CAR of the banks must be above the stipulated minimum of 10.0 percent. According to the guideline 1 of the supervision department of CBvS, the formula to calculate CAR:

$$\text{CAR} = \frac{Regulatory\ Capital}{Risk\ Weigted\ Assets}$$

For this study, the CAR is obtained as it is reported in the annual reports of the commercial banks.

Bank size

According to prior research, bank size is measured by the ratio of a bank's assets to total banking sector assets. The formula for this ratio is:

$$\text{Bank size} = \frac{Total\ Assets\ Bank_x}{Aggregated\ Total\ Assets\ all\ banks}$$

The variable bank size is equal to the logarithm of the total assets. The data regarding bank size is extracted from the balance sheet of the commercial banks. For the total assets of the banking system, the assets of the individual banks is added up.

6.5.2 Dependent variable

The return on assets (ROA) is considered as an important indicator of profitability of an entity relative to its total assets. The ROA gives analysts the idea of how efficient the management is at spending its assets to harvest earnings. The ratio is displayed as a percentage and calculated by dividing the annual earnings or, in other word, net income by the total assets. According to CBvS guidelines, the formula for ROA is as below:

$$RoA = \frac{Net\ Income}{Average\ Assets}$$

As it is with the independent variables, the data for the dependent variables are also extracted from the annual reports of the commercial banks. The norm for this ratio is ≥ 1 percent in accordance with the Basel guidelines.

6.5.3 Control variable

Exchange rate is important because fluctuations in exchange rate has impact on country's prices through import prices of consumption and intermediate goods (Wekesa, 2012).Data regarding the exchange rate is obtained from the website of CBvS.

7. Results & Analysis

7.1 Introduction

In this chapter, the results and analysis of the research are discussed. The second paragraph explains the descriptive statistics, followed by the third paragraph that concerns correlation coefficients. The fourth paragraph explains the econometric model while the last paragraph explains the results of the hypothesis testing and shows if the hypotheses are valid or not.

7.2 Descriptive statistics

As mentioned in the introduction, this paragraph describes the descriptive statistics concerning the research model and data. Below is a short description of the statistical measurements that are used in this section:

1. Mean: arithmetic mean
2. Median: arithmetic median
3. Max: Maximum
4. Min: Minimum
5. Std. Deviation: standard deviation
6. N: number of observations

Table 1 *Descriptive Statistics*

	Mean	Median	Max	Min	Std. Dev.	N
ROA	1.2450	1.5810	2.2542	(0.7100)	0.9140	84
CAR	10.6350	11.4000	12.6700	5.5000	2.1226	84
NPLs	252,457	110,193	637,905	66,754	234,688	84
BANKSIZE	11,859,207	10,193,898	22,001,977	5,141,621	6,028,657	84
FX_RATE	4.4526	3.2500	7.3960	2.7100	2.0506	84

Table 1 gives a statistical overview of the dependent and independent variables, which are used in this study. The mean value of the dependent variable (ROA) is 1.24. This value explains that the majority of the commercial banks examined in the sample had a return on their assets of more than 1 percent in accordance with the benchmark. This means that the banking system has been profitable during the period 2009-2018. ROA has a minimum value of -0.71 caused by the

economic recession in 2016, which affected the banking environment. The table shows that CAR has a mean of 10.63, meaning that the banking system have a CAR above the minimum regulatory capital ratio of 10 percent during 2009-2018. The minimum CAR takes a value of 5.50, which is also attributable to the recession in 2016. Furthermore, this table shows an average value of SRD 252 million for provisions and SRD 11 billion for bank size. The average U.S. dollar exchange rate is SRD 4.45 during the period 2009-2018.

7.3 Correlation Coefficients

The correlation test is commonly used to obtain firsthand information on the degree of association among the variables. A high and statistically significant correlation is preferable between the independent variables and dependent variable. While on the other hand if high correlation is present between the independent variables, problems of multi-collinearity arise.

7.3.1 Pearson's correlation coefficients regarding the independent variables

Examining the relationship between CAR and ROA, the correlation coefficient has a value of 0.863 (table 2). This represents a positive correlation between these two variables, which means that an increase of CAR will results in an increase of ROA. In other words, an increase in the CAR of banks leads to more profit. Moving on to the relationship between provisions and ROA, the table also shows a value of -0.829. This means that there is a negative correlation between these variables. In other words, an increase of the provisions will lead to a decrease of the ROA; The higher the NPL-ratio (more non-performing loans), the higher the provisions and the smaller the ROA. The table shows a value of -0.857 for the relationship between bank size and ROA, meaning a negative correlation between these two variables. An increase of the assets of the banks will lead to a decrease of the performance of banks.

7.3.2 Pearson's correlation coefficients regarding the control variable

Looking at the relationship between U.S. dollar FX-rate and ROA, table 2 shows a value of -0.899, indicating a negative correlation. It can be concluded that when the U.S. dollar exchange rate increases, the performance of banks declines. Due to lack of data from 2019 and 2020, the sample period from 2009-2018 has been used in this study. In this period, there were only two depreciations, so the effect of the U.S. dollar FX-rate is not reflected on the ROA. In recent years, the banks have protected their foreign currency positions by holding more assets in foreign

currencies. As a result, it will be noticeable in subsequent years that an increase in the exchange rate will have a positive effect on the ROA.

7.3.3 Pearson's correlation coefficients between the independent variables and the control variable

The independent variables, bank size and FX-rate, show strong correlation with each other (colored in green). To avoid problems of multi-collinearity, independent variables with high inter-correlation are not jointly use in the regression model. Bank size and FX-rate are highly correlated because bank assets consist of foreign currency components. As bank assets are denominated in SRD, the assets of banks will automatically increase when the FX-rate increases, due to the foreign currency components. Due to this, separate models were estimated.

Table 2 Correlation Matrix

	CAR	ROA	NPLs	FX_RATE	BANKSIZE
CAR	1.000				
ROA	0.863	1.000			
NPLs	-0.733	-0.829	1.000		
FX_RATE	-0.800	-0.899	0.987	1.000	
BANKSIZE	-0.664	-0.857	0.970	0.964	1.000

Model 1 estimates with the independent variables and the dependent variables: CAR, bank size and provisions; while model 2 estimates by leaving out bank size and using the control variable U.S. dollar FX-rate instead. Table 3 gives the summary of the model outcomes.

Table 3 *Model Summary*

Model	R-Squared	Adjusted R-Squared	Std. Error of Estimate	Durbin Watson
1	0.296603	0.165739	0.853275	2.814068
2	0.338931	0.215942	0.827203	2.821316

The Durbin Watson statistic is a test statistic used to detect autocorrelation in the residuals from a regression analysis. The Durbin Watson statistic ranges from zero to four, with a value of 2.0 indicating zero autocorrelation. Values below 2.0 mean there is positive autocorrelation and above 2.0 indicates negative autocorrelation. The test indicates a negative correlation between the residuals based on the Durbin Watson statistic of 2.

R-Squared is a statistical measure of fit that indicates how much variation of a dependent variable is explained by the independent variable(s) in a regression model. According to Garson (2016) a good R^2 value should be equal to or greater than 0.10. Table 3 shows that both models have a R-squared greater than 0.10.

7.4 Econometric model

The majority of previous studies that focuses on the determinants of profitability of commercial banks utilized panel data approach with fixed or random effects. As theoretical model, this study adopted a dynamic specification of the panel model to ascertain the determinants of profitability in the banking sector of Suriname. The model has a multiple regression function that includes a dependent variable in the right hand side among the regressors. Following the recent literature in panel data studies (Salas & Saurina, 2002, Louzis et al., 2012), this panel regression method is applied for this study. The Hausmann test was conducted to determine that the fixed effects approach will be utilized.

Equation 1:

$$ROA_{i,t} = \alpha + \beta_1 \Delta NPls_{i,t} + \beta_2 \Delta CAR_{i,t} + \beta_3 \Delta Bank\ size_{i,t} + \delta\_i + \tau\_t\ \varepsilon\_(i,t)$$

Equation 2:

$$ROA_{i,t} = \alpha + \beta_1 \Delta NPLs_{i,t} + \beta_2 \Delta CAR_{i,t} + \beta_3 \Delta US\ Dollar\ FX - rate + \delta\_i + \tau\_t\ \varepsilon\_(i,t)$$

Where i denotes the cross sections and t refers to time dimension of the panel.

7.5 Hypothesis Testing

Table 4 Regression Results

Dependent Variable		ROA			
Independent Variables		Coefficient	Std. Error	T-test	Prob.
Model 1	Constant	-0.042357	0.118799	-0.356547	0.7232
	Bank size	-0.966861	0.371328	-2.603791	0.0126
	CAR	0.078018	0.031798	2.453572	0.0183
	NPLs	-0.282168	0.163935	-1.721225	0.0924
Model 2	Constant	-0.010881	0.115374	-0.094307	0.9253
	CAR	0.069181	0.031238	2.214682	0.0321
	NPLs	-0.268778	0.159119	-1.689160	0.0984
	US dollar FX-rate	-2.439324	0.772654	-3.157071	0.0029

All tests are performed at a significant level of 1%, 5% and 10%

H$_1$: Non-performing loans has a negative effect on the profitability of commercial banks in Suriname

As mentioned earlier, the correlation coefficient showed a negative relationship between provisions and ROA. The next step is to test this relationship, using the T-test, to determine whether it is significant or not. After conducting the T-test, the p-value will determine the significance. The T-test shows a value of -1.721 in the first model and a value of -1.689 for the second model, for the relationship between NPLs and ROA. As mentioned above, all tests are performed at a significance level of 1%, 5% and 10%. It can be stated that NPLs are not significant at 1% and 5%, as the p-value of NPLs is higher than the significance level of 1% and 5%. As the p-value of NPLs has a lower value than the significance level of 10% in both models (model 1: 0.0924<0.10 / model 2: 0.0984<0.10), the first hypothesis (H$_1$) is accepted at a significance level of 10%. In other words, NPLs negatively affects the ROA of commercial banks in Suriname.

H$_2$ Capital Adequacy Ratio has a positive effect on the profitability of commercial banks in Suriname

The correlation coefficients show a positive relationship between CAR and ROA. The T-test states a value of 2.453 in the first model and a value of 2.214 in the second model for this relationship, which means that the p-value is smaller than the significance level of 5% and 10% (0.0183<0.05).

The second hypothesis (H$_2$) is accepted at a significant level of 5% and 10%, meaning that CAR has a positive effect on the profitability of commercial banks in Suriname.

H$_3$ Bank size has a negative effect on the profitability of commercial banks in Suriname

When the relationship between bank size and ROA is tested, the correlation coefficient resulted in a negative relationship between these two variables. The T-test takes on a value of -2.603 for this relationship. P has a lower value than the significance level 5% and 10% (0.01<0.05) and for that reason the last hypothesis (H$_3$) is also accepted on a significant level of 5% and 10%, meaning that bank size does affect the profitability of commercial banks in Suriname.

H$_4$ Foreign Exchange rate has a negative effect on the profitability of commercial banks in Suriname

As mentioned earlier, the correlation coefficient showed a negative relationship between U.S. dollar FX-rate and ROA. The next step is to test this relationship, using the T-test, to determine whether it is significant or not. After conducting the T-test, the p-value will determine the significance. The T-test shows a value of -3.157 for the relationship between U.S. dollar FX-rate and ROA. The test is performed at a significance level of 1%, 5% and 10%. It can be stated that P has a lower value than the significance level (0.029<0.01) and the fourth hypothesis (H$_4$) is accepted on a significant level of 1%, 5% and 10%.

8. Conclusion

This study examines the determinants of profitability of commercial banks in Suriname. The focus of this study is to ascertain what "The effect of Capital Adequacy Ratio (CAR), Non-Performing Loans (NPLs) and bank size is on the profitability of commercial banks in Suriname during the period 2009-2018.

As mentioned in the introduction, the main research question of this thesis is:

Does non-performing loan-ratio, capital adequacy ratio and bank size effect the profitability of the commercial banks in Suriname?

All sub-questions were answered in the second to fifth chapter of this thesis. Based on prior research, four hypotheses were developed. These hypotheses were tested using the multiple regression model, which was conducted in in E-views.

Based on the research done in this thesis it can be concluded that NPLs has a negative effect on the ROA of the commercial banks in Suriname. The first hypothesis stated: "*Non-performing loans has a negative effect on the profitability of commercial banks in Suriname*". Prior research found that there is negative relationship between NPLS and profitability. According to Kadioglu, Telceken & Ocal (2017), Do, Ngo & Phung (2020), Kumar, Hossain & Islam (2020) and Abedin (2020) the profitability of a bank increase if there is downward movement of the non-performing loans in the bank and vice versa. When examining the correlation coefficient, a negative correlation was found between provisions and ROA, which means that an increase of NPLs will lead to an increase of the provisions and this will result in decrease of ROA. The first hypothesis is accepted and it can be concluded that NPLs affects the ROA of commercial banks in Suriname.

The second hypothesis: *"Capital Adequacy Ratio has a positive effect on the profitability of commercial banks in Suriname*" is also accepted based on the correlation and regression results. In contrast to Ochei (2013): *"CAR have negative impact on the profitability of banks",* the results show a positive impact of CAR on the profitability of banks. According to Ozili (2015), it is expected that the higher the CAR, the lower the need for external funding and, therefore, the higher bank profit. In 2016, when there was a recession in Suriname, the CAR declined to 5.5 percent (the lowest percentage in the sample period). The ROA was -0.7 percent in this year, also the lowest percentage during 2009-2018.

The third hypothesis was developed regarding bank size and ROA: "Bank size has a negative effect on the profitability of commercial banks in Suriname". Prior research produces mixed evidence regarding the impact of Bank size on the ROA of banks. According to Murthy (2008) there is a positive relationship between bank size and performance of banks. Darrat and Yousif (2002) showed contradictory results in the case of Kuwait. They found a negative relationship between bank size and bank performance. Evidence showed a negative correlation between bank size and ROA. Based on the results, the third hypothesis was also accepted.

The fourth hypothesis: "*Foreign Exchange rate has a positive effect on the profitability of commercial banks in Suriname"* is also accepted. According to Wekesa (2012) foreign exchange rates fluctuations typically generate significant gains or losses for banks. The study of Wong et al. (2008) revealed that foreign exchange rate and bank performance positively correlates. The study of Hossin & Fazlu (2020) investigates the impact of exchange rate fluctuations on financial performance of commercial banks in Bangladesh. They found a weak negative association between exchange rate fluctuations and financial performance. The results in this study are in line with the results of Hossin & Fazlu, exchange rate fluctuations has a negative effect on the profitability of banks.

This study suffers from some limitations. Due to confidentiality, the NPLs-ratio was not used in this study. Nevertheless, in order to measure NPLs instead of the NPLs-ratio, the provisions for NPLs were used for the correlation and regression tests. In case NPLs increase, the provisions increase automatically. An increase of the provisions leads to a decrease of the ROA.
Furthermore, the data of one foreign bank has not been used because this bank only publishes consolidated data. The results including this bank gave a distorted picture of the reality that is why this bank has been removed from the sample to achieve better results.

This study contributes to the literature on bank stability in Suriname. As commercial banks have the most important share in the financial system, it is important to monitor the performance of these institutions. This study helps to find out to what extent the performance of banks is influenced by several factors. This study was conducted in many countries before, but never for Suriname. Future research can be done regarding this topic including the period 2018-2021 since notable developments have taken place in the banking system during this period.

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Appendix A Summary of prior research

Authors	Research Object	Sample	Method	Results	Limitations
Abedin (2020)	Aims to investigate the status of NPLs in the banking industry of Bangladesh	This paper uses the sample of 59 bank's data from the year 2008 to 2019.	Panel Data Regression	Default Loans has instigated a negative influence on the growth of Banking Business	No limitations
AGBEJA, O.,ADELAKUN, O.J., OLUFEMI, F. I	Determines the effect of CAR and NPLs on bank profitability	Secondary data from Central Bank of Nigeria Statistical Bulletin and Annual Financial Reports of the selected five banks during the period 2010-2014	Multiple regression	There is a significant relationship between capital adequacy ratio and bank's profitability. Loans and advances that are performing are significant on bank's performance.	No limitations
Baasi (2018)	Aim of this study was to establish the effect of non-performing loans on profitability of four of the major banks listed on the Ghana Stock Exchange (GSE)	The study used secondary data that span from 2009 to 2016.	Panel Data Regress	The study revealed that NPLR negatively affect profitability of banks but rate of CAR showed a significant positive relationship with profitability.	No limitations

Dao & Nguyen (2020)	Investigates the factors affecting the profitability of commercial banks in Asian developing countries, including Vietnam, Malaysia and Thailand.	Panel data with 135 observations of 27 domestically incorporated commercial banks during the time period from 2012 to 2016	Panel Data Regression	Negative relationship between CAR and profitability indicators as well as the positive association between NPL and banking profitability.	No limitations
Do, Ngo & Phung (2020)	Investigates the impact of non-performing loans on the ability to make profit of Vietnamese commercial banks in the period of 2008 to 2017.	With the panel data of 15 Vietnamese commercial banks from the period of 2008 to 2017, the research will be conducted with 150 observations, which suitability meets the requirements.	Panel Data Regression	The test results have shown that when the rate of nonperforming loans increases, the bank's ROA will decrease, meaning that the bank profitability will be lowered.	No limitations
Haron (2004)	Examines the impact of profitability determinants on performance of Islamic banks in a manner analogous to such studies conducted with conventional banks.	The data used are panel data of 14 banks and it is assumed that all behavioural differences between individual banks are captured by the intercept.	Panel Data Regression	The finding of this study suggests that all three sources of funds for Islamic banks are positively related with profitability	No limitations

Hossin & Fazlu (2020)	Investigating the effects of exchange rate fluctuations on financial performance of financial institutions in Bangladesh.	Target population for the study comprised of all financial institutions operating in Bangladesh as on 31, December, 2019. Secondary data was collected from the banks' consolidated financial statements as well as World Bank database website.	Descriptive Survey & Multiple Regression	Exchange rate fluctuations and financial performance had a weak negative association.	The research concentrated on Ten years (2009 to 2018). The study period was therefore not entirely exhaustive in investigating exchange rate fluctuations effects on the financial performance of Bangladesh bank. Research with a wider time span would be imperative.
Irawati et al. (20	This study sought to find out the effect CAR, NPL and bank size on the performance of banks listed in stock Exchange Indonesia.	The study population included all Banks that listed in Indonesian Stock Exchange 2010–2015.	Panel Data Regression	Results of the study showed that CAR has a significant effect on ROA and that NPLs-ratio would reduce the financial performance of the banks since NPL has a statistically negative significant on ROA.	No limitations

Kadioglu, Telceken & Ocal (2017)	This study investigates whether NPLs effect the profitability of banks in Turkey.	Quarterly data set including 1809 observation from 55 Banks in Turkey during the period from 1 st quarter of 2005 to 3 rd quarter of 2016.	Panel Regression	It is found that there is a significant, negative relationship between non performing loans and bank profitability which is measured by return on asset.	No Limitations
Kasimodou et al. (2006)	Tested the banks effectiveness of UK using the bank size as a key factor.	Data of 78 banks were used for the years 2002 to 2008.	Multiple regression	Small banks showed higher performance in comparison to large ones.	No Limitations
Kasmir, Manajehem & Perbankan (2017)	The main aim of this paper is to analyze the recent trend of NPLs in banking sector of Bangladesh		Multiple regression	The results revealed that the profitability of the banks gets upward trends if there is downward movement of the NPLs in the bank and vice versa	No limitations

Mohammad (2015)	Aim of this study is to investigate the effect of bank size on its profitability for Jordanian listed commercial banks within different size bank categories	Primary Data of the model are gathered from Amman stock exchange annual reports for the available of 15 commercial banks for the period from 2007-2012. Secondary data are collected from journals.	Panel Data Regression	The study revealed that the profitability increases as the asset size decreases.	No limitations
Ochei (2013)	Investigates the impact of bank capital adequacy ratios, management and performance in the Nigerian commercial bank (1986 - 2006).	The sample (of 14 commercial banks) was drawn from both the old and new generation banks using the Stratified sampling technique based on simple random sampling supported by Judgment Sampling	Ordinary least square regression method	CAR has a negative impact on ROA.	This study is limited to commercial banks in Nigeria whereas in the financial intermediation process, there is a gamut of non-bank financial institutions such as insuran-ce companies, finance houses etc

Olalekan & Adeyinka (2013)	Examines the effect of CAR on profitability of deposit-taking banks in Nigeria.	From a total of 518 copies of the questionnaire distributed, 393 were returned, out of which 125 were either not filled at all or not properly filled thus, producing a response rate of 76%	This study used the survey design in line with cross - sectional research design	There is no significant relationship between banks capital adequacy and their profitability in domestic banks in Nigeria.'	Even though the sample included all deposit-taking banks actively operating in Nigeria, the secondary data analysis for foreign banks was limited.
Owoeye & Ogunmakin (2013)	Investigates the impact of unstable exchange rate on the performance of commercial banks in Nigeria.	Annual time series are used for this study. Data for exchange rate, real gross domestic product are sourced from IMF while data for interest rate and government expenditure are sourced from Central Bank of Nigeria's Statistical Bulletin.	Ordinary least square regression method	Positive relationship between exchange rate and loan loss, which may explain the decreasing performance of banks as a result of fluctuating exchange rate.	No limitations

Yuksel & Zengin (2017)	Aim of this paper is to define the influencing factors of net interest margin in Turkish banking sector.	The data was provided from Turkish Banking Association, OECD, Central Bank of Turkey and Turkish Statistical Institute during 2003-2015. Moreover, all banks of Turkey were included in the study.	Multiple regression	The major finding in this study is that net interest margin is negatively related with non-interest income, non-performing loans, total assets and exchange rates	No limitations

Appendix B Data

Year	Bank	ROA	CAR	Log Banksize	Log Provisions	FX Rate
2009	Bank 1	1.2	9.8	9.289	6.885	2.71
2010	Bank 1	1.4	10.7	9.325	7.036	2.71
2011	Bank 1	1.5	10.5	9.405	7.099	3.25
2012	Bank 1	1.4	10.3	9.498	7.205	3.25
2013	Bank 1	1.4	9.8	9.571	7.192	3.25
2014	Bank 1	1.4	11.4	9.611	7.447	3.25
2015	Bank 1	0.7	10.3	9.690	7.775	3.96
2016	Bank 1	-3.1	0.7	9.876	8.431	7.354
2017	Bank 1	0.1	4.4	9.856	8.150	7.396
2018	Bank 1	-0.8	8.2	9.872	8.147	7.396
2009	Bank 2	1.75	14.26	9.045	6.324	2.71
2010	Bank 2	1.67	14.74	9.105	6.405	2.71
2011	Bank 2	1.82	14.87	9.170	6.815	3.25
2012	Bank 2	1.68	15.08	9.271	6.269	3.25
2013	Bank 2	1.51	15.40	9.328	6.830	3.25
2014	Bank 2	1.48	10.93	9.353	6.596	3.25
2015	Bank 2	1.08	9.98	9.389	7.007	3.96
2016	Bank 2	1.01	9.51	9.528	7.368	7.354
2017	Bank 2	0.93	10.65	9.617	7.335	7.396
2018	Bank 2	0.70	7.65	9.666	7.401	7.396
2009	Bank 3	1.56	12.36	8.38	6.42	2.71
2010	Bank 3	1.20	12.68	8.46	6.30	2.71
2011	Bank 3	0.90	13.00	8.54	6.18	3.25
2012	Bank 3	0.80	12.80	8.60	5.88	3.25
2013	Bank 3	1.13	12.36	8.65	5.70	3.25
2014	Bank 3	1.20	13.48	8.67	6.38	3.25
2015	Bank 3	1.17	13.70	8.75	6.73	3.96
2016	Bank 3	0.44	8.76	9.03	7.39	7.354
2017	Bank 3	0.29	19.64	9.10	6.76	7.396
2018	Bank 3	0.26	22.71	9.20	7.09	7.396
2009	Bank 4	1.00	8.00	8.277	5.846	2.71
2010	Bank 4	1.00	8.00	8.388	5.199	2.71
2011	Bank 4	1.00	8.00	8.473	5.849	3.25
2012	Bank 4	1.00	8.00	8.604	6.718	3.25
2013	Bank 4	1.00	8.00	8.673	6.714	3.25
2014	Bank 4	2.00	15.00	8.743	6.720	3.25
2015	Bank 4	1.6	17.10	8.845	6.899	3.96
2016	Bank 4	1.1	10.90	9.065	6.563	7.354
2017	Bank 4	0.90	11.80	9.239	7.030	7.396
2018	Bank 4	0.75	11.30	9.299	6.508	7.396

2009	Bank 5	1.58	18.00	7.919	2.913	2.71
2010	Bank 5	1.59	20.00	8.019	3.000	2.71
2011	Bank 5	1.84	16.00	8.167	5.588	3.25
2012	Bank 5	1.38	13.00	8.378	5.740	3.25
2013	Bank 5	0.58	11.00	8.508	5.767	3.25
2014	Bank 5	0.77	8.72	8.573	5.879	3.25
2015	Bank 5	0.08	8.25	8.610	6.927	3.96
2016	Bank 5	0.85	7.36	8.852	6.635	7.354
2017	Bank 5	0.82	9.35	8.880	6.349	7.396
2018	Bank 5	0.71	11.84	8.876	7.178	7.396
2009	Bank 6	2.00	21.00	8.168	6.606	2.71
2010	Bank 6	0.54	26.00	8.220	6.352	2.71
2011	Bank 6	0.55	25.00	8.297	6.356	3.25
2012	Bank 6	0.45	21.00	8.344	6.353	3.25
2013	Bank 6	0.27	19.00	8.420	6.312	3.25
2014	Bank 6	0.22	16.00	8.440	6.309	3.25
2015	Bank 6	0.28	15.00	8.487	6.367	3.96
2016	Bank 6	0.4	10.00	8.670	6.335	7.354
2017	Bank 6	0.45	11.00	8.739	6.457	7.396
2018	Bank 6	0.41	10.30	8.814	6.450	7.396
2009	Bank 7	2.97	6.55	7.881	4.899	2.71
2010	Bank 7	2.81	6.87	7.952	5.087	2.71
2011	Bank 7	3.00	7.21	8.024	5.276	3.25
2012	Bank 7	3.00	7.57	8.131	5.465	3.25
2013	Bank 7	3.00	9.53	8.224	5.653	3.25
2014	Bank 7	3.00	10.00	8.254	6.430	3.25
2015	Bank 7	2.00	10.00	8.348	6.434	3.96
2016	Bank 7	1.00	10.30	8.474	6.539	7.354
2017	Bank 7	0.00	10.50	8.505	9.185	7.396
2018	Bank 7	1.00	10.50	8.568	8.698	7.396
2009	Bank 8	2.47		8.129	6.215	2.71
2010	Bank 8	2.43		8.163	6.231	2.71
2011	Bank 8	2.52		8.174	6.047	3.25
2012	Bank 8	2.48		8.214	6.103	3.25
2013	Bank 8	2.19	27.60	8.261	6.060	3.25
2014	Bank 8	2.10	25.77	8.275	6.104	3.25
2015	Bank 8	1.97	15.37	8.321	6.384	3.96
2016	Bank 8	1.42	9.40	8.326	6.716	7.354
2017	Bank 8	1.94	11.42	8.338	6.773	7.396
2018	Bank 8	2.00	12.11	8.349	6.890	7.396

2009	Systeem	2.3	10.66	6.711	4.824	2.71
2010	Systeem	2.0	11.52	6.766	4.900	2.71
2011	Systeem	1.7	11.98	6.845	4.978	3.25
2012	Systeem	1.7	12.67	6.932	4.988	3.25
2013	Systeem	1.6	12.42	6.993	4.996	3.25
2014	Systeem	1.6	11.50	7.023	5.084	3.25
2015	Systeem	1.3	11.30	7.073	5.332	3.96
2016	Systeem	(0.7)	5.50	7.251	5.697	7.354
2017	Systeem	0.9	9.30	7.302	5.805	7.396
2018	Systeem	0.1	9.50	7.342	5.789	7.396

Appendix C Libby boxes

In the Libby box, the association between the determinants of profitability (construct X) and profitability (construct Y) is examined. The boxes in the second row present the operationalization of the X and Y constructs. The remaining box includes the control variable 'U.S. dollar FX-rate' that is used in the empirical analysis.
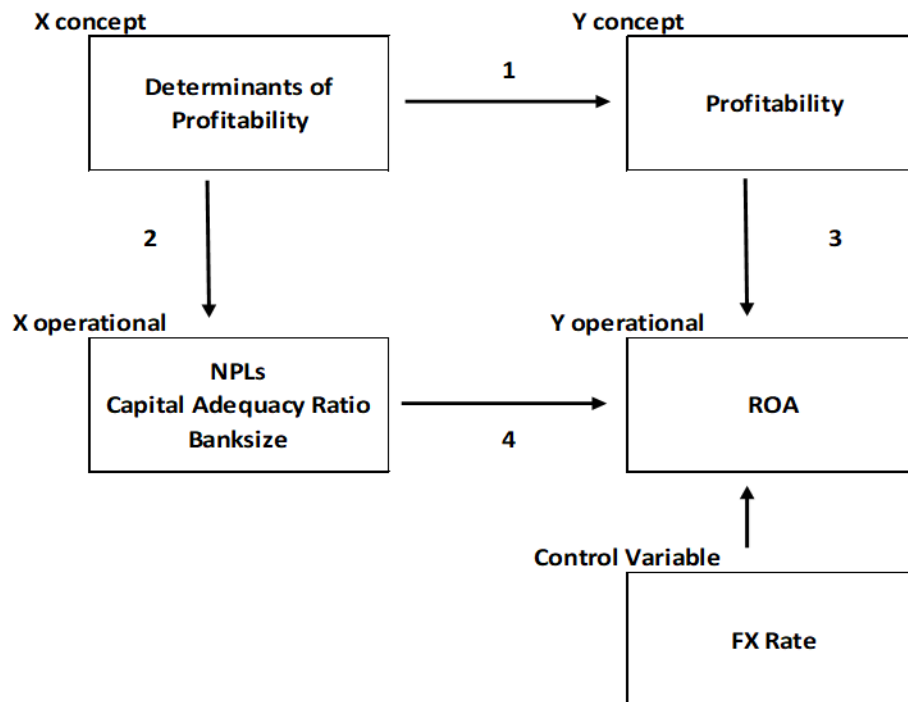
Appendix D Skewness

Skewness is a measure of symmetry, or more precisely, the lack of symmetry. A distribution, or data set, is symmetric if it looks the same to the left and right of the center point (Rashid, 2018). The skewness for a normal distribution is zero, and any symmetric data should have a skewness near zero. Negative values for the skewness indicate data that are skewed left and positive values for the skewness indicate data that are skewed right (Rashid, 2018).

Data and interpretation for Skewness

	Values	Interpratation
NPLs	0.856983	Right skewed
CAR	-1.482595	Left skewed
Bank Size	0.598760	Right skewed
FX-rate	0.784571	Right skewed

Looking at the table, it can be stated that the variable NPLs is right skewed, meaning that data is positively skewed. CAR is left skewed and has a mean of 10.63, meaning that most of the observations has a CAR lower than 10.63. Bank size and FX-rata are both right skewed; this means that the mean of bank size and FX-rate is larger than the median.

Appendix E Stationarity test

In order to avoid spurious regression, stationarity tests of the used time series were conducted. The table beneath presents the panel unit root test results (namely the ADF and PP panel unit root test). Its null hypothesis is that all variables contain unit roots in level against the alternative of stationarity. The variables, which exhibit non-stationarity in their levels form, are first differenced to be made stationary.

Table *Unit Root Test*

Variables	ADF				PP			
	Level		1st difference		Level		1st difference	
	C	T &C	C	T &C	C	T &C	C	T &C
ROA	0.2000	0.4431	0.0001	-	0.3981	0.6791	0.0000	-
CAR	0.3538	0.2134	0.0072	-	0.5203	0.8184	0.0023	-
Banksize	0.7360	0.2095	0.0001	-	0.6812	0.5784	0.0005	-
NPLS	0.0041	0.7415	0.0029	-	0.5517	0.7859	0.0000	-
USD/SRD FX-rate	0.8146	0.9617	0.0147	-	0.7782	0.9562	0.0126	-

Because all variables are significant in first difference, a co-integration test is done. The co-integration test resulted in the outcome that all variables have a long run relationship with each other.