

## Determinants of non-performing loans: evidence from commercial banks in Barbados

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### Abstract

*The commercial banking sector is the primary form of financial intermediation in Barbados. It is the largest conduit for the mobilisation of domestic savings, main source of external capital for firms and key player in the payment system. With the onset of the global financial crisis in 2008, the financial indicators of the commercial banking sector worsened with credit quality in particular being noteworthy. The non-performing loans to total loans ratio increased from a historic low of 2.9% in 2007 to 12.9% in 2012. Given the adverse effect of non-performing loans on the financial performance of commercial banks, there has been a proliferation of studies on the determinants of non-performing loans over the years. This paper examines the bank-specific and macroeconomic determinants of non-performing loans of commercial banks in Barbados over the period 1991-2015. 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.*

### 1. Introduction

The commercial banking sector is the primary form of financial intermediation in Barbados. It is the largest conduit for the mobilisation of domestic savings, main source of external capital for firms and key player in the payment system. With the onset of the global financial crisis in 2008, the financial indicators of the commercial banking sector worsened with credit quality in particular being noteworthy. The non-performing loans to total loans ratio increased from a historic low of 2.9% in 2007 to 12.9% in 2012; the figure subsequently declined to 10.8% at the end of 2015. The depressed economic conditions during the crisis and the challenges with macro-economic management introduced higher levels of uncertainty in the economy and a greater level of risk aversion among the household and business sectors. The banking system therefore experienced a significant slowdown in the demand for loans from 2009 to 2013.

Given the importance of loan growth and its management to the performance of the banking sector, the decrease in loans and advances, and increased credit impairments resulting from defaults ultimately had a negative impact on the profitability of the banks. Indeed, the return on equity of the banking sector declined from 15.6% in 2009 to its lowest value of 5.9% in 2012. The return on assets also experienced a declining trend over the period.

Given the adverse effect of non-performing loans on the financial performance and survivability of commercial banks, there has been a proliferation of studies on the determinants of non-performing loans over the years. Some studies were country specific, while others considered groups of countries in a specific region or internationally. Knowledge of the major influences on non-performing loans places banks in a position to control their upward movement, thereby restricting their constraining impact on bank performance. Also, understanding the influences of non-

performing loans helps to ensure a sound and healthy banking system which is able to support economic growth.

In the case of Barbados, studies were undertaken by (i) Chase et al. (2005) who examined the macroeconomic determinants (3-month Treasury bill rate, inflation rate and GDP growth) of non-performing loans; (ii) Greenidge and Grosvenor (2010) who amplified the model of Chase et al. (2005) and replaced the 3-month Treasury bill rate with the average loan rate; (iii) Guy and Lowe (2011) who used both macroeconomic (inflation, GDP growth and the lending rate) and bank-specific (return on assets and loan to deposit ratio) factors; (iv) Belgrave et al. (2012) who examined the impact of specific industry-income shocks on non-performing loans using macroeconomic (unemployment and real interest rate) and institutional (efficiency, moral hazard, size and aggressive lending) factors; and Grosvenor and Guy (2013) who used both macroeconomic (inflation and GDP growth) and bank-specific (bank size and loan growth) factors to explain the impact of economic conditions on non-performing loans.

This paper focuses on extending the literature on the determinants of non-performing loans in Barbados by examining two additional variables, the return on equity and capital adequacy ratio. These variables are included based on the theoretical literature and their perceived importance in the Barbadian context.

The remainder of the paper is structured as follows: Section 2 focuses on the review of the theoretical and empirical literature on the determinants of non-performing loans for developing countries; Section 3 provides an overview of the commercial banking industry in Barbados; Section 4 deals with methodological and associated issues; Section 5 presents the empirical results which are then discussed in Section 6; and concluding remarks and areas for future research are provided in the final section.

## 2. Literature Review

There is no global standard to define non-performing loans at the practical level. It is recognised that what is appropriate in one country may not be suitable for another. However, a non-performing loan is generally defined as a sum of borrowed money for which the debtor has not made the scheduled payments (principal and/or interest) for at least ninety days. Once a loan is non-performing, the chances that it will be repaid in full are considered to be substantially lower.

In Barbados the standard loan classifications are defined as follows: Pass - loans with repayments in arrears up to one month; Special Mention - loans in arrears for one to three months; Substandard - loans owing for at least three months; Doubtful - unsecured portion of loans at least six months due; and Loss - unsecured portion of loans at least twelve months due. Non-performing loans comprise loans in the latter three categories and can be further differentiated according to the degree of collection difficulties.

### 2.1 Theoretical Analysis

The literature highlights that macroeconomic, bank-specific and institutional factors could affect non-performing loans. Among the indicators of the macro-economic environment are gross domestic product, inflation, real interest rate and unemployment rate. The bank-specific variables include return on assets, return on equity, capital adequacy ratio and loan to deposit ratio, whilst the institutional factors are explained through the moral hazard hypothesis, bad management hypothesis, bad management II hypothesis, skimming hypothesis and bad luck hypothesis.

#### Macroeconomic Factors

##### *Gross Domestic Product (GDP) growth*

Documented in the literature is a negative impact of GDP growth on non-performing loans. GDP growth reflects a positive economic environment which is beneficial for both businesses and households. In favourable economic conditions, incomes of households and businesses grow, and borrowers have sufficient funds to service their debts. This in turn contributes to lower non-

performing loans. Conversely, when there is a slowdown in the economy the level of non-performing loans is expected to increase.

#### *Inflation*

The influence of inflation on non-performing loans is not clear-cut. Theoretically, inflation may have a negative impact on non-performing loans since higher inflation can enhance the loan payment capacity of borrowers by reducing the real value of outstanding debt. Conversely, since high levels of inflation are considered an indicator of macroeconomic instability, financial institutions will demand a higher risk premium resulting in higher interest rates (and interest payments). This situation leads to a reduction in borrowers' cash flow which lessens their ability to repay their loans.

#### *Interest Rate*

During periods of high interest rates, the rate of default borrowers is anticipated to increase and, hence, non-performing loans. Thus, interest rates are anticipated to have a positive impact on non-performing loans.

#### *Unemployment*

An important macroeconomic determinant of non-performing loans is unemployment in the economy. An increase in unemployment negatively affects the income of individuals which in turn increases their debt burden and decreases the probability of them paying their debts. Thus, unemployment is expected to have a positive influence on non-performing loans.

### **Bank-Specific Factors**

#### *Return on Equity (ROE)*

The return on equity measures how much the bank is earning on its equity investments. ROE is anticipated to have a negative effect on non-performing loans. The justification for this result is the existence of better management of funds invested by shareholders via good agency relationships. In other words the better the ROE, the more effective is management in utilising shareholders' capital.

#### *Return on Assets (ROA)*

The return on assets indicates the ability of bank management to generate profits by utilising the available assets of the bank. Theoretically, the impact of ROA on non-performing loans is ambiguous. A positive impact can be rationalised through the behaviour of bank management. In order to increase short-term earnings, bank management may portray a wrong picture to investors relating to the future profitability and positive return prospects. As a consequence investors access funds from banks and invest in less profitable projects. This results in current good performance and profitability of the banks. However, because of the incorrect forecasting, returns on investment are not in accordance with investors' expectations, resulting in inability of investors to repay their loans and, hence, increases in non-performing loans in the future (Ahmad and Bashir, 2013a). Conversely, the negative influence of ROA on non-performing loans can rest on the view that banks with strong profitability have less incentive to generate income and are less inclined to engage in the granting of risky loans.

#### *Capital Adequacy Ratio (CAR)*

The capital adequacy ratio measures a bank's solvency and ability to absorb risk. It is used to protect depositors, and promote stability and efficiency in the financial system. Theoretically, the impact of CAR on non-performing loans is uncertain. On the one hand, banks with high levels of CAR may pursue opportunities more aggressively, which means increased risk taking leading to riskier credit portfolios (Demirguc-Kunt and Huizinga, 1999). Thus, CAR is expected to have a positive impact on non-performing loans. 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. This behaviour is more likely when deposit insurance schemes are in place. In this case, CAR is expected to exert a negative impact on non-performing loans.

### *Loan to Deposit (LTD) Ratio*

The loan to deposit ratio is a commonly used statistic for assessing a bank's liquidity and it reflects the utilisation of funds policy of the bank. An increase in this ratio is indicative of the bank deploying more funds to loans. Such a situation reflects a less liquid position for the bank. The literature suggests that the LTD ratio has a positive effect on the level of non-performing loans. The justification for such a result is that the growth of customer deposits impacts positively on a bank's lending activity. Inefficiencies in the credit administration process in such circumstances can result in a higher level of non-performing loans.

### **Institutional Factors**

#### *Bad Management Hypothesis*

Under the 'bad management' hypothesis, low measured cost efficiency is a signal of poor senior management practices, which apply to both day-to-day operations and to managing the loan portfolio. Subpar managers do not sufficiently monitor and control their operating expenses, and do not practice adequate loan underwriting, monitoring and control. Such managers may (i) have poor skills in credit scoring and, therefore, choose a relatively high proportion of loans with low or negative net present values, (ii) be less than fully competent in appraising the value of collateral pledged against the loans, and (iii) have difficulty monitoring and controlling the borrowers after loans are issued to assure that covenants are obeyed. This hypothesis predicts that cost efficiency will have a negative influence on non-performing loans.

#### *Bad Management II Hypothesis*

The 'bad management II' hypothesis indicates that substandard performance is positively associated with increases in future non-performing loans. This may be justified in a way analogous to the 'bad management' hypothesis by regarding past performance as a proxy for the quality of management.

#### *Skimping Hypothesis*

Under the 'skimping' hypothesis, the amount of resources allocated to underwriting and monitoring loans affects both loan quality and measured cost efficiency. Here, the critical decision of the bank lies in the trade-off between short-term operating costs and future loan performance problems. A bank maximizing long-run profits may rationally choose to have lower costs in the short run by skimping on the resources devoted to underwriting and monitoring loans, but bear the consequences of greater loan performance problems and the possible costs of dealing with these problems in the future. The reduced effort devoted to screening loan customers, appraising collateral, and monitoring and controlling borrowers after loans are issued makes the bank appear to be cost efficient in the short run because fewer operating expenses can support the same quantity of loans and other outputs. The stock of non-performing loans remains unaffected in the short run, but as times passes, a higher proportion of borrowers become delinquent on their loans and the inattention to the loan portfolio becomes apparent. Thus, under the skimping hypothesis the relationship between measured cost efficiency and non-performing loans is opposite to the bad management hypothesis, that is, skimping implies that measured cost efficiency impacts positively on problem loans.

#### *Moral Hazard Hypothesis*

The 'moral hazard' hypothesis is the classical problem of excessive risk-taking when another party is bearing part of the risk and cannot be easily charged for or prevented from risk-taking. Under this hypothesis, banks with relatively low capital respond to moral hazard incentives by increasing the riskiness of its loans portfolio, which results in higher non-performing loans on average in the future. Thus, under the moral hazard hypothesis, it is expected that low financial capital will result in high non-performing loans. Although the moral hazard hypothesis does not describe the relationship between measured cost efficiency and problem loans, it is used for several reasons. First, moral hazard gives an alternative explanation for non-performing loans, so the effects

of measured cost efficiency on non-performing loans could be biased if the potential effects of capital were neglected. Second, moral hazard effects can magnify the impacts of the other hypotheses, and any of those hypotheses could be the primary cause of reduced capital and moral hazard incentives. Finally, as a leading theory of problem loans and bank failures, the moral hazard hypothesis has different policy implications than the other hypotheses.

#### *Bad Luck Hypothesis*

Under the 'bad luck' hypothesis, external events (for example, a local plant closing) precipitate an increase in problem loans for the bank. After the loans become past due or non-accruing, the bank begins to expend additional managerial effort and expense dealing with these problem loans. These extra operating costs include, but are not limited to, the additional monitoring of delinquent borrowers and value of their collateral; the expense of analysing and negotiating possible workout arrangements; the cost of seizing, maintaining, and eventually disposing of collateral if default later occurs; the additional cost of defending the bank's safety and soundness record to bank supervisors and market participants; any additional precautions taken to preserve the high quality of loans that are currently performing, which becomes more crucial for a bank in a perilous financial situation; and the diversion of senior management attention away from solving other operational problems. Most of these costs, especially those associated with loan workout and default, are incurred well after the increase in problem loans. Thus, under the bad luck hypothesis, we expect increases in non-performing loans to temporally precede decreases in measured cost efficiency. Importantly, under the bad luck hypothesis, the extra expenses associated with problem loans create the appearance, but not necessarily the reality, of lower cost efficiency. Faced with an exogenous increase in non-performing loans, even the most cost-efficient banks have to purchase the additional inputs necessary to administer these problem credits.

These hypotheses are not mutually exclusive. In an extreme case, the hypotheses could affect the same bank at the same time. For example, bad luck could befall a poorly managed bank that also happens to be skimping on loan monitoring expenses. Any loss of capital as a result of bad luck, bad management and skimping might cause the bank to respond to moral hazard incentives and take increased risks. Similarly, banks responding to moral hazard incentives may take increased risks by skimping.

## **2.2 Empirical Literature**

The literature review focuses on empirical studies on the determinants of non-performing loans in developing economies. Some studies were conducted on the basis of individual countries, while others considered groups of countries in a specific region or internationally.

Brownbridge (1998) investigated the causes of non-performing loan in local banks in four African countries (Kenya, Uganda, Zambia and Nigeria) for the period 1985-1994. The results revealed that the main determinant of non-performing loans was insider lending. In the study three forces of insider lending were highlighted: over concentration in ownership, political pressure and under capitalization. Another important cause of non-performing loans was the interest rate charged to borrowers operating in the high-risk segment of the credit market.

Ranjan and Dhal (2003) examined the response of non-performing loans to bank size, terms of credit (maturity terms of credit, changes in cost terms of credit, credit orientation) and macroeconomic variables in public sector banks in India. The results indicated that the terms of credit variables have significant effects on the banks' non-performing loans in the presence of bank size induced risk preferences and macroeconomic shocks. The maturity terms of credit have a significant negative impact, indicating that higher term loans induce lower non-performing loans. Changes in cost terms of credit, that is, the difference between current cost and past cost conditions, have a positive impact on non-performing loans, implying that the expectation of higher interest rates induces changes in cost conditions which fuel further increases in non-performing loans.

Interestingly, the measure of credit orientation, defined by a bank's credit-to-deposit ratio relative to that of the industry, has a significant negative influence on non-performing loans, implying that borrowers attach considerable importance to relatively more credit (customer) oriented banks. Also, bank size, as measured by the ratio of a bank's assets to total banking sector assets was found to have a statistically significant negative impact on non-performing loans, indicating that the larger the bank the lower the level of non-performing loans. Finally, the growth variable has a negative influence on non-performing loans, suggesting that increased economic activity leads to lower financial distress of borrowers and, thus, lower non-performing loans for banks.

Another study on the Indian banking sector was conducted by Swamy (2012) who investigated the macroeconomic and indigenous determinants of non-performing loans using panel data for the period 1997 to 2009. The results indicated that the loan to deposit ratio and ROA have strong positive effects on non-performing loans, bank size has a strong negative effect, while real GDP growth rate, inflation, capital adequacy, bank lending, and savings growth have insignificant impact on non-performing loans. Prasanna (2014) also investigated the determinants of non-performing loans in the Indian banking system using panel data for the 2000 to 2012 period. The study found that growth rates in GDP, savings and per capita income have significant negative impact on non-performing loans, while the influence of interest rates and inflation was significantly positive. Exchange rates and stock market volatility exerted an inverse impact but it was insignificant.

Bercoff et al. (2002) investigated the determinants of non-performing loans for commercial and savings banks in Argentina using an accelerated failure time (AFT) model for the period 1993-1996. The findings revealed that bank size measured by assets has a positive effect on non-performing loans, while asset growth has a negative effect. Other variables such as operating cost, exposure to peso loans, credit growth, and foreign interest rate have negative effect on non-performing loans. In addition, the money multiplier, reserve adequacy, institutional characteristics and tequila effect have positive influence on non-performing loans.

Hu et al. (2004) analysed the relationship between the ownership structure and impaired loans of the banking sector in Taiwan covering the period 1996-1999. Variables used in the study were government shareholdings, size, entropy index for revenues, D1991 (1 if the bank was established after deregulation; 0 otherwise) and time. The results highlighted the following: (1) the rate of NPLs decreases as government shareholding in a bank rises (up to 63.51 percent), while thereafter it increases; (2) bank size is negatively related to the rate of NPLs; (3) revenue source diversification cannot effectively reduce the rate of NPLs; (4) rates of NPLs steadily increased from 1996 to 1999; and (5) banks established after deregulation, on average, have a lower rate of NPLs than those established before deregulation.

Fofack (2005) examined the determinants of non-performing loans for sixteen Sub-Saharan African countries using pseudo panel (unbalanced panel) models over the 1993 to 2002 period. The findings showed the macroeconomic variables, change in real effective exchange rate and real interest rate, have significant positive effect on non-performing loans, while the influence of GDP per capita was negative and significant. The only significant bank-specific variable was net interest margin which has an adverse impact on non-performing loans.

Boudriga et al. (2010) analysed the impact of bank-specific, business and institutional environmental factors on non-performing loans for a sample of forty-six banks from twelve countries in the Middle East and North Africa (MENA) region for the period 2002 to 2006. The results revealed that among the bank-specific factors, foreign participation coming from developed countries, credit growth and return on assets have significant negative influence on non-performing loans, while capital adequacy and loan loss provisions have a positive and significant impact. The results also highlighted the importance of the institutional environment in enhancing credit quality. Specifically, better enforcement of rule of law, sound regulatory quality, better control of corruption, and free

voice and accountability were significant in reducing non-performing loans. With regards to the business environment, quality of information published by private and public credit bureaus, and legal rights were significant in reducing non-performing loans in the MENA countries.

Warue (2012) used multiple regression analysis to determine the effect of external factors, microfinance institutions' (MFIs) and self-help groups' (SHGs) specific factors on loan delinquency in MFIs in Kenya. A survey research design was used and a census of forty-nine MFIs was taken. The findings revealed a significant positive effect of the MFI factor (proxied by management information system) on loan delinquency. The self-help groups' specific factor (peer pressure) and the external factor (economic downturn) also have a positive and significant impact on loan delinquency. Akinlo and Emmanuel (2014) also contributed to studies done in Africa. The authors estimated a macroeconomic model for non-performing loans in Nigerian banks over the period 1981 to 2011. The results showed that in the long run, economic growth has significant negative impact on non-performing loans while the influence of credit to the private sector and exchange rate was positive and significant. In the short run, the significance of credit to the private sector and exchange rate was maintained, and the lending rate and stock market index were also main determinants of non-performing loans.

Using monthly data for the period 2007 to 2009, Adebola et al. (2011) employed the autoregressive distributed lag (ADRL) approach to examine the effects of macroeconomic determinants (industrial production index, interest rate, producer price index) on non-performing loans in Malaysian Islamic banks. The findings revealed that in the long run, interest rate (average lending rate) has significant positive effect on non-performing loans, while the impact of producer price index was negative and significant. The effect of the industrial price index was found to be positive but insignificant. The short-run results were generally similar to the long-run findings.

Using a dynamic panel data model, Kastrati (2011) examined the determinants of non-performing loans in fifteen transition economies (Albania, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Georgia, Bulgaria, Croatia, Macedonia, Moldova, Montenegro, Kosovo, Romania, Serbia, Ukraine) for the period 1994 to 2009. The findings revealed that the macroeconomic variables, GDP growth and inflation, have significant negative impact on non-performing loans while competition in the banking sector, proxied by the number of banks, has a positive and significant effect. There was also evidence of persistence in the non-performing loans through the significantly positive coefficient of the lagged non-performing loans variable. In addition, the dummy variable for year 2009 has significant positive impact on non-performing loans. This result was in line with developments that characterized year 2009, especially the first part of the year, considering the start of the financial crisis in 2008, whose effects were mainly transferred during the year 2009.

De Bock and Demyanets (2012) assessed the determinants of non-performing loans for twenty-five developing economies over the period 1996 to 2010. The results from a dynamic panel regression indicated that GDP growth, currency depreciation against the US dollar, terms of trade and outflows of debt-creating capital have significant negative impact on non-performing loans. There was also evidence of persistence in the non-performing loans.

Ahmad and Bashir (2013a) investigated the bank-specific determinants of non-performing loans for thirty banks in Pakistan over the 2006 to 2011 period. The results showed that the loan to deposit ratio, return on assets, credit growth and reserve ratio have significant positive influence on non-performing loans. In another study Ahmad and Bashir (2013b) analysed the impact of macroeconomic variables on non-performing loans in Pakistan over the 1990 to 2011 period. The findings revealed that the impact of GDP growth, interest rate, inflation rate, exports and industrial production was negative and significant, while the consumer price index has significant positive effect on non-performing loans. The other variables unemployment rate, real effective exchange rate and foreign direct investment were insignificant in explaining variations in non-performing loans. Hassan et al. (2015) also conducted a study on Pakistan banks. Their results indicated that various

bank-specific variables like credit assessment, credit monitoring and credit growth have significant effect on non-performing loans, whereas interest has weak significance. Also, social factors including political interference and bankers' incompetence have significant impact on non-performing loans.

Shingjergji (2013a) examined the impact of bank-specific factors on non-performing loans in the Albanian banking system over the 2002 to 2012 period. The results revealed that return on equity and loans to asset ratio have significant negative effect on non-performing loans, while the impact of total loans and net interest margin was positive and significant. The capital adequacy ratio was found to have insignificant influence on non-performing loans in the Albanian banks. In another study Shingjergji (2013b) assessed the impact of macroeconomic factors (GDP growth, inflation rate, interest rate, foreign exchange rate) on Albanian banks over the period 2005 to 2012. The findings indicated that GDP growth and foreign exchange rate have significant positive effect on non-performing loans while inflation has significant negative effect. The positive and statistically significant coefficient of the lagged non-performing loans variable was suggestive of persistence in non-performing loans in the banking system. Berhani and Ryskulov (2014) also studied the impact of macroeconomic variables (GDP growth, inflation rate, money supply (M2) annual growth rate, interest rate and unemployment rate) on non-performing loans in the banking system of Albania. The multiple regression analysis indicated that all variables except unemployment rate have negative impact on non-performing loans. However, all the variables were statistically insignificant.

Ouhibi and Hammami (2015) analysed the macroeconomic determinants of non-performing loans in the banking system of six Southern Mediterranean countries (Tunisia, Morocco, Egypt, Lebanon, Jordan and Turkey) for the 2000-2012 period. The result showed that the consumer price index and gross capital formation have significant negative impact on non-performing loans, while the effect of nominal exchange rate was positive and significant.

In a more recent study Rajha (2016) investigated the bank-specific and macroeconomic determinants of non-performing loans for twelve banks in Jordan over the 2008 to 2012 period. The empirical results revealed that economic growth and inflation have significant negative effect on non-performing loans, while the impact of the loans to asset ratio and dummy variable representing the global financial crisis was positive and significant. There was also evidence of persistence in the non-performing loans. The lending rate and bank size variables were insignificant in explaining movements in non-performing loans in the Jordanian banks.

### **Caribbean evidence**

Studies undertaken on banking systems in the Caribbean have found varied explanations for the variations in non-performing loans. Khemraj and Pasha (2009) investigated the macroeconomic (GDP growth, inflation rate, real effective exchange rate) and bank-specific (loans to total assets ratio, credit growth, size, real interest rate) determinants of non-performing loans in the Guyanese banking sector for the 1994 to 2004 period using a panel dataset and a fixed effect model. The findings revealed that real effective exchange rate has significant positive impact on non-performing loans, while there was a significant inverse and instantaneous effect of GDP growth on non-performing loans. However, inflation was shown not to be an important determinant of non-performing loans in the Guyanese banking system. With respect to the bank-specific variables, real interest rates (measured as the difference between the weighted average lending rate and the annual inflation rate) and loans to asset ratio have significant positive impact on non-performing loans, while credit growth exerted significant negative influence on non-performing loans. The results also showed that large banks were not necessarily more effective in screening loan customers when compared to smaller banks, as evidenced by the insignificance of the bank size variable.

Chase et al. (2005) used ordinary least squares (OLS) to forecast non-performing loans in Barbados using quarterly data for the period 1996 to 2002. The explanatory variables considered were the 3-month Treasury bill rate, inflation rate, GDP growth and lagged non-performing loans. All of the explanatory variables were found to be significant. Greenidge and Grosvenor (2010) used

quarterly data spanning the period 1996 to 2008 to forecast non-performing loans for five commercial banks operating in Barbados. The authors amplified the model presented by Chase et al. (2005) and replaced the 3-month Treasury bill rate with the weighted average loan rate. The results revealed that macroeconomic factors such as growth in real GDP, inflation and the weighted average loan rate have significant negative impact on the level of non-performing loans. There was also evidence of persistence in the non-performing loans.

Guy and Lowe (2011) contended that the model presented by Greenidge and Grosvenor (2010) produced inaccurate results. They noted the exclusion of the largest bank from their study due to a merger that took place in 2002. Therefore, the authors reconstructed the data and employed a balanced panel framework, utilizing quarterly data from the six commercial banks for the period 1996 to 2010. To create a comprehensive forecasting model of the commercial banks' non-performing loans, two variants of a dynamic panel framework were used: a pooled estimator and a heterogeneous fixed-effect estimator. The results indicated that GDP growth, inflation and lending rate have significant negative impact on non-performing loans, while loan growth, loan to deposit ratio and ROA were shown to be insignificant variables.

Belgrave et al. (2012) also added to the literature on non-performing loans in Barbados. Using a panel vector autoregressive (VAR) model and a database consisting of quarterly observations for the period 1996 to 2010, the authors examined the sensitivity of non-performing loans to shocks to six economic industries in Barbados. The industries included agriculture and fishing; construction, mining and quarrying; distribution; manufacturing; professional services and tourism. The results indicated some degree of heterogeneity in the response of non-performing loans to shocks to the six industries. For example, positive shocks to aggregate output of the distribution, professional and tourism industries led to an overall reduction in the level of stress in the financial system though the timing of responses differ across each industry. In addition, there was a positive relationship between non-performing loans and shocks to the construction, mining and quarrying industries. On the other hand, there was no evidence of a direct relationship between non-performing loans and shocks to the agriculture and manufacturing industries which are the two smallest industries. Based on the non-uniformity in the non-performing loans response to shocks to the various industries, the authors concluded that studies based on aggregate output shocks for Barbados could conceal differences in non-performing loan behaviour and can even lead to erroneous conclusions. They further noted that the significance of the direct impacts largely depends on the size of the industry in relation to GDP and total loans.

Grosvenor and Guy (2013) analysed non-performing loans in Barbados using a Markov Switching approach and quarterly data the period 1996 to 2011. The variables used in the study were inflation, average loan growth and GDP. The result showed a negative relationship between non-performing loans and GDP. The impact of GDP is greater in times of low non-performing loans (Regime 0) compared to periods of high non-performing loans (Regime 1). This implies that the rate at which non-performing loans decrease in periods of economic boom is higher than the pace at which non-performing loans grow during recessionary times. Also, mixed results were observed for inflation and loan growth. In Regime 0, inflation is negatively correlated with non-performing loans, while in Regime 1 a positive association is indicated, with both effects significant. Loan growth was found to have a positive insignificant relationship with non-performing loans in Regime 0 whereas the relationship is negative in Regime 1. The authors justified this result by stating that in periods of low non-performing loans, banks may become less stringent in their lending practices and lend to more risky borrowers, thereby causing the total loans portfolio and non-performing loans to increase.

Jordan and Tucker (2013) employed a vector error correction (VEC) model to examine the determinants of non-performing loans in the Bahamas for the period 2002 to 2011. The results revealed that real GDP growth has significant negative impact on non-performing loans, while the

effect of private sector credit was positive and significant. These results were obtained for both the long run and dynamic specifications. There was also evidence of a small but statistically significant feedback effect from non-performing loans to output.

Rahaman et al. (2014) employed the Generalized Method of Moments approach to investigate the bank-specific (ROE, equity to assets ratio, loans to assets ratio, loan growth) determinants of non-performing loans in the commercial banking sector of Trinidad and Tobago. The results showed that the equity to assets and loans to assets ratios have significant positive impact on non-performing loans, while loan growth has significant negative influence. However, ROE was found to be insignificant in explaining movements in non-performing loans in the Trinidad and Tobago banking system.

Beaton et al. (2016) assessed the macroeconomic and bank-specific determinants of non-performing loans for thirty-four banks in the Eastern Caribbean Currency Union (ECCU) using quarterly data for the period 1996 to 2015. The results indicated that both global and country-specific macroeconomic developments affect non-performing loans in the ECCU. Specifically, growth in advanced economies has significant negative impact on non-performing loans, suggesting a positive spillover from global macroeconomic developments. Conversely, tourism growth (proxy for domestic economic activity) was found to have significant positive influence on non-performing loans, reflecting the inherent riskiness in lending to the tourism sector. Bank-specific variables were also found to be important determinants of non-performing loans. Exposure to the construction sector and household loans exerted significant positive influence on non-performing loans. On the other hand, the impact of profitability, captured by the ROA, credit to the private sector lagged and type of bank ownership (represented by a foreign bank dummy) was negative and significant. Further, the global financial crisis, captured via a dummy variable for 2008-2015, has significant positive effect on non-performing loans in the ECCU over the review period.

### 3. Commercial Banking Industry in Barbados

Commercial banking began in Barbados with the establishment of the colonial Bank (later to become Barclays Bank) in 1837. Indigenous banking began in 1978 with the opening of the Barbados National Bank. Today, however, the banking system comprises foreign-owned banks with headquarters in Canada, and Trinidad and Tobago (Table 1)

Since 2002 a series of changes have taken place in the banking industry resulting in the merger and acquisition of some commercial banks. As at 2017 the commercial banks licensed to operate in Barbados were the Bank of Nova Scotia, CIBC FirstCaribbean International Bank (a merger of Barclays Bank PLC and Canadian Imperial Bank of Commerce (CIBC)), First Citizens Bank (Barbados) Limited (formerly Bank of Butterfield), Republic Bank (Barbados) Limited (formerly the Barbados National Bank), and RBC Royal Bank (Barbados) Limited (a merger of Royal Bank of Trinidad and Tobago (RBTB) and Royal Bank of Canada). The mergers and acquisitions in the banking industry may have been in response to the increasing global pressures and the desire of these multinational corporations to expand market share, and enhance competitiveness and efficiency (Wood and Brewster, 2016). The banks and their majority shareholders have continued to achieve high levels of profitability as evidenced by the ratings given Standard & Poors and Moodys, respectively (Table 1).

Name	Majority Shareholder/ Headquarters	Local (S&P)	Rating	Majority Shareholder's Rating (Moody's)
Bank of Nova Scotia	Bank of Nova Scotia/Canada	AAA		Aa2
Republic Bank (Barbados) Limited	Republic Bank/ Trinidad and Tobago	A		Baa1

First Citizens Bank (Barbados) Limited	First Citizens Bank/ Trinidad and Tobago	A	Baa1
CIBC FirstCaribbean International Bank	CIBC/Canada	AAA	Aa3
RBC Royal Bank (Barbados) Limited	Royal Bank of Canada/Canada	AAA	Aa3

Table 1: Ownership Structure and Rating of Commercial Banks in Barbados

Source: Central Bank of Barbados.

The banking industry in Barbados conforms to the theoretical requirements of oligopoly: only a few firms in the industry so that the actions of one can affect the profits of another, bank deposits and loans are homogenous commodities and the number of banks is restricted by barriers to entry like the dominant position of established banks and financial regulations (Wood, 2012).

Commercial banks dominate the financial system, accounting for 60% of total assets, 80% of total deposits and 72% of all lending (Central Bank of Barbados, 2014). Since 2000 most of the credit extended by the banks went to the personal sector, followed by tourism, distribution, professional and other services, and the government. Loans are heavily collateralized. Wood (1994) reported that in 1991 about 99% of loans allocated by the foreign-owned commercial banks were secured by some form of collateral and Howell (2014) found there was no material change in the situation in 2013.

Commercial banks in Barbados provide a range of products and services to their customers. Banking services include personal accounts, electronic banking, premium banking, and corporate and commercial banking. Mobile banking, retirement plans, mutual fund investments, automatic teller machines, credit and debit card technologies are also utilised by commercial banks. Some of the services have been introduced and developed in response to legislative changes within the sector and others due to customer erudition and advances in technology. Further, commercial banks have added small business units, wealth management services and merchant banking to their operations to cater to the needs of smaller enterprises, attend to their more discriminating clients and perform investment banking activities, respectively.

Over the years there have been other important developments in the financial sector which have changed the behaviour of banks. These developments include:

- Establishment of the Central Bank of Barbados which is the chief regulator of the banking system.
- Liberalisation of the weighted average loan rate as a means of mobilising savings in the economy and promoting commercial bank efficiency.
- Establishment of the Barbados Stock Exchange (BSE) which offers an alternative source of funds for corporate borrowers, in addition to providing new opportunities for investors seeking to earn more attractive returns than those available on saving accounts.
- Development of the mutual funds industry which provides an alternative to the traditional saving accounts offered by banks.
- Rapid expansion of the credit union movement.
- Removal of the minimum savings rate that signalled the end of a long-established policy of structured interest rates on loans and deposits.

The commercial banking sector has weathered the global financial crisis and local recession relatively well, with capital adequacy ratios remaining well above international guidelines and the statutory requirement of 8%. Furthermore, the banks maintained a strong liquidity position in the post crisis period (Wood and Brewster, 2016). However, the main impact of the economic downturn has been an increase in loan delinquency and weakened credit quality. The non-performing loans to total loans ratio increased from a low of 2.9% in 2007 to 12.9% in 2012 before declining to 10.8% at the end 2015. While the bulk of the non-performing loans are in the substandard category, there has been a notable increase in doubtful loans tied to the overall macroeconomic conditions.

#### 4. Methodology and Data Issues

The paper investigates the determinants of non-performing loans in commercial banks in Barbados. A multiple regression model was utilised which includes a number of macroeconomic and bank-specific variables. The macroeconomic variables are GDP growth, inflation rate, unemployment rate and interest rate, while the bank-specific variables are ROE, ROA, capital adequacy ratio and loan to deposit ratio. The choice of variables for the model was influenced by the literature review, particularly the research undertaken on non-performing loans in the commercial banking system of Barbados. However, we extend the previous work through the inclusion of the ROE and capital adequacy ratio. These variables were considered based on their use in studies in other developing economies and their perceived importance in a Barbadian context.

Accordingly, the estimated model is as follows:

$$\ln NPL = f(\text{GDPGR}, \ln INF, \ln UR, \ln RIR, \ln ROE, \ln ROA, \ln CAR, \ln LTD)$$

where NPL is the non-performing loans ratio, GDPGR is the growth rate of gross domestic product, INF is the inflation rate, UR is the unemployment rate, RIR is the real interest rate, ROE is the return on equity, ROA is the return on assets, CAR is the capital adequacy ratio, LTD is the loan to deposit ratio and ln is the natural logarithm. The methodology for calculating the variables and their anticipated impact on non-performing loans are given in Table 2.

The study uses aggregate annual data for the period 1991 to 2015 which were obtained from the Central Bank of Barbados. Manual variable calculation was done with the assistance of Microsoft Excel and the econometric model was estimated using SPSS. Descriptive statistics were derived in order to summarise the data with the generation of means, standard deviations, minimum and maximum values.

#### 5. Empirical Results

The summary statistics and trends for the variables are presented in Table 3 and Figures 1 to 8 in the Appendix, respectively. All variables except ROE and CAR have twenty-five observations.

##### 5.1 Descriptive Statistics

The non-performing loans ratio declined steadily until 2000 after reaching a high of 13.2% at the end of 1993. This decline can be attributed to eight years of growth in the Barbadian economy from 1993 to 2000 (Figure 1). The quality of the loan portfolio weakened in 2001 which was in line with the contraction of GDP by 2.1% during that year.

Variables	Definition	Anticipated Impact
NPL	Ratio of non-performing loans to total loans	
GDPGR	$\frac{\text{GDP}_t - \text{GDP}_{t-1}}{\text{GDP}_t} \times 100$	(-)
INF	$\frac{\text{CPI}_t - \text{CPI}_{t-1}}{\text{CPI}_{t-1}} \times 100$ where CPI is the consumer price index	(+)(-)
UR	Ratio of unemployed persons to the total labour force	(+)
RIR	The weighted average lending rate	(+)
ROE	Ratio of profits to total equity	(-)
ROA	Ratio of profits to total assets	(+)(-)
CAR	Ratio of total equity to total assets	(+)(-)
LTD	Ratio of loans to deposits	(+)

Table 2: Summary of variables used in regression model

Source: Authors' compilation

<b>Determinants</b>	<b>Observations</b>	<b>Mean</b>	<b>Standard Deviation</b>	<b>Maximum</b>	<b>Minimum</b>
Non-performing loans Ratio	25	8.45	3.56	13.20	2.90
GDP Growth	25	0.99	2.79	5.67	-5.70
Inflation Rate	25	3.45	2.94	9.43	-1.27
Unemployment Rate	25	12.93	4.95	25.60	7.40
Interest Rate (Weighted Average)	25	10.22	2.11	15.00	6.84
Return on Equity	22	25.81	10.52	36.60	5.90
Return on Assets	25	1.62	0.53	2.60	0.70
Capital adequacy Ratio	21	17.40	2.02	21.00	14.60
Loan to Deposit Ratio	25	62.43	6.00	73.60	51.20

Table 3: Summary of Descriptive Statistics

Source: Authors' compilation using SPSS

The economic decline resulted from some sectors grappling with adjustment efforts to cope with trade liberalisation and the negative spillover effects of a depressed world economy. As early as 2002 requests for the restructuring of loans were being realised by banks as they started to see an increase in loan defaults by borrowers (IMF, 2003). Economic expansion during the period 2003 to 2007 contributed to an improvement in the quality of loans, with the non-performing loans ratio declining from 8.2% to 2.9% during those years. However, with the Barbadian economy being impacted negatively by the global financial crisis, there was a reversal in the trend in non-performing loans (Figure 1). The ratio increased steadily to a level of 12.9% in 2012. With modest recovery in the economy since 2012 there has been a slight decline in the non-performing loans ratio to 10.8% in 2015.

The inflation rate averaged 3.45% over the review period. The highest level of 9.43% was recorded in 2011 (Figure 2) which can be attributed to the pass-through effects of the increase in indirect taxes in late 2010 coupled with higher import prices, particularly for fuel (Central Bank of Barbados, 2011). The economic expansion experienced by the Barbadian economy between 1993 and 2000 was reflected in a decline in the unemployment rate from 25.6% to 9.3% over the period (Figure 3). The rate increased to 10.3% in 2002, before falling to its lowest level of 7.4% in 2007. However, there were increases in the unemployment rate since 2008 as the country grappled with the effects of the global financial crisis. Over the review period the rate of interest (weighted average lending rate) averaged 10.22%, with the highest level of 15% recorded in 1991 and the lowest at 6.84% in 2015 (Figure 4). From 1991 to 2003 the interest rate remained at levels above 10%. In 2004, the interest rate fell by 0.3 of a percentage point to 9.83% as a result of the Central Bank cutting the minimum deposit rate from 2.5% to 2.25% and lowering the minimum securities requirement of commercial banks from 16% to 12% of domestic deposits. However, in 2005 the weighted average lending rate rose to 10.63% as a result of the action of the Central Bank to increase the bank rate (interest rate commercial banks are charged on short-term loans) from 7.5% to 10%. This action reflected the tight monetary policy stance adopted by the Central Bank in an effort to curb credit demand and thereby reduce the pressure on the Net International Reserves (NIR). Since 2007 the interest rate has remained below 10%, reflecting a softer monetary policy by the Central Bank and the commercial banks' response to the adverse impact of the global financial crisis.

Commercial banks in Barbados remained relatively profitable from 1991 to 2000, with the ROE fluctuating between 34% and 38% (Figure 5). Profitability declined over the next three years as indicated in the fall of the ROE to 21% in 2003. There was a subsequent increase in the ROE to 27.6% in 2006. However, because of the weak economic environment caused by the financial crisis, which resulted in an increase in delinquency and deterioration in credit quality, there was a decline in the profitability and performance of banks in the post 2006 period. The ROE declined to 5.9% in 2012. The profitability of the banks in the 1990s was also reflected in the ROA which fluctuated between

1.3% and 2.2% (Figure 6). Over the next four years the ROA averaged 2.3%. There was a reversal in the trend of ROA in the post financial crisis period; the ROA recorded its lowest value of 0.8% in 2013 before recovering slightly to 1.0% in 2015. The capital adequacy ratio for the commercial banks consistently surpassed the regulatory requirement of 8%. The CAR recorded a minimum value of 14.6% in 2006 and a maximum value of 21% in 2012 (Figure 7). This indicates that the commercial banks were well-capitalised during the review period. The loan to deposit ratio is a measure of liquidity and over the review period fluctuated from a low of 51.2% in 1996 to a high of 73.6% in 2012 (Figure 8). The LTD declined by 4.3% percentage points to 69.3% in 2013 and further to 66.4% in 2015. The latter decline may have resulted from the Central Bank's decision in April 2015 to discontinue its policy of setting the minimum savings deposit rate. This policy shift to market-determined rates resulted in broad-based reductions in deposit rates given the oligopolistic nature of the commercial banking industry in Barbados. Such behaviour on the part of commercial banks has resulted in some customers switching their deposits to local credit unions where the returns are relatively higher.

## 5.2 Model Results

Determinants	Coefficient	P> [T]
Constant	12.57	0.000
GDP Growth	-0.182	0.000*
Inflation Rate	0.019	0.907
Unemployment Rate	0.485	0.000*
Interest Rate	-0.631	0.000*
Return on Equity	-0.679	0.000*
Return on Assets	-0.469	0.001*
Capital adequacy Ratio	0.496	0.001*
Loan to Deposit Ratio	0.334	0.028**
R <sup>2</sup>	0.822	
Adjusted R-Square	0.806	
F-statistic	10.624	
Prob (F-statistic)	0.000	
*significant at the 1% level.		
**significant at the 5% level.		

Table 4: Results of the regression model

Source: Authors' compilation using SPSS

Table 4 shows the R-squared which indicates the proportion of variability in the dependent variable which is explained by the regression model. The result indicates that the estimated model explains 82.2% of the variation in the non-performing loans ratio. Moreover, when R-squared is adjusted for positive bias 80.6% of the variation in the non-performing loans ratio is due to the explanatory variables. These values are indicative of a good fit of the model to the data. When tested using the Analysis of Variance (ANOVA) method at the 5% significance level, the model is also shown to be statistically significant as indicated by the F-statistic of 0 which is less than the p-value of 0.05, thus confirming that the regression is highly explained.

The significance of individual variables in explaining the movements of the non-performing loans ratio over the review period can be tested using the probability value reported in the last column on Table 4. With the exception of the inflation rate, all other variables have a significant impact on the non-performing loans ratio. Of the macroeconomic variables, the interest rate has the largest impact on the non-performing loans ratio with a coefficient of -0.631; whilst the bank-specific variable exerting the greatest influence is the return on equity with a coefficient of -0.679.

## 6. Discussion of Findings

The results show that GDP growth has a significant negative impact on non-performing loans. This finding indicates that an improvement in the real economy enhances the debt-servicing capacity of the borrower, which in turn contributes to lower non-performing loans. Such a result was anticipated and supports many previous studies including Ranjan and Dhal (2003), Fofack (2005), Chase et al. (2005), Khemraj and Pasha (2009), Greenidge and Grosvenor (2010), Guy and Lowe (2010), Jordan and Tucker (2013) and Prasanna (2014). Inflation was shown to have a negative and insignificant impact on non-performing loans of commercial banks in Barbados. This result corroborates the studies by Khemraj and Pasha (2009) and Berhani and Ryskulov (2014) but is at variant with the findings of Guy and Lowe (2011), Kastrati (2011), Shingjergi (2013b), and Rajha (2016) who obtained a significant impact of inflation on the level of non-performing loans.

Consistent with the theory, the unemployment rate exerts a significant positive influence on non-performing loans. Unemployment negatively affects the cash flow of households and businesses, increase their debt burden and prohibits them from meeting their financial obligations. The interest rate (weighted average lending rate) was found to have a significant negative influence on non-performing loans. This unanticipated result supports previous studies by Greenidge and Grosvenor (2010), Guy and Lowe (2011) and Ahmad and Bashir (2013b) and suggests that an increase in loans rates causes a reduction in loan growth and therefore a decrease in the level of non-performing loans. The result is however contrary to the findings of Fofack (2005), Khemraj and Pasha (2009), Adebola (2011) and Prasanna (2014).

All the bank-specific variables in the model were statistically significant. The negative and significant impact of ROE on the levels of non-performing loans indicates the existence of sound management of funds invested by shareholders via good agency relationships in commercial banks in Barbados. Furthermore, the result is supportive of the bad management hypothesis as bad management leads both to riskier activities and weak financial performance. The negative influence of ROE on non-performing loans corroborates the previous finding of Shingjerji (2013a) in the case of Albanian banks. The significant negative impact of the ROA on non-performing loans substantiates the view that risk taking is reduced in banks exhibiting high levels of performance. The result is also supportive of the bad management hypothesis and accords with the findings of Boudriga et al. (2010) and Beaton et al. (2016). However, the result is contrary to the significant positive effect of ROA on non-performing loans found by Swamy (2012) and Ahmad and Bashir (2013a).

The positive and significant impact of the CAR on non-performing loans is an interesting result given that commercial banks in Barbados consistently maintain a CAR well above the minimum 8% threshold. The result, however, supports the finding of Godlewski (2004) that regulatory pressure may not be the most appropriate regulatory device to mitigate excessive risk taking by banks in emerging markets. Indeed, Demircuc-Kunt and Huizinga (1999) noted that larger capital stores result in banks pursuing opportunities more aggressively, which means increased risk taking with the consequential result of higher non-performing loans. Our finding is supportive of Boudriga et al. (2010) and Rahaman et al. (2014), but contrary to Swamy (2012) and Shingjerji et al. (2013a) who found CAR to be negative and insignificant in their studies.

The empirical results indicate that the LTD has a significant positive effect on non-performing loans. This finding suggests that with the growth in deposits banks engage in extensive lending, which leads to an increase in bank lending relative to deposits. Such aggressive lending behaviour results in banks allocating funds to low quality borrowers, thereby increasing the riskiness of the loan portfolio and the level of non-performing loans. The result supports the previous findings of Swamy (2012) and Ahmad and Bashir (2013a), and is stronger than the finding of Guy and Lowe (2011) who found a positive but insignificant impact of LTD on non-performing loans for commercial banks in Barbados.

## 7. Conclusion

This paper examined the bank-specific and macroeconomic determinants of non-performing loans of commercial banks in Barbados using annual data for the period 1991 to 2015. Based on the findings, 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.

Some important conclusions emerge from the empirical results. First, commercial banks should pay close attention to several factors when granting loans in order to restrict the level of non-performing loans. Specifically, banks should use macroeconomic conditions such as economic growth, unemployment and interest rate in predicting the level of non-performing loans. The adverse impact of GDP growth (and positive impact of unemployment) on credit quality means that banks should take precautionary measures against the expansion of credit during economic downturns. Thus, they should allocate credit more efficiently by concentrating lending on clients with good credit records and collateral security in order to reduce the incidence of default and level of non-performing loans. Restoration of growth in the economy through carefully designed economic policies by the government will undoubtedly increase the level of employment with the consequential impact of reducing the level of non-performing loans. Second, the banks should be mindful of the adverse impact of the interest rate on non-performing loans and, hence, should continue to employ sound screening procedures for loan applicants. Third, the significant negative influence of ROE and ROA on non-performing loans indicates the importance of managerial performance in the banks achieving good credit portfolios. Thus, the banks should continue to aim for healthy profitability positions. Fourth, the positive impact of CAR on non-performing loans indicates that well-capitalised banks in Barbados are able to utilise their capital to absorb the risk associated with their loan portfolios. Indeed, the Central Bank of Barbados during 2013 reported that various stress tests were undertaken to determine the impact of credit risk on the capital adequacy of banks and the results indicated that the banks remained solvent even in the face of sizeable economic shocks. Finally, the significant positive impact of LTD on non-performing loans implies that banks should not utilise an extensive lending policy in order to deploy their deposits since it leads to an increase in the LTD ratio and increasing riskiness in the loan portfolio. They should use more detailed methods in determining credit worthiness and also seek safer alternative investments when deploying increased levels of deposits.

Though the study produced some encouraging results, it can be extended in a few important ways. First, the influence of a wider range of bank-specific (for example, size, credit growth, loan size) and macroeconomic (for example, money supply growth, gross capital formation, global macroeconomic developments) variables on non-performing loans can be considered in the future. It would also be useful to investigate the impact of social and cultural factors, and the institutional environment on non-performing loans. Further, incorporating structural breaks into the analysis can be explored. The financial crisis commencing in late 2007 may represent a structural break affecting the interrelations between non-performing loans and their determinant factors. Second, a methodological approach combining quantitative and qualitative approaches could be utilised in future studies on non-performing loans. Third, studies could be undertaken at a disaggregated level by decomposing loans by specific purpose (commercial, residential, and real estate mortgages), and by examining the interactions and relationships between non-performing loans and different types of borrowers, namely: individuals/households, small and medium-sized enterprises, and corporate borrowers. Fourth, it would also be useful if bank-level data are used in order to identify firm-specific issues and recommend tailored solutions. Fifth, the research is based on a single country. Future empirical work on the determinants of non-performing loans can be conducted on a Caribbean-wide basis or may consider a panel of Caribbean and other developing or developed economies. Finally, investigating the procedures that banks undertake to handle problem loans is an area of future research.

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Appendices

Figure 1 - Graphs showing trends of nonperforming loans ratio and growth in gross domestic product from 1991-2015

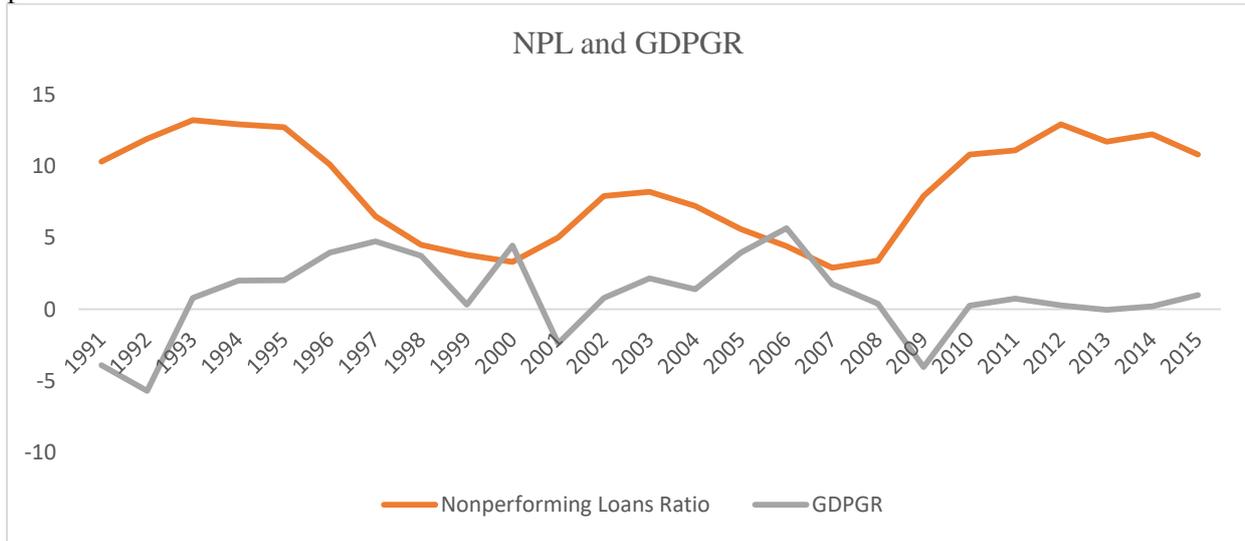


Figure 2 - Graph showing trend of inflation from 1991-2015

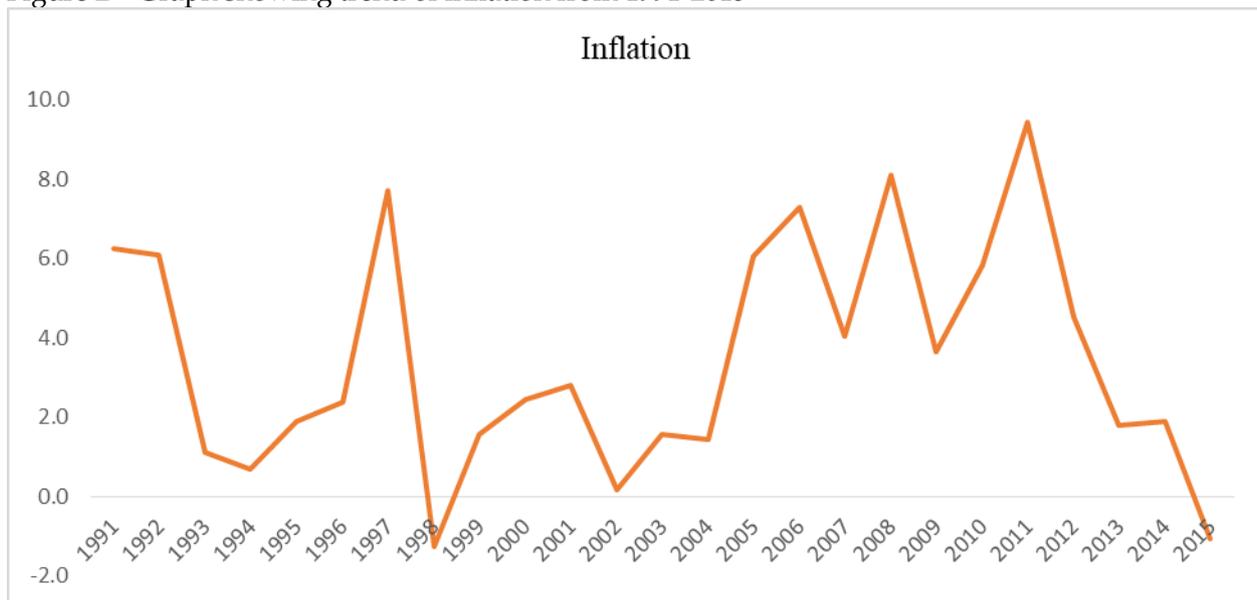


Figure 3 – Graph showing trend of unemployment from 1991-2015

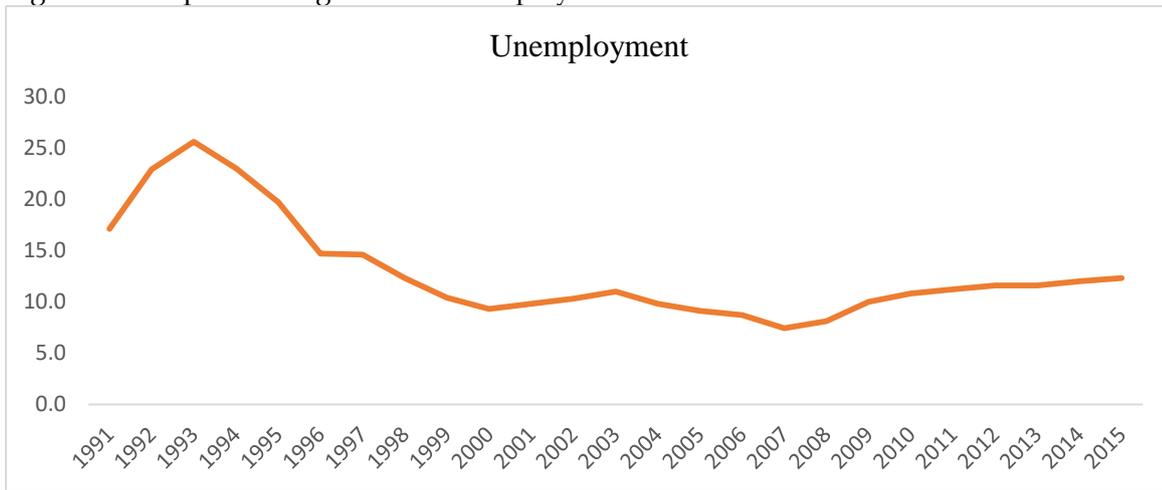


Figure 4 – Graph showing trend of weighted average lending rate from 1991-2015

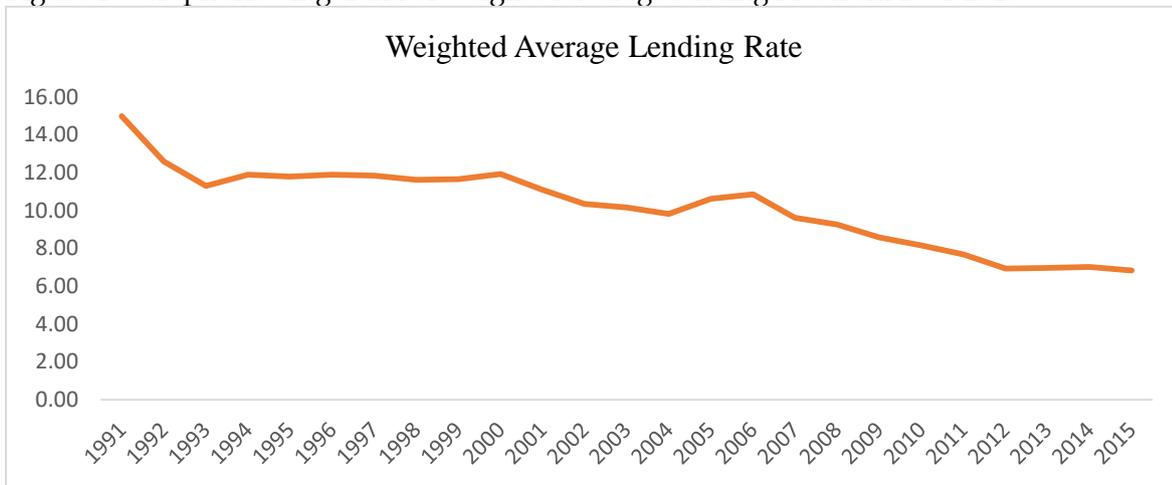


Figure 5 – Graph showing trend of return on equity from 1991-2012



Figure 6 – Graph showing trend of return on assets from 1991-2015



Figure 7 – Graph showing trend of capital adequacy ratio from 1995-2015

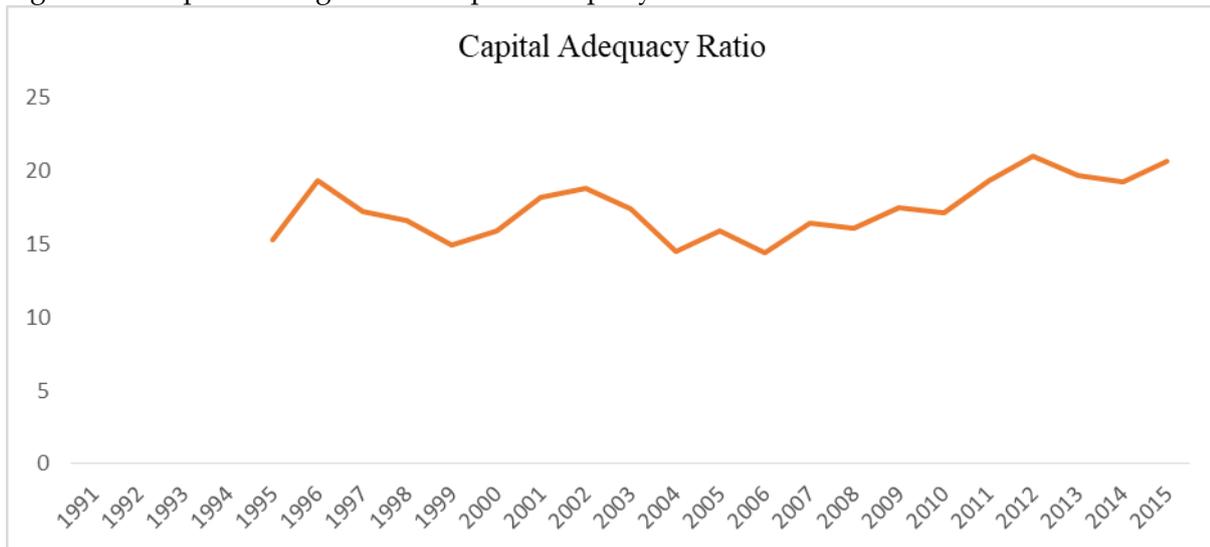


Figure 8 – Graph showing trend of loan to deposit ratio from 1991-2015

