NEAR EAST UNIVERSITY
GRADUATE SCHOOL OF SOCIAL SCIENCES
BANKING AND FINANCE PROGRAM

A COMPARATIVE ANALYSIS OF DETERMINANTS OF BANK PROFITABILITY: A CASE STUDY OF UNITED STATES OF AMERICA, AUSTRALIA AND GHANA

PROFIT MWANYENYEKA

MASTER'S THESIS

NICOSIA

2019

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THESIS SUPERVISOR
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2019

ACCEPTANCE/APPROVAL

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ACKNOWLEDGEMENTS

ABSTRACT

A COMPARATIVE ANALYSIS OF DETERMINATS OF BANK PROFITABILITY: A CASE STUDY OF UNITED STATES OF AMERICA, AUSTRALIA AND GHANA

The study sought to compare determinants of bank profitability of three different countries, United States of America, Australia and Ghana for the period 2005 to 2015. Performance of banks has been examined using internal and external determinants of profitability. The internal factors were determined using CAMEL framework and selected macroeconomic variables constituted the external factors. The study is based on the review of five banks with the largest assets in each of the three countries and it attempts to find whether there are similarities and differences on the determinants of bank profitability among the countries under study. The findings have revealed that there are differences in determinants of profitability in different economic environments. Moreover, it was detected that internal factors impact on profitability is more than macroeconomic factors.

Keywords: Bank Profitability, Panel Data Analysis, Fixed Effect Model, Return on Asset, CAMEL.

ÖZ

BANKA KÂRLILIĞI BELİRLEYİCİLERİNİN KARŞILAŞTIRMALI ANALİZİ: AMERİKA BİRLEŞİK DEVLETLERİ, AVUSTRALYA VE GANA ÖRNEĞİ

Çalışma, üç farklı ülkede, Amerika Birleşik Devletleri, Avustralya ve Gana da banka kârlılığının belirleyicilerini 2005-2015 dönemi için karşılaştırmaya çalışmıştır. Bankaların performansı, iç ve dış kârlılık belirleyicileri kullanılarak incelenmiştir. İç faktörler CAMEL çerçevesi kullanılarak belirlenmiştir ve seçilen makroekonomik değişkenler dış faktörleri oluşturmuştur. Çalışma, üç ülkenin her birinde en büyük varlıklara sahip beş bankanın incelenmesine dayanmakta ve incelenen ülkeler arasında banka kârlılığının belirleyicileri üzerinde benzerlik ve farklılık olup olmadığını bulmaya çalışmaktadır. Bulgular, farklı ekonomik ortamlardaki kârlılık belirleyicileri arasında farklılıklar olduğunu göstermiştir. Ayrıca, iç faktörlerin kârlılık üzerindeki etkisinin makroekonomik faktörlerden daha fazla olduğu tespit edilmiştir.

Anahtar Kelimeler: Banka Kârlılığı, Panel Veri Analizi, Sabit Etki Modeli, Aktif Kârlılık Oranı, CAMEL.

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ABBREVIATIONS

ATM   :Automatic Teller Machines

EFT   :Electronic Funds Transfer

ROA   :Return On Assets

ROE   :Return On Equity

OCC   :Office of the Comptroller of Currency

FIDC   :Federal Deposit Insurance Corporation

GDP   :Gross Domestic Product

US   :United States

USD   :United States Dollar

IMF   :International Monetary Fund

BOG   :Bank Of Ghana

EVA   :Economic Value Added

RAROC   :Risk- Adjusted Return on Capital

NIM   :Net Interest Margin

HHI   :Hirschman-Herfindahl Index

BNYM   :Bank of New York Mellon Corporation

UNEP   :United Nation Environment Programme

RBS   :Royal Bank of Scotland

GH₵   :Ghanaian Cedi

CBA   :Commonwealth Bank of Australia

NAB   :National Australian Bank

WBC   :Westpac Banking Corporation

BNSW   :Bank of New South Wales

ANZ　　　　　:Australia and New Zealand Banking Group

BOQ　　　　　:Bank of Queensland

JPMC　　　　 :JP Morgan Chase Bank

BAC　　　　　:Bank of America cooperation

CGI　　　　　:Citigroup Incorporation

WFB　　　　　:Wells Fargo Bank

RBSG　　　　 :Royal Bank of Scotland group

EBG　　　　　:Ecobank of Ghana

BBG　　　　　 :Barclays Bank of Ghana

OLS　　　　　:Ordinary Least Square

CA　　　　　 :Capital Adequacy

LQ　　　　　 :Liquidity ratio

EF　　　　　　:Cost Efficiency ratio

AQ　　　　　 :Asset Quality ratio

BS　　　　　　:Bank Size

EXP01　　　　:Export of goods and services (constant LCU)

MS　　　　　 :Money Supply

INF　　　　　:Annual inflation ra

CHAPTER 1

INTRODUCTION

Banks have a significant role in financial systems since they play a role as intermediaries. They collect funds and actuate resources to finance every sector in the economy. Commercial banks seek ways to remain profitable under increasing pressure due to rapid changes in globalization, rearranged policies and competition with other banks. In any country, almost everything is linked to its banking system.

A well-functioning banking system facilitates the exchange of goods and services. It plays a vital role for economic growth and financial development for every country. In the past decades, surveys have shown that most of the financial crisis occurred because of banks failure, which clearly indicates the importance of such institutions. In the banking sector, it has been noted that commercial banks take the largest slice of the banking industry. These banks provide a wide range of services, such as, loans, credit cards, cheques, mobile banking, e-banking facilities, Automatic Teller Machines (ATM), SWIFT, EFT. Survival of them mostly depends on their profitability. Therefore, to understand determinants of profitability of a bank leads to a stabilized economy.

1.1 Brief Background

Generally, performance of the banks can be dealt with in terms of competition, concentration, efficiency, productivity and profitability (Bikker and Bos, 2005). The measures of bank performance, in relation to profitability, can simply be described as risk minimization and positive return on investment. The profitability of a bank is affected by internal and external determinants. Besides other managerial strategies, internal factors contain the bank's liquidity management, credit risk management, operating expenses management and

assets management. Moreover, profitability of banks, as highlighted by Ongore and Kusa (2013), in developing and developed countries is usually affected by different factors. For instance, some developed countries have high technology advantage as compared to developing countries.

In literature, it has been observed that ROA (Return on Asset) and ROE (Return on Equity) have usually been used as a measure of bank profitability. Furthermore, financial ratios have been benefited to measure the overall soundness of banks (Kumbirai and Webb, 2010). In addition to these, CAMEL has also been recognized as effective, efficient and accurate model to evaluate bank profitability (Flamini et al. 2009, Petria et al. 2015). CAMEL was started to use in the 1980's. The Bank of International Settlements (BIS) proposed the CAMEL framework in 1988 for assessing financial institutions and banks (Petria et al. 2015). Afterwards, it was also adopted by other US Supervisory agencies, the Federal Reserve System, Office of the Comptroller of currency (OCC) and the Federal Deposit Insurance Corporation (FDIC). Thus, by this model, bank supervisory authorities have rated the banks based on six factors which are capital adequacy, asset quality, management soundness, earnings and profitability, liquidity and sensitivity to market risk (Dang, 2011). Hence, the financial condition of the banks has been evaluated accurately and consistently. Since it has provided flexibility on-site and off-site monitoring and helped to reduce the potential risk which may bring about bank failure, this framework has been accepted in the banking system all over the world.

1.2 Aim of study

The thesis compared the banking environment of three different countries in different continents, America, Australia and Ghana, to determine the factors which mostly affect the profitability of a bank. On selecting the countries,different economies were considered, that is, Ghana, an under developed economy and US and Australia developed economies according to World Bank country classification list. Since the banks turns the economic wheel by offering credits for investments, understanding operations of banks and their involvement in financial industry is critical for policy makers. Also, a healthy banking system of a country guarantees proper functioning of its

economy. In the following paragraphs, financial and banking data of the three countries which are considered in the study will be dealt with briefly.

The US banking system comprises of the Federal Reserve Bank, commercial banks, savings institutions and credit unions. The whole system is regulated by both Federal and State level. It is an economy which includes financial markets which are highly developed, complex and also effective on the world economy. The banking industry is the least concentrated compared to banking sectors in peer economies such as UK, Canada and Japan. It houses to the world's eight largest banks with a total asset of 62% of the US GDP (IMF Report 2016). After the financial crisis in 2008, banks in US by strengthening their capital amounts, improving liquidity of their balance sheets and also reducing interconnectivity with other financial institutions, they increased their resiliency, the ability to absorb losses and market shocks. The role of traditional banks and other depository institutions as credit providers declined with a corresponding rise in shadow banking which constitutes comprising of mutual funds, real estate, finance companies, investment trusts, hedge funds and similar institutions. Assets and liability continued an upward trend over the years and total assets and total liabilities reached to $ 16.8 billion and $ 14.9 billion liabilities, respectively in 2016. In 2016, profitability indicated a steady trend, also the industry actualized $ 171.3 billion net profit and with regard to 2015 4.6% increase (EY Global Banking Outlook Report, 2017).

The banking sector constitutes the largest part of the Australian financial industry. It consists of 147 authorized deposit taking institutions which hold 55% in 2015 of financial institutions' assets in Australia. The Australian banking system can be regarded as similar to that of Canadian, Swedish and Dutch banking systems in terms of market concentration (CommonWealth report of Australia, 2018). A notable increase in the number of domestic owned banks has been observed over the years, such as this number was 6 in 2011, then reached to 28 in 2017. International Monetory Fund Global Financial Stability Report (2017) has underlined that Australian financial system remain in good condition since capital ratios of most banks well above regulatory minimums. Over the years, the increase in bank capital led to a decline in equity despite the high expectations of investors. Therefore, banks seem to

seek higher returns by taking on additional risk. In this study, the largest retail banks of Australia which are Commonwealth Bank of Australia, National Australian Bank, Westpac Banking Corporation, Australia and New Zealand Banking Group, and Bank of Queensland have been dealt with.

The Ghana banking industry consists of a licenced national network and statutory financial institutions. The central bank is the Bank of Ghana (BOG) which regulates the activities of all banks. It is highly concentrated with the top five largest banks controlling more than 50% of the total market share in terms of total assets in 2014. It has twenty-one banks, including fifteen foreign and six African banks; this case shows that the sector is under the domination of foreign owned banks (Ackah and Asiamah 2014). The Ghana banking sector witnessed many reforms and restructuring resulting from economic and internal developments. According to asset quality review conducted by the Bank of Ghana (BOG) in 2016, there was a severe deterioration in asset quality in the banking sector, a decline in loan allocation to the private sector and high lending rates. Although Ghana has achieved rapid growth in the number and diversity of financial institutions, the sector unfortunately has shown an insufficiency in terms of service provision and cost management.

1.3 Research questions

This study has investigated bank profitability determinants in different economic conditions via an empirical comparison of commercial banks in Ghana, Australia and America. Five banks have been selected from each country according to their asset size for the period of 2005-2015. In the study, we have tried to answer the question of whether there is a statistical difference between the determinants of bank profitability in these countries by using ROA, which is one of the indicators of profitability.

The research tries to seek answers to the following questions:

- What is the difference and similarities in bank profitability trends of these countries within the period 2005 to 2015?
- Do macroeconomic variables have the same impact on the profitability in these countries?

- Are there similarities between internal factors that affect the profitability of banks in these countries?

The main focus of the thesis is commercial banks. Five banks with the largest asset size from each country is investigated, so the assessment of total fifteen commercial banks has been made. Same profitability indicator is used for all countries. These countries have been chosen since they are from different continents with different economies. The external and internal factors are compared which have significant influence on bank profitability in these countries. In addition, the major purpose is to determine the main factors which increase the efficiency and performance of banks in general. The study gives investors and bank managers an idea of the differences and similarities between profitability determinants in different countries with different economies.

The rest of the thesis is organized as follows. In Chapter 2, literature review and contribution of the study to the literature is introduced. Chapter 3 provides detailed information on different banks in the countries dealt with in the study. Data and methodologies used are discussed in Chapter 4. Chapter 5 includes analysis of the results. The thesis ends with Chapter 6 by a conclusion and an outlook for further studies.

CHAPTER 2
LITERATURE REVIEW

Bank profitability can be measured using different indicators; however, clarifying how bank performance can be further assessed according to literature is substantial. In the past, in order to measure bank performance, financial ratio analysis or comparing the budget of the bank with its performance have been used by financial institutions, or a mixture of these methodologies have been applied.

Bank profitability is generally explained as a function of internal or external elements. While internal factors are expressed as bank specific factors, external determinants may be classified as economic and market factors. Bank specific factors are related to the banks' management decisions which affect the operational outcomes of the banks. Such factors are mostly obtained from the balance sheet and the income statements. The impact of management on performance depends on bank objectives, policies, decisions and actions, and this changes from one bank to another.

In fact, bank profitability research dates back to the studies of Short (1979) and Bourke (1989). Bourke (1989) studied on twelve countries selected in Europe, North America and Australia using pooled time series method with linear regression to predict effects of some internal and external variables on profitability. In his study, staff expenses, capital ratio and liquidity ratio constituted internal variables, concentration ratio, government ownership, interest rates, market growth and inflation were used as external variables. He showed that a bank is accepted as more profitable if it has a high capital ratio and market growth.

Demirguc-Kunt (1999) examined eighty developed and developing countries in the years between 1988 and 1995 and they found that foreign banks had more profitability than domestic banks in developing countries. In the study, he used external factor variables like concentration ratio, government ownership and interest rate. Kasie et al. (2014) have stressed that bank profitability has been usually evaluated based on how well assets has been utilized, shareholders equities and liabilities, revenues and expenses.

According to European Central Bank 2010 report on how to evaluate bank performance, it was highlighted that there are traditional measures, economic measures and market-based measures of profitability. The report further pointed that ROE and ROA, as traditional measures of bank performance, were not risk sensitive and could not be used as standalone performance measure. Furthermore, the report pointed out that these indicators are short term and not appropriate in high volatility conditions. Performance measurement can also be further done in two different ways as economic measures and market-based measures. Economic based measurements include indicators like:

-EVA (Economic Value Added) which is related to total return of an investment and takes into account the opportunity cost aspect.

-RAROC (Risk Adjusted Return on Capital) which analyses risk adjusted financial performance. Moreover, it is a ratio obtained by dividing risk adjusted return to equity capital.

Market based profitability measurement includes a number of ratios like total shareholder return, price earnings ratio, price to book value and default rate according to Echekoba et al. (2014)

As expressed in the research of Ongore and Kusa (2013), size and composition of credit portfolio, capital size, and size of deposits liabilities, interest rate policy, labour productivity, technology, management quality, bank size, and ownership type have also been used as factors to evaluate the bank performance.

As already mentioned bank performance can be assessed by using ROA, ROE and NIM (Net Interest Margin). However, there are other studies which measure it differently. In recent studies, the method which is mostly used is the CAMEL concept. CAMEL is an acronym for determinants of bank performance which are Capital adequacy, Asset quality, Management, Earning and Liquidity ratios. Camel is a system which is developed by the US supervisory authorities to examine banking institutions on site in the early 1980s Flamini et al. (2009). This concept however limited the number of variables to be used in studies. Therefore, most studies which use this concept also include variables like bank size, bank deposits, productivity ratio, cost of fund ratio and bank portfolio composition (Nouaili et al. 2015, Rostami 2015, Kutsienyo 2011, Athanasoglou et al. 2008, Short, 1979).

If the CAMEL components are examined in detail, Capital adequacy is a rate of bank capital to its risk adjusted assets and liability. This ratio helps to protect and promote stability and efficiency in the banking industry. The minimum ratio should be 8%. Different outcomes were found by Husain et al (2015) who studied determinants of profitability in Malaysia, concluded that there was a negative relation among capital adequacy and ROA. Hence, it can be inferenced that different results can be obtained from different economic environments. As expressed by Wahdan and Leithy (2017) capital adequacy determines a financial institution's capacity to meet its liabilities and other risks like credit or operational risk.

Asset quality is one of the internal determinants of bank profitability. Trujilo-Ponce (2013) studied on Spanish banks and found that less amount of poor asset quality in the balance sheet was a favourable indicator in terms of their profit. Ally (2014) noted that poor asset quality is one of the considerable causes of bank failure.

Another factor is bank size. Spathis et al. (2002) proclaimed that bank size has an effect on profitability of the bank by analysing small and big banks. The research was done with twenty-three banks in Greece for the period of 1990-1999. The study distinguished small and large banks' effect on profitability using logistic regression and they concluded that bank size played a crucial

role. Trujilo-Ponce (2013) studied on Spanish banks to analyse the relation between bank size and profitability and found a positive effect on ROA like Spathis et al. (2002). According to Wahdan and Leithy (2017), the impact of expanding bank size on profitability can be positive up to a definite threshold but after this level it may cause a negative effect. Moreover, Podder (2012) emphasized that bank size is an internal factor since bank management is responsible from the expansion by addition of assets and liabilities.

Operating efficiency is another commonly used variable for profitability and can be defined as a measure of how better bank expenses are managed. It can also be used to evaluate cost management. Ratio of cost to income or ratio of bank's operating expenses to its revenues can be used to measure this efficiency. If an increase occurs in operating expenses ratio, this could be a signal of inefficiency. As pointed out by Wahdan and Leithy (2017), a negative relationship between ROE and operating expense ratio shows that a bank is inefficient in cost management.

Another ratio is the liquidity ratio which displays whether a bank meets its financial obligations. The most used ratios measuring liquidity are loan to deposit, net loans to total assets and liquid assets to deposits. For instance, if the loan to deposit ratio raises, then liquidity falls, as a result, banks will be reluctant to lend. Ongore and Kusa (2013) found a weak relation among liquidity and commercial banks' profitability. Husain et al (2015) obtained similar results with Ongore and Kusa (2013) and he noted a weak impact of liquidity ratio on performance of commercial banks in Malaysia.

As for industry-based factors, they are referred to as uncontrollable variables or external factors in terms of bank profitability. Staikouras and Wood (2004), Athanasoglou et al. (2008), Petria et al. (2015) used such variables in their research like bank ownership (foreign bank or domestic) and market concentration. Market concentration is mostly given by Hirschman-Herfindahl (HHI) index which is calculated as the sum of square of market share. Greater market concentration means less competition. According to Athanasoglou et al. (2008) findings both ownership and concentration of market did not

influence on bank profitability. Flamini et al. (2009) utilised market power in their study and found that it had no direct effect on bank profitability.

Macroeconomic factors are also external determinants and those factors are not affected by specific decisions and policies of the banks. The most used macroeconomic variables are Gross Domestic Product (GDP) and inflation. In the study of Staikouras and Wood (2004), it has been found that GDP has a direct impact on profitability. Akhtar et al. (2011) studied on profitability of Pakistan banks and obtained similar results as Staikouras and Wood. Also, Trujilo-Ponce (2013), Petria et al. (2015) and Kamran et al. (2016) found the similar outcomes related to effect of GDP on profitability. In addition, Ally (2014) declared that GDP has an impact on demand and supply of loans and bank deposits.

Another macroeconomic determinant that is thought to effect profitability is inflation. Inflation causes changes in demand of different types of financial services. A rise in inflation may lead to difficulties for borrowers and this may conduce to termination of loans. Since such a situation directly affects interest rates, the operation and margins of the bank have also been influenced. Staikouras and Wood (2004) highlighted that besides raising in labour prices, inflation has also caused with changes in interest rates and in asset prices. The study of Yilmaz (2013) related to Turkish banks' profitability has indicated that inflation has a significant effect on profitability. Moreover, Ally (2014) pointed out that inflation affects the real value of revenue and costs. In literature, some of the other macroeconomic variables whose impacts on profitability studied are exchange rates, imports, tax rates and income level.

Since the global financial crisis of 2008, the banking system has faced with many different challenges in banking activities. In the period before financial crisis, profitability of banks boosted due to the use of high leverage and reliance on relatively cheap wholesale funding. Changes in the banking sector caused some of these strategies less viable, unfavourable macroeconomic policies and financial market conditions also reduced the use of some of the strategies. After this experience, bank profitability has been determined by how banks adapt to the new operational environment.

Banks have made sustainable effort to reconfigure their business models in responds to challenges which occurred in crisis time. Furthermore, afterthe global 2008 crisis, most banks in Euro zone had scaled down their activities in several areas with high risk while they strengthened core business activities (European Central Bank Eurosystem 2010). According to the Asian economic and financial review (Duraj and Moci, 2015), banks have concentrated on increasing capital in their balance sheet to meet risk-based requirements. New liquidity regulations as per Basel III imply that banks rely more on stable funding resources and to hold more liquid assets which will lead to less profits.

Furthermore, if we look at general view of the banks recently the banks in advanced economies have displayed a stronger balance sheet because they have stable profitability according to 2016 IMF World Economic and Financial Surveys. However, the survey has also stated that market capitalization of these banks fallen by almost $430 billion thus resulting in increased challenges for weaker European banks. Because of less margins and low demand for domestic markets, Japanese banks faced significant challenges, too. Also, due to increased capital requirements and poor profitability, ROE decreased by 11.4% in Europe and 3% in US banks in 2016. This necessitated fundamental changes in banking structuring since about a third of European banks had poor profitability (European Central Bank Eurosystem, 2016).

As mentioned in Ghana survey report of 2014 by Pricewaterhousecoopers and Ghana Association of Bankers, the profit of banking industry before margin constantly improved so that, while it was 37.3% in 2012, increased to 45.3% in 2013. The industry did not suffer any significant losses during the financial crisis of 2008 to 2010. According to the report, ROA of the banking industry continuously improved between the period from 2010 to 2013. Although huge profits are achieved in this sector over the years, general perception shows that the sector is insufficient in terms of service provision.

According to Reserve Bank of Australia Report of 2014, in banking area, improvements in profit growth have been observed over the years. In fact, asset performance has led to this growth. Operating expenses declined in 2013 but increased in 2014 because of high staff and investment costs. ROE

of Australia's leading banks was significantly higher than developed economies and costs to income rate was lower as compared to banks in Europe.

In this ever-changing banking environment, it is important to know which factors affect the bank profitability. In order to make more profit, the effects on profit should be learned at the internal and external level. Hence, this thesis will contribute by finding determinants of bank profitability in three different continents with different economic environments via panel data analysis.

CHAPTER 3
DIFFERENT BANKING ENVIRONMENTS

This section contains information about the banking system of the countries in our study and the banks we dealt with in these countries. A banking system which functions efficiently is the most important contribution to a country's economy, and profitability is a key criterion in the performance evaluation of banks. The five banks selected to represent each country have the largest asset size and also, they have ranked as at the top in terms of performance. As already mentioned, countries in our study are United States of America, Australia, and Ghana.

3.1 Banking in United States of America

The American banking system is regulated by both the federal state and government, and made up of commercial banks, saving institutions and credit unions (Ding et al 2017). The Federal Reserve Bank is the central bank of the United States and there is a total of 6812 banks in United States with approximately 93000 branches by 2013. It has the largest market-based banking system and the banks are allowed to perform all kinds of banking transactions. US banks are ranked as the third largest credit provider to the rest of the world after UK and Japan. According to the 2015 US Financial Assessment Report, balance sheets and income statements of the banks improved compared to pre-crisis period (2007-2008). Banks have strengthened their capital by holding more liquid assets and reducing leverage ratios.

Table 1.

Total asset value of the five largest banks in America in 2015.(Researcher's compilation)

Name of the bank	Total asset value
JP Morgan Chase	$2.35 trillion
Bank of America Cooperation	$2.14 trillion
CITI group Incorporation	$1.731 billion
Bank of New York Mellon Corporation	$ 394,780 million
Wells Fargo Bank	$ 1.787 billion

JP Morgan Chase's 2016 annual report stated that the corporation engages in investment banking, small business banking services, commercial banking, financial transactions and asset management. It is the largest bank in the United States with total asset of $ 2.35 trillion and 5217 branches and announced a net income of $ 24.7 billion in 2015. Since it operates in more than 50 countries it has been ranked as the number one among private banks in US for more than 8 consecutive times with its increased market share.

Bank of America Cooperation has operated in more than 50 states and 35 countries by 2015 and ranked as the second largest bank in America. In annual bank report, it announced that the bank earned $16 billion in 2015 and served approximately 80% of the US population with 4700 retail centres and 16,000 ATMs. The main strategy used for this success was to rebuild capital and liquidity as well as investing.

CITI Group Incorporation, its headquarters is in New York, it has $230 billion in shareholders' equity, $1.731 billion in total assets and $1.5 billion in liabilities by 31 December 2015. Core business of the group are security broking, commercial banking, corporate and investment banking. Its operations had

spread to over 140 countries by 2015, and it has been proclaimed as the largest investment bank in the world in terms of assets.

Bank of New York Mellon Corporation (BNYM) was one of the first companies to be listed on the New York Stock Exchange. It is a global investment company which manages assets for financial institutions. It is one of the oldest banking corporations in United States and in the world and it has operated in 35 countries by 2015. The bank serves in six primary fields which are securities, asset management for private client services, corporate banking, global market services and retail banking.

Wells Fargo Bank was founded in 1852 and it is a multinational financial service company whose headquarter is in San Francisco. It is the second largest bank in terms of capital in the world and the third largest bank with total asset in the US. Its branches in 11 states offer diverse services by $2 trillion asset. It provides banking, investment, mortgage, consumer and commercial finance services through more than 8300 locations, 13000 ATMs, internet and mobile banking.

3.2 Banking in Ghana

Ghana banking system comprises foreign and local banks, rural and community banks, savings and loan companies, microfinance institutions, discounting houses, insurance companies and lending corporations. British banks have dominated the market according to IMF report of 2011. The number of foreign banks in the market is considerably higher and 75% of total assets belonged to commercial banks until 2012. As announced in December 2012, 27 commercial banks with 13 foreign owned subsidiaries operates with a market share of 51% of bank asset (Sarpong et al. 2014). In December 2016, the number of banks reached to 33 banks and 16 of them were domestic while 17 of them were foreign. While there were 374 branches in 2005, this number increased to 708 in 2010 and to 1342 in 2016. Namely, the growth in the network of bank branches has increased steadily. In Bank of Ghana 2007 report, it was highlighted that a change occurred from direct system of monetary control to indirect system which utilize market-based policy instruments. Increasing liberation in financial policies has created healthy,

competitive and efficient business practices for foreign banks and investors in Ghana financial service industry (Bank of Ghana report, 2007). In 2015, the banking sector faced a decline in profit. This circumstance was attributed to the rise in operating cost due to increased non-performing loans as well as energy challenges.

Table 2.

Total asset value of the five largest banks in Ghana in 2015.(Reseacher's compilation)

Name of the bank	Total asset value
Ghana Commercial Bank	GHC4 ,659, 181 billion
Barclays Bank Ghana	GHC3, 611,110 billion
Ecobank Ghana	GHC6, 691, 810 billion
HFC Bank Ghana	GHC1, 600,329 billion
CAL Bank Ghana	GHC3, 364,500 billion

Barclays Bank of Ghana (BBG) was incorporated in 1917 and is a subsidiary of Barclays Bank PLC of UK. It is regarded as the second largest bank in Ghana and its headquarters is in Accra Ghana. It provides a range of banking and financial services as well as cash management strategies.

Ghana Commercial Bank (GCB) was established in 1953 as Bank of the Gold Coast, at that time, the Government was the sole owner of the bank. The ownership structure of the bank changed in 1996 when the government sold a portion of the shares to 21.36% ownership.

Ecobank of Ghana (ECBG) was established in Togo in 1985, and initially named as Ecobank Transnational Incorporation in 1981. There was foreign bank dominancy in most African countries and this bank was established to fill domestic bank gap. It operates in western, eastern, central and southern of Africa as well as 10 regions of Ghana.

HFC Ghana bank is a leading banking institution in Ghana. It is a subsidiary of Republic Financial Holding Limited. It provides services which includes corporate, commercial, retail, investment banking, mortgage and micro finance. It has been ranked as number one in the field of loan provider in the Ghana bank survey report. In 2015 annual report of the bank, it was announced that the assets of the bank raised from GH₵1.34 billion to GH₵1.60 billion. However, in the same year, in order to fulfil international financial regulatory requirements, they lost GH₵ 36.3 million driven by increase in impairment charges.

CAL Bank is a domestic bank was founded in 1990 and its headquarters is in Accra Ghana. It is considered as the most innovative bank in Ghana. The bank has had 24 branches and 92 ATMs by 2013 and has listed in the Ghana Stock Exchange with three subsidiaries. The services offered by the bank are corporate, retail banking, brokerage and asset management. The bank's annual report for 2015 proclaimed that GH₵160 million profit after tax. In order to strengthen the balance sheet, the bank applies deposit mobilization techniques. In addition, in 2015, because the Ghana Cedi depreciated against the US dollar by 26.2% the bank's operations affected negatively in that period.

3.3 Banking in Australia

The banking sector constitutes the largest part of the financial system. The Australian banking sector is ranked as fifth among the world's financial systems. In 2016, there were 53 Australian banks totally, 14 of them were the government owned. In retail banking sector, there are 21 banks including domestic, subsidiary and foreign owned. Since about 68% of the banking transactions in the sector are performed by several large banks, the market structure can be defined as oligopoly.

Table 3.

Total asset value of the five largest banks in Australia in 2015. (researcher's compilation)

Name of the bank	Total asset value
Commonwealth Bank of Australia	$873, 446 billion
National Australian Bank Ltd	$955,052 billion
Westpac Banking Corporation	$812, 156 billion
Australia and New Zealand Banking Group	$889.900 billion
Bank of Queensland	$47,587 billion

Commonwealth Bank of Australia (CBA) was founded under the Commonwealth Act in 1911 and was privatised in 1956. It is one of the most traded companies on the Australian Stock Exchange. Its financial services include retail, corporate banking and asset management. It has the leading market share in retail banking in Australia and New Zealand. It has employed around 51800 employees and had more than 11000 branches across Australia. By the end of 2016, total assets recorded as US$740 billion and a total income as US$19.52 billion. At the end of 2017, loans have constituted 77% of total asset and this corresponds to the largest part of the bank's balance sheet.

National Australian Bank LTD (NAB) was established in 1858. It is one of the four largest banks in the Australian financial sector in terms of market value. It was more strengthened by a merger of Bank of Australia and the Commercial Banking Company of Sydney in 1982. According to 2017 National Australian Bank annual report, it had the largest market share with 29.4%. Westpac followed it by a market share of 14.6%. Also, it has the largest liquidity power with broad range of flexible, competitive products and services in Australian market. It owns 820 branches in New Zealand, US, Asia and

Europe. In 2017, the group maintained a strong capital funding and liquidity with a coverage ratio of 123% and a ROE of 14.0%.

Westpac Banking Corporation (WBC) was established in 1817 as New South Wales bank. It became Westpac Bank Corporation in 1982 after the merger of Bank of New South Wales (BNSW) and Commercial Bank of Australia. It has 1429 branches and 3850 ATMs by 2016. In 2015, return on capital ratio was realized as 15% through improving liquidity level and efficiency as well as increasing amount of assets and capital.

Australia and New Zealand Banking Group (ANZ) was established in 1895 and it has been ranked as number one in New Zealand. It is one of the 50 best banks in the world. Moreover, it is the third largest bank with a market value of AU$93.4 billion and with total asset of AU$896.5 billion by 31 March 2017. It has operated in 34 markets across US, Europe, New Zealand, the Asia- Pacific region and the Middle East (Australia and New Zealand Banking Group Annual report 2017). Also, it has 550000 shareholders which contain 42% retail and 58% corporate investors.

Bank of Queensland (BOQ) was founded in 1874 and is considered as one of the oldest Australian banks. Its headquarters is in Queensland. It operates 200 banks by the end of 2017. In addition to banking, the bank also operates in insurance. In 2016, the bank's total asset was US$40.1 billion and total income of US$394 million.

Having described different banks under consideration from different countries, in the next chapter, the methodology used will be highlighted to find the significant determinants of bank profitability.

CHAPTER 4
DATA INFORMATION AND METHODOLOGY

Data information and methodology used in conducting the research are presented in this section. For the period 2005-2015, secondary data have been taken from the yearly reports of the banks and World Bank data. The macroeconomic data of the countries considered in the study were obtained from World Bank statistics.

In literature, the most common methods used to find determinants of bank profitability are ordinary least squares, generalised methods of moments (GMM), logistic regression models and panel data models. In some thesis, the relation between bank profitability and internal-external factors also dealt with. The majority of these studies suggest that there is a relation between bank profitability and these factors, but it should be underlined that relations are not always in the same direction (Bourke, P. 1989. Adam. M 2014, Topak and Talu, 2017).

In previous studies on the determinants of the bank profitability, mostly one country (Gupta 2014, Maredza 2014) or a region (Molyneux and Thornton 1992, Yilmaz 2013, Staikouros and Wood 2004) has been studied but, in some studies, we see the comparison of two countries (Bhandari 2010, Kraidi 2015). This thesis contributes to literature by conducting a comparative analysis for three different countries which are in different continents, i.e., in different economic environments. Countries under study are Ghana, Australia and America. The sample includes the first five banks with the largest total asset value from each country. To obtain the bank profitability factors, ratios which indicate internal factors have been calculated via the CAMEL frame and macroeconomic variables have been took into consideration as external factors. Table 4 shows the banks selected from each country for the research.

Table 4.

List of the banks dealt with in the study.(researcher's compiliation)

COUNTRY	NAME OF THE BANK	ABRIVATION
America	• JP Morgan Chase Bank	- JPMC
	• Bank of America Cooperation	- BAC
	• Citigroup Incorporation	- CGI
	• Bank of New York Mellon Corporation	- BNYM
	• Wells Fargo Bank	- WFB
Ghana	• Barclays Bank of Ghana	- BBG
	• Ghana Commercial Bank	- GCB
	• Ecobank of Ghana	- EBG
	• HFC Ghana Bank	- HFC
	• CAL Bank	- CAL
Australia	• Commonwealth Bank of Australia	- CBA
	• National Australian Bank	- NAB
	• Westpac Banking Corporation	- WBC
	• Australia and New Zealand Banking Group	- ANZ
	• Bank of Queensland	- BOQ

Since the panel data analysis combine both time series and section analysis, and panel data creates less the problem of multicollinearity between variables, this technique has been applied to deduce the determinants in different countries. To detect the determinants of the bank profitability, ROA (Return on Assets) has been used as dependent variable. As for the independent variables, macroeconomic indicators, and financial ratios obtained with the CAMEL framework have been employed. Banks represent a panel in each country the period under consideration. The following section defines some of the terms to be used in the context of panel data analysis.

4.1 Terminology

Dependent (*response*) variable is a variable which is expressed as a linear function of one or more explanatory variables. It is the focus of a research question in a study.

Independent (*explanatory*) variable is a variable that explains changes in the dependent variable.

Time series data are the set of observations on the value that a variable takes at distinct time period.

Cross sectional data are data on one or more variables aggregated at the same point in time.

Balanced panel is a dataset where every unit in a panel is observed in every time period. If a balanced panel includes M panel member and T periods, observation number in the data set is MxT.

Unbalanced panel is a dataset where at least one panel member is not observed in every time period. If an unbalanced panel comprises with M panel member and T periods, observation number will be less than MxT.

Pooled time series are observations viewed as repeated measures at each point in time.

Outliers are observations that are too different compared to the other observations in the sample, i.e., they are either too small or too large.

Subjects are participants in a longitudinal study.

4.2 Structure of the Panel Data Analysis

Panel data may be alluded to as pooled data, micro panel data or longitudinal data (Wooldridge, 2002; Gujarati and Porter, 2009). In order to make panel data analysis, we benefit from *multiple linear regression model* which is employed to investigate the relation between a dependent variable and two or more independent variables. This regression model can be expressed as follows:

$$Y_i = \beta_1 x_{i1} + \beta_2 x_{i2} + \cdots + \beta_p x_{ip} + \varepsilon_i \tag{1}$$

where $x_{i1} = 1$ for all individuals, and β_1 is the intercept. The regression explain that the expected value of *Y* varies linearly with values of the independents. An increase one unit in x_i results an increase or decrease of β_i in mean values of *Y*. Maximum likelihood method is performed to forecast unknown parameters, *β*s. The probability distribution corresponding to the linear regression model is given by in Eqn. (2).

$$f\left(y_i \,\middle|\, x_{i1}, \ldots, x_{ip}\right) = \frac{1}{\sqrt{2\pi\sigma^2}} \exp\left\{-\frac{\left(y_i - [\beta_1 X_{i1} + \cdots + \beta_p X_{ip}]\right)^2}{2\sigma^2}\right\} \tag{2}$$

The method finds $\beta_1, \beta_2, \ldots, \beta_p$ which maximize the probability of the dependent variables calculated at their observed values. The outcome values are named the maximum likelihood estimates (MLEs) of $\beta_1, \beta_2, \ldots, \beta_p$. With *N* subjects, the likelihood is expressed as follows:

$$L\left(\beta_1, \beta_2, \ldots, \beta_p\right) = \prod_{i=1}^{N} f\left(y_i \,\middle|\, x_{i1} \ldots \ldots x_{ip}\right) = \prod_{i=1}^{N} \frac{1}{\sqrt{2\pi\sigma^2}} \exp\left\{-\frac{\left(y_i - [\beta_1 X_{i1} + \cdots + \beta_p X_{ip}]\right)^2}{2\sigma^2}\right\} \tag{3}$$

The method chooses *β* values which maximize $L\left(\beta_1, \beta_2, \ldots, \beta_p\right)$. In other words, maximum likeli- hood estimates equals to the least squares estimates. Least squares method minimizes residuals sums of squares. In other words, the least squares estimation calculates the estimations of the regression model in such a way that the deviation between the observations and the estimated data is minimal. Deviations of the fitted model is calculated via the statement in the Eqn. (4).

$$\sum_{i=1}^{N} (y_i - \hat{y}_i)^2 = \sum_{i}^{n} \hat{e}_i^2 \tag{4}$$

Here, y_i and $\hat{y}_i$ indicates *observed* and *predicted* data, respectively. The difference between them shown with $\hat{e}_i$ called as *residual.*

On the other hand, the panel data model also has a different equation form which considers time and cross-sections. Gujarati and Porter (2009) state that panel data own space and time dimensions, as observations in the same

cross-sectional unit are evaluated over time. The main objective of longitudinal studies is to characterise the switch in response over time and factors that affect these changes. As in Eqn. (5), panel data model has double subscripts on its variables for time t and i individual observations.

$$y_{it} = \alpha + \beta\, X_{it} + \mu_{it} \qquad\qquad i = 1, ..., N, t = 1, ..., T \qquad\qquad (5)$$

Where y is the dependent variable, X is the independent variable, α and β are coefficients, and μ is the error term. Also, i stands for the ith cross sectional unit. Panel data mostly utilize a one-way error component model for the disturbances like in Eqn. (6).

$$\mu_{it} = u_{it} + v_{it} \qquad\qquad (6)$$

where u_i demonstrates the unobservable individual specific impact and v_{it} shows the remainder disturbance.

4.3 Characteristics of Longitudinal Data

Outcomes of longitudinal data can be continuous, binary or discrete. In binary outcomes the dependent variable Y takes two values as follows:

$$Y = \begin{cases} 1, & \text{with probability} \quad p \\ 0, & \text{with probability } (1 - p) \end{cases}$$

For binary dependent variables, linear probability model, logistic, probit or tobit regression models can be employed. In this study, continuous and discrete qualitative data have been used. Continuous variables are qualitative and infinite in nature and can be measured at interval or ratio level. This type of data may be time, market price or ratios. Discrete variables are those that can be counted, such as number of banks, ATMs, branches or employees. Also, panel data models may use dummy variables within the model.

Another feature of the panel data is whether it is balanced or unbalanced. In balanced panels, the number of time periods T is the same for all individuals i but when the time periods differ for observations, the panel will be unbalanced.

Furthermore, longitudinal analysis removes irrelevant information by comparing each outcome with two or more circumstances. This eliminates sources of variability (noise) within the predictions. Moreover, there are two main challenges in panel data analysis. First, in panel (longitudinal) data, even

though the subjects are independent of each other, within-subject dependence exists because the same subjects are measured repeatedly over time. The second challenge is heterogeneity, that is, the error variance in a regression model might not be constant. Since panel data is collected over time, the error variance might change over time leading to heterogeneity.

Lastly, the most common approaches used in panel data analysis are independently pooled panels, fixed effects and the random effects models.

Since we have employed multiple linear regression model to analyse our panel data, the data should satisfy the assumptions of the multiple linear regression model. Assumptions of the model are explained in detail in the following paragraphs.

a) *Independency* – Whole values of the output should derive from a different person/member/object of the sample.

b) *Linearity* – There should be linear relation between the outcome variable and independent variables. The linearity assumption can be tested through visual examination of residual plots. This includes scatterplots which may show randomly standardised residuals around the horizontal line. These plots may portray a nonlinear structure which shows violation of linearity assumption.

c) *Multivariate Normality* – The residuals are normally distributed. Non-normally distributed variable distorts tests and significance of the regression analysis, such a data may have outliers. In smaller samples, outliers in data may have a stronger influence on normal distribution assumption. Kolmogorov-Smirnov test, Shapiro-Wilk test or Jarque-Bera test can be used to test this assumption. Also, graphical methods such as histograms, normality plots, Q-Q plot can produce visual examination of normal distribution.

d) *No multicollinearity* – The independent variables should not be highly correlated with each other. Correlation matrix or Variance Inflation Factor (VIF) is used to test this assumption. The correlation coefficients should be less than 80%. As for VIF, if it is greater than 10, this is the indicator of multicollinearity problem.

e) *Homoscedasticity* – This assumption states that variance of errors is equal and constant across all levels of independent variables. As in Fig. 1, a graph of standardized residuals versus fitted values demonstrates whether the homoscedasticity assumption is satisfied.
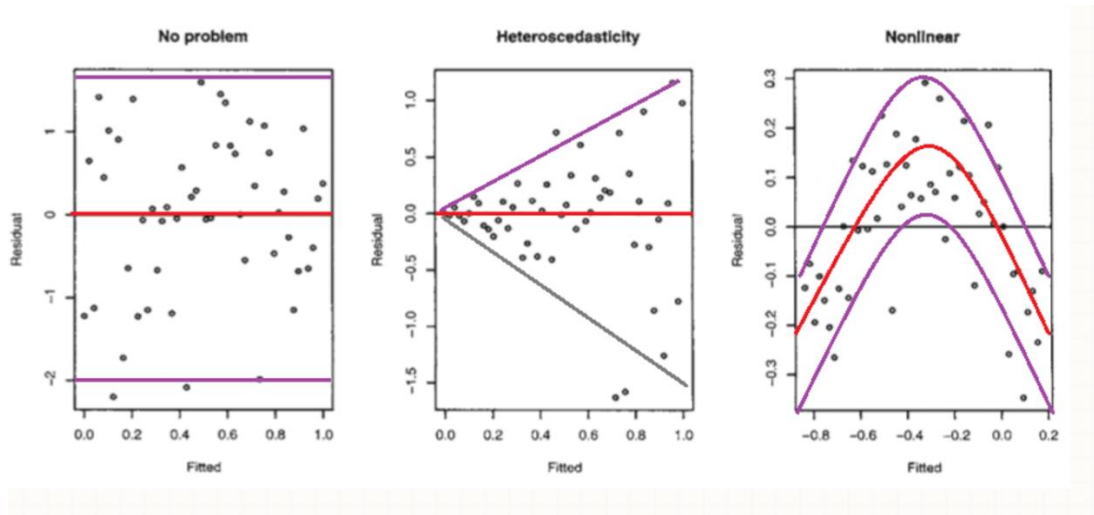
Figure 1. Graphical representation of Heteroscedasticity and Homoscedasticity(http://.adataanalyst.com)

4.4 Outcomes of the Panel Data Analysis

The assumptions of panel data analysis include "no heteroscedasticity" (the variance around the regression line is the same for all values of the predictor variables), "no autocorrelation" (the residuals are independent from each other) and cross-sectional dependency between error terms. In this context, related test results of these assumptions are viewed at the outcome screen of the panel data analysis. In the following paragraphs, the brief explanation is given about the other results which are observed in the outcome screen.

4.4.1 Descriptive Statistics

Descriptive statistics denote variations of data for both dependent and independent variables. It is used to summarise the data. It includes various statistical descriptive measures such as mean, standard deviation. In this study, summary of the data related to for each country under consideration are indicated in the Descriptive Statistics outcomes.

4.4.2 Correlation Analysis

The primary aim of the correlation analysis is to detect multicollinearity among independent variables. Gujarati and Porter (2009) pointed out the objective of correlation analysis as measuring the strength or degree of linear relation between variables. The direction of the relation between the variables is indicated by the sign of the correlation coefficient. Correlation in longitudinal data is mainly caused by repeated measures on the same individuals and these data necessitate advanced statistical methods to make valid inference related to this correlation. In the analysis, the Pearson`s correlation coefficient has been used. It is shown by ρ and defined as follows:

$$\rho(x,y) = \frac{n(\sum xy) - (\sum x)(\sum y)}{\sqrt{[n\sum x^2 - (\sum x)^2][n\sum y^2 - (\sum y)^2]}} \qquad \text{where} \qquad -1 \leq \rho \leq 1 \qquad (7)$$

As a rule of thumb, if the correlation coefficient is greater than 0.80, then this is an indicative of a severe multicollinearity problem.

4.4.3 Normality Test

One of the assumptions of linear regression is distribution of error terms, ε_i, must follow a normal distribution with zero mean and constant variance as shown in Eqns. (8)-(10).

Mean $\qquad E(\varepsilon_i) = 0$ $\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad$ (8)

Variance $E[\varepsilon_i - E(\varepsilon_i)]^2 = E(\varepsilon_i^2) = \sigma^2$ $\qquad\qquad\qquad\qquad\qquad\qquad$ (9)

$cov(\varepsilon_i, \varepsilon_j) \qquad E\{[\varepsilon_i - E(\varepsilon_i)][\varepsilon_j - E(\varepsilon_j)]\} = E(\varepsilon_i, \varepsilon_j) = 0 \ \ i \neq j$ $\qquad$ (10)

The above equations can be explained more compactly as $\varepsilon_i \sim N(0, \sigma^2)$. In fact, with normality assumption, it is underlined that ε_i and ε_j are not only uncorrelated but also, they are independently distributed. That is to say, $\varepsilon \overset{iid}{\sim} N(0, \sigma^2)$.

In time series data, to test normality, Jarque-Bera (JB) test is used. So, here, this test will be employed. As reported by Gujarati and Porter (2009), Jarque-Bera test is an asymptotic test based on OLS (Ordinary Least Square)

residuals. JB statistics test whether the sample's skewness and kurtosis matching with a normal distribution and its formula is given in Eqn. (11):

$$JB = (n - r + 1)\left[\frac{s^2}{6} + \frac{(k-3)^2}{24}\right] \tag{11}$$

where n, r, s and k demonstrate sample size, the number of regressors, skewness and kurtosis, respectively. If the data has normal distribution, the JB statistic asymptotically follows a chi-squared distribution with two degrees of freedom. If the test statistics far from the zero, this means that data do not follow a normal distribution.

4.4.4 Autocorrelation Test

Another assumption of the multiple linear regression is no autocorrelation among the residuals. Namely, for all $i \neq j$, $cov(\varepsilon_i, \varepsilon_j) = 0$. In other words, the meaning of autocorrelated data is for some $i \neq j$, $cov(\varepsilon_i, \varepsilon_j) \neq 0$.

First order autocorrelation arises when sequential residuals are correlated. If we generalize, p-order autocorrelation takes places when residuals p units distinct are correlated. The case of *first order autocorrelation* can be modelled as follows:

$$\varepsilon_t = \rho\varepsilon_{t-1} + e_t \tag{12}$$

where ρ is called as the first-order autocorrelation coefficient which takes values between -1 and +1. Here, e_t is independently identically distributed (iid). If $\rho = 0$, then there is no autocorrelation. When ρ closes to -1, this means there is a negative autocorrelation. If ρ approaches to +1, it indicates positive autocorrelation.

Durbin- Watson test (1950) is used to detect autocorrelation. It is defined as follows:

$$d = \frac{\sum_{t=2}^{t=n}(\varepsilon_t - \varepsilon_{t-1})^2}{\sum_{t=1}^{t=n}\varepsilon_t^2} \tag{13}$$

The Durbin Watson statistics always takes the values between zero and four, $0 \leq d \leq 4$. A value of two denotes no autocorrelation, values greater than zero and less than two evidence of positive autocorrelation and values above two

and less than four show negative autocorrelation. Residuals are considered as not correlated if the Durbin- Watson statistics is between 1,5 and 2,5.

4.4.5 Heteroscedasticity Test

Heteroscedasticity is one of the major assumptions of linear regression. This assumption of homoscedasticity (equal) spread, equal variance is expressed as

$$E(\mu_i{}^2 = \sigma^2 \quad i = 1,2,\ldots,n) \tag{14}$$

Heteroscedasticity occur due to many reasons which includes omitted values, skewness in distribution of one or more regressors, misspecifications, and outliers in the data. Outliers in data are observations that are too different, either too small or large in relation to the observation in the study. Incorrect data transformation which includes ratio, or first difference transformations and incorrect functional form are also sources of heteroscedasticity. Heteroscedasticity problem is also likely to occur in cross sectional analysis.

Gujarati and Porter (2009) state that detecting heteroscedasticity is a matter of intuition, educated guesswork, prior empirical experience or sheer speculation. Fig. 1 present graphical method of detecting heteroscedasticity residual plots. Heteroscedasticity can also be detected using statistical tests.

4.4.6 Model Performance Evaluation Criteria

i) Akaike Information Criterion (AIC)

The Akaike information criterion (AIC) is used to select the best model and it gauges the relative value of a statistical model for a given set of data, Akaike (1974). It is an estimator for model selection, it chooses the best model fit for the set. It is defined as

$$2n - 2\text{In}(\hat{L}) \tag{15}$$

where n is the number of predicted parameters in the model and $\hat{L}$ is the maximum value of the likelihood function for the model. The lower AIC displays the better the fit.

ii) Schwarz Information Criterion (SIC)

Schwarz information criterion (SIC) or Bayesian information criterion (BIC) is applied to choose the better one among two or more models. It was announced in an article which was written by Gideon Schwarz in 1978. Similar to AIC, lower values of SIC are preferred. The formula for SIC is shown in Eqn. (16).

$$\text{In}(k)n - 2\text{In}(\hat{L}) \tag{16}$$

where *n* is the number of predicted parameters in the model, k indicates the sample size and $\hat{L}$ is the maximized value of the likelihood function of the model.

iii) Hannah-Quinn Information Criterion (HQC)

It is another choice to AIC and SIC. It is also a measure of goodness of fit for model selection and calculated as follows:

$$-2L_{max} + 2n \, \text{In}(\text{In}(k)) \tag{17}$$

Here *L* demonstrates the log-likelihood, k is the number of observations and n is the number of parameters. The value is also expected to be low.

4.5 The model

In order to analyse bank profitability determinants in each country, panel data analysis has been used with their internal and external elements, through a model given in Eqn. (18) which is similar to Eqn. (5)

$$\pi_{itk} = c + \sum_{j=0}^{J} \beta_j X_{it}^j + \sum_{m=0}^{M} \beta_m X_{it}^m + \varepsilon_{it} \qquad i = 1, \dots, N \text{ and} t = 1, \dots, T \tag{18}$$

where $\varepsilon_{it} = v_i + \vartheta_{it}$ and *c* is a constant term, Π_{itk} is the profitability of a bank *i* at time *t* and measured by parameter *k*. In this research, *k* corresponds to ROA. The superscripts *j* and m denote the bank specific and macroeconomic determinants, respectively. Also, ε_{it} is the disturbance with v_i the unobserved distribution as $u_i \overset{iid}{\sim} N(0, \sigma_v^2)$

If we adapt the Eqn. (18) to our research, we obtain the Eqn. (19).

$$\text{ROA}_{it} = \beta_0 + \beta_1 \, \text{CA}_{it} + \beta_2 \, \text{LQ}_{it} + \beta_3 \, \text{EF}_{it} + \beta_4 \, \text{AQ}_{it} + \beta_5 \log(\text{BS}_{it}) + \beta_6 \, \text{INF}_{it} +$$
$$\beta_7 \, \text{GDP}_{it} + \beta_8 \, \text{MS}_{it} + \beta_9 \, \text{EXP01} + \varepsilon_{it} \tag{19}$$

Description of the variables in Eqn. (19) as follows:

Y= ROA_{it} : Return on Assets of bank *i* at time *t*

X_1 = CA : Capital adequacy ratio

X_2 = LQ : Liquidity ratio

X_3 = EF : Cost efficiency ratio

X_4 = AQ : Asset quality ratio

X_5 = log(BS): Natural logarithm of bank size reflecting the management quality

X_6 = INF: Inflation rate

X_7 = GDP: Gross domestic product

X_8 = MS: Money supply

X_9 = EXP01: Exports

β_0: Constant

$\beta_1, ..., \beta_9$: Coefficients of independent variables

ε: Error

4.6 Explanation of the Variables

The variables used have been categorized as internal and external factors. The variables that classified as internal factors (excluding bank size) are ratios which are selected by taking into consideration the CAMEL framework whereas external factors are macroeconomic indicators reflecting the economic status of each country.

4.6.1 Dependent Variable

ROA is a key profitability indicator for banks and it has become the most common measure of bank profitability over time. It calculated as in Eqn. (20).

$$ROA = Net Income / Total Assets \qquad (20)$$

It is a ratio that indicates how profitable a bank is in relation to its total assets (European cental bank Eurosystem, 2010). It also shows how banks efficiently manage its assets to produce earnings.

4.6.2 Independent Variables

Capital Adequacy Ratio (*CAR*): Previous studies in literature have shown that bank capital adequacy is an important determinant of bank profitability. It is a rate of a bank's capital to its risk. In fact, this is the evaluation of the capital of a bank. Two kinds of capital which are tier 1 and tier 2 are measured. Tier 1 capital is defined as the principal capital which is held in a bank's reserves and exists as the principal fund resource. Tier 1 capital contains common stock, retained earnings, and preferred stock. The amount of capital owned is an indicator of whether a bank has the financial power to manage emergencies. Unlike tier 1 capital which is defined as a bank's principal capital, tier 2 capital is known as a bank's supplementary capital. Revaluation reserve, undisclosed reserves, hybrid security, and subordinate debt compose the tier 2 capital. The formula for this ratio is given in Eqn. (21).

Capital Adequacy Ratio = (Tier 1 Capital+ Tier 2 Capital) / Risk Weighted Assets   (21)

CAR is crucial to assure that banks own adequate cushion to diminish a plausible amount of losses before they bankrupt. Furthermore, this ratio is also used by regulators for stress testing (Maredza 2014, Shukur et al. 2015).

Liquidity: Liquidity management is related to the ability of banks to fulfill their financial obligations and relevant ratio is calculated as follows:

   Liquidity Ratio = Total Customer Deposit / Total Assets   (22)

Some of the liquidity ratios include *cash* to *deposit ratio* and *total investment* to *total deposit ratio*. In this study, *total customer deposit* to *total assets* will be used. An increase in this ratio indicates efficiency of banks in utilising its funds to generate high profit. This ratio also reveals capability of banks whether it responds to any financial circumstance requiring immediate flow of money without depending on reserves (Ongore and Kusa 2013, Husain et al 2015).

Management Efficiency: Since management quality refer to all the qualitative features of a bank such as, organizational culture, management policies, compatibility to the internal and external norms etc.; this part is the subjective aspect of the CAMEL framework. In literature, previous studies agree that

management quality and efficiency are straightly related (Wahdan and Leithy 2017, Husain et al 2015). It can be measured by distinct ratios that include the components which decide the quality degree. In this study, in order to measure management efficiency, *cost* to *income* ratio is used.

Efficiency Ratio = Total Operational Expenses / Net Income　　(23)

The efficiency ratio represents an overview of the functioning of the banks, which has been understandable via the assessment of management systems, organizational culture and control mechanisms. This ratio is used to monitor operational efficiency or management of expenses.

Bank Size: In this study, bank size has been dealt with as an element of management quality. Management quality is the ability of executives to diagnose, gauge and control the risks arising from the activities of a bank. Here, bank size is not a ratio, but it is a logarithm of a bank's total assets. The impact of bank size can have a positive influence on bank profitability up to a certain limit but beyond to this threshold it may also cause a negative effect (Wahdan and Leithy 2017, Husain et al 2015, Podder 2012, Trujillo-Ponce 2010)

Asset Quality: The financial soundness of banks is determined by quality of assets its hold. Poor asset quality is a main cause of bank failure. Thereby, asset quality is one of the most crucial topics to ascertain the overall status of a bank. The main factor which impacts overall asset quality is the quality of the credit portfolio since credits are generally the largest item of the assets and they can also load down the highest amount of potential risk to the bank's capital account. Therefore, asset quality has been measured with Eqn. (24) containing non-performing loans (NPL) which are mostly used as an indicator of asset quality

Asset Quality Ratio = Non-Performing Loans / Total Assets　　(24)

4.6.2.1 Macroeconomic Variables

Gross Domestic Product (*GDP*) is the total monetary value of whole finished goods and services generated and sold on the market in a country generally within one year. Ongore and Kusa (2013) found that there was a decline in loan demand in the period when GDP fell and detected that this situation had a negative impact on the profitability of the bank. Moreover, Athanasogou et al. (2005) states that demand for credit is higher during boom than recession period. Since GDP is an exact indicator of economic activity, in this study, it was used as a macroeconomic variable which is thought to affect the profitability of the bank.

Inflation is a state of a continuously raise in the general price level in an economy. In other words, it is a rise in the cost of living as the price of goods and services increase. Inflation rate is a percentage change in aggregate price levels which affect bank profitability directly or indirectly and it is one of the considerable macroeconomic indicators for a country. High inflation rate is also associated with high interest rates which increase bank profitability (Wood and Staikouros, 2004).

Money supply means to the total stock of money rotating in the economy. The rotating money includes the currency, printed notes, money in the deposit accounts and other liquid assets. Valuation of the money supply is significant since it impacts the business cycle and thereby impacts the economy. Money supply data is published by every country's central bank periodically.

Exports are the goods and services manufactured in one country and bought by residents of another country. Since exports lead to raise job opportunities, earn more salaries, and increase the living standard of residents, governments stimulate it. Exports also go up the foreign exchange reserves held in a country's central bank. A country with high reserves can use this to govern its own currency's value. Also, countries can benefit from foreign exchange reserves to manage liquidity. In other words, governments can control inflation using the foreign currency to buy their own currency. This reduces the money supply and makes the local currency more valuable. Furthermore, since the

export variable is an external funding source, it is anticipated to have a positive impact on the bank's profitability.

A panel data analysis was performed for each country to answer the research questions, using Eviews 10. Each country under study is represented by a single panel using key performance variables as a comparative analysis has been done.

CHAPTER 5.

INTERPRETATION AND ANALYSIS OF RESULTS

In this chapter, based on panel data analysis, the empirical evidence of the comparative analysis of determinants of bank profitability are presented. Results of each country are given separately and analysed. Hypothesis testing also carried out to answer the research questions. A comprehensive comparative analysis on all the countries under study is represented also in this chapter. Moreover, for the analysis, Eviews software used.

5.1 The Outcomes for United States of America

5.1.1 Descriptive Statistics

Descriptive analysis related to five banks under study in America has been introduced in Table 5.

Table 5.

Descriptive Analysis for US Data

Variable	Minimum	Maximum	Mean	Std. dev.
ROA	-1.2	2.82	0.88	0.65
Aq	13	66.4	37.4	14.4
Bs	9857000	13138767	1683019	1749475
Ca	10.6	17.26	14.25	1.94
Lq	37.7	71.0	53.45	9.5
Ef	38.2	88.25	62.1	10.99
Exp01	9.99	13.6	12.27	1.26
GDP	-3.62	2.39	0.80	1.69
Inf	-0.35	3.83	2.09	1.30
Ms	-2.74	11.71	5.83	3.58

The statistics show general outlook of the US banking environment represented by five major banks. Also, inflation showed an average increase of 1.30% in America during the period under study.

5.1.2 Correlation Analysis

The Table 6 contains the summary of correlation matrix of the independent variables used in this study. The correlation coefficients show the direction and magnitude of the relationship between the variables. The aim of this matrix is to test whether there exists multicollinearity among independent variables. As a rule of thumb, if the correlation coeffcient is more than 80%, it is not be accepted since this value is the indicator of multicllinearity among the variables (Topak and Talu 2017). In our case, the matrix shows low values which denotes that most variables are not related (the highest being 0.63). As a result, "no multicollinearity" assumption has been satisfied for this panel data.

Table 6.

Correlation Matrix for US Data

	AQ	BS	CA	EF	Exp01	GDP	INF	LQ	MS
AQ	1								
BS	-0.12	1							
CA	-0.33	0.39	1						
EF	-0.18	0.40	0.39	1					
EXP01	-0.14	0.63	0.63	0.48	1				
GDP	0.002	-0.14	-0.16	0.03	0.12	1			
INF	0.13	-0.26	-0.29	-0.01	-0.14	0.28	1		
LQ	-0.103	0.12	0.19	0.003	0.30	0.10	-0.20	1	
MS	0.14	-0.29	-0.56	-0.10	-0.37	-0.13	0.52	-0.13	1

5.1.3 Normality Test

Series: Standardized Residuals	
Sample 12/01/2005 12/01/2015	
Observations 55	
Mean	-8.07e-18
Median	0.032278
Maximum	0.686540
Minimum	-1.137163
Std. Dev.	0.307376
Skewness	-0.996564
Kurtosis	5.423308
Jarque-Bera	22.56142
Probability	0.000013
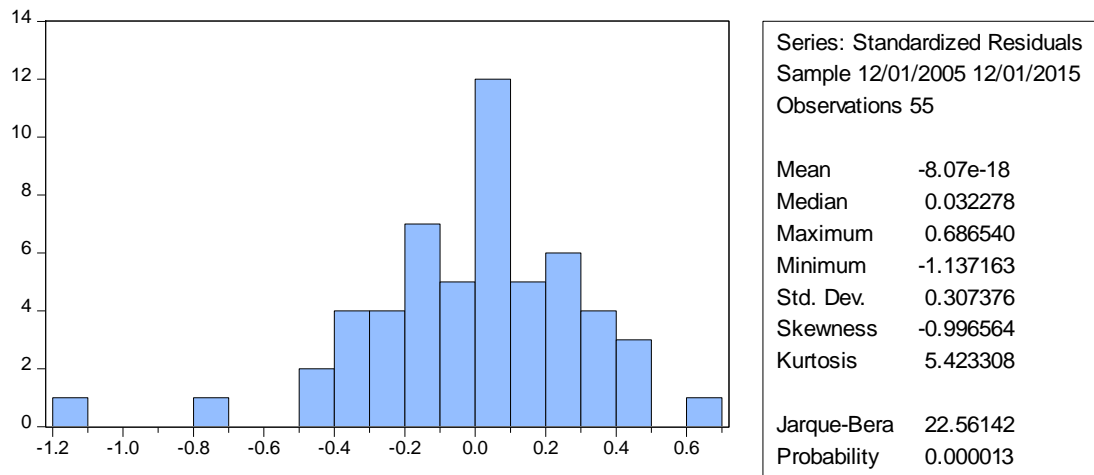
Figure 2. Histogram for US Data

The normality assumption which is tested using histogram, should reflect a bell-shaped curve, the coefficients of skewness and kurtosis should be equal to zero. The histogram in Fig.2 shows a bell shaped with a long left tail as the skewness is negative with a value of -0.99. This negative skewness coefficient is a common feature of return on asset (ROA) data. The kurtosis is a measure of the thickness of the distribution for the random variable along its tail. Here, it is above 3 which means that the distribution is peaked (leptokurtic) relative to normal. The value of Jarque-Bera, which is 22.56, is statistically significant. This indicates that residuals are not normally distributed.

5.1.4 Residual Plot

The graph in Fig. 3 demonstrates the residuals and fitted ROA on the vertical and horizontal axes, respectively. The residuals show a fairly randomly dispersed pattern around the horizontal meaning the homoscedasticity assumption is satisfied.
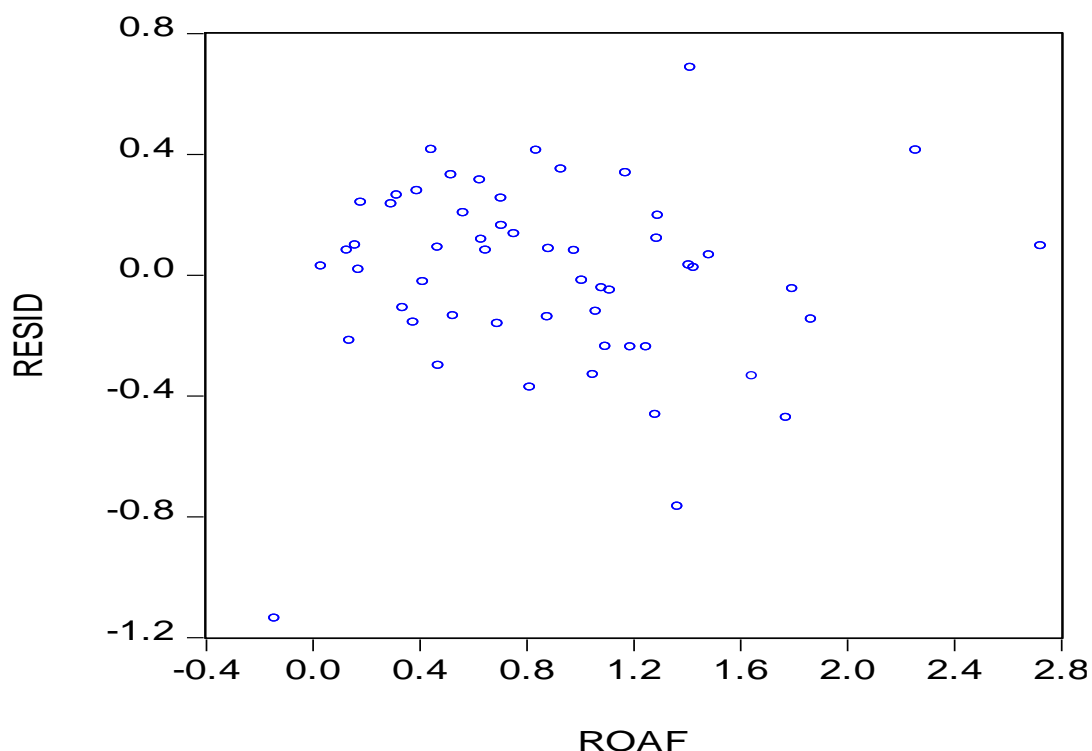
Figure 3. ROA Residual Plot (America)

5.1.5 The Pooled OLS Results

The R-squared is 0.78 which means 78% of changes in ROA can be explained by the independent variables. The adjusted R-squared of 73% is also high and acceptable. The value of Durbin-Watson statistics between 1.5 and 2.5 is accepted as normal but out of this range is thought as problematic. Here, 1.4991~1.5 result can be assumed as in this range. So, it can be concluded that there is no correlation between the residuals. Thus, one of the assumptions of panel data model of autocorrelation was met. Akaike information criterion AIC, the Schwardz criterion and the Hannan- Quinn criterion all show small values indicating a good fit model. As for coefficients, for example, GDP has a positive coefficient of 0.19 indicating that when GDP value raises by 1%, ROA will also rice by 0.19.

Most of the variables are significant which are AQ, BS, EXP, GDP, LQ, EF). Only three variables, capital adequacy ratio, money supply and inflation, are not significant. Efficiency ratio (EF) moves in the reverse direction with ROA, i.e., for every 1% increase of EF, ROA will decrease by about 2%. The results

show that the CAMEL factors which determined bank profitability in America during the period considered include asset quality, bank size, liquidity ratio and efficiency ratio.

Table 7.

Pooled OLS Results for America

Dependent Variable: ROA
Method: Panel Least Squares
Date: 01/16/19   Time: 16:04
Sample (adjusted): 12/01/2005 12/01/2015
Periods included: 11
Cross-sections included: 5
Total panel (balanced) observations: 55

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.654283	0.862104	4.238798	0.0001
AQ	0.009531	0.004081	2.335680	0.0240
LOG(BS)	-0.139910	0.057387	-2.438026	0.0188
CA	0.048763	0.041206	1.183388	0.2429
EF	-0.022132	0.005020	-4.409211	0.0001
EXP01	-0.150285	0.064191	-2.341232	0.0237
GDP	0.193482	0.034684	5.578374	0.0000
INF	-0.062857	0.050496	-1.244779	0.2197
LQ	0.020609	0.006933	2.972437	0.0047
MS	0.038079	0.020494	1.858030	0.0697

R-squared	0.781352	Mean dependent var	0.889455
Adjusted R-squared	0.737622	S.D. dependent var	0.657350
S.E. of regression	0.336713	Akaike info criterion	0.823795
Sum squared resid	5.101911	Schwarz criterion	1.188765
Log likelihood	-12.65437	Hannan-Quinn criter.	0.964932
F-statistic	17.86779	Durbin-Watson stat	1.499105
Prob(F-statistic)	0.000000		

Capital adequacy is not statistically significant, meaning that it does not influence profitability of American banks. Furthermore, it can also be concluded that as external factors GDP and exports can influence bank profitability in America. However, inflation and money supply are not significant determinants of bank profitability in America.

5.1.6 Fixed Effect Model Results

Table 8.

Fixed Effect Model Results for America

Dependent Variable: ROA
Method: Panel Least Squares
Date: 06/15/19   Time: 12:56
Sample: 2005 2015
Periods included: 11
Cross-sections included: 5
Total panel (balanced) observations: 55

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.082444	1.213138	2.540884	0.0149
AQ	0.022837	0.013832	1.650934	0.1064
LOG(BS)	-0.134083	0.066102	-2.028436	0.0490
CA	0.068990	0.042957	1.606023	0.1159
EF	-0.021663	0.005237	-4.136562	0.0002
EXP01	-0.129140	0.067370	-1.916872	0.0622
GDP	0.211903	0.040162	5.276190	0.0000
INF	-0.101180	0.059994	-1.686506	0.0993
LQ	0.010189	0.016716	0.609548	0.5455
MS	0.044502	0.022497	1.978131	0.0547

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.800525	Mean dependent var	0.889455
Adjusted R-squared	0.737277	S.D. dependent var	0.657350
S.E. of regression	0.336935	Akaike info criterion	0.877475
Sum squared resid	4.654528	Schwarz criterion	1.388433
Log likelihood	-10.13057	Hannan-Quinn criter.	1.075067
F-statistic	12.65688	Durbin-Watson stat	1.709715
Prob(F-statistic)	0.000000		

The fixed effect model shows an R-squared is 0.80 which means 80% of changes in ROA can be explained by explanatory variables. The adjusted R-squared of 73% is also fairly acceptable. The outcomes display that only bank size and efficiency ratio are significant as the CAMEL factors. Most of the variables are not significant. As for macroeconomic variables, just GDP is significant.

Comparison of pooled ordinary least square regression and fixed effect regression indicates that performance of the fixed effect model is better than the pooled OLS model. This is because log-likelihood ratio of fixed effect model

is higher, sum of squared residuals is less and also its adjusted R-squared is slightly greater than the pooled OLS model.

5.2 The Outcomes for Australia

5.2.1 Descriptive Statistics

Descriptive analysis related to five banks under study in Australia has been introduced in Table 9.

Table 9.

Descriptive Analysis for Australia Data

Variable	Minimum	Maximum	Mean	Std. dev.
ROA	-0.06	1.42	0.86	0.30
Aq	58.97	95.94	73.80	7.88
Bs	12.49	17.61	14.05	1.64
Ca	6.7	14.15	11.11	1.61
Lq	39.40	82.68	56.6	9.64
Ef	41.3	97.00	50.28	12.65
Exp01	18.28	23.03	20.50	1.18
GDP	-0.15	3.13	1.27	0.84
Inf	1.50	4.35	2.64	0.81
Ms	3.20	18.23	9.74	4.68

The lowest ROA recorded during the period under study was negative 0.06%. The 0.86% as mean shows that banks in Australia in the long run, expect to a return on asset invested of 86 cents per 100 dollars.

5.2.2 Correlation Analysis

The Table 10 contains the correlation matrix of the independent variables used in this study for Australian banks. As mentioned earlier, matrix detects the existence of multicollinearity among independent variables. In this case, the

matrix has low values which means that most variables are moderately related (the highest being 0.67). There is no multicollinearity in this panel data.

Table 10.

Correlation Matrix for Australia Data

	AQ	BS	CA	EF	Exp01	GDP	INF	LQ	MS
AQ	1								
BS	0.65	1							
CA	-0.018	0.39	1						
EF	0.57	0.61	0.13	1					
EXP01	-0.004	0.09	0.13	-0.17	1				
GDP	0.06	-0.08	-0.26	0.11	-0.38	1			
INF	0.13	-0.08	-0.35	0.17	-0.30	0.11	1		
LQ	0.19	0.23	0.08	-0.31	0.11	-0.13	0.19	1	
MS	0.16	-0.10	-0.42	0.23	-0.40	0.67	0.64	-0.29	1

5.2.3 Normality Test

The histogram and Jarque-Bera test will be used to test for the normality assumption.
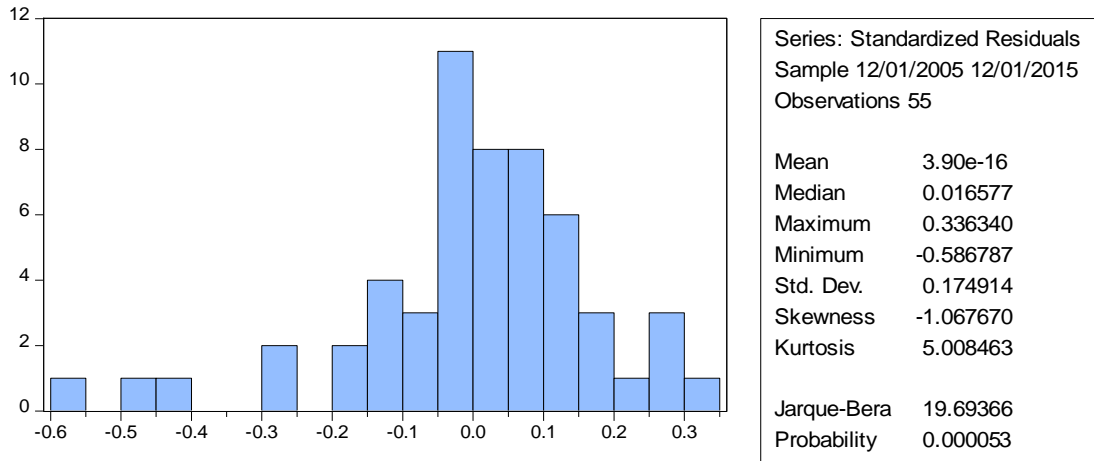
Figure 4. Histogram for Australia Data

A bell shaped curve reflect normally distributed residuals with coefficients of skewness equal to zero and kurtosis equal to 3. The histogram on Fig. 4. shows a bell shaped with a long left tail as the skewness is negative with a value of -1.06. The kurtosis is above 3 which means that the distribution is peaked (leptokurtic) relative to normal. The value of Jarque-Bera, which is 19.69, is statistically significant since the p-value is less than 5%. This demonstrates that residuals are not normally distributed.

5.2.4 Residual Plot

The Fig. 5 shows the residual plot for Australia ROA data. The residuals show a fairly randomly dispersed pattern around the horizontal. That is to say, there is no evidence of heteroscedasticity in the model.
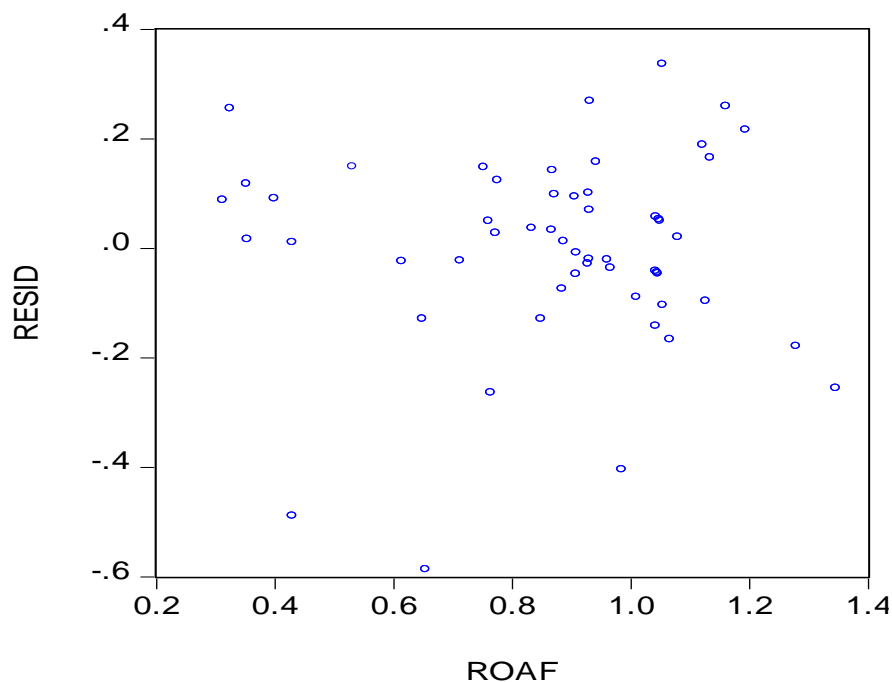
Figure 5. ROA Residual Plot (Australia)

5.2.5 The Pooled OLS Results

The R-squared value of 0.66 means the 66% changes in ROA are explained by the independent variables in the model but the remaining 34% is explained by other factors which are not included in the model. The adjusted R-squared is 60% is acceptable, too. The F statistic with a p-value zero which is less than 0.05 shows that the model is statistically significant.

The CAMEL variables which are significant include asset quality ratio and bank size. This denotes that in Australia, bank size and asset quality play an important role as the determinants of bank profitability. Capital adequacy ratio and cost efficiency ratio were not found to be determinants of profitability in the period under study.

Findings on external determinant of bank profitability in Australia show that only export is significant with a p-value of 0.02. The other macroeconomic factors, money supply, GDP and inflation were not significant. This means that they do not have any impact on bank profitability in the period under study.

Table 11.

Pooled OLS Results for Australia

Dependent Variable: ROA
Method: Panel Least Squares
Date: 01/16/19   Time: 14:25
Sample (adjusted): 12/01/2005 12/01/2015
Periods included: 11
Cross-sections included: 5
Total panel (balanced) observations: 55

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.085960	0.673928	4.579067	0.0000
AQ	0.021492	0.005211	4.124307	0.0002
LOG(BS)	-0.202393	0.029334	-6.899643	0.0000
CA	0.040215	0.020660	1.946505	0.0579
EF	-0.000395	0.003751	-0.105332	0.9166
EXP01	-0.062290	0.025860	-2.408729	0.0202
GDP	0.083121	0.053873	1.542912	0.1299
INF	-0.001965	0.052275	-0.037594	0.9702
LQ	3.17E-05	0.003785	0.008361	0.9934
MS	-0.021520	0.012636	-1.703166	0.0954

R-squared	0.668796	Mean dependent var		0.869036
Adjusted R-squared	0.602555	S.D. dependent var		0.303933
S.E. of regression	0.191609	Akaike info criterion		-0.303754
Sum squared resid	1.652131	Schwarz criterion		0.061216
Log likelihood	18.35322	Hannan-Quinn criter.		-0.162617
F-statistic	10.09643	Durbin-Watson stat		1.291190
Prob(F-statistic)	0.000000			

The Durbin- Watson statistic value of 1.29 indicates that residuals are slightly correlated since the result is not in the range of 1.5 and 2.5. Since Akaike information criterion AIC, the Schwardz criterion and the Hannan- Quinn criterion all are small values enough, the model is good fit.

5.2.6 Fixed Effect Model Results

Table 12.

Fixed Effect Model Results for Australia

Dependent Variable: ROA
Method: Panel Least Squares
Date: 06/15/19   Time: 17:46
Sample: 2005 2015
Periods included: 11
Cross-sections included: 5
Total panel (balanced) observations: 55

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.439697	1.904550	-0.755925	0.4540
AQ	0.016484	0.007499	2.198183	0.0336
LOG(BS)	0.192987	0.148735	1.297529	0.2017
CA	-0.007579	0.030569	-0.247946	0.8054
EF	0.005865	0.004460	1.315048	0.1958
EXP01	-0.085583	0.026293	-3.254989	0.0023
GDP	0.112520	0.052118	2.158953	0.0368
INF	0.013378	0.049824	0.268511	0.7897
LQ	-0.000371	0.003821	-0.097031	0.9232
MS	-0.024075	0.012071	-1.994386	0.0528

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.729527	Mean dependent var	0.869036
Adjusted R-squared	0.643767	S.D. dependent var	0.303933
S.E. of regression	0.181403	Akaike info criterion	-0.360862
Sum squared resid	1.349188	Schwarz criterion	0.150095
Log likelihood	23.92371	Hannan-Quinn criter.	-0.163271
F-statistic	8.506645	Durbin-Watson stat	1.629078
Prob(F-statistic)	0.000000		

The R-squared is 72% which means that 0.72 changes in ROA can be explained by explanatory variables, but the remaining 28% is accounted for by other factors that are not captured by the model. The adjusted R-squared of 64% is also fairly acceptable. Since the residuals are considered as not correlated if the Durbin- Watson statistic value is between 1.5 and 2.5, it can be interpreted that autocorrelation assumption is met, meanig there is no correlation problem.

The results show that internal factor which is significant is asset quality. All the other internal variables are not significant. Two macroeconomic variables are significant which are GDP and export. This means that asset quality, GDP and export variables are determinants of bank profitability in Australia.

Since log-likelihood ratio and Adjusted R-squared value is greater than pooled OLS model, the fixed effect model performance is better. Furthermore, sum of squared residuals value of the fixed effect model is less than the first model. This is also another indicator of the better goodness of fit in terms of the fixed effect model.

5.3 The Outcomes for Ghana

5.3.1 Descriptive Statistics

Descriptive analysis related to five banks under study in Ghana has been demonstrated in Table 13.

Table 13.

Descriptive Analysis for Ghana Data

Variable	Minimum	Maximum	Mean	Std. dev.
ROA	-2.5	7.0	3.5	1.89
Aq	19.35	65.8	47.05	11.41
Bs	11.96	22.25	15.29	2.93
Ca	8.3	29.19	18.02	5.23
Lq	39.7	86.7	54.41	11.16
Ef	32.6	87	54.41	11.73
Exp01	24.52	44.42	33.21	6.65
GDP	1.50	11.27	4.37	2.85
Inf	7.12	19.25	13.18	3.5
Ms	19.46	39.34	30.27	7.34

Similar to the other countries, we observe minimum ROA as a negative value also for Ghana but unlike the other countries under study, Ghana is the only country with a minimum positive GDP.

5.3.2 Correlation Analysis

As it is seen from Table 14, the values in the correlation matrix are small enough. Hence, it can be concluded multicollinearity is not a problem for these data set.

Table 14.

Correlation Matrix for Ghana Data

	AQ	BS	CA	EF	Exp01	GDP	INF	LQ	MS
AQ	1								
BS	-0.35	1							
CA	-0.12	-0.03	1						
EF	0.0013	0.05	-0.29	1					
EXP01	-0.29	0.18	0.20	-0.27	1				
GDP	-0.19	-0.01	-0.18	0.14	0.03	1			
INF	0.16	-0.014	0.19	0.10	0.05	-0.57	1		
LQ	-0.54	0.49	-0.38	0.01	0.03	0.24	-0.27	1	
MS	0.16	-0.04	-0.15	0.11	-0.49	0.10	0.16	-0.006	1

5.3.3 Normality Test

As we see from Fig. 6, the value of Jarque-Bera statistics which is 7.92, is statistically significant since the p-value is less than 5%. This demonstrates that residuals are not normally distributed. So, it can be deduce that normality assumption is not satisfied.
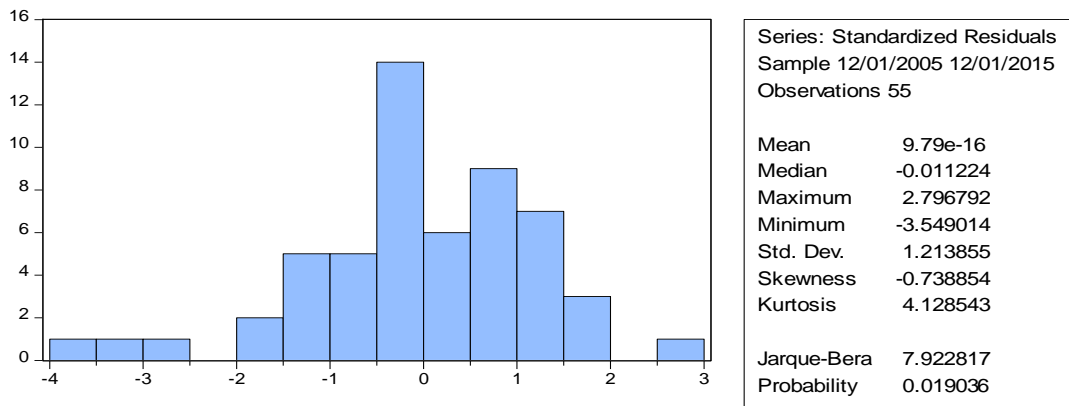
Figure 6. Histogram for Ghana Data

5.3.4 Residual Plot

From the Fig. 7 which belongs to the residual plot for ROA data, we see that the residuals show a randomly scattered pattern. In other words, it can be concluded that there is no evidence for heteroscedasticity in the data set.
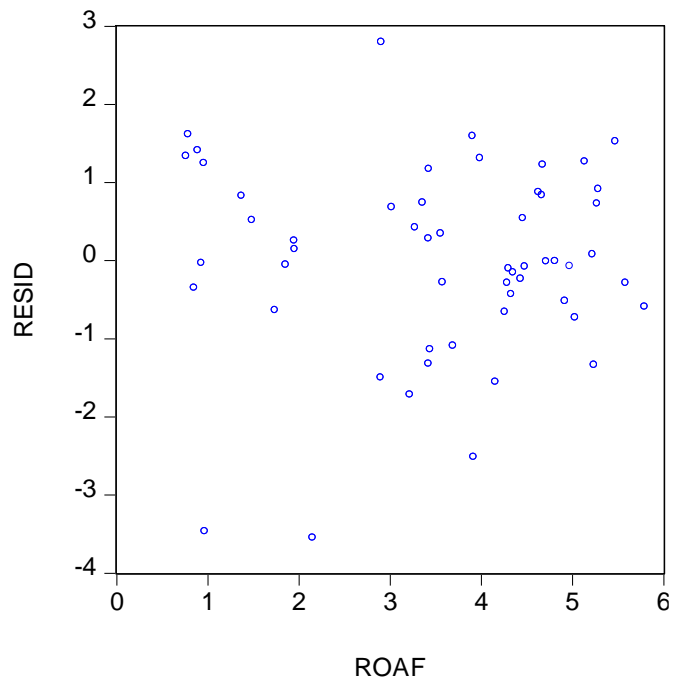
Figure 7. ROA Residual Plot (Ghana)

5.3.5 The Pooled OLS Results

In Table 15, the results show that the only statistically significant determinant from the CAMEL factors which determine the bank profitability in Ghana during the period covered in the study is efficiency ratio. It can be concluded that cost reduction skills play a high role in determining profitability. The findings also show that since the coefficient of efficiency ratio is negative, an increase in profitability means a decrease in cost efficiency ratio. The outcomes also indicate that macro economic factors used in the study does not have an impact on bank profitability in Ghana during the period considered.

Table 15.

Pooled OLS Results for Ghana

Dependent Variable: ROA
Method: Panel Least Squares
Date: 03/10/19   Time: 17:42
Sample (adjusted): 12/01/2005 12/01/2015
Periods included: 11
Cross-sections included: 5
Total panel (balanced) observations: 55

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	8.257818	3.911179	2.111337	0.0403
AQ	-0.027042	0.022236	-1.216122	0.2303
LOG(BS)	0.011424	0.072845	0.156833	0.8761
CA	0.032669	0.045310	0.721024	0.4746
EF	-0.100637	0.018176	-5.536673	0.0000
EXP01	0.010385	0.035219	0.294873	0.7694
GDP	-0.160770	0.082858	-1.940319	0.0586
INF	-0.101876	0.067830	-1.501942	0.1401
LQ	0.034501	0.027246	1.266243	0.2119
MS	0.024616	0.029057	0.847169	0.4014

R-squared	0.600278	Mean dependent var		3.529091
Adjusted R-squared	0.520334	S.D. dependent var		1.919941
S.E. of regression	1.329712	Akaike info criterion		3.570767
Sum squared resid	79.56599	Schwarz criterion		3.935737
Log likelihood	-88.19609	Hannan-Quinn criter.		3.711904
F-statistic	7.508703	Durbin-Watson stat		1.536125
Prob(F-statistic)	0.000001			

5.3.6 Fixed Effect Model Results

As it is seen from the Table 16, fixed effect model outcomes indicate slightly different results from the pooled OLS model. Together with efficiency ratio, bank size is also significant variable as internal factor which determines the bank profitability in Ghana. As for external factors, solely inflation is designated as significant explanatory variable. Since the inflation has negative beta coefficient, we can conclude that there is a reverse relationship between profitability and inflation rate as expected.

Table 16.

Fixed Effect Model Results for Ghana

Dependent Variable: ROA
Method: Panel Least Squares
Date: 06/27/19   Time: 02:14
Sample: 2005 2015
Periods included: 11
Cross-sections included: 5
Total panel (balanced) observations: 55

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	16.91898	5.018500	3.371322	0.0016
AQ	-0.020740	0.021451	-0.966846	0.3393
LOG(BS)	-0.352309	0.170583	-2.065328	0.0453
CA	0.059236	0.045511	1.301587	0.2003
EF	-0.094586	0.020778	-4.552151	0.0000
EXP01	0.050253	0.035227	1.426514	0.1613
GDP	-0.129437	0.078787	-1.642869	0.1081
INF	-0.144578	0.066760	-2.165636	0.0362
LQ	-0.045740	0.039519	-1.157409	0.2538
MS	0.026302	0.027249	0.965251	0.3401

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.684509	Mean dependent var	3.529091
Adjusted R-squared	0.584476	S.D. dependent var	1.919941
S.E. of regression	1.237617	Akaike info criterion	3.479582
Sum squared resid	62.79951	Schwarz criterion	3.990540
Log likelihood	-81.68850	Hannan-Quinn criter.	3.677173
F-statistic	6.842793	Durbin-Watson stat	1.889566
Prob(F-statistic)	0.000001		

By comparison to pooled OLS model, performance of the fixed effect model is better because of higher Adjusted R-squared and log-likelihood, and smaller sum of squared residuals value.

5.4 Analysis of the results

The study has aimed to compare the determinants of bank profitability in three different countries which reflect different economies. Banks play a crucial role in the economy of a country as they have an intermediary role collecting and mobilizing resources contributing to economic growth of a country. As it has been shown in literature, bank profitability determinants can be classified as internal and external factors. In this study, CAMEL has been used as a frame for internal factors and findings suggest there exist differences among countries on profitability in terms of internal determinants.

Asset quality ratio, banks' size and export variables were found as determinants in both USA and Australia using the pooled regression analysis. Besides these variables, in America, efficiency ratio, liquidity ratio and GDP are also found as factors which affect the profitability according to the same model. Unlike Australia, cost reduction strategies were determined as a major factor in profitability in Ghana and America since efficiency ratio has been found as significant variable in both countries according to both modes used in the research.

The ability of banks to meet its short-term obligation is mostly shown by its liquidity ratio. It shows banks' capability to respond to financial situations requiring flow of money. Moreover, an increase in liquidity ratio also induce to increase in ROA. According to the pooled OLS model, only in US, this variable has been found as considerable factor on profitability during the period of under study. In pooled OLS model, it was found that the bank size variable reflecting total asset value has reversely affected profitability in Australia and America because it has a negative beta coefficient.

Furthermore, exports were also found to be a macroeconomic factor that had a significant impact on profitability in Australia and the US. In addition, findings demonstrated that money supply had no effect on profitability in all countries used in the study. On the other hand, based on the fixed effect model, results have shown that except Ghana, inflation was not a significant macroeconomic factor in all the countries under study. From the outcomes, it can be concluded

that bank profitability is determined both by internal and external factors and these factors change from country to country.

5.5 Limitations of the model

The study also compared the fixed effect and the pooled OLS results. Due to the nature of the data the random effect model results were not computed hence no further tests could not carry out to choose the most appropriate model to use, such as Hausman test. Since the Random effect model requires number of cross sections greater than the number of coefficients for between estimators for estimate of RE innovation variance, in this case, this requirement was not met. In other words, since the number of banks which corresponds to the number of cross sections is less than number of variables used in model, random effect model which is one of the model alternatives applied in panel data analysis could not be employed. As a future work, it is planned to repeat the study with countries where more bank data can be obtained to compare these three models.

CHAPTER 6
CONCLUSION AND OUTLOOK

In this study, the objective is to detect the determinants of bank profitability in different economies by using CAMEL framework and macroeconomic factors. The results, findings and examination of the used models have been clearly highlighted in the previous chapter and it has been found that there are different determinants affecting bank profitability in different countries.

In an attempt to find the determinants of bank profitability, various studies were done prior to this thesis. The difference and contribution of this thesis is it compares the banks which are in different continents, America, Australia and Africa. In other words, completely different banking environments have been compared. Ghana, an under developed economy, comparing with America and Australia which are developed countries according to World Bank country classification as well as according to United Nations World Economic Situation and Prospect report of 2014.

Moreover, the main difference between this thesis and the previous studies is that the thesis contributed to the understanding of the factors that determine the profitability of banks using top 5 in terms of asset size of the countries under study. Most studies used country average which is not the case with this thesis, the study used data for five banks for country analysis. The thesis will make a contribution to bank owners, investors, policy makers and financial institutions to have an understanding of different strategies for banks operating in different continents.

In the research, ROA which is a profitability indicator has been used as a dependent variable. Bank profitability is not only attributed to efficiency of management but other factors, as discussed in the literature review leading to

formulation of a panel data approach. In this approach, each panel has been represented by five largest banks of each country.

Table 17.

Summary of the Pooled OLS Model Outcomes

	AUSTRALIA	AMERICA	GHANA
AQ	✓	✓	✗
LOG(BS)	✓	✓	✗
CA	✗	✗	✗
EF	✗	✓	✓
EXP01	✓	✓	✗
GDP	✗	✓	✗
INF	✗	✗	✗
LQ	✗	✓	✗
MS	✗	✗	✗
R²	0.668	0.781	0.6002
Adjusted R²	0.602	0.737	0.5203
SUM of Sq. Re	1.652	5.119	79.565
LOG Likelihood	18.353	-12.654	-88.19
AIC	-0.303	0.823	3.57

Table 17 shows the pooled OLS results for the three countries. It can be concluded that money supply, inflation and capital adequacy were not

determinants of bank profitability in all the three countries. America and Australia had similar results regarding asset quality, bank size and exports.

The following table demonstrates the combined results for fixed effect model:

Table 18.

Summary of the Fixed Effect Model Outcomes

	AUSTRALIA	AMERICA	GHANA
AQ	✓	✗	✗
LOG(BS)	✗	✓	✓
CA	✗	✗	✗
EF	✗	✓	✓
EXP01	✓	✗	✗
GDP	✓	✓	✗
INF	✗	✗	✓
LQ	✗	✗	✗
MS	✗	✗	✗
R^2	0.729	0.8005	0.6845
Adjusted R^2	0.643	0.7372	0.5844
Sum of Sq. Res.	1.349	4.65	62.79
LOG Likelihood	23.923	-10	-81
AIC	-0.360	0.87	3.47

As seen from the Table 18, according to the fixed effect results, money supply, liquidity and capital adequacy were not determinants in all the three. Money supply and capital adequacy were not significant in both the pooled OLS and the fixed effect method.

From the results of the study, responses to the research questions as follows:

Comparison of the outcomes of the study and financial reports related to banking trends of the countries under study – The findings of the study also supported by the financial reports belonging to each country. According to IMF Financial Assessment report United States (2015), most of the banks have increased their liquidity levels in the period covering the study. This action increased profitability of the banks as also found by the results of the study. As it is seen from the both model outcomes, there is a positive relation between liquidity ratio and profitability. Australia, on the other hand according to Reserve Bank of Australia report (2014), a significant profit growth was noted which was attributed to asset performance. This is also clearly revealed by the panel analysis which showed a positive significant result for asset quality. In the case of Ghana, due to increased competition, profits had a declining trend caused by increased operation cost as according to Bank of Ghana report (2015). This result is clearly reflected on the findings of panel data approach since the cost efficiency variable was found as a significant determinant of profitability.

Comparison on impact of macroeconomic variables on profitability – Macroeconomic factors used in this study include inflation, GDP, money supply and exports. As discussed in the literature review section, effects of these indicators differ from period to period and economy to economy. According to fixed effect model, GDP variable was found one of the determinants on profitability in America and Ghana. In none of the countries, money supply variable was found to have an impact on profitability. Furthermore, the effect of export level impact on profitability is solely found in Australia.

Comparison on effect of internal factors on bank profitability – The study revealed that internal factors influence bank profitability differently in each country under study. Except the capital adequacy ratio, all variables used were found to affect profitability in different countries, even with different models. Liquidity was found to influence profitability with significant result in America while in Australia and Ghana it was not a significant factor. A study done by

Ongore and Kusa (2013) revealed that liquidity ratio was not a determinant of bank profitability. In addition, a study conducted by Husain et al. (2015) there was a positive significant impact between liquidity and bank profitability, similar to Australian results in this study. On another note, efficiency ratio was detected as one of the factors for US and Ghana but not for Australia. Based on the fixed effect model, bank size is a determinant only for America. Spathis et al. (2002), Yilmaz (2013) and Kamran et al. (2016) all proclaim that bank size has an effect on profitability in their studies which are similar to the result found for America. Bank size was also found not to be a determinant of bank profitability in the study of Athanasonglou et al. (2006)

As previously shown and discussed in the thesis literature, several studies have been done to find determinants of bank profitability. Different methods and data set has been used in an attempt to find determinants of bank profitability. In previous studies, one country analysis was done where banks in one country were analyzed as seen in the studies of Maiti and Jana 2017, Maredza 2014, Echkoba et al. 2014 and Kumbirai and Webb 2010. In addition, other studies compared two different countries (Kraidi, 2015), other compared regions (Islam and Nishiyama 2016, Fillip 2016, Petria et al. 2015, Filip 2016, Athanasonglou et al. 2008). However, in this thesis, a comparative analysis of countries in different continents, America, Australia and Ghana in different economies have been dealt with.

6.2 Outlook – The following recommendations are proposed for future work:

In addition to the profitability indicator ROA, alternative dependent variables maybe used such as ROE and NIM. Based on the results of the research, it is critical to note that five banks were used to represent a country. The sample of banks was limited in each country, a much larger sample for future studies is recommended for more accurate results. Since the thesis formulates a framework for policy makers, regulators, investors and shareholders, more variables can be incorporated in the study which are also paramount in bank profitability. Industry specific factors such as market concentration, number of branches can also be added to the proposed approach.

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12.06.2019

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