

# THE IMPACT OF RISK FACTORS ON THE FINANCIAL PERFORMANCE OF THE COMMERCIAL BANKING SECTOR IN BARBADOS

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## Abstract

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The objective of this paper is to determine the impact of risk factors on the financial performance of the commercial banking sector in Barbados using quarterly data for the period 2000 to 2015. The empirical results indicate that Capital Risk, Credit Risk, Liquidity Risk, Interest Rate Risk and Operational Risk have statistically significant impacts on financial performance. The only risk variable which does not derive this result is Country Risk. In addition, of those variables which proxy external factors, only GDP Growth has a statistically insignificant influence on financial performance. Credit risk exerted a negative impact on the banks' financial performance, thus the banks must ensure they adopt appropriate measures to minimise the impact of this risk. Higher levels of capital impacted positively on the banking sector's profitability. This paper is the first effort employing such an extensive dataset based on Barbados' commercial banking sector and shows the main factors that influence commercial banks' financial performance in this developing economy.

**Keywords:** Barbados, Commercial Banks, Financial Performance, Risk, Risk Factors

## 1. INTRODUCTION

It is well established in the literature that banks play a pivotal role in the development process. In the course of financial activity, the savings of the economy are increased and rendered highly mobile, and the risk facing savers are reduced through diversification. Also, banks contribute to economic growth by enhancing the volume and productivity of investment activities (Wood, 2012). In performing these important roles, risks are inherent in the operations of banks. These risks are the basis of the banks' profitability (Gup and Kolari, 2005; Adeusi et al. 2014) and may impact the banks' financial performance in an adverse or positive manner (Schroeck, 2002; Fadun, 2013).

The objective of this paper is to determine the impact of risk factors on the financial performance of the commercial banking sector in Barbados. Knowledge of the ways in which risk factors influence financial performance places managers of Barbadian commercial banks in a position to effectively manage

their risk exposures in order to maximise profitability. Also, understanding the manner in which risk factors affect commercial banks' profitability helps to ensure a sound and efficiently functioning banking system which is able to support economic growth.

While studies on the relationship between risk factors and commercial bank profitability have been undertaken in many developing countries, there has surprisingly been a dearth of research in this area for Barbados and the wider Caribbean. Studies on the commercial banking sector in Barbados have focused on the development of commercial banking (Worrell and Prescod, 1983; Haynes, 1997; Wood, 2012; Howard, 2013), credit allocation (Codrington and Coppin, 1989; Wood, 1994; Howard, 2006; Craigwell and Kaidou-Jeffrey, 2012; Grosvenor and Lowe, 2014), competitiveness in the commercial banking industry (Craigwell et al., 2006), determinants of non-performing loans (Chase et al., 2005; Greenidge and Grosvenor, 2010; Guy and Lowe, 2011; Belgrave et al., 2012; Grosvenor and Guy, 2013), determinants of

non-interest income and its impact on commercial banks' financial performance (Craigwell and Maxwell, 2006), risk management practices (Wood, 1994; Wood and Kellman, 2013), innovation in the banking industry (Craigwell et al., 2005; Wood and Brathwaite, 2014) and performance of the banking sector (Wood and Brewster, 2016). This paper is the first effort employing such an extensive dataset based on Barbados' commercial banking sector and shows the main factors that influence commercial banks' financial performance in this developing economy. The paper therefore adds to the literature on commercial banking in the Barbadian economy.

The remainder of the paper is set out as follows: Section 2 reviews the empirical literature on the relationship between risk factors and commercial bank performance; Section 3 presents an overview of Barbados' commercial banking sector; Section 4 discusses the methodology and associated issues; Section 5 presents the empirical results which are then discussed in Section 6; and the conclusion is provided in Section 7.

## 2. LITERATURE REVIEW

Research on the impact of risk factors on the financial performance of commercial banks in developing countries has intensified with the advent of the financial crisis in late 2007. These studies have utilised varying estimation techniques to determine the influence of a range of risk variables on financial performance, measured as return on assets (ROA), return on equity (ROE), return on capital employed (ROCE), and net interest margin (NIM). Some studies were country specific while others considered groups of countries in a specific region or internationally.

Credit risk is acknowledged as the most important risk facing commercial banks. Thus, some studies have focused exclusively on examining the impact of credit risk on the financial performance of commercial banks. Kithinji (2010) examined the impact of credit risk on the profitability of banks in Kenya for the 2004 to 2008 period. The findings indicated that the credit proxies, amount of credit and non-performing loans, have insignificant impacts on the profitability of the commercial banks.

Boahene et al. (2012) investigated the impact of credit risk on the profitability of six Ghanaian banks for the period 2005 to 2009. The results revealed that the credit risk indicators, namely non-performing loan rate, net charge-off rate, and pre-provision profit as a percentage of net loans and advances were positive and significantly related with profitability measured by ROE. Another study on banks in Ghana was undertaken by Afriyie and Akotey (2013). They examined the influence of credit risk on the profitability of rural and community banks in the Brong Ahafo Region of Ghana. The panel regression model was employed for the estimation and the review period was 2006 to 2010. The results showed that non-performing loans have a significant positive impact on profitability, measured by ROE, while the influence of capital adequacy was insignificant.

Studies on commercial banks in Nigeria include Kolapo et al. (2012), Iwedi and Onuegbu (2014) and Uwalomwa et al. (2015). Kolapo et al. (2012) assessed the effect of credit risk on five commercial banks over the period of eleven years (2000 to 2010). The profitability measure was the ROA and the credit risk

variables were the ratio of non-performing loans to loans and advances (NPL/LA), ratio of total loans and advances to total deposits (LA/TD) and ratio of loan loss provision to classified loans (LLP/CL). Panel model analysis was employed to estimate the determinants of ROA. The results indicated that the credit risk variables have significant impacts on financial performance: non-performing loans and loan loss provisioning were inversely related to ROA, and loans and advances were positively related to ROA. Iwedi and Onuegbu (2014) investigated the effect of credit risk on the performance of five deposit money banks over a period of fifteen years (1997 to 2011). Panel data estimation was utilised to regress ROA on the credit proxies, non-performing loans ratio and the ratio of loans and advances to total deposits. The results indicated that both variables have a significant positive influence on financial performance. Uwalomwa et al. (2015) employed panel linear regression to assess the impact of credit risk on financial performance for the listed banks over the period 2007 to 2011. The findings revealed that while the non-performing loans ratio and bad debt variables have significant negative effects on financial performance of banks, the impact of the secured and unsecured loan ratio was insignificant.

Gizaw et al. (2015) utilised panel data estimation to assess the impact of credit risk on the profitability of eight commercial banks in Ethiopia for a period of twelve years (2003 to 2014). The results showed that the credit measures, non-performing loans and capital adequacy, have significant negative influence on profitability, while the impact of loan loss provisioning was positive and significant.

Other empirical studies outside of Africa have established a significant relationship between credit risk and bank performance. For example, Li et al. (2014) investigated the relationship between credit risk and profitability for forty-seven of the largest banks in Europe from 2007 to 2012. The results indicated non-performing loans have a significant positive effect on both profitability measures (ROA and ROE) and capital adequacy has an insignificant effect on both measures of profitability. Poudel (2012) studied the relationship between credit risk and commercial bank profitability in Nepal for the 2001 to 2012 period. The results revealed a significant inverse relationship between commercial bank performance, measured by ROA, and credit risk measured by the default rate and capital adequacy ratio. A significant inverse relationship between credit risk and profitability was also obtained by Hosna et al. (2009) in their study of Swedish banks, and Epure and Lafuente (2012) for the Costa Rican banking industry.

Other studies have assessed the impact of a wider range of risk variables on bank performance. Adeusi et al. (2014) investigated the impact of credit, capital, and liquidity risks, along with managed funds, on the financial performance of ten Nigerian banks from 2006 to 2009 using panel data estimation. The results indicated a significant negative impact of credit risk on financial performance, measured as ROA and ROE, whilst the capital risk and managed funds variables showed a significant positive influence on financial performance.

Soyemi et al. (2014) utilised cross-sectional Ordinary Least Squares regression to examine the

impact of credit, liquidity, operational, and capital risks on financial performance for eight deposit money banks in Nigeria in 2012. The results showed that credit risk and capital risk have significant positive influence on ROA, whilst only credit risk has significant positive influence on ROE. Another study on the Nigerian banking industry was undertaken by Olamide et al. (2015). The authors employed an Ordinary Least Squares regression for fourteen banks listed on the Nigerian Stock Exchange for the period 2006 to 2012. Proxies were used for credit, liquidity and capital risks, along with risk disclosure. The results revealed that the risk factors have an insignificant impact on financial performance, measured as ROE.

Hakim and Neaime (2001) examined the relationship between capital, credit and liquidity risks, and profitability measured as ROE for forty-three banks in Lebanon and sixty-two Egyptian banks over the period 1993 to 1999. The findings showed a significant negative impact of capital adequacy on bank profitability in both countries. The credit variable has a significant positive influence on profitability, while the liquidity variable's impact was insignificant across all banks.

Al-Tamimi et al. (2015) examined the influence of credit, liquidity, operational and capital risks on financial performance for eleven Islamic banks in the Gulf Cooperation Council (GCC) from 2000 to 2012. The results indicated a significant negative relationship between capital risk and operational risk when tested against ROE as the financial performance variable. In addition, capital risk was found to be the most important risk to banks in the region followed by operational risk.

Haque and Wani (2015) investigated the relationship between financial risk and financial performance of ten public and private sector banks in India from 2009 to 2013. Employing a Linear Multiple Regression model, the authors found that capital risk and insolvency risk exerted a significant positive influence on financial performance, whilst the impact of credit risk was significantly negative. Further, interest rate risk and liquidity risk showed an insignificant positive impact on financial performance.

Apart from risk, there are other bank-specific factors which may have an impact on banks' financial performance or profitability. These factors, which exemplify a bank's internal characteristics, include but are not limited to bank size, bank age, productivity growth and capital structure. Researchers have also considered the impact of external (environmental) or macro factors on banks' financial performance. With regard to the external factors, the most widely used are interest rates, economic growth, inflation, financial market structure (represented by regulatory conditions or concentration) and ownership structure.

Javaid et al. (2011) utilised the Pooled Ordinary Least Squares (POLS) method to analyse the internal determinants of ten Pakistan banks' profitability over the period 2004 to 2008. The results indicated that bank size has a significant negative effect on ROA, while the capital ratio and asset composition variables have significant positive influence on ROA. The liquidity proxy was found to have an insignificant effect on bank profitability. Another study on Pakistan was undertaken by Dawood (2014) who

evaluated the impact of cost efficiency, liquidity, capital adequacy, deposits and bank size on the profitability of twenty-three commercial banks over the period 2009 to 2012. The results revealed that cost efficiency and liquidity have significant negative influence on ROA, while capital adequacy has a positive and significant impact on ROA. However, the other variables deposits and bank size did not demonstrate any significant influence on profitability.

Ani et al. (2012) undertook an empirical assessment of select internal determinants of profitability for fifteen Nigerian banks over a ten-year period from 2001 to 2010. The results revealed that the capital ratio and asset composition have significant positive influence on ROA, while the impact of bank size was found to be insignificant. Similarly, Almumani (2013) examined the bank-specific factors determining profitability of thirteen Jordanian commercial banks listed on the Amman Stock Exchange over the 2005 to 2011 period. The major outcome of the study was that the cost management variable has a strong negative influence on bank profitability, measured as the ROA. The other variables liquidity, credit composition, credit risk, capital adequacy and bank size did not show any significant effect on profitability.

Menicucci and Paolucci (2016) investigated the impact of internal determinants on the profitability of twenty-eight European banks over the period of 2006 to 2015. The results indicated that the capital ratio, deposit ratio and size have significant positive impacts on bank profitability measured as ROE, while higher asset quality resulted in lower profitability levels.

Some early studies provided mixed results when the impact of various internal and external determinants of bank performance was examined. Molyneux and Thornton (1992) executed a study based on previous methodologies employed by Short (1979) and Bourke (1989). The authors examined the determinants of bank performance for a pooled sample of eighteen countries across Europe from 1986 to 1989. The results indicated a statistically significant positive relationship between return on capital and concentration. A positive relationship was also revealed between return on capital and nominal interest rates. Furthermore, there was a statistically significant positive relationship between government ownership and return on capital, which is contrary to the findings of Short (1979) and Bourke (1989). As it relates to asset-based returns, Molyneux and Thornton (1992) found that capital ratios and nominal interest rates were positively related to profitability. These results coincide with the findings of Bourke's study. In addition, government ownership and staff expenses have a positive influence on profitability and concentration has a statistically significant positive influence on profitability in that sample. Alternatively, liquidity was found to have a weak inverse relationship with profitability.

Demircuc-Kunt and Huizinga (1999) used bank-level data for the period 1988 to 1995 for eighty countries to study the determinants of bank profitability. The variables used encapsulated bank characteristics, bank taxation, macroeconomic determinants, financial structure, deposit insurance regulations, and legal and institutional indicators. The findings highlighted that banks were less

profitable when they have high levels of non-interest earning assets and when deposits are their main source of funding. International ownership usually translated to higher profitability for banks in developing countries whilst the relationship was opposite for industrialised nations. From an examination of the effects of the macro-economic variables, there was a positive relationship with inflation and profitability. High real interest rates were also associated with higher profitability, especially in developing countries. Furthermore, lower market concentration usually led to lower profits and banks which operate in sectors with higher competition were also less profitable.

Athanasoglou et al. (2008) examined bank-specific, industry-specific and macroeconomic determinants of bank profitability for an unbalanced panel of Greek banks over the period 1985 to 2001. The findings showed that capital and productivity were positively related to profitability whilst credit risk and expenses management have the opposite relationship. Size is the only firm-specific variable tested which does not have a statistically significant impact on profitability. From an industry perspective, ownership status and concentration were also found to have an insignificant impact on profitability for the review period. Finally, the macro-determinants of inflation and cyclical output were found to have positive and significant effects on the financial performance of the banking sector.

Sufian and Chong (2008) assessed the bank-specific and macroeconomic determinants of commercial bank profitability in the Philippines for the 1990 to 2005 period. The results indicated that size, credit risk and expense preference behaviour have significant negative impacts on bank profitability measured as ROA, while non-interest income and capitalization have significant positive influences. Of the macroeconomic determinants, inflation has a negative and significant effect on bank profitability while economic growth, money supply and market capitalization showed insignificant impacts.

Flamini et al. (2009) investigated the determinants of commercial bank profitability in forty-one countries across Sub-Saharan Africa for the period 1998 to 2006. As it relates to bank-specific variables, the study focused on measures of credit risk, activity mix, capital, size and market power. The results showed that higher profitability is concurrent with larger banks, activity diversification and private ownership. The study also examined macroeconomic determinants of profitability, more specifically cyclical output and inflation, which have a significant and positive effect on bank profitability.

Ally (2014) examined the effect of bank-specific and macroeconomic factors on the profitability of twenty-three Tanzanian banks for the 2009 to 2013 period. The findings showed size, capital adequacy and liquidity have significant positive impacts on profitability measured as ROA, while asset quality and expense management exerted a significant negative influence. However, the macroeconomic factors did not significantly affect bank profitability.

In examining the Caribbean, Moulton (2011) assessed the bank-specific and macroeconomic determinants of bank profitability in Jamaica. A Generalized Method of Moments technique was applied to a panel of fifteen banks using quarterly

data over the period 2000 to 2010. The results indicated that the bank-specific variables: bank expenditure, bank capital, credit risk and size have significant negative influences on profitability measured as ROA, while non-interest income and the market structure variables were found to have significant positive impacts on ROA. Regarding the macroeconomic variables, improvements in the stock market, economic growth and inflation have significant positive influences on banks' profitability. There was also evidence of persistence of profitability through the significantly positive coefficient of the lagged endogenous variable, ROA(-1).

Another study on the Caribbean was undertaken by Augustin and Prophète (2016) who investigated the bank-specific, market structure and macroeconomic determinants of bank profitability in Haiti. A Generalized Method of Moments approach was employed on a panel of nine banks using quarterly data for the 2001 to 2015 period. The findings showed that bank-specific factors, size and equity, have significant positive impact on profitability measured as ROA, while the influence of operating expenses and activity mix was negative and significant. With respect to market structure, banking system concentration has a relatively minor positive impact on ROA. For the macroeconomic variables, the growth in commercial activity and the main monetary policy rate have significant positive influence on bank profitability. The results also indicated evidence of profitability persistence, and that foreign ownership of banks and the January 2010 earthquake both exerted a significant negative impact on the profitability of banks.

A more recent study on the Caribbean was conducted by Hodge (2017) who examined the determinants of commercial bank profitability in the Eastern Caribbean Currency Union (ECCU) over the 1998 to 2016 period. Bank profitability was proxied by net interest margin and return on assets. The results indicated that bank size, non-performing loans and liquidity have significant negative impact on net interest margin, while GDP growth has a significant positive influence. There was also evidence of persistence of profitability with the net interest margin measure. When the return on assets is considered, non-performing loans, cost efficiency and liquidity have significant negative influence on profitability. GDP growth was also found to have a significant positive impact on the return on assets for commercial banks in the ECCU.

Emerging from the literature review is the observation that there are critical factors separate to risks which impact commercial bank performance. These factors are generally categorised as internal determinants (size, structure and internal efficiencies) and external determinants which tend to be macroeconomic variables that exert some influence on the operating environment of commercial banks and by extension their performance.

### 3. COMMERCIAL BANKING IN BARBADOS

Commercial banking started 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 is dominated by

foreign-owned banks with headquarters in Canada, and Trinidad and Tobago.

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 2002 a series of changes have taken place in the banking sector 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 (RBTT) and Royal Bank of Canada).

Over the years, the commercial banks have invested heavily in technology. The automatic teller machine (ATM), telebanking and internet banking services are among the advances which have made banking more convenient for all ages. Also, there has been a rapid increase in the use of debit and credit cards, especially for security purposes (Wood and Brathwaite, 2014). These advances have improved the productivity and efficiency in commercial bank operations by lowering the cost per transaction, increasing the speed of transactions and reducing the possibility of human error (Wood and Brewster, 2016). In a study on ATM usage and productivity in the Barbadian banking industry over the period 1979 to 2001, Moore et al. (2003) found that after the technology was fully implemented and was being used effectively, the productivity gains for the banks ranged from 3% to 17% in a given year. In another study on innovation and efficiency, Craigwell et al. (2005) found that the average Barbadian bank was relatively efficient when compared with their international counterparts and that bank size, financial innovation and income growth were the most important determinants of efficiency within the banks.

The issue of competitiveness within the Barbadian banking industry was addressed by Craigwell et al. (2006). Using panel data for the 1991 to 2004 period, the authors provided evidence that competition increased for the period 1991 to 2002 and again in 2004. Also, competition declined in 2003, which the authors attributed to the reduction in the number of banks due to merger and acquisition activity. Other research has focused on competition from non-bank financial institutions. Craigwell et al. (2006) placed emphasis on developments such as the establishment of the Barbados Stock Exchange (BSE) and advances in the mutual fund and credit union industries. However, given the rapid growth in the credit union industry, Belgrave et al. (2006) chose to investigate the interaction between bank activities and credit union activities during 1994 to 2000. The conclusion drawn was that the entities were not in

direct competition with each other. This meant that despite the challenge posed by credit unions to commercial banks, especially due to similarities in products offered, banks still remained dominant in the sector.

Another development shaping the banking sector was the establishment of the Central Bank of Barbados (CBB) in 1972. The Central Bank of Barbados is the chief regulator of the banking system in Barbados. Within its mandate for prudential regulation, the CBB monitors the operations of the commercial banks (and finance companies, merchant banks and trust companies) on the basis of the Financial Institutions Act 1997. It also has responsibility for the regulation of international or offshore banks on the basis of the Financial Services Act 2002 (Wood and Clement, 2015). Over the years the CBB has implemented many policies. For example, credit controls were employed to reduce the risk to export-oriented sectors (Worrell and Prescod, 1983); minimum requirements were set relating to capital and reserves (Haynes, 1997); and interest rate policies and foreign exchange controls were also issued to commercial banks. The CBB was aware of emerging risks and implemented these regulatory requirements to curtail possible negative outcomes, ensuring the banking sector's stability.

In the area of lending, commercial banks dominate the financial system. 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.

The impact of the global financial crisis on the performance of the commercial banking sector was examined by Wood and Brewster (2016). The analysis showed that the Barbadian financial sector did not experience the adverse effects of the crisis directly because of its lack of integration with the international financial system. However, the economy was plunged into recessionary conditions. There was declining export performance, especially in the heavily-reliant tourism sector; reduced foreign capital inflows; declining remittances flows; increased unemployment; shrinking government revenues and larger fiscal deficits; and a surge in the level of government indebtedness (Downes et al., 2014). The harsh economic circumstances introduced higher levels of uncertainty in the economy and a greater level of risk aversion among the household and business sectors. The resulting impact was a decline in loan demand and supply, increase in loan delinquency and weakened credit quality, thus leading to decreased profitability and performance of the banks.

#### 4. METHODOLOGY AND DATA ISSUES

The paper investigates the impact of risk factors on the financial performance of the commercial banking sector in Barbados. We utilise a multiple regression model which includes a number of risk variables and other factors which might influence the banks' financial performance. The estimated model is of the following form:

$ROA = f(X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8, X_9, X_{10})$  where ROA is return on assets, the measure of financial performance and is the ratio of net income to total assets;  $X_1$  is credit risk, CREDRISK, measured using the non-performing loans (NPL) ratio, which is a ratio of total non-performing loans to total loans;  $X_2$  is capital risk, CAPRISK, proxied by the capital ratio which is total capital as a share of total assets;  $X_3$  is operational risk, OPERISK, proxied by the cost to income ratio which is operating expenses as a proportion of gross earnings;  $X_4$  is liquidity risk, LIQRISK, measured through the loan to deposit ratio;  $X_5$  is interest rate risk, INTRISK, which is the percentage change in net interest margins;  $X_6$  is country risk, CTYRISK, measured by the ratio of commercial bank foreign assets held by countries with good credit ratings as determined by Moody's to total foreign assets of the commercial banks;  $X_7$  is GDPGR, which is indicative of the country's economic growth;  $X_8$  is inflation rate, INFL, calculated using the consumer price index;  $X_9$  is prime lending rate, BLR, which is a measure representing interest rates; and  $X_{10}$  is the logarithm of the country's money supply, MSUP, which is representative of market growth/competition.

The study uses quarterly data for the period 2000 to 2015 which were obtained from the Central Bank of Barbados and consisted of various ratios, the sector's aggregated income statements and balance sheets. Data were also sourced from the Central Bank of Barbados Statistical Database, particularly on the macroeconomic variables.

Manual variable calculation was done with the assistance of Microsoft Excel and the econometric model was estimated using the Eviews 8 package. Descriptive statistics were derived in order to summarise the data with the generation of means, standard deviations, minimum and maximum values. The correlation matrix for the variables was also examined.

The choice of variables for the econometric model was heavily influenced by the literature review, particularly the research undertaken on the Barbadian banking sector which highlighted key sector features. Similar to the majority of cited studies, ROA is the measure of financial performance. This ratio indicates how profitable a bank is relative to its assets and illustrates how well management is employing the bank's total assets to make a profit.

The study by Wood and Kellman (2013) was extremely useful as it specifically identified the main risk exposures faced by Barbadian commercial banks. These risks: credit, operational, country/sovereign, interest rate, liquidity and market risk are the exposures that risk managers in Barbados paid attention to and had systems in place to actively measure and manage. The findings of the paper also indicated that the commercial banks believe that risk management has an impact on their financial performance and is part of the main business of the bank. However, in our analysis we discounted market risk given the close relationship between market risk and interest rate risk, and the fact that the Barbadian commercial banking sector is very limited in its trading of commodities, equities and foreign exchange which limits market risk (Central Bank of Barbados, 2011).

The risk ranked most important by Barbadian banks is credit risk (Wood and Kellman, 2013). The

non-performing loans ratio highlights the proportion of the entire loan portfolio which is in default due to borrowers not making their payments. The ratio naturally indicates commercial banks' settlement risk which affects their anticipated cash flows since banks depend heavily on this interest income. Hence, commercial bank profitability is expected to be adversely affected by credit risk.

Despite capital risk not being prioritised by the industry according to Wood and Kellman (2013), we thought it necessary to include the variable in the model. Barbadian banks have been long characterised as well capitalised. The industry has consistently recorded capital adequacy ratios (CAR) well above the BASEL recommended 8%. Banks with strong capital positions can pursue business opportunities more aggressively and are better able to deal with issues regarding unexpected losses; this therefore contributes positively to profitability (Athanasoglou et al., 2008). In trying to determine the relationship between CAPRISK and ROA, a limitation arose. The Central Bank of Barbados only started to capture CAR in 2005, thus leaving a fair portion of the review period without data points. Ultimately, the capital ratio was the chosen variable to capture capital risk as was done in other studies, with the limitation of not adjusting assets for risk.

Christie-Veitch (2004) deduced that the framework was not present to properly manage operational risk in Caribbean banks. This conclusion provides further support for the threat of operational risk to the Barbadian banking industry. The cost to income ratio signals how banks are handling their expenses relative to profits and essentially highlights their expense management. The more efficiently the expenses are managed, the less costly it is for the bank which results in increased profitability. Therefore, the anticipated impact of operational risk on financial performance is negative.

Liquidity risk was not ranked highly as a major risk exposure to the sector but it was actively managed according to the research by Wood and Kellman (2013). The Barbadian banking industry has long been described as very liquid due to the persistent excess liquidity within the system. This makes it necessary to examine the impact that this feature has on the financial performance of the commercial banks in operation. The loan to deposit ratio reflects the utilisation of funds policy of the banks as it measures the proportion of deposits used for loans. An increase in this ratio is indicative of reduced liquidity within the banks and will enhance profitability provided that effective management of the loans portfolio is being achieved. Also, when banks hold excessive amounts of liquidity (as reflected in a decline in the loan to deposit ratio) it comes at a cost, thereby impacting on profitability in an adverse manner. Thus, the loans to deposit ratio is expected to have a positive impact on financial performance.

We utilise the percentage change in net interest margins to capture interest rate risk. The net interest margin is a ratio which accounts for interest income less interest expense in relation to average earning assets and as such allows analysts to examine the interest spread as a proportion of earning assets. An increase in the volatility in net interest margins increases the threat of interest rate risk, leading to a decline in profitability. Therefore, interest rate risk is

anticipated to have an adverse impact on financial performance.

Based on our proxy for country risk (ratio of commercial banks foreign assets held by countries with good credit ratings as measured by Moody's to total foreign assets of the commercial banks), we expect that CTYRISK will impact positively on bank profitability. When the ratio increases, it means that the banking sector's foreign assets to be serviced are held with increasingly more investment grade countries. This results in the risk of default from these countries being lower due to the high credit rating. This is indicative of lower possibility of disruptions in anticipated cash flows from entities in these countries which results in more secure and increased profitability of commercial banks.

The control variables, GDPGR and INFL, have been popular macroeconomic variables used when examining determinants of bank profitability. GDP growth rate is a signal of improvement in the country's economic performance. As the growth rate increases, there is higher demand for interest and non-interest activities. This increased demand for banking activities leads to higher profitability for these entities. This profitability is further secured due to the fact that during periods of economic growth, the instances of loan default are reduced which improves profitability. With regard to inflation, increases in inflation prompt commercial banks to raise their lending rates in order to maintain their

incomes. Due to the increases in lending rates, profit margins will widen and ultimately increases in financial performance or profitability occur. Thus, the influence of both GDPGR and INFL, on ROA, is expected to be positive.

A positive impact on ROA is also expected to be found for the measure for real interest rates, BLR. This relationship was confirmed by Demirguc-Kunt and Huizinga (1999) who found the result was especially robust for developing countries as demand deposits usually pay extremely low rates. The final control variable, MSUP, is market growth / competition. Growth in money supply can lead to market growth which in turn stimulates competition. The increased competition may result in banks exhibiting riskier behaviour in the pursuit of profits which actually decreases profits (Molyneux and Thornton, 1992). Thus, the impact of MSUP on financial performance is anticipated to be negative.

## 5. EMPIRICAL RESULTS

The summary statistics and trends for the variables are presented in Table 1 and Figures 1 to 10 in the Appendix, respectively.

### 5.1 Descriptive Statistics

Table 1. Summary descriptive statistics

<i>Variable</i>	<i>Mean</i>	<i>Maximum</i>	<i>Minimum</i>	<i>Std. Dev.</i>	<i>Observations</i>
ROA	0.014	0.021	0.007	0.004	64
CREDRISK	0.079	0.139	0.024	0.034	64
CAPRISK	0.069	0.101	0.024	0.023	64
OPERISK	0.599	0.823	0.300	0.067	64
LIQRISK	0.632	0.756	0.492	0.063	64
INTRISK	0.002	0.202	-0.172	0.076	64
CTYRISK	0.699	0.975	0.247	0.197	64
GDPGR*	-0.035	3.052	-4.971	1.256	64
INFL*	3.844	9.432	-1.061	2.688	64
BLR*	8.604	10.450	7.250	0.949	64
MSUP	14.851	15.228	14.139	0.295	64

\* Figures input as percentages

The Barbadian banking industry has consistently recorded profits over the period 2000 to 2015. However, despite this profit persistence, in the latter years of the review period the sector experienced a general decline in profitability due to the challenging recessionary conditions of the 2007/2008 global financial crisis. ROA was at its highest at the start of the period, in the second quarter of 2000, recording 2.1% as seen in Figure 1. Conversely, the sector was only able to achieve returns of 0.7%, its lowest ROA, in the last quarter of 2014. Since that relative poor performance, the sector has been able to benefit from an upswing in profits for 2015. This recovery is attributed to improvements

in credit quality and a widening of the interest rate spread (Central Bank of Barbados, 2015). Overall, the sector has benefitted from an average return of 1.4% shown in Table 1.

CREDRISK as measured by the NPL ratio indicated that for every one hundred loans, roughly eight were non-performing. Overall, this figure was encouraging given the grievous economic conditions the sector faced. From the latter months of 2004 onwards, NPLs trickled downward to below the mean ratio of 7.9% as shown in Figure 2. This steady decline could be due to the credit boom the sector experienced from 2004 to 2007. Ultimately, the sector recorded its minimum credit risk of 2.4% in 2009.

However, since that period NPLs rose drastically and continued to worsen until it reached its peak in 2013. The sharp spike in the ratio in 2010 was due to the non-performance of two large loans in the real estate and hotel sectors (Central Bank of Barbados, 2011). Furthermore, this issue was compounded by the general harsh economic conditions which resulted in decreased loan demand and largely worsening quality of the credit portfolio. After 2013, NPLs have been on the decline for the sector as the country experienced tentative recovery.

The mean CAPRISK for the sector was 6.9%. The lowest ratio was recorded in 2002, 2.4%, whilst within the same year the capital ratio rose to 7.7% as indicated in Figure 3. This drastic increase within the same year could have been due to a new entrant in the market which immediately increased the capital held by the sector. Until the beginning of 2011, the sector's capital risk had been sporadic; afterwards it consistently maintained an upward trajectory until its peak at the end of 2015 at 10.1%. It was found that after the global financial crisis, the sector sought to strengthen its capital position (Central Bank of Barbados, 2011).

OPERISK gave a fairly satisfactory performance of the sector for the period. On average, approximately 60% of the gross earnings of the industry were used to service operating expenses. This meant that approximately 40% was left to service non-operational expenses. This was a fairly consistent indicator for the period with two clear exceptions. In 2010, the cost to income ratio dropped to 30%, which was essentially half of the average for the research period. Conversely, operational risk was its highest for the sixteen years at the end of 2013 with a ratio of 82% as highlighted in Table 1.

With regard to LIQRISK, the statistics revealed that the mean loan to deposits ratio was 63.2% for the period. The sector recorded its highest liquidity with a ratio of 49.2% in the second quarter of 2004. After that quarter, liquidity generally decreased until the end of 2006. This decline in liquidity coincides with the credit boom experienced by the industry post-2004. Thereafter, the ratio experienced a steep decline to reach 55% in 2008 which indicated that liquidity increased concurrently during that time. The loan to deposit ratio increased to its highest level of 75.6% in mid-2012. The reduction in liquidity was influenced by a slowdown in deposits during that time. Since then, the ratio has continuously waned as depicted in Figure 5 which meant upward movement for the sector's liquidity as loan demand continued to be depressed.

INTRISK had a fairly wide range between the maximum and minimum percentage change of net interest margins. The maximum percentage change in net interest margins was 20.2% versus a change of -17.2% for the lowest data point. The variable was fairly volatile as well, with a standard deviation of 7.6% (Table 1).

The sector's CTYRISK indicated that approximately 69.8% of the sector's foreign assets were held with countries whose rating was of high investment grade. The ratio was at its highest level of 97.5% at the beginning of the review period. These exposures overseas trended downwards as time progressed to reach the lowest level of 24.7% recorded in 2012. Central Bank of Barbados (2011) posits that especially after the global financial crisis,

commercial banks operating in Barbados sought to withdraw their funds from international markets due to the obvious risk posed. Assets declined sharply due to reduction in holdings in the US, Canadian and Caribbean affiliates, and matured investments were not reinvested. The foreign holdings in US treasury bills were substituted for holdings in their affiliates.

As it relates to the control variables, Table 1 shows that GDPGR has grown at an average of -0.035% over the period, whilst ranging from a minimum of -4.971% to a maximum of 3.052%. Next is INFL which recorded a mean rate of 3.844%. Inflation peaked with a rate of 9.432% whilst having a low of -1.061%. BLR ranged from 7.25% to 10.45% whilst having a mean rate on 8.60% over the sixteen-year period. The rate has been fairly consistent over the review period as demonstrated with the low standard deviation of 0.949%. Finally, MSUP achieved a mean log money supply of 14.851 for the research period. MSUP had an increasing trend over the sixteen years which is reflective of fairly continuous sector growth (Figure 10).

## 5.2 Correlation Matrix

The correlation matrix produced some interesting results. The findings showed statistically significant negative correlation between ROA and CAPRISK, CREDRISK, LIQRISK, OPERISK and MSUP at the 5% significance level as seen in Table 2. Of those relationships only CREDRISK can be described as having a very strong correlation with ROA, with all the other previously mentioned variables having a moderate correlation with ROA. Alternatively, CTYRISK and BLR are the only variables which have a statistically significant positive correlation with ROA. When focusing on the association among independent variables, statistically significant positive correlations exist between CREDRISK and CAPRISK, CREDRISK and LIQRISK, CREDRISK and OPERISK, BLR and CTYRISK, BLR and INFL and LIQRISK, and finally MSUP and INFL though the associations only range between weak to moderate strength. Statistically significant negative correlations were identified between CTYRISK and CAPRISK, CREDRISK and CTYRISK, LIQRISK and CTYRISK, BLR and CAPRISK, BLR and OPERISK, GDPGR and BLR, INFL and CREDRISK, INFL and CTYRISK, and MSUP and CTYRISK. The levels of association between MSUP and CAPRISK and BLR and CREDRISK were 0.751818 and -0.73557, respectively, and were both statistically significant.

**Table 2. Correlation Matrix**

<b>Correlation</b>											
<b>Probability</b>	<b>ROA</b>	<b>CAPRISK</b>	<b>CREDRISK</b>	<b>CTYRISK</b>	<b>INTRISK</b>	<b>LIQRISK</b>	<b>OPERISK</b>	<b>BLR</b>	<b>GDPGR</b>	<b>INFL</b>	<b>MSUP</b>
ROA	1										
	-----										
CAPRISK	-0.571219	1									
	0	-----									
CREDRISK	-0.805266	0.52982	1								
	0	0	-----								
CTYRISK	0.608609	-0.597576	-0.686869	1							
	0	0	0	-----							
INTRISK	-0.20539	0.033087	0.06355	-0.040134	1						
	0.1035	0.7952	0.6179	0.7529	-----						
LIQRISK	-0.544525	0.214781	0.444273	-0.386235	0.068192	1					
	0	0.0883	0.0002	0.0016	0.5924	-----					
OPERISK	-0.477817	0.14709	0.416446	-0.166283	0.024914	0.21103	1				
	0.0001	0.2461	0.0006	0.1891	0.8451	0.0942	-----				
BLR	0.57305	-0.377845	-0.73557	0.46923	0.027676	0.035262	-0.300259	1			
	0	0.0021	0	0.0001	0.8281	0.7821	0.0159	-----			
GDPGR	-0.121376	0.07916	0.216662	-0.215462	0.206895	-0.139283	0.110628	-0.319725	1		
	0.3394	0.5341	0.0855	0.0873	0.1009	0.2724	0.3842	0.01	-----		
INFL	0.153042	-0.01069	-0.264171	-0.247519	0.060696	0.247898	-0.178468	0.45021	-0.236382	1	
	0.2273	0.9332	0.0349	0.0486	0.6338	0.0483	0.1583	0.0002	0.06	-----	
MSUP	-0.405813	0.751818	0.183698	-0.567741	0.078234	0.057488	-0.064564	-0.08256	0.043561	0.330093	1
	0.0009	0	0.1462	0	0.5389	0.6518	0.6122	0.5166	0.7325	0.0077	-----

### 5.3 Model Results

**Table 3.** Summary model results

<i>Variable</i>	<i>Coefficient</i>	<i>Std. Error</i>	<i>t-Statistic</i>	<i>Prob.</i>
C	0.164927	0.021009	7.850358	0.000000
CREDRISK	-0.044172	0.014932	-2.958248	0.004600
CAPRISK	0.047247	0.017201	2.726778	0.008200
OPERISK	-0.013356	0.003261	-4.096033	0.000100
LIQRISK	-0.030567	0.004617	-6.620140	0.000000
INTRISK	-0.008156	0.002689	-3.032895	0.003700
CTYRISK	-0.003085	0.002154	-1.432509	0.157900
GDPGR	0.000231	0.000178	1.299921	1.199500
INFL	0.000304	0.000115	2.645574	0.010700
BLR	0.001404	0.000393	3.569167	0.000800
MSUP	-0.009040	0.001370	-6.597846	0.000000
<b>R-squared</b>	<b>0.88952</b>			
<b>Adjusted R-squared</b>	<b>0.86867</b>			
<b>F-statistic</b>	<b>42.67120</b>			
<b>Prob(F-statistic)</b>	<b>0.00000</b>			

Table 3 shows the R-squared which indicates the proportion of variability in the dependent variable which is explained by the regression model. As such, the estimated model is responsible for 89% of the variability in ROA, the financial performance measure. Moreover, when the R-squared is adjusted for positive bias 86.9% of variation in ROA is due to the independent variables. When tested 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 0.05, thus confirming that the regression is highly explained.

The significance of individual variables in explaining the dynamics of financial performance over the review period can be tested using the t-statistic for each coefficient and the corresponding probability value reported in the last column of Table 3. With the exception of country risk, all other variables which were used to proxy the risk exposures had a significant influence on financial performance. CAPRISK has the largest impact on the sector's financial performance with a coefficient of 0.047247. The other four risk measures all have a significant negative impact on financial performance, those being CREDRISK (-0.044172), LIQRISK (-0.030567), OPERISK (-0.013356) and INTRISK (-0.008156).

Of the four control variables, three have a significant relationship with ROA. BLR and INFL have a significant positive influence on ROA, doing so with coefficients of 0.001404 and 0.000304, respectively. Contrarily, MSUP has a significant negative impact on financial performance. GDPGR showed a positive influence on financial performance; however the effect is an insignificant one.

## 6. DISCUSSION OF FINDINGS

The results show that the proxy for capital risk has the largest influence on the financial performance of Barbados' banking sector. A unit increase in CAPRISK results in an increase in sector ROA by about 0.047, holding all other variables constant. When higher capital ratios are achieved, this lowers the sector's capital risk and results in higher sector financial performance. Demircuc-Kunt and Huizinga (1999)

mentioned that larger capital stores resulted in banks pursuing opportunities more aggressively, which meant increased risk taking and better financial performance. This significant positive relationship was anticipated and reflected in studies by Ani et al. (2012), Adeusi et al. (2014), Soyemi et al. (2014) and Menicucci and Paolucci (2016). Wood and Brewster (2016) cite the Central Bank of Barbados Financial Stability Report for 2013 which reported that the sector was able to withstand considerable credit risk shocks and remain solvent when the sector was stress-tested to investigate the impact of certain strenuous conditions on the industry. These tests showed that having the safety net of high capital allows Barbadian banks to operate fairly normal despite stressful conditions. This means that in times of crisis, profitability can still be reasonably maintained due to adequate capital stores.

Indeed, the Central Bank of Barbados (2011) highlights that all banks in Barbados are part of regional or international banking groups with substantial excess capital. With this in mind, Barbadian banks can feel confident in their risk taking since there is sufficient capital to withstand adverse shocks.

The second largest risk to Barbadian commercial bank profitability over the review period is credit risk. The regression model indicates that for every unit increase in CREDRISK, ROA decreases by 0.044. This depicts a negative relationship between CREDRISK and ROA, made significant with the p-value 0.0046. This finding is consistent with the researcher's anticipated relationship and corroborates the results of many previous studies including Tafri et al. (2009), Moulton (2011), Adeusi et al. (2014), Haque and Wani (2015), Olamide et al. (2015) and Hodge (2017). Although the sector was spared the direct effects of the 2007/2008 financial crisis due to lack of integration with the international financial system, the Barbadian economy still experienced recessionary conditions (Wood and Brewster, 2016). These conditions resulted in diminished loan demand and deteriorating credit quality. These factors negatively affected the NPL ratios. With loans being the main business of banks in Barbados, the situation had a

negative impact on the banks' financial performance. Additionally, the decreasing diversification of banks' loan portfolios would have increased concentration risks, which would negatively affect profitability (Grosvenor and Lowe, 2014).

OPERISK had a significant negative impact on ROA. For every unit increase in OPERISK, profitability declines by 0.013. The expected negative impact of operational risk on profitability was previously found by Soyemi et al. (2014), Al-Tamimi et al. (2015), and Augustin and Prophète (2016). Technology has been advancing rapidly in the sector resulting in a number of new initiatives and improvements being undertaken over the review period. However, it is generally acknowledged that the cost benefits of some innovations tend to be gathered over the longer term.

As it relates to LIQRISK, the expected positive impact on ROA was not derived. The LIQRISK has a negative and significant influence on ROA and corroborates the previous findings of Dawood (2014) and Hodge (2017). Demirguc-Kunt and Huizinga (1999) provided a possible explanation for the relationship found. The authors postulate that banks which rely heavily on their deposits for funding are less profitable since using deposits incur higher branching and other expenses. Wood and Brewster (2016) confirmed that at least for 2007 to 2012, commercial banks in Barbados were able to fund more loans from their core deposits. Due to the low priority of this risk in the Barbadian banking sector, risk managers may not have considered the costs associated with using deposits as primary funding for banks.

INTRISK was the least impactful influential risk variable for this study, with a coefficient of -0.008. The small influence of interest rate risk on profitability accords with the view of Haque and Wani (2015) that as long as changes in interest rates produce deviations in net interest margins which are predictable in size, direction or timing over the business cycle, the risk is not highly ranked. The Central Bank of Barbados had for some time used the setting of certain interest rates as a monetary policy tool. This allowed for interest rate movements to be easily predictable, hence the low impact of the risk on financial performance. Our result, which was predicted, is contrary to the findings of Tafri et al. (2009) and Haque and Wani (2015) who derived positive relationships between interest rate risk and ROA.

CTYRISK, the only insignificant risk, has a negative impact on ROA. Such a result was unexpected. A higher ratio signals increased exposure to countries with high credit ratings and logically, this should have led to lower probability of default and therefore increased profitability. One possible argument for the negative impact could be that the performance of these countries and by extension the entities operating in them slowed due to the global economic downturn. The declining performance of these foreign entities would have depressed the profitability of banks in Barbados.

The control variables do not have as strong an impact on ROA, when compared to the majority of the risk variables. GDPGR was the only insignificant control variable but it accords with previous studies by having an expected positive impact on ROA. Flamini et al. (2009) provided some insight to the

insignificance of the variable. The authors believe that the negative net effect of fuel prices could have dampened the influence of the GDP variable as it depressed profits.

All other control variables have significant impacts on ROA. The expected positive influence of INFL on ROA was derived and supports previous research by Demirguc-Kunt and Huizinga (1999), Athanasoglou et al. (2008), Flamini et al. (2009) and Moulton (2011). These authors advanced that such a finding suggests that inflation brings about higher costs for banks and this results in them increasing their rates in order to restrict those heightened costs from exceeding their income.

BLR was also confirmed to have the predicted positive influence on ROA as suggested by Demirguc-Kunt and Huizinga (1999). The authors opined that high real interest rates usually results in higher interest margins and thus profitability.

Finally, the results indicated that MSUP has a significant negative impact on ROA. This anticipated result, which was previously obtained by Molyneux and Thornton (1992), is indicative of increasing competition in the sector with a consequential negative impact on profitability.

## 7. CONCLUSION

This paper examined the impact of risk factors on the financial performance of the Barbadian banking sector using quarterly data for the period 2000-2015. Over that period, the sector experienced persistent profits despite being subjected to challenging operating conditions, especially in the latter years of the period.

Based on the findings, four of the five proxies for risk have a significant influence on financial performance. The results show that CREDRISK has a significant negative impact on ROA; thus better credit risk management will reduce losses and improve profitability. CAPRISK has a significant positive influence on ROA and this would have contributed to the sector being able to withstand the credit shocks increasing NPLs, especially during and after the financial crisis. LIQRISK was shown to have a significant negative impact on ROA. The banks need to examine their funding options closely given this result. Alternative sources must be considered since the cost of using deposits for funding has a material impact on their financial performance. Furthermore, alternative uses for deposits should be sought in order to gain higher return on these resources.

Banks need to be more strategic when introducing new technologies to the sector which admittedly may be difficult as the advancements are rapid. Given the negative impact of OPERISK on ROA, more attention must be paid not only to technology, but to streamlining processes and hiring and retaining highly trained staff. This extra consideration to these areas can contribute to productivity and increase efficiency.

The results showed that the influence of the risk (internal) factors is generally stronger than that of the external variables considered. As a result, risk managers should first seek to improve their risk management practices in conjunction with monitoring the external environment in order to enhance their profitability.

Though the study produced some encouraging results, it has a few limitations. First, the empirical analysis was based on secondary data obtained from the Central Bank of Barbados. As noted by Saunders et al. (2012), such data may be generally lacking in quality or may be unsuitable in terms of aggregations.

Second, the use of aggregate data disallows comparative analysis of banks and prevents the formulation of practical, bank-specific recommendations. Therefore, in the future it would be useful if bank-level data could be used in order to identify firm-specific issues and recommend tailored solutions.

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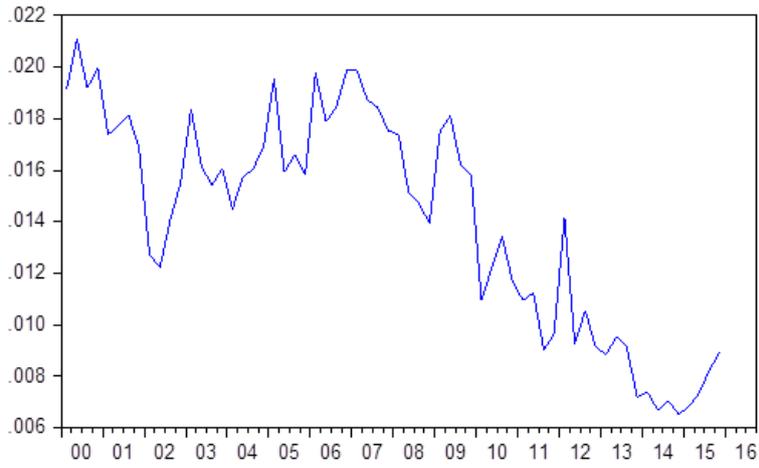
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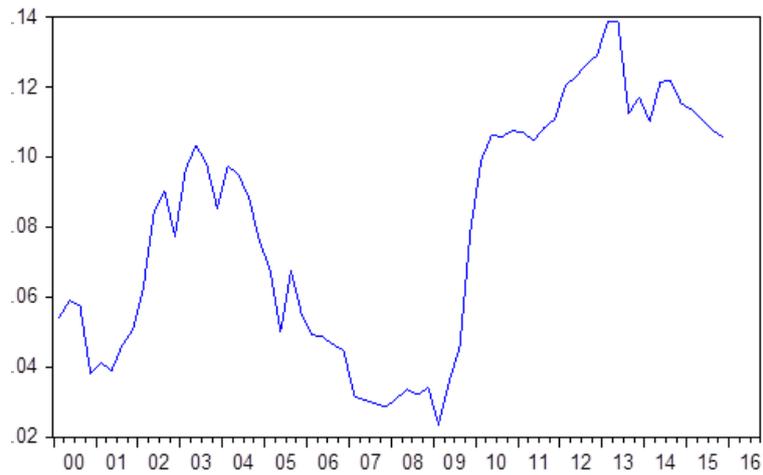
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### Appendices

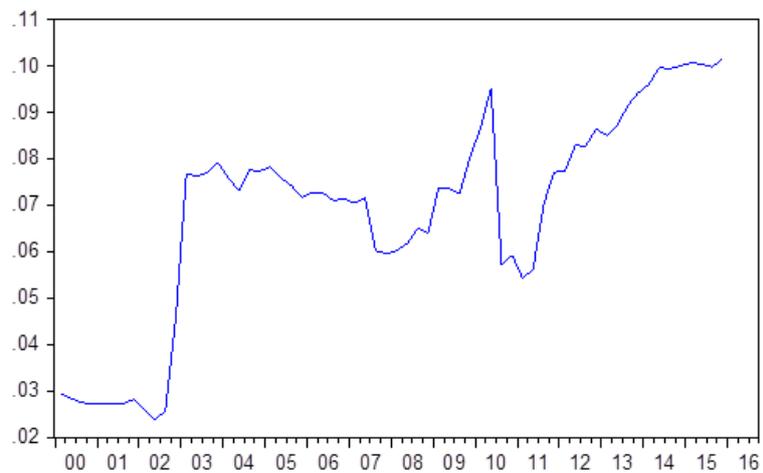
**Figure 1.** Trend of financial performance (ROA) from 2000-2015



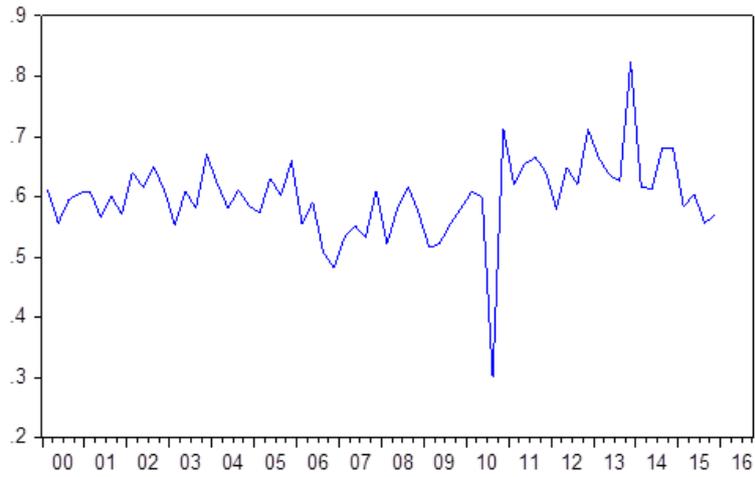
**Figure 2.** Trend of non-performing loans ratio (CREDRISK) from 2000-2015



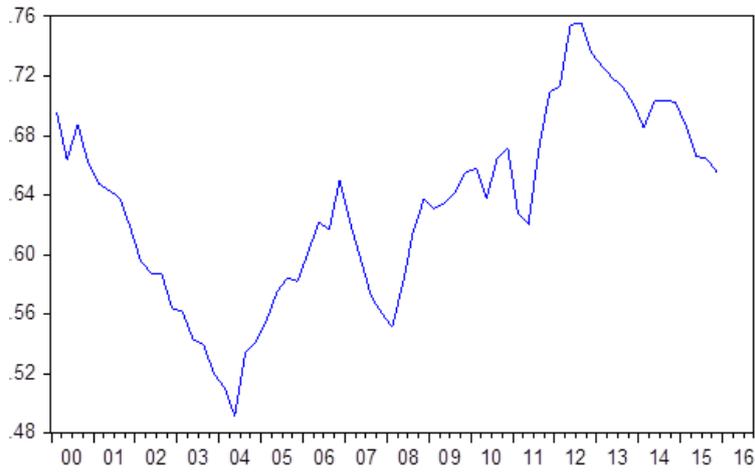
**Figure 3.** Trend of capital ratio (CAPRISK) from 2000-2015



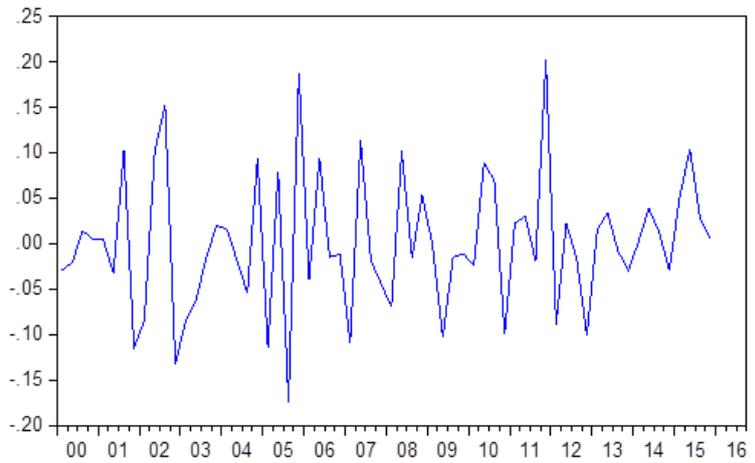
**Figure 4.** Trend of cost to income ratio (OPERISK) from 2000-2015



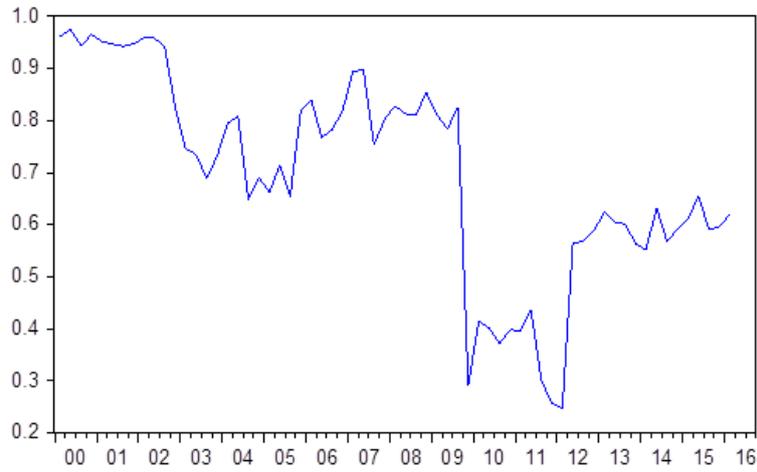
**Figure 5.** Trend of loan to deposit ratio (LIQRISK) from 2000-2015



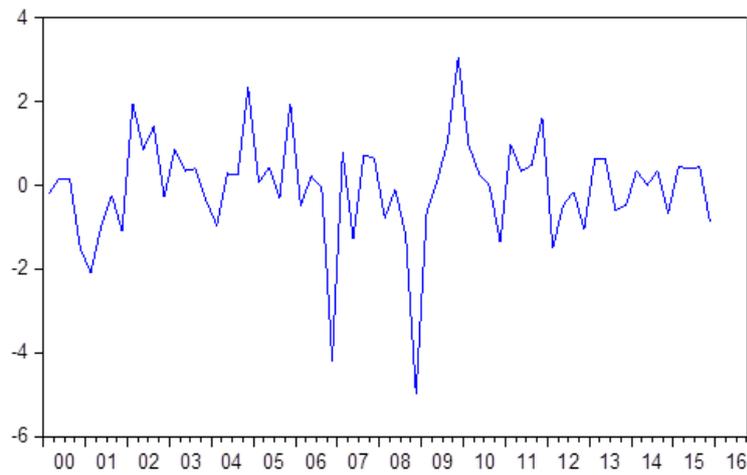
**Figure 6.** Trend of percentage change in net interest margin (INTRISK) from 2000-2015



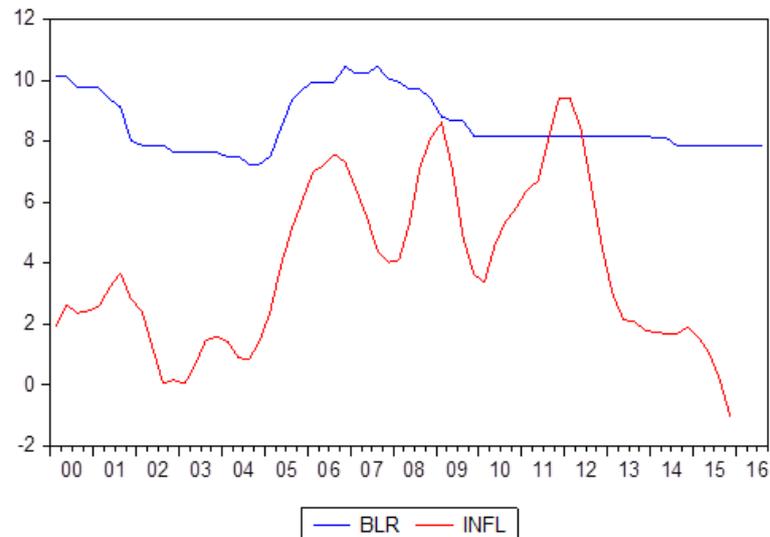
**Figure 7.** Trend in CTYRISK from 2000-2015



**Figure 8.** Trend in GDPGR from 2000-2015



**Figure 9.** Comparison of trend in BLR and INFL from 2000-2015



**Figure 10.** Trend in log money supply (MSUP) from 2000-2015

