EUROPEAN BUSINESS INSTITUTE OF LUXEMBOURG

THE IMPACT OF CHANGES IN THE CAPITAL STRUCTURE ON THE FINANCIAL PERFORMANCE OF UK COMMERCIAL BANKS

By

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Abstract

The purpose of this study was to establish the impact of changes in the capital structure on the financial performance of UK commercial banks. HSBC, LLOYDs and Barclays were selected as appropriate samples. The time period for this study was between 2010 and 2023. Pearson Correlation Coefficient and Random Effect Panel Regression were the primary analytical methods. Measured variables included debt-equity ratio, debt-capital ratio and net profit margin. The findings revealed that there exists a weak negative correlation between changes in the capital structure and financial performance of UK commercial banks. The correlation was found out to be statistically significant. Lastly, it was established that Any increase in debt-equity ratio leads to decrease in the net profit margin by 5.61%. At the same time, any increase in the debt-to-capital ratio leads to decrease in the net profit margin by 1.17%.

STATUTORY DECLARATION

I, **John Maina** declare that:

(i) The research reported in this Thesis, except where otherwise indicated, is my original research.

(ii) This Thesis has not been submitted for any degree or examination at any other university.

(iii) This Thesis does not contain other persons' data, pictures, graphs or other information unless specifically acknowledged as being sourced from other persons.

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Signed: .....J.M.....Student

Signed.....Supervisor

ACKNOWLEDGEMENTS

I would like to thank Almighty God for seeing me through to the completion of this thesis. Furthermore, I am deeply indebted to my family for encouragement and understanding while I was engaged in this research project. I also take this opportunity to appreciate and applause my supervisor, Dr. James Mulli, for his commitment and genuine efforts towards ensuring the successful completion of this thesis. Last but not least, I would like to thank my fellow classmates for helpful insights and meaningful discussions.

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1. INTRODUCTION

The global commercial banking industry serves as a cornerstone for financial stability and economic development in the global economy. As of 2024, there were about 10,173 global commercial bank businesses, according to IBIS World (2024). On average, they have increased by 0.1% annually between 2019 and 2024. In revenue terms, they have been growing at a CAGR of 0.8% over the last five years (IBIS World, 2024). The following line graph shows the annual revenue trend for global commercial banking industry between 2010 and 2023 (Statista, 2023).

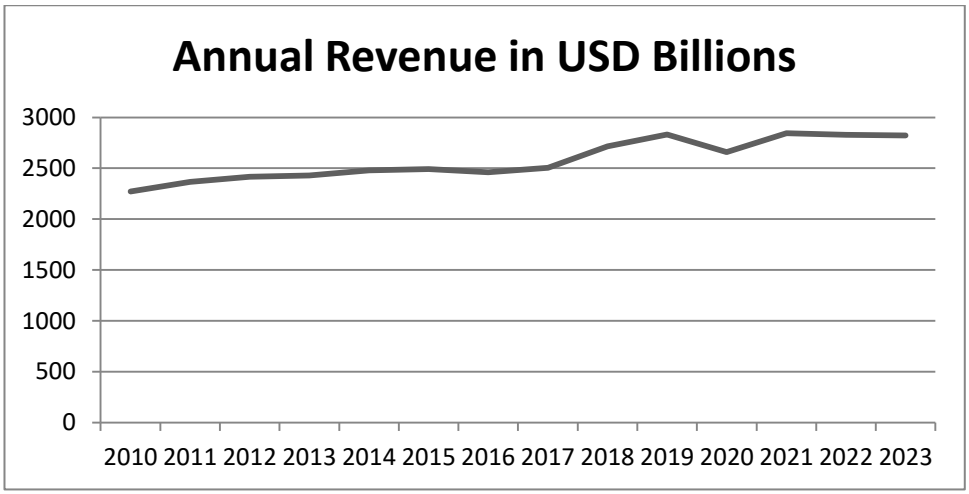

Figure 1: Line graph showing the annual revenue for the global commercial banks industry

This industry entails local, community, national, multinational banks and their subsidies. Commercial banks offer an array of services and products ranging from savings and checking accounts, loan facilities, safe deposit boxes, foreign exchange, insurance services, investment advice and bank guarantee. The top five largest commercial banks by asset are Industrial & Commercial Bank of China, China Construction Bank, Agricultural Bank of China, Bank of China and JP Morgan & Chase respectively, as of December 2023 (Statista, 2023). However, by market capitalization, the largest commercial banks in the world include JP Morgan & Chase, Bank of America, Industrial & Commercial Bank of China, Wells Fargo and China Construction Bank respectively (Statista, 2023).

In the realm of macroeconomic, commercial banks play pivotal role in enhancing international trade and other global transactions. However, over the years, the global commercial banking industry has had to navigate through a series of challenges including the global recession, climate change, COVID-19, Russia-Ukraine geopolitical conflict and Israel-Palestine war. Amidst the challenges, some banks have not only thrived but also flourished. On the other hand, some high-profile banks and other financial institutions have succumbed to the challenges and ultimately collapsed.

According to S&P Global, between 2008 and 2019, there have been 532 complete bank failures around the world. For United States, 2023 caught the banking industry by surprise after five major banks completely collapsed. Silicon Valley Bank and Signature Bank collapsed in March 2023, a second and third largest collapse in the history of US (Russell & Zhang, 2023). Later, First Republic Bank, Citizen Bank of Sac City and Heartland Tri-State Bank collapsed in November 2023.Turbulences within the banking industry has not only affected US but also the European zone over the years.

Between 2009 and 2020, the number of banks in the European Union has continuously declined following acquisitions, mergers and industry related-challenges. In 2020, there were 5 441 banks in the European Union, a decline of 33 % from 2009 (European Union, 2023). Also, in 2023, Credit Suisse, second largest bank in Switzerland was forced into a reinforced merger with UBS, one of its competitors, as a result of insolvency concerns. Moreover, due to the recent economic crises and ultimately bank failures, cross-border capital inflows have significantly reduced in more advanced countries forcing some banks to retrench, merge or restructure. However, banks from developing and emerging economies have expanded internationally. For example, according to Global Finance (2023), Africa banks were growing at a faster rate than those in the developed markets such UK.

According to IMF, UK is one of the advanced economies that recently had a good share of implications caused by economic crises and bank failures. Nonetheless, its commercial banking industry has generally remained resilient amidst the macroeconomic and banking-specific challenges thanks to vigorous and thorough strategies (Bank of England, 2023). Among the strategies, UK commercial banks have structurally made changes in the capital structures to achieve sustainable liquidity and capital requirements. Of interest, in this research, are the recent structural changes in the capital structure of UK commercial banks and subsequent financial performance.

Capital structure can be referred as a mix of debt and equity used by a company to finance its overall operations and growth (CFA Institute, 2022). Determining how much equity and how much debt to use is one of critical decisions financial managers are faced with every day. Different companies have different mix of debt and equity depending on factors such as capital market conditions, size, ownership, equity-debt ratio and other company-specific factors (CFA Institute, 2022). Typically, a company heavily financed by debt instruments over equity is regarded to be highly aggressive or highly leveraged. On the other hand, a company using a higher percentage of equity over debt is deemed as a lowly leveraged or conservative (JAXA Auditors, 2022).

1.1. Background of the study

The UK commercial banking industry is, by all metrics, influential and pivotal not only in the UK economy but also within the European economy (Clarence-Smith, 2017). As such, regulators and central banks in UK and Europe have always been keen on ensuring this industry remains strong amidst economic crises and impactful events such as Brexit. As such, UK commercial banks have constantly been subjected to regulatory compliance. Capital and liquidity requirements, as part of regulatory compliance has resulted the banks to change their capital structures in order to adhere to the compliance. Ultimately, change in capital structure have had resultant implications including cost of finance, investors' perception of the company, credit rating status, competitive pressures and risk management (Schoenmaker & Willem Schramade, 2023).

Therefore, debt and equity, as sources of finance, have advantages and drawbacks (Lynch, 2021). Hence, financial managers are bound to establish the optimal mix capital structure that would increase the financial performance and ultimately the wealth of its shareholders while simultaneously adhering to the regulatory compliance. However, there have been discussions among experts and scholars on whether a mix of capital structure has significant impact on the financial performance of companies. As such, this report attempts to establish the impact of changes in the capital structure on financial performance of UK commercial banks.

1.2. Objectives of the study

i. To examine whether changes in the capital structure and performance of UK commercial banks move inversely, directly or randomly against each other.
ii. To establish what extent does the changes in the capital structure impact the performance of UK commercial banks.

1.3. Research questions

i. Is there any correlation between changes in the capital structure and financial performance of UK commercial banks?
ii. What is the strength of the correlation, if any, between changes in the capital structure and financial performance of UK commercial banks?
iii. Is the correlation, if any, between changes in the capital structure and financial performance of UK commercial banks statistically significant?
iv. To what extent do changes in the capital structure affect the financial performance of UK commercial banks?

1.3. Hypotheses

I. NULL HYPOTHESIS

The changes in the capital structure do not have any impact on the financial performance of UK commercial banks.

II. ALTERNATIVE HYPOTHESIS

The changes in the capital structure do have an effect on the financial performance of UK commercial banks.

1.5. Significance of the study

The study is primarily significant to financial managers, regulatory bodies, professional investors, investment analysts, creditors and scholars. To start with, the findings of this research would likely compel financial managers to become keen and cautious when determining the mix of debt and equity in the capital structure. In other words, understanding how much impact is generated in terms of financial performance by changing the capital structure is a key insight at ensuring that the wealth shareholders is maintained and possibly increased.

Furthermore, findings of this study would assist the regulatory bodies in having good understanding of how much impact capital structure has on the financial performance of companies. Ultimately, they would likely be able to adjust the regulatory requirements in such a way that the financial performance of companies is not unreasonably jeopardized. Also, investment analysts and professional investors are inherently keen on the performance of companies, particularly, for public companies. Among the factors that they look at is the capital structure decisions.

Therefore, understanding potential performance of companies informs them on whether or not to invest in certain financial assets. Ideally, they associate high debt with higher credit risk and ultimately high default risk. At the same time, when a company is utilizing more equity than debt, investment analysts and investors tend to typically believe that the company is paying too much for cost of capital (equity typically cost more than debt) which ultimately affects the bottom line performance of companies. Therefore, these findings would scientifically approve or dis-approve these perceptions held by professional investors and analysts in relations to

Additionally, the ability to service financial obligations is facilitated by financial performance. That is, a company can only be able to pay off its financial obligations when it is able to earn significant profits from its operations and investments. As such, creditors are always keen to understand the potential financial performance of companies. Financial performance, on the other hand, is determined by many factors including market conditions, financial management, expenses, regulatory policies, among others. Capital structure is one of the financial management aspects. Therefore, scientifically informing creditors whether or not capital structure has an impact on the financial performance of companies is significant.

Lastly, findings of this research may debunk or approve previous theories, concepts and empirical studies put forward by academic scholars. That is, the findings would either confirm or reject the assertions by some scholars on the irrelevance of capital structure on the fundamental value of companies. Lastly, scholars who have interest in this line of research would get some insights to further their research especially from a perspective of advanced economies such as UK as well as from a perspective of the UK commercial banking industry.

1.6. Assumptions of the study

This research works on the assumption that it is potentially and scientifically possible to explore this line of research. This assumption is informed by previous studies, theories and concepts have been put forward in regards to the relevance of capital structure on the performance and fundamental value of companies. Additionally, the researcher believes that narrowing the research to 3 samples (3 UK commercial banks) would reflect an accurate picture of the entire UK commercial banking industry. Additionally, this research assumes that the correlation between changes in the capital structure and financial performance of UK commercial banks is linear. Lastly, it holds the Ceteris Paribus assertion whereby all other factors influencing financial performance are believed to have remained constant. Hence, the research is able to specifically isolate the impact of changes in capital structure on the financial performance of UK commercial banks.

1.7. Scope, Limitations and Delimitations

1.7.1. Scope

It is important to establish the parameters within which the study will operate. To begin with, the target population for this study is the UK commercial banks. Some of the UK commercial banks include NatWest, ANZ bank, HSBC, LLOYDS, Barclays, ABC International Bank, Access Bank UK Limited and Santander UK. So, the study intends to investigate the impact of changes in the capital structure on the financial performance of three largest UK commercial banks namely HSBC, LLYODS and Barclays. Important to note, the data is secondary in nature. As such, it is to be obtained from secondary sources, particularly, official financial websites. The study period is between 2010 and 2023. Lastly, the research only focuses on debt-equity ratios (DER), debt-to-capital ratios (DCR) and net profit margin (NPM) as the measurement variables. Ultimately, the expected findings include presence of correlation (or lack of it), strength of correlation, statistical significance and impact quantification.

1.7.2. Limitations and Delimitations

1.7.2.1. Limitations

This study is limited and constrained in a number of ways. To start with, the study holds the Ceteris Paribus assertion whereby all other factors influencing financial performance are believed to have remained constant. In reality, however, these factors tend to change over time. As such, they may have an effect on financial performance of companies. Secondly, the sample size for this study only involves three largest commercial banks. Hence, understanding the impact of changes in the capital structure on the financial performance of small and medium sized commercial banks might not be fully explored. Lastly, since the data to be used is secondary in nature which is to be obtained from financial websites, there is an inherited possibility of data inaccuracies. This is because the research intends to gather and analyse the variables (ratios) as calculated and presented in the financial websites. This means that if the calculation process used to obtain the ratios is inaccurate, the findings of the research are also compromised.

1.7.2.2. Delimitations

The study only observes the time period between 2010 and 2023 and not beyond or before that. Additionally, the research does not include other key performance indicators such as operating profit margin, ROA, ROCE, ROE, current ratio and gross profit margin. Also, the research does not include small and middle-sized commercial banks. Lastly, the target population does not include investment banks and other financial institutions other than commercial banks.

2. LITERATURE REVIEW

This chapter intends to provide a conceptual framework that will act as visual guide for this research. Also, it will explore previous theories, concepts, models and empirical studies that have been put forward within this line of research. The concept of capital structure gained prominence after the Modigliani and Miller (1958) established that the mix of debt and equity does not have any effect on the fundamental value of a company (Brusov & Filatova, 2023).

2.1. Conceptual framework

It is appropriate to formulate a conceptual framework for this study. It will assist in mapping out the variables that are to be measured. The following visual shows the conceptual framework for this study.

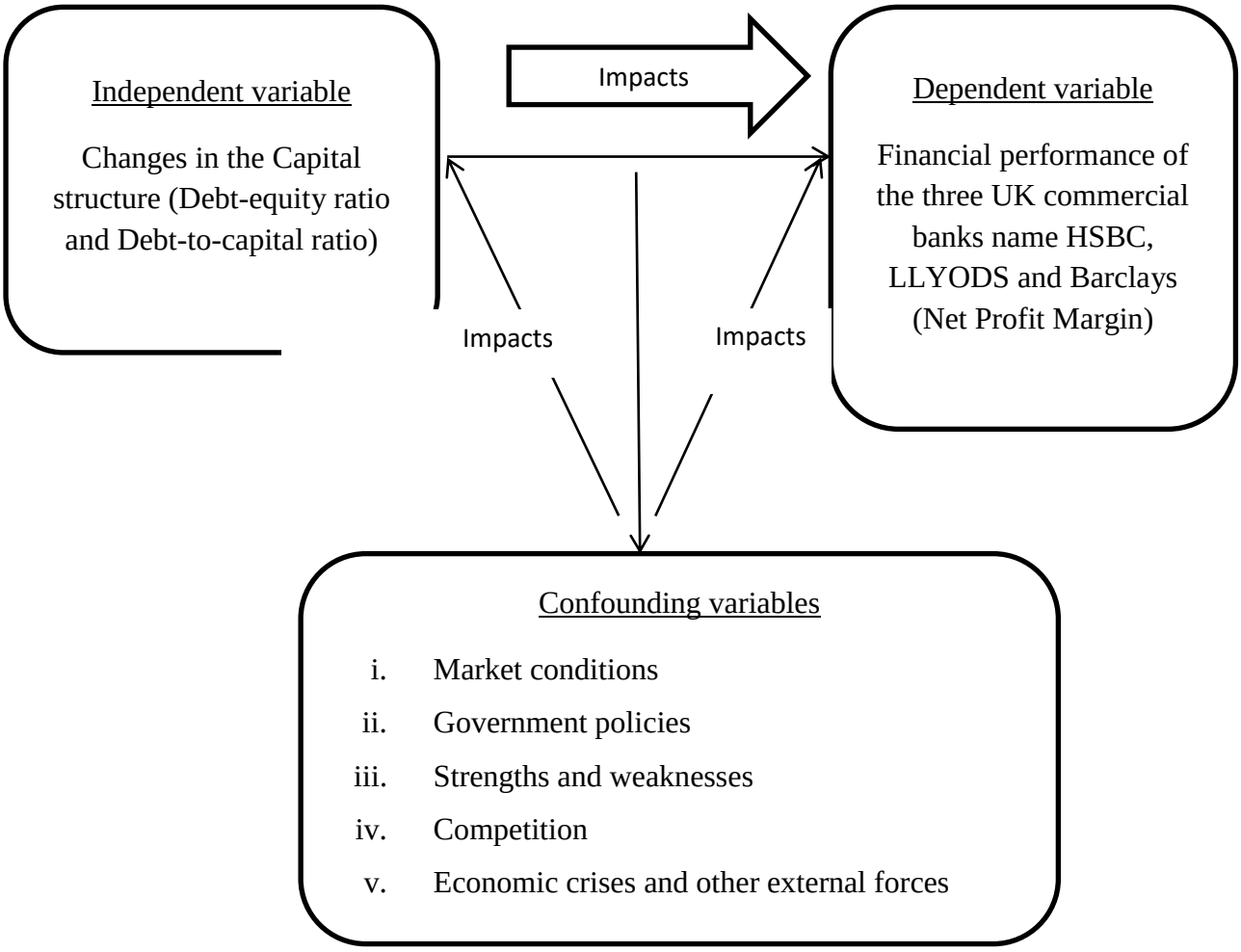

Figure 2 is a conceptual framework for this study

From figure 2, three variables namely independent variable, confounding variables and dependent variables have been established. The independent variable is the capital structure which is to be measured by debt-equity ratio and debt-to-capital ratio. On the other hand, the dependent variable is the financial performance which is to be measured by net profit margin. Figure 2 also portrays five confounding variables namely market conditions, government policies, strengths and weaknesses, competition, economic forces and other external forces. By definition, confounding variables are those individually unmeasured variables that can affect both expected cause and effect or independent variable and dependent variable (Nair, 2023).

For this case, the confounding variables can only be collectively accounted for. This means that the findings will provide the percentage of the confounding variables attributable to financial performance by first establishing the percentage of changes in the capital structure. Simply put, having identified the percentage of changes in the capital structure attributable to the financial performance, the rest of the percentage will be assumed to be the effect of confounding variables mentioned herewith on the financial performance.

2.2. Theories, concepts and themes

This line of research has been explored by various scholars. As a result, numerous theories, concepts and empirical studies have been established. Some of the common theories and concepts include Modigliani & Miller Theory, Net income theory, Pecking Order theory, Trade-off theory and Free cash flow theory. Additionally, some of the empirical studies that have been established include Mohammad & Bujang (2020) and Hashim & Hassan, (2017).

2.2.1. Modigliani-Miller theory

Over the years, the concept of capital structure and its implication was birthed under this theory 1950s by Merton Miller and Franco Modigliani (Jaros & Bartosova, 2015). The theory asserts that capital structure does not have any implication on the fundamental value of a firm. The theory also suggests that the fundamental value of a firm is calculated as the sum of present values of future cash flows including the terminal value. Hence, the aspect of capital structure is irrelevant. The theory can be mathematically illustrated as follows:

$$V_U = V_L$$

Where,

V_L= Value of levered firm. A levered firm is one which is financed by both debt and equity (Business Development Bank of Canada, 2022)

V_U = Value of Unlevered firm. Unlevered firm is one which is financed only by equity without debt.

Furthermore, the theory operates under the following assumptions:

i. There are no transaction costs
ii. Companies operate under perfectly efficient markets where they are not liable to taxes. As such, a 100% leveraged is not bound to receive any operational cost relief from tax-deductible interest expenses (Hanlon & Heitzman, 2022).
iii. No bankruptcy costs
iv. No agency costs

The theory also proposed a second proposition. The proposition suggested that cost of equity of a company is proportionately equivalent to its leverage level. This means that any increase in debt or leverage level, the cost of equity would proportionately increase. This is because increase in debt level would typically increase the default probability. Then, investors would demand for a higher compensation in order to withstand the default risk. The following equation summarizes the M&M proposition two:

$$K_e = K_a + \frac{Debt}{Equity}(K_e - K_D)$$

Where,

K_e = Cost of unlevered equity

K_a = Cost of levered equity

$\frac{Debt}{Equity}$ = Debt-to-equity ratio

K_D = Cost of debt

However, various scholars and experts criticized the theory citing that it operates in an idealized world rather than a real world where companies are liable to pay taxes and are exposed to bankruptcy, agency and transaction costs. It was upon criticism that the second version of the theory was developed to reflect aspects of taxes, transaction costs, bankruptcy and agency costs. The second version of this theory asserts that financial leverage affects the value of a firm in the real world. In the newer version, the tax advantages emanating from the tax deductible interest expenses make the levered firm more valuable than the unlevered firm. The rationale behind this assertion is that tax deductible tax payments tend to have positive implications in the free cash flows. Since the fundamental value of the firm is the sum of present value of those cash flows, the value of levered firm become higher. In summary, the following equation illustrates the improvement made on the first proposition of the theory:

$$V_L = V_U + T_C \times D$$

Where,

V_L = Value of levered firm

T_C = Corporate tax

D = Interest payment on debt

The newer version of the proposition two of this theory asserts that although investors are typically concerned with default risks, they are likely not to be scared off when a firm increases its debt levels because of the tax advantages associated with interest payments. The following equation the summary of improved version of proposition two:

$$K_e = K_a + \frac{D}{E} \times (1 - T_C) \times (K_a - K_D)$$

Where,

$\frac{D}{E}$ = Equity-debt ratio

K_a = Cost of unlevered equity

T_C = Corporate rate

K_e = Cost of levered equity

K_D = Cost of debt

The major weakness attributed with this newer version of Modigliani-Miller theory is that it still overlooks costs attributed to the potential financial distress as a result of high debt. Some of the costs include legal fees, lost sales and reputation damage of a firm when in critical financial distress. Lastly, the theory still assumes that markets are perfectly efficient in the sense that investors have equal access to information hence no possibility of information asymmetry.

2.2.2. Net Income approach

The net income theory was developed and presented by Durand, an influential economist. He asserted that the fundamental value of a firm can be boosted by reducing the cost of capital through more debt (Wang & Chen, 2023). This is because debt tends to cost more than equity. Therefore, any change in the financial leverage in the capital structure results to a corresponding change in the cost of capital. A reduced cost of capital as a result of leveraging would then improve the fundamental value of a firm. So, he affirmed that the changes in the capital structure have an impact on the fundamental value of a firm.

For example, if the capital structure of a company has an equity-debt mix of 50:50, then the equity-debt mix changes to 30:70, the change would tend to positively impact the value of the company and ultimately increase the value per share. This theory works on the assumption that regardless of changes of the debt, the cost of equity is bound to remain unchanged (Borad, 2019). Another assumption in this theory is that the cost of debt is always lower than the cost of equity (Borad, 2019). In reality, however, cost of equity tends to be greater than the cost of debt.

Also, just like the second version of M&M theory, the net income theory asserts that the value of a leveraged company is increased due to tax advantages attributable to tax deductible interest payments. Scholars have criticized this theory citing that it oversimplifies the complexities associated with capital structure decisions by not accounting for all the elements that may affect the capital structure of a company.

Essentially, it operates under the following assumptions:

i. Confidence and perception level of investors cannot be affected by increase in the debt level owing to the tax advantages and reduced cost of capital. In reality, however, investors tend to react when a firm become highly leveraged.
ii. It assumes that a company can only use ordinary shares and debt as sources of finances. In real world, however, companies tend to utilize their retained earnings and preference equity.
iii. It assumes that zero bankruptcy and transaction costs
iv. Capital markets are perfectly efficient and sources of finance cannot be depleted.

2.2.3. Pecking Order theory

This theory was initially developed by Donaldson in 1961and modified by Nicolas Majluf and Stewart C. Myers in 1984 (Frank et al., 2020). It asserts that managers are bound to give preference to internal sources of finance over external source such as equity and debt. In other words, it believes that managers should first utilize its internal reserves, followed by debt and finally equity as the last resort (Frank et al., 2020). They are typically motivated to initially use the internal sources of finance because they are not taxes paid on retained earnings and no transaction costs involved at this point.

Also, the theory believes that manager possess more information than investors which cause information asymmetry. As a result, managers will tend to utilize debt instruments when they are positive and optimistic about the future. However, when they are not sure about the future prospects, they would issue equity. The investors, on the other hand, will tend to positively react more when the company seeks more debt over equity. That is, they tend to that associated more debt with positive future cash flows.

On the downside, managers would easily avoid signalling adverse information to the public by using the internal sources of finance. Lastly, this theory does not account for the market-related potential advantages. For example, when a company issues equity when the stock is already overvalued, the wealth of the shareholders could become more, even when the company has already signalled a negative outlook in terms of the future prospects of the company.

2.2.4. The Trade-off theory

This theory was developed by Merton Miller and Franco Modigliani in 1958. It asserts that the managers ought to find a balanced and optimal mix of debt and equity so that the fundamental value of a firm can be maximized. Additionally, it recognizes the need for managers to have a trade-off between the tax deductible interest payments and costs of financial distress & bankruptcy associated with debt. In other words, these two economics believed that the marginal expected tax benefits of leverage must be equal to marginal expected cost of bankruptcy and financial distress (Miglo, 2016).

Typically, the theory operates under the following assumptions:

i. Investors are rational
ii. Capital structure decision of a firm is primarily driven by the desire of managers to increase the wealth of its shareholders
iii. Markets are perfectly efficient

While balancing out the sources of finances based on potential benefits and costs, the theory asserts on the need to take into account other factors such as risk profile of the firm, expansion ambitions and expected future cash flows. In summary, the theory provides the fundamental value of a firm as follows:

$$Fundamental\ value\ of\ a\ firm = value\ if\ only\ equity\ is\ utilized + PV\ (tax\ savings) - PV\ (cost\ of\ bankruptcy\ and\ financial\ distress$$

Where,

Value if only equity is utilized represents a hypothetical fundamental value of a firm if only equity (unlevered) was used

PV (tax savings) represents tax savings as a result of tax deductible interest payments

PV (cost of bankruptcy and financial distress) represents the cost of bankruptcy and financial distress when a company is unable to fulfil its debt obligations.

However, this theory does account for the implications of ever-changing market conditions over time. Factors such as interest rates, market sentiment and state of the economy would make it harder or easier for a firm to tap into the debt or equity market. In summary, all the theories discussed herein can be categorized as follows:

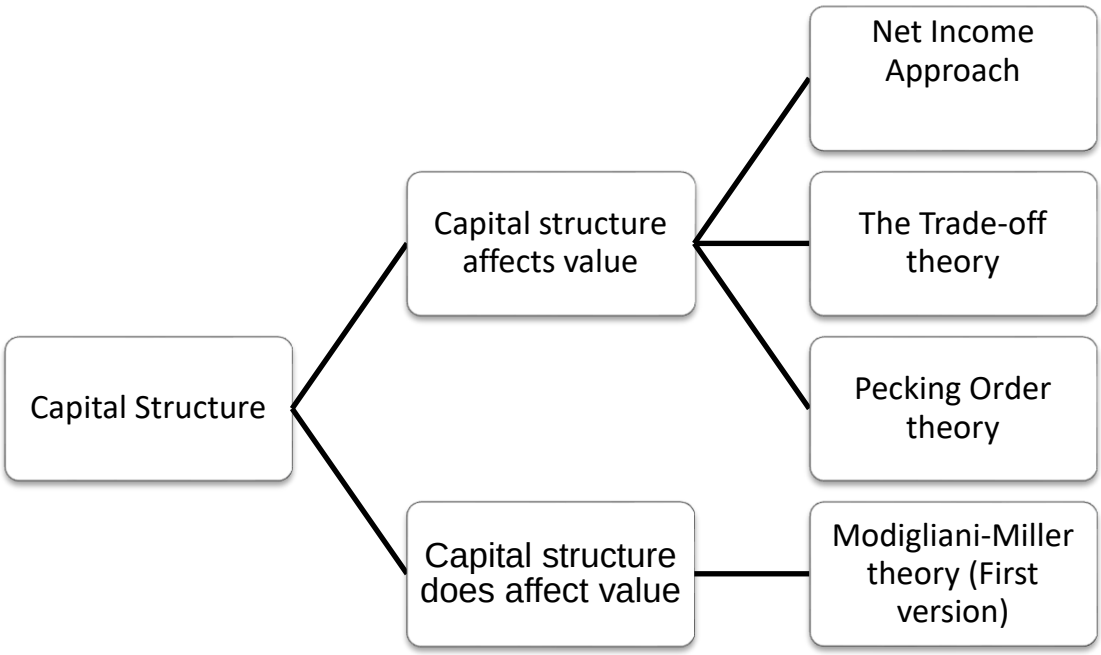

Figure 3: Hierarchy of existing theories and models

2.3. Empirical Studies

The study by Mohammad & Bujang (2020) investigates the impact of capital structure on the financial performance of Malaysian finance, construction and plantation companies for the period between 2011 and 2015. It measured the capital structure using debt ratios, long-term debt and short-term debt while the financial performance was measured by ROE and ROA. A panel dataset of 150, 205 and 185 observations for finance, construction and plantation firms respectively was used.

The findings of the research established that the firms' goal ultimately guide the capital structure decisions. It specifically established that the capital structure decisions in finance and construction firms are influenced by their specific goals, with the pecking order theory being favoured for ROA maximization while trade-off theory favoured for ROE maximization. On the other hand, plantation firms primarily adhere to the trade-off theory.

This research paper evidently and practically proves the relevance of capital structure theories such as trade-off theory and pecking order theory. However, it utilizes a relatively small sampling period (2011 -2015). Also, it does not quantify and show correlation between the impact of changes in the capital structure and financial performance of companies. Therefore, my research is compelled to address the weaknesses from Mohammad & Bujang (2020). For example, the sampling period for my research is between 2010 and 2023. Lastly, my research will quantify the impact of changes in the capital structure on the financial performance of UK commercial banks.

Furthermore, the study by Hashim & Hassan (2017) attempts to determine the impact of capital structure on profitability of 36 publicly listed construction companies. Specifically, the research aimed to establish the correlation between debt to asset ratio with return of equity, return on equity and net profit margin. Also, it aimed to establish the correlation between debt to equity ratio with return on equity, return on assets and net profit margin.

The study made use of descriptive, correlation and regression functions to analyse the data. The findings revealed that capital structure impacts financial performance of construction firms (Hashim & Hassan, 2017). Also, the capital structure impact was statistically significant with debt to equity ratio and not significant with debt to asset ratio. The findings also showed a negative relationship between debt to asset and debt to equity with net profit margin, return on equity and return on assets The major weakness with this study is that it does not numerically quantify the impact of capital structure on profitability. Hence, my research will quantify the impact.

3. RESEARCH METHODOLOGY

3.1. Research design

A research design ensures guided, structured and systematic approach to carrying out the study. This ensures that it is valid, reliable and produces meaningful results (Leverage Edu, 2021). The most appropriate research design for this study was descriptive, correlational and deductive in nature. To start with, the suitability of adopting descriptive design was based on the fact that it allows easier and summarized understanding of the variables. Additionally, the essence of using correlational research design for this study was that it helps to establish and quantify correlation between variables.

Lastly, deductive research approach was useful for this study because this line of research has been significantly explored by numerous scholars who have established theories and models. A deductive research approach is where the researcher begins with establishing existing hypotheses, models and theories then approve or dis-approve them by empirically carrying out a research as it was the case herein. Some of the models and theories include Pecking order theory, Modigliani-Miller theory and Net Income Approach. Also, numerous empirical studies such as Mohammad & Bujang (2020) and Hashim & Hassan (2017) have been established within this line of research.

3.2. Sampling

3.2.1. Sampling technique

The most appropriate sampling technique for this research was purposive sampling. Here, researcher's judgement was used to identify and select samples which provided meaningful information that was essential at achieving the research objectives and questions. That is, three of the ten largest UK commercial banks were selected as samples. The researcher believed that these samples would be an appropriate representative of the UK commercial banking industry. These samples included HSBC, LLOYDS and Barclays. The sampling period for this research was between 2010 and 2023. Ultimately, a total of 126 observations were established.

3.3. Procedure and Methods of Data Collection

3.3.1. Data collection procedure and sources

The data to be collected was debt-to-equity ratios, debt-to-capital ratios and net profit margin for HSBC, Barclays and LLOYDS for the period between 2010 and 2023. This data was primarily obtained from MacroTrends, a finance website just like Yahoo Finance and Financial Times. It is important to note that the data was collected just as calculated and presented in this website. However, it was randomly counter checked through the audited financial statements of the three commercial banks. This ensured accuracy and reduced inheriting potential calculation errors from the website. However, there were instances where data for specific periods was unavailable. As such, the researcher was compelled to directly carry out the ratio calculation after obtaining information of the audited financial statements of the three samples.

3.3.2. Data description

There were three set of data for this research namely debt-to-equity ratio, debt-to-capital ratio and net profit margin. Debt-to-equity ratio is one of the key performance indicators that reflects the financial health of a copmpany from a perspective of insolvency and leverage. In other words, debt-to-equity ratio measures the relative proportion of total debt and shareholder's equity as used by a company in a given period of time, usually on yearly basis (Indeed, 2020). Debt-to-equity ratio is calculated as follows:

$$Debt - to - equity\ ratio = \frac{Total\ debt}{Total\ Shareholder's\ Equity}$$

On the other hand, debt-to-capital ratio measures the proportion of debt that a firm utilizes to fund its operations and investments as compared with the total capital (Wall Street Prep, 2023). The formula for debt-to-capital ratio is therefore given as follows:

$$Debt - to - capital\ ratio = \frac{Total\ debt}{(Total\ debt + Total\ Shareholders'\ Equity)}$$

Lastly, net profit margin measures the percentage of net income generated from the total revenues after all the expenses have been deducted. As such, the formula for net profit margin is given as follow:

$$Net\ profit\ margin = \frac{Net\ income}{Total\ revenue} \times 100\%$$

3.3.3. Data limitation

The major limitation was that the data only reflected profitability (net profit margin) as the only financial performance variables although there are other measures of financial performance which include liquidity, insolvency, efficiency and market value ratios. Additionally, the research only relied on net profit margin as a measure for profitability although there are other profitability ratios such as ROCE, ROA, ROE, operating profit margin and gross profit margin. Lastly, the research did not account for preference shares.

3.4. Procedure and Methods of Data Analysis

The following figure identifies all the analytical methods that were used to analyse the data for this study.

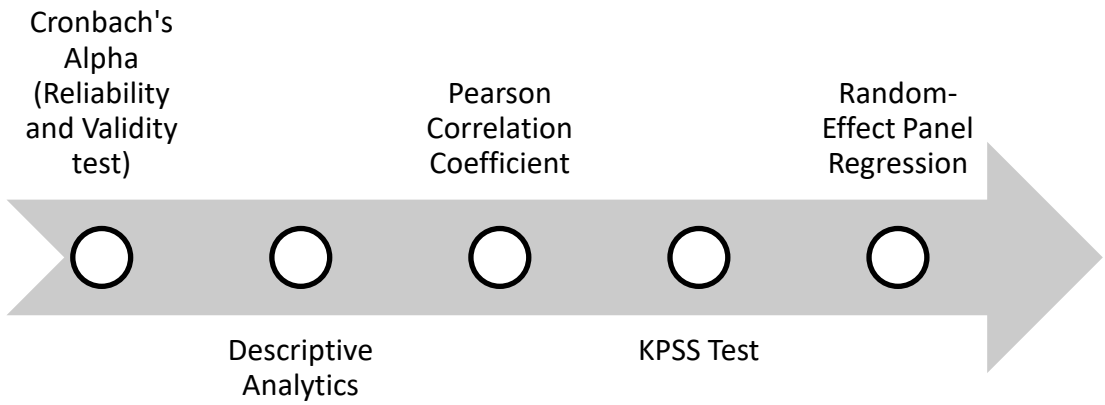

Figure 4: Analytical methods used to analyse data

3.4.1. Cronbach Alpha

The essence of this analytical method was to assess the reliability and validity of the data collected. The formula for Cronbach's Alpha was given as follows:

$$Cronbach's\ Alpha\ (\alpha) = (\frac{k}{k-1})(\frac{S_y^2 - \sum S_i^2}{S_y^2})$$

Where,

S_y^2 = Variance of total sum of items

k = Number of items in the data set. In this case, there were 9 items name debt-equity ratios, debt-to-capital ratios and net profit margin for HSBC, Barclays and LLOYDS.

$\sum S_i^2$ = Sum of variances for each item

The decision rule for the Cronbach's Alpha was as follows (Frost, 2023):

Cronbach's Alpha (α)	Internal consistency
$Cronbach's\ Alpha \geq 0.9$	Exceptional
$0.9 > \alpha \geq 0.8$	Satisfactory
$0.8 > \alpha \geq 0.7$	Fairly Acceptable
$0.7 > \alpha \geq 0.6$	Questionable
$0.6 > \alpha \geq 0.5$	Slightly unreliable
$0.5 > Cronbach's\ Alpha$	Unacceptable

Table 1: Decision rule for Cronbach's Alpha

Ideally, analysts tend to frequently use 0.7 as a benchmark value for Cronbach's alpha. At this level and higher, the items are sufficiently consistent to indicate the measure is valid and reliable (Frost, 2023).

3.4.2. Descriptive Analytics

The essence of descriptive analytics, in this case, was to simply summarize the data by mean, median, kurtosis, minimum, maximum, range, skew-ness, largest and smallest value. Kurtosis and Skew-ness are two of the critical components in descriptive analytics. Kurtosis measures the tailed-ness in a data set (Turney, 2022). Tailed-ness is how often outliers occur. An outlier is an observation that is significantly different from the rest of the observation. A higher kurtosis indicates that the distribution has more infrequent extreme deviation and vice versa

On the other hand, skew-ness measures distribution asymmetry in a dataset. Positive skew-ness indicates that the tail on the right side of the distribution is longer than the left side (Turney, 2022). Simply put, there are more positive observations than negative ones. When the skew-ness is more towards negative side, there are more negative observations than positive. A skew-ness value of 0 indicates a perfectly symmetric distribution which means that positive and negative observations are equal in a given data set.

3.4.3. Pearson Correlation Coefficient

The Pearson Correlation Coefficient measures the type and strength of correlation that exists between two variables. For this case, it was used to establish the type and strength of correlation between changes in the capital structure and financial performance of UK commercial banks. Essentially, the Pearson correlation coefficient is given as follows (Pennsylvania State University, 2021):

$$r = \frac{\sum(x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum(x_i - \bar{x})^2 \sum(y_i - \bar{y})^2}}$$

Where

$r = Pearson\ correlation\ coefficient$

$x_i =$
$cell\ values\ of\ the\ x - variables\ (debt -$
$equity\ ratios\ and\ debt\ to\ capital\ ratios)$

$\bar{x} = mean\ of\ the\ x - variables\ (debt - equity\ ratios\ and\ capital\ ratios$

$y_i = cell\ values\ of\ the\ y - variables\ (net\ profit\ margin)\ in\ a\ given\ sample$

$\bar{y} = mean\ of the\ y - variables$

The following table shows the decision rule for the Pearson Correlation Coefficient, according to the Selvanathan (2020).

Pearson Correlation Coefficient ®	Type and strength of correlation
r = 0.5 to 1.0	Strong positive
r = 0.3 to 0.49	Moderate positive
r= 0.1 to 0.29	Weak positive
r = -0.1 to -0.29	Weak negative
r = -0.3 to -0.49	Moderate negative
r = -0.5 to-1.0	Strong negative

Table 2: Decision rule for Pearson correlation coefficient

3.4.4. KPSS Test

The data underwent a stationarity test using the KPSS test. The KPSS test measured whether the times series was either stationary or followed a unit root (Kumar, 2021). The importance of carrying out this test was to ensure that the results derived from the panel regression analysis were reliable and could be used for prescriptive analysis which involves forecasting. The formula for KPSS test is given as follows:

$$KPSS = \frac{\sum_{t=1}^{N} S_t^2}{N^2 \lambda^2}$$

Where,

$$S_t^2 = \sum_{\tau=1}^{t} \varepsilon_t$$

S= Squared cumulative residual

ג= Standard error

N= Number of observations (126)

T= time series (time periods)

The decision rule, as established by the developers of KPSS, is that when KPSS statistic is greater than the critical value at significant levels of 1% and 5%, then the null hypothesis is rejected and the time series is deemed non-stationary and vice versa. For KPSS test, the hypotheses are as follows:

Null hypothesis: **Time series is regarded as stationary in nature**

Alternative hypothesis**: Time series is regarded as non-stationary in nature and has a unit root**

For regression model to be regarded reliable, stable and valid, the time series data should not have any trend in order to make accurate predictions. As such, it should be possess stationarity properties.

3.4.5. Random Effects Panel Regression

Random Effect Panel Regression is a combination of time series and cross-sectional data, where the same unit cross section is measured at different times. That is, panel data is data from some of the same individuals observed in a certain period of time. For example, if we have T time periods and N the number of individuals, then with panel data we will have total observation units of N x T. Since the data set has the same sum unit time for each individual, the data is regarded as balanced.

The formula for the Random Effects Regression Model is given as follows:

$$y_{it} = \alpha + \beta^{i} X_{it} + \mu_i + \varepsilon_{it}$$

Where,

$i = 1,2,3 \ldots \ldots N\ (Number\ of\ individuals)$

$t = 1,2,3 \ldots \ldots T\ (time\ period)$

$N = Number\ of\ individuals\ (9)$

$T = Number\ of\ Time\ period\ (14)$

$\mu_i = Individual\ residual\ (\ random\ characteristics\ unit\ observation)$

$\varepsilon_{it} = Residual\ as\ a\ whole\ (combination\ of\ cross\ section\ and\ time\ series\ )$

This model operates under the following assumptions:

i. The unit-specific effects (u_i) are not correlated with errors
ii. The unit-specific effect (u_i) fluctuate around the zero mean
iii. The error term ε_{it} is not correlated across different time or units
iv. The error term ε_{it} is assumed to have a constant variance

Essentially, this model estimates the following (Date, 2022):

i. Variance components σ^2_ϵ and σ^2_u associated with the composite residual error $(\mu + \epsilon)$.
ii. Common bias *α and* regression coefficients β. This is what forms the intercept.

Of importance in the regression output were the R Squared, estimate coefficient, Z-value and P-value. The R –squared established the percentage of financial performance that can be explained by the changes in the capital structure. The coefficient intercept established the extent in which changes in capital structure impacted the financial performance of UK commercial banks. On the other hand, P-value was used to determine whether the correlation was statistically significant. Lastly, Z-value was used to either reject or accept the research hypothesis.

3.5. Validity and Reliability

Validity measures the extent in which the research methods are well-founded ad accurate such that the research is likely to accurately correspond with the real world. On the other hand, reliability measures whether research methods can reproduce the same results multiple times. For this case, we used Cronbach's Alpha. The Cronbach's Alpha was 0.629 which suggested that the reliability and validity of the data was questionable but still acceptable as it was lying in the vicinity of 0.7 (minimum acceptable).

4. RESULTS AND DISCUSSION

The following table shows the results for descriptive analytics which aimed at summarizing the date set.

	Debt-Equity Ratio			Debt to Capital Ratio			Net Profit Margin		
	HSBC	*Barclays*	*LLOYDS*	*HSBC*	*Barclays*	*LLOYDS*	*HSBC*	*Barclays*	*LLOYDS*
Mean	0.59	3.93	2.64	0.07	0.95	0.93	0.28	0.09	0.02
Standard Error	0.06	0.37	0.25	0.00	0.00	0.02	0.05	0.03	0.27
Median	0.51	3.81	2.24	0.07	0.95	0.94	0.23	0.08	0.04
Mode	#N/A	#N/A	#N/A	0.06	0.96	0.95	#N/A	#N/A	#N/A
Standard Deviation	0.24	1.39	0.95	0.01	0.01	0.07	0.18	0.10	1.00
Sample Variance	0.06	1.93	0.90	0.00	0.00	0.00	0.03	0.01	0.99
Kurtosis	1.10	-1.35	0.78	-0.97	-1.50	13.76	0.64	-0.18	5.73
Skew-ness	1.27	0.31	1.23	0.27	-0.09	-3.70	0.70	0.30	-0.61
Range	0.85	4.16	3.17	0.02	0.02	0.27	0.65	0.38	4.94
Minimum	0.30	2.23	1.71	0.06	0.94	0.68	0.02	-0.09	-2.64
Maximum	1.15	6.39	4.88	0.08	0.96	0.95	0.67	0.29	2.30
Sum	8.31	55.07	37.00	0.99	13.30	12.97	3.87	1.22	0.31
Count	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00
Largest(1)	1.15	6.39	4.88	0.08	0.96	0.95	0.67	0.29	2.30
Smallest(1)	0.30	2.23	1.71	0.06	0.94	0.68	0.02	-0.09	-2.64

Table 3 shows the summary for the data set

Also, we established the correlation between debt - equity ratio and net profit margin as well as one between debt-capital ratio and net profit margin. The following table shows correlation 1 and correlation 2.

Correlation 1

	Debt-Equity Ratio (DER)	*Net Profit Margin (NPM)*
Debt-Equity Ratio (DER)	1	
Net Profit Margin (NPM)	**-0.071492176**	1

Correlation 2

	Debt-to-Capital Ratio (DCR)	*Net Profit Margin (NPM)*
Debt-to-Capital Ratio (DCR)	1	
Net Profit Margin (NPM)	**-0.184831785**	1

Table 4: Pearson Correlation Coefficient results

From table 4, we see that correlation 1 and correlation 2 are negative. Correlation 1 addressed the relationship between debt-equity ratio and net profit margin. On the other hand, correlation 2 established the relationship between debt-capital ratio and net profit margin. While referring from table 2 (correlation decision rule), we saw that the correlation between debt-equity ratio and net profit margin was **weak negative**.

On the other hand, the correlation between debt-capital ratio and net profit margin was a **weak negative**. As such, we concluded that there exists a weak negative correlation between the changes in the capital structure and financial performance of UK commercial banks. This means that as the UK commercial banks **increase** more debt than equity in the capital structure, the financial performance tends to **decline.**

Furthermore, the following table is the result for the KPSS Test:

	Constant	
	Average	0.13
	Constant + trend	
	Trend	Constant
	0.007062	0.075507326
	Constant	Constant + trend
Squared cumulative residual (S)	76.40032	74.05321223
Standard error (ג)	0.225778	0.212185324
Number of Observation (N)	126	126

KPSS Statistic	0.021314	0.021983026
Critical value (95%)	0.463	0.146
Critical value (99%)	0.739	0.216

Table 5: KPSS Test Statistic

From table 5, we see that the KPSS statistic is lower than the critical value at 95% and 99% confidence level. Therefore, we accepted the KPSS hypothesis that time series was stationary in nature. As such, the random effect panel regression was bound to reliable, stable, valid and would be used for predictive analysis. Lastly, the output for panel regression was derived as follows:

Goodness of fit statistics:

rsq	**0.360**
adjrsq	0.014

Joint test of significance (F or Chi-square test):

statistic.Chisq	parameter.df	p.value.Chisq
3.381	1	**0.035950625**

Coefficients:

	Estimate	Std. Error	z-value	Pr(>|z|)
(Intercept)	0.017	0.012	**2.12458**	0.151
Debt.equity.ratio	**-0.0561099**	0.083027857	0.675797	0.503158
Debt.Capital.ratio	**-0.0116514**	0.0000634	1.839	0.066

Table 6: Random Effect Regression Output

Of importance from table 6 is R-squared (rsq), p-value, z-value and estimate coefficient. The r-squared is 0.360. This means 36% of the financial performance can be explained by the changes in the capital structure. Also, p-value is 0.036 which is less than the critical value of 0.05 (universal). The decision rule is that when p-value is lower the critical value (0.05), the correlation between variables is deemed to statistically significant. In this case, therefore, it would be appropriate to conclude that the correlation between changes in the capital structure and financial performance of the UK commercial banks is statistically significant. Also, it was noted that z-value was 2.12 which is greater than the 1.96. Ideally, when z-value is greater than 1.96, the null hypothesis is rejected. As such, the null hypothesis was rejected.

Lastly, using the two estimate coefficients -0.0561099 and -0.0116504, we can be able to estimate the extent in which the changes in capital structure impacts the financial performance of UK commercial banks. In this regard, any increase in debt-equity ratio leads to decrease in the net profit margin by 5.61%. At the same time, any increase in the debt-to-capital ratio leads to decrease in the net profit margin by 1.17%.

5. RECOMMENDATION AND CONCLUSION

5.1. Accept/reject hypothesis

I. NULL HYPOTHESIS

The changes in the capital structure do not have any impact on the financial performance of UK commercial banks.

II. ALTERNATIVE HYPOTHESIS

The changes in the capital structure do have an effect on the financial performance of UK commercial banks.

Reject the null hypothesis

5.2. Answers to research questions

Is there any correlation between changes in the capital structure and financial performance of UK commercial banks?

Yes, negative correlation

What is the strength of the correlation, if any, between changes in the capital structure and financial performance of UK commercial banks?

Weak negative correlation

Is the correlation, if any, between changes in the capital structure and financial performance of UK commercial banks statistically significant?

Yes, the correlation is statistically significant

To what extent do changes in the capital structure affect the financial performance of UK commercial banks?

Any increase in debt-equity ratio leads to decrease in the net profit margin by 5.61%. At the same time, any increase in the debt-to-capital ratio leads to decrease in the net profit margin by 1.17%.

5.3. Research limitation

The validity and reliability of the data set used herein was questionable but still acceptable. Ultimately, this may have slightly led to research misspecification. Nonetheless, the findings of this study hold. Also, the research did not carry out a test to conclusively establish what type of panel regression analysis was the most appropriate. Panel regression tend to take various forms which include fixed effect models, pooled least square, random effect model and common effect model. Chow Test, Hausman Test and Test Lagrange multiplier are the most common that researchers tend to deploy when determining what type of panel regression analysis. Random effect panel regression was used in this research.

5.4. Future research

In future, researchers may need to utilize Chow Test, Hausman Test or Test Lagrange multiplier to establish type of panel regression analysis that is most suitable. Additionally, the research was based on the largest UK commercial banks. Therefore, it is appropriate that future researcher also explore the impact of changes in the capital structure on the financial performance of UK small and medium sized banks. Lastly, this research only focused on debt and equity. However, there are other elements that make up capital structure. Such elements include retained earnings and preference shares. Therefore, it is also crucial that future research account for such elements as they part of capital structure.

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APPENDIX A: DATA SET

	Debt-Equity Ratio (DER)			Debt to Capital Ratio (DCR)			Net Profit Margin (NPM)			
Date	HSBC	Barclays	LLOYDS	HSBC	Barclays	LLOYDS	HSBC	Barclays	LLOYDS	
2010	1.15	2.97	4.88	0.063	0.958	0.953	0.18	0.12	-0.01	
2011	0.97	2.37	3.97	0.065	0.958	0.952	0.21	0.11	-0.07	
2012	0.81	3.52	3.39	0.068	0.958	0.952	0.20	-0.03	-0.02	
2013	0.70	2.71	3.04	0.071	0.951	0.954	0.24	0.02	-0.03	
2014	0.61	2.49	2.05	0.076	0.951	0.942	0.21	0.00	0.03	
2015	0.56	2.23	2.24	0.082	0.945	0.942	0.22	0.01	0.05	
2016	0.48	2.74	2.25	0.077	0.941	0.940	0.03	0.08	0.04	
2017	0.3	4.1	1.85	0.079	0.942	0.939	0.02	-0.09	0.10	
2018	0.43	5.01	3.42	0.074	0.944	0.684	0.23	0.07	0.15	
2019	0.5	4.55	2.18	0.072	0.942	0.938	0.34	0.15	0.08	
2020	0.51	5.11	2.23	0.068	0.95	0.939	0.41	0.07	2.30	
2021	0.4	5.16	1.96	0.070	0.95	0.943	0.42	0.29	0.68	
2022	0.42	5.72	1.71	0.063	0.954	0.943	0.51	0.20	-2.64	
2023	0.47	6.39	1.83	0.063	0.957	0.950	0.67	0.21	-0.39	
	14	14	14	14	14	14	14	14	14	
Observations	126									

APPENDIX B: CRONBACH'S ALPHA

	Debt-Equity Ratio (DER)			Debt to Capital Ratio (DCR)			Net Profit Margin (NPM)			
Date	HSBC	Barclays	LLOYDS	HSBC	Barclays	LLOYDS	HSBC	Barclays	LLOYDS	Total
2010	1.15	2.97	4.88	0.063	0.958	0.953	0.18	0.12	-0.01	11.2665
2011	0.97	2.37	3.97	0.065	0.958	0.952	0.21	0.11	-0.07	9.5481
2012	0.81	3.52	3.39	0.068	0.958	0.952	0.20	-0.03	-0.02	9.8421
2013	0.70	2.71	3.04	0.071	0.951	0.954	0.24	0.02	-0.03	8.6599
2014	0.61	2.49	2.05	0.076	0.951	0.942	0.21	0.00	0.03	7.3576
2015	0.56	2.23	2.24	0.082	0.945	0.942	0.22	0.01	0.05	7.2804
2016	0.48	2.74	2.25	0.077	0.941	0.940	0.03	0.08	0.04	7.5774
2017	0.3	4.1	1.85	0.079	0.942	0.939	0.02	-0.09	0.10	8.2384
2018	0.43	5.01	3.42	0.074	0.944	0.684	0.23	0.07	0.15	11.0165
2019	0.5	4.55	2.18	0.072	0.942	0.938	0.34	0.15	0.08	9.7539
2020	0.51	5.11	2.23	0.068	0.95	0.939	0.41	0.07	2.30	12.5884
2021	0.4	5.16	1.96	0.070	0.95	0.943	0.42	0.29	0.68	10.8733
2022	0.42	5.72	1.71	0.063	0.954	0.943	0.51	0.20	-2.64	7.8799
2023	0.47	6.39	1.83	0.063	0.957	0.950	0.67	0.21	-0.39	11.1565
										2.915937
Variance	0.056563	1.933225	0.904976	3.86E-05	4.07E-05	0.004905	0.031377	0.010727	0.994818	3.936669
k	9									
Cronbach's Alpha	0.639									

APPENDIX C: KPSS TEST

			Residual		Cumulative residual				
Date	Time series	Net Profit Margin (NPM)	Constant	Constant + Trend	Constant	Constant +Trend		Constant	
2023	1	0.18	0.051626	0.097530476	0.0516262	0.097530476		Average	0.13
2022	2	0.21	0.086326	0.125168278	0.1379524	0.222698755			
2021	3	0.20	0.066626	0.098406081	0.2045786	0.321104835		Constant + trend	
2020	4	0.24	0.113526	0.138243883	0.3181048	0.459348718		Trend	Constant
2019	5	0.21	0.077126	0.094781685	0.395231	0.554130403		0.007062	0.075507326
2018	6	0.22	0.088426	0.099019487	0.4836571	0.65314989			
2017	7	0.03	-0.10267	-0.099142711	0.3809833	0.554007179		Constant	Constant+trend
2016	8	0.02	-0.10947	-0.113004908	0.2715095	0.441002271	Squared cummulativ	76.40032	74.05321223
2015	9	0.23	0.105626	0.095032894	0.3771357	0.536035165	Standard error (λ)	0.225778	0.212185324
2014	10	0.34	0.207226	0.189570696	0.5843619	0.725605861	Number of Observat	126	126
2013	11	0.41	0.278026	0.253308498	0.8623881	0.978914359	KPSS Statistic	0.021314	0.021983026
2012	12	0.42	0.287126	0.2553463	1.1495143	1.234260659	Critical value (95%)	0.463	0.146
2011	13	0.51	0.377926	0.339084103	1.5274405	1.573344762	Critical value (99%)	0.739	0.216
2010	14	0.67	0.541526	0.495621905	2.0689667	2.068966667			
2023	1	-0.01	-0.13407	-0.088169524	1.9348929	1.980797143			
2022	2	-0.07	-0.19507	-0.156231722	-0.195074	-0.156231722			
2021	3	-0.02	-0.15327	-0.121493919	-0.348348	-0.277725641			
2020	4	-0.03	-0.15477	-0.130056117	-0.503121	-0.407781758			
2019	5	0.03	-0.09437	-0.076718315	-0.597495	-0.484500073			
2018	6	0.05	-0.07657	-0.065980513	-0.674069	-0.550480586			
2017	7	0.04	-0.08647	-0.082942711	-0.760543	-0.633423297			

APPENDIX D: RANDOM EFFECT REGRESSION MODEL

A	B	C	D	E	F	G	H
Time period	UK Commercial Banks	I (cross sectional)	t (time series)	Debt-Equity Ratio (DER)	Debt-to-Capital Ratio (DCR)	Net Profit Margin (NPM)	
2023	HSBC	1	1	1.15	0.063	0.18	
2022	HSBC	1	2	0.97	0.065	0.21	
2021	HSBC	1	3	0.81	0.068	0.20	
2020	HSBC	1	4	0.70	0.071	0.24	
2019	HSBC	1	5	0.61	0.076	0.21	
2018	HSBC	1	6	0.56	0.082	0.22	
2017	HSBC	1	7	0.48	0.077	0.03	
2016	HSBC	1	8	0.3	0.079	0.02	
2015	HSBC	1	9	0.43	0.074	0.23	
2014	HSBC	1	10	0.5	0.072	0.34	
2013	HSBC	1	11	0.51	0.068	0.41	
2012	HSBC	1	12	0.4	0.070	0.42	
2011	HSBC	1	13	0.42	0.063	0.51	
2010	HSBC	2	14	0.47	0.063	0.67	
2023	LLOYDS	2	1	4.88	0.953	-0.01	
2022	LLOYDS	2	2	3.97	0.952	-0.07	
2021	LLOYDS	2	3	3.39	0.952	-0.02	
2020	LLOYDS	2	4	3.04	0.954	-0.03	
2019	LLOYDS	2	5	2.05	0.942	0.03	
2018	LLOYDS	2	6	2.24	0.942	0.05	
2017	LLOYDS	2	7	2.25	0.940	0.04	
2016	LLOYDS	2	8	1.85	0.939	0.10	

Data set | Cronbach's Alpha | Sheet1 | Panel Regression Data | KPSS Test

APPENDIX E: XL STAT REGRESSION OUTPUT

XLSTAT 2023.3.1.1416 - Panel regression - Start time: 03/01/2024 at 18:22:31
Dependent variables: Workbook = Book2 / Sheet = Sheet1 / Range = Sheet1!$G$1:$G$43 / 42 rows and 1 column
Quantitative variables: Workbook = Book2 / Sheet = Sheet1 / Range = Sheet1!$E$1:$F$43 / 42 rows and 2 columns
Time: Workbook = Book2 / Sheet = Sheet1 / Range = Sheet1!$D$1:$D$43 / 42 rows and 1 column
Individuals: Workbook = Book2 / Sheet = Sheet1 / Range = Sheet1!$C$1:$C$43 / 42 rows and 1 column
R function author: Yves Croissant
Interactions / Level: 2
Effect: Two ways
Model: Random / Random method: swar
Instrumental variables: bvk

Please wait until the analysis is finished.

Summary statistics:

Variable	Observations	Obs. with missing data	Obs. without	Minimum	Maximum	Mean	Std. deviation
Net.Profit.Margin..N	42	0	42	-2.640	2.300	0.128	0.584
Debt.Equity.Ratio..D	42	0	42	0.300	6.390	2.390	1.690
Debt.to.Capital.Ratio	42	0	42	0.063	0.958	0.649	0.416

Results for variable Net.Profit.Margin..NPM.:

Goodness of fit statistics:

rsq	0.360
adjrsq	0.014

Joint test of significance (F or Chi-square test):

statistic.Chisq	parameter.df	p.value.Chisq
3.381	1	0.035950625

Coefficients:

	Estimate	Std. Error	z-value	Pr(>|z|)
(Intercept)	0.017	0.012	2.125	0.151
Debt.equity.ratio	-0.0561099	0.083027857	0.675797	0.503158
Debt.Equity.ratio	0.0001165	0.0000634	1.839	0.066