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Impact of capital structure on financial performance: Evidence from mobile telecommunications operators
by
GRANT CHIVANDIRE

A dissertation submitted in partial fulfilment of the requirements for the degree of
Master of Commerce
in
Finance
at the
College of Business and Economics
UNIVERSITY OF JOHANNESBURG
Supervisor: Prof. Ilsé Botha
Co-supervisor: Ms. Marise Mouton

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I would not have made it without the tremendous support, expertise and direction of my supervisors; Professor Botha and Ms. Mouton - may God bless you. I am also appreciative of Professor J. Spowart for the guidance on technical writing.

Above all, I am grateful to God because we can do all things through Him who strengthens us.
Declaration of original work

I, Grant Chivandire (Student Number – 217040434), declare that this minor dissertation is my own unaided work. Any assistance that I have received has been duly acknowledged in the minor dissertation. It is submitted in partial fulfilment of the requirements for the degree of MASTER OF COMMERCE in FINANCE at the University of Johannesburg. It has not been submitted before for any degree or examination at this or any other University.

___________________  ____________________
Signature                  Date

UNIVERSITY OF JOHANNESBURG
Abstract
The study adopts a panel regression approach to examine the impact of capital structure on financial performance for mobile operators based in sub-Saharan Africa. It considers eight (8) companies with publicly available annual reports for the seven-year period from 2010 to 2016. Financial performance was measured by return on equity (ROE), return on assets (ROA) and operating profit margin (OM), while capital structure was measured by short-term debt to total assets ratio (STD\text{TA}), long-term debt to total assets ratio (LTD\text{TA}), and total debt to total assets ratio (TD\text{TA}). The total number of subscribers, size as measured by revenue and tangibility were used as the controlling variables.

The study provides evidence of a mixed impact of capital structure on financial performance. STD\text{TA}, LTD\text{TA} and TD\text{TA} had an insignificant impact on ROE and ROA. However, LTD\text{TA} and TD\text{TA} had a negative and significant impact on OM. The number of subscribers had a significant and negative relationship with financial performance, while size (revenue) had a positive one and tangibility showed a mixed impact.

The findings suggest that mobile operators need to focus on other factors that have a direct and stronger influence on financial performance. They should continue to use short-term debt and keep the overall debt position reasonable; while regulators and governments must ensure a stable operating environment to support long-term commitments. Furthermore, operators must develop a profitability mindset and shift their focus from average revenue per user to average profit per user to have a complete value creation picture that considers the costs associated with these revenues. Although size (revenue) matters, operators should be cautious about pursuing subscriber growth at this stage of the industry’s lifecycle. Tangibility either had an insignificant or a significant positive impact on financial performance and operators should own those fixed assets driving their performance but be open to sharing models to enhance efficiency even as they consider 5G investments.

Key Words

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<th>Term</th>
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<tr>
<td>3GPP</td>
<td>3rd Generation Partnership Project - refers to the international body that is responsible for standardising mobile technologies</td>
</tr>
<tr>
<td>1G</td>
<td>First Generation - refers to the first-generation technology for mobile telephony</td>
</tr>
<tr>
<td>2G</td>
<td>Second Generation – refers to the second-generation technology for mobile telephony</td>
</tr>
<tr>
<td>3G</td>
<td>Third Generation – refers to the third-generation technology for mobile telephony.</td>
</tr>
<tr>
<td>4G</td>
<td>Fourth Generation – refers to the fourth-generation technology for mobile telephony</td>
</tr>
<tr>
<td>5G</td>
<td>Fifth Generation – refers to the upcoming fifth generation technology for mobile telephony</td>
</tr>
<tr>
<td>LTE</td>
<td>Long Term Evolution</td>
</tr>
<tr>
<td>Cloud Architecture</td>
<td>An architecture that allows certain network functions to be run as software on hardware platforms located in the data centre</td>
</tr>
<tr>
<td>EDGE</td>
<td>Enhanced Data rates for GSM Evolution (EDGE or 2.75G) is a digital mobile phone technology that allows improved data transmission rates</td>
</tr>
<tr>
<td>GPRS</td>
<td>General Packet Radio Services (GPRS or 2.5G) is a packet-based wireless communication service aimed at improving 2G’s data capability</td>
</tr>
<tr>
<td>Internet of Things (IoT)</td>
<td>Everyday objects connect and exchange data with each other via the internet</td>
</tr>
<tr>
<td>IP</td>
<td>Internet Protocol – refers to the rules governing the transmission of data on the internet</td>
</tr>
<tr>
<td>Latency</td>
<td>The amount of time a message takes to traverse a system measured as the time required for a packet to be returned to its sender.</td>
</tr>
<tr>
<td>Mbps</td>
<td>Megabits per second – refers to the speed at which data is transmitted</td>
</tr>
<tr>
<td>ms</td>
<td>Milliseconds – is a measure of time</td>
</tr>
<tr>
<td>Spectrum</td>
<td>The frequency resources which mobile networks need to transmit voice and/or data signals wirelessly</td>
</tr>
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Dedication

I dedicate this work to my wife, Kudzaishe and our beautiful children, Eliecia Tawananyasha, Adriel Nashe and Annika Tinaye.

You were part of every step of the dream, the journey and the victory – because of that, it was all worthwhile!
Chapter One (1): Introduction and Background of Study

1.1 Introduction

The most important objective of a firm is to create and maximise its value (Damodaran, 2001). According to the shareholder model, maximising the firm’s value satisfies shareholders and enables all other stakeholders’ interests to be served in a sustainable way (Friedman, 1962). Successful companies can create shared value by delivering an acceptable return to their shareholders, attract further investments, create employment, pay taxes, grow the economy and impact society positively (Kramer & Porter, 2011). In contrast, those performing poorly, become weak and irrelevant; eroding their ability to create shared value. Good financial performance is good for society (Rodriguez-Fernandez, 2015) and firms have an important responsibility of sustaining the benefits of good financial performance.

In pursuit of value creation, companies undertake projects that promise to deliver net positive cashflows above the cost of capital (Allen, Brealey & Myers, 2011). The firm’s capital is primarily secured from debt and shareholder’s equity, reflecting its capital structure (Damodaran, 2006). These providers of capital expect compensation and impose a minimum hurdle rate for the company’s financial performance (Allen et al., 2011). Consequently, determining a firm’s capital structure is a key decision which has potential implications for a firm’s performance. For this reason, Mouton and Smith (2016) highlight the need for close monitoring of capital structure drivers to detect potential changes in a company’s value.

A key area of interest for researchers has been to investigate how a firm’s capital structure impacts its financial performance. Earlier work by Miller and Modigliani (1958, 1963), Jensen and Meckling (1976) as well as Majluf and Myers (1984) provided a firm theoretical grounding for empirical studies which focussed on different markets and industries. Empirical investigations by researchers have reported different results on how capital structure impacts financial performance; an inconsistency that is carried over from the diverging theoretical views available. Some have found a positive relationship or a negative relationship or an insignificant relationship; while others have found a mixed relationship between capital structure and financial performance (Obonyo, 2017; Alawwad, 2013; Chimara & Ogbonnaya, 2016; Mauwa, Namusonge & Onyango, 2016; Nassar, 2016; Akanni & Isola, 2015;

This relationship will be critical for industries that impact society in a significant way, have strong competition and require huge on-going capital investments. This was found in the Mobile Telecommunications industry where competition had a strong impact on the firm’s performance (Kaunyangi, 2014). By creating excess capacity when demand is stable, individual revenues and profits of a firm decline (Caves & Porter, 1977). This diminishes the company’s ability to cover the cost of its investments; resulting in failure to attract further investments, create new jobs and a reduction in tax revenue for the government (Fisher, 1930; Cai & Liu, 2009).

In the period between 2004 and 2013, the global mobile telecommunications industry delivered an average return on invested capital (ROIC) of almost eight percent (8%) compared to a corresponding weighted average cost of capital (WACC) of nine percent (9%). This is shown in the graph (Figure 1.1) below ((PwC Analysis, 2014):

![Graph showing Global Telecommunications Industry ROIC](image)

**Figure 1-1: Global Telecommunications Industry ROIC**

(Source: PwC Analysis, 2014)

This indicates that the financial performance was, on average, inadequate since the generated profits were less than the investment costs. When ROIC is less than WACC,
value is being destroyed and investors may find it better to invest elsewhere (Goedhart, Koller & Wessels, 2010).

In sub-Saharan Africa, mobile operators experience the additional challenges of expanding their coverage into rural areas with a lower average revenue per user, whilst needing to modernise their networks amid increased price competition (Deloitte, 2014). This increases the pressure on the balance sheet whilst prudent capital structure decisions are crucial if superior financial performance is to be achieved. Unfortunately, there is no agreement amongst theorists on how capital structure impacts financial performance, whilst empirical literature concerning the mobile telecommunications sector is scant.

The focus of this study was to investigate the relationship of capital structure and financial performance. Evidence from mobile telecommunications operators based in sub-Saharan Africa was examined so that financing decisions of future investments could be informed, including those in the fifth-generation (5G) networks.

1.2 Background

1.2.1 Significance of the Mobile Telecommunications Sector

The mobile telecommunication industry has had a positive impact on society and is a major sector for economies (O’Mahony, Michalas, Mountford & Simes, 2013). In 2015, the world’s mobile ecosystem contributed more than four percent (4.2% - US$43.1 trillion) of the global Gross Domestic Product (GDP), 32 million jobs (17 million direct jobs, 15 million indirect jobs), US$43 billion in tax and paid US$90 billion for spectrum (GSMA, 2016a). In sub-Saharan Africa, the sector had contributed approximately US$110 billion towards the GDP, directly employed 11 million people and had connected 420 million people by the end of 2016. Tax contributions from mobile operators have also been robust; for example, Econet Wireless Zimbabwe was presented with the Highest Voluntary Dollar Value Contributor Award for the Value Added Tax category by the Zimbabwe Regulatory Authority (ZIMRA, 2017). The projections are that by 2020, the sector would have connected 535 million subscribers, employing 13 million people and contributing $142 billion towards the GDP of sub-Saharan Africa (GSMA, 2017).

Research has also shown that increased mobile phone usage stimulates economic growth and the effect is greater for less developed areas (Warda & Zheng, 2015).
Separate studies by Kumara, Samitas and Stauvermann, (2016) as well as Arvin, Bele, Norman, and Pradhan (2014), confirmed a bidirectional causality between mobile telecommunication and economic growth. Mobile telecoms technology is a leading driver for growth and will continue to be a key contributor of economic growth (Katz & Koutroumpis, 2012). This is supported by the increased usage of smartphones, the reduction in data prices and an increase in innovative applications that are driving digital inclusion in areas such as health, agriculture, finance and energy. For example, mobile money services have been successful and were used by 40% of all adults in sub-Saharan Africa to transact US$66 million in 2016 (GSMA, 2016b). New solutions are also emerging, including mobile enabled solar pay-as-you-go services that aim to bring electricity to the unconnected rural population (Mulupi, 2016). This is in addition to live-streaming and cloud services since mobile networks can now deliver higher speeds, low latency and improved productivity. South Africa now offers peak and average speeds of 32.4Mbps and 6.1Mbps respectively (Akamai, 2017).

Berry and Katz (2014) summarised the economic benefits of deploying network infrastructure for digital communications as both direct (boosting consumer surplus, enhancing total factor productivity) and indirect (attracting investment) as shown in Figure 1-2 below:

![Figure 1-2: Economic Benefits of Deploying Digital Communications Networks (Source: Berry & Katz, 2014)](source)
1.2.2 Evolution of the Mobile Telecommunications Sector

The growing influence of mobile telephony has been a result of progressive advances in communication technology. The mobile telecommunications technology has evolved from 1G to 4G over a forty-year period as shown in Figure 1-3 (Qualcomm, 2014). The first generation (1G) network was launched in the early 1980s when the handsets were big and heavy; these were primarily installed in vehicles and served a niche market. In the 1990s, the second-generation network (2G) introduced digital voice, bringing better efficiency and prepaid billing that extended its appeal to the mass market with the focus primarily on voice service. As email messaging became popular, further enhancements to accommodate data services were added, together with the introduction of the General Packet Radio Service (GPRS) and the Enhanced Data rates for GSM Evolution (EDGE) technologies. However, the demand for higher peak rates created the need for a third-generation (3G) network, launched in the early 2000s, that could deliver better data speeds and voice simultaneously. Today, developments on the internet protocol (IP) have enabled the introduction of a flatter network architecture and data-centric fourth-generation technology (4G). With 4G, speeds of 100Mbps and latency of less than 20ms can be achieved.

Figure 1-3: Evolution of Mobile Telecommunications Technology
(Source: Qualcomm, 2014)
The rate of adoption of these technologies has varied in different markets. In sub-Saharan Africa, new networks using the different technologies were launched as shown in Figure 1-4 below (GSMA, 2017):

![Figure 1-4: Sub-Saharan Africa - Networks Launched according to Technology (Source: GSMA, 2017)](image)

Today, 3G is currently the dominant technology in sub-Saharan Africa but 4G is experiencing a much faster uptake (GSMA, 2017). It can be observed that the time taken to promote new technologies is shortening between developed and developing markets.

A fifth generation (5G) technology is now on the horizon and is expected to meet rising demand for data while extending connectivity beyond humans; to machines and the internet of things (IoT) (3GPP, 2017). It promises to provide better broadband speeds, which are multiple times faster than those achievable by 4G, a latency of less than 2ms and a capacity to connect billions of IoT devices (5G Americas, 2017). The first set of 5G standards was signed-off on 20 December 2017 (Tyson, 2017). Trials and commercial rollouts were to commence in 2018 and 2019 respectively in line with the 3GPP Release 15 standardisation roadmap shown in Figure 1-5 below (3GPP, 2017):
Like earlier technologies (2G, 3G & 4G), the evolution to 5G will require significant financing that may impact operators' capital structure, with the potential to influence financial performance.

The next section considered the future investment requirements for mobile operators and what this would mean for capital structure.

1.2.3 Future Investment Requirements for Mobile Networks

The previous sections discussed the importance of the mobile telecoms sector and its technology evolution. The introduction of newer technologies has been largely positive; however, it has had several side effects for the operators. With newer capabilities, new competition emerged from internet media services companies like WhatsApp and Skype. In the Middle East and Africa (MEA), the industry’s average return to shareholders declined from 14% in the early 2000s to 9% in the early 2010s (Abou-Zahr, Alatovic, Boniecki, El Hamamsy & Marcati, 2016). The revenue growth in sub-Saharan Africa slowed over time and is expected to persist as shown below in Figure 1-6 (GSMA, 2017):

**Figure 1-5: 5G 3GPP Rel. 15 Standardisation Roadmap**
(Source: 3GPP, 2017)
Regardless of this decline, the need for continued capital investments increased as operators attempted to satisfy the exponential rise in demand for data and rich communications services. In 2016, operators in sub-Saharan Africa spent just over US$7 billion in capital expenditure and are expected to spend more than US$30 billion between 2017 and 2020 (GSMA, 2017). This figure will continue to rise beyond 2020 with the wider adoption of 5G.

Early figures from more developed markets suggest that the implementation of 5G will require greater investments than previous technologies. Chinese operators are expected to spend US$180 billion in the seven (7) years from 2017 to 2023, compared to 4G investments of US$117 billion for seven (7) years from 2013 to 2020 (Waring, 2017). For the ten-year period between 2020 and 2030, the Chinese will invest US$411 billion in 5G (GSMA Intelligence & CAICT, 2017). In Japan, mobile operators are allocating US$45 billion (Waring, 2017), while in the US, at least US$130 billion will be spent on 5G technology (Deloitte, 2017). Duetshce Telekom plans to invest €2 billion and estimates that the entire European Union (EU) market will finance 5G technology with €300 million to €500 billion (Advanced Television, 2017). In a recent study to guide 5G Infrastructure Strategy for the United Kingdom, Frias and Oughton...
(2016) established nine possible scenarios for 5G deployment where the ten-year Total Cost of Ownership (TCO) ranged from £20 billion to £71 billion. On the other hand, the Scandinavian operator, Telenor, hopes that 5G investments will be more gradual (Reuters, 2017).

Orange Telecoms Group, which operates in Europe and Asia, also operates in sub-Saharan Africa and expects its capital expenditure profile to peak in 2018/2019 as it prepares for the introduction of 5G (Morris, 2017). Figures from other mobile operators in Africa are not yet available as operators are at different stages of 4G deployment and assessment of how 5G will be used in their markets. However, as Research and Markets (2017) pointed out, 5G will require significant investments.

These investments will go towards:

1. **New spectrum** – to provide required capacity for massive mobile broadband. This can be purchased as new licenses or through acquisition of companies holding the spectrum. In the United States of America (USA), Verizon recently outbid AT&T’s 160% premium offer and acquired Straight Path for US$3.1 billion (400% premium) to access its 28GHz and 39GHz spectrum for 5G use (Shaffer, 2017).

2. **Network Architecture Evolution** – to facilitate delivery of new services requiring responsiveness, high reliability and ultra-low latency by adopting centralised and distributed network cloud/virtual architecture which require investments in transport/fibre (Perrin, 2017).

3. **Organisation Architecture Evolution** – new operating models that require streamlining of capabilities, processes and the alignment of the organisation to serve in new service and market segments created by new technologies.

4. **Coverage and Capacity Expansion of Existing Technologies** – existing technologies (2G/3G/4G) will continue to play a role in future; they will need investments to extend coverage and expand capacity where required.

According to Mbongue (2017), by the end of 2022, the first 5G networks in Africa are likely to be deployed in South Africa, Tanzania and Mauritius. However, such plans are being accelerated as Vodacom South Africa has already indicated that it wants to be the first to market with 5G. To achieve this, it has announced a partnership with Nokia to conduct 5G trials as early as 2018 (Bowker, 2017).
During the 2016 Southern Africa Telecommunications Networks and Applications Conference, Professor Thomas Magendaz of the Fraunhofer Institute for Open Communication Systems, urged mobile operators to start thinking and developing 5G strategies (Mzekandaba, 2016). These strategies should not only look at the technical aspects but consider the business and financial decisions necessary for the viable evolution of today’s networks and introduction of new technologies like 5G. Industry experts point out that: ‘….economics and not technology, will define what 5G becomes over the course of the next decade.’ (Sharma, 2018:1).

Studies examining the US, Japanese and European markets (IDATE Consulting, 2015) showed that mobile operators have historically maintained a 13%-15% Capex/Revenue ratio in their investments. If such levels of re-investment were to be maintained, the retained earnings from declining revenues are unlikely to match the scale of required future capital expenditure. The impact of these investments will be observed on the balance sheet as their capital structure changes. China Unicom plans to raise US$11.7 billion for investments in 5G by issuing stocks to private investors and staff (Maistre, 2017). However, there is no evidence to assure companies that when it comes to financial performance, this is the optimal approach for them and other mobile telecommunications operators based in sub-Saharan Africa.

Capital structure decisions are likely to impact financial performance; with poor decisions affecting shareholders and society negatively. Declining revenues, competitive pressures, investment requirements and people’s strong reliance on mobile telecommunications are reducing the acceptable margin of error in decision-making. It is critical to seek empirical evidence on how capital structure affects financial performance to support decision-making by management, policy makers and other stakeholders.

1.3 Problem Statement
The mobile telecommunication industry makes a meaningful contribution to the economy through tax, employment creation and investment attraction (GSMA, 2017; O’Mahony et al., 2013). By providing digital communications, the industry facilitates improved productivity, stimulates innovation in other sectors and transforms the way people work, learn and play (Berry & Katz, 2014).
These benefits have been a result of progressive investments to advance the technology, extend the service coverage to more people and increased the capacity to match the demand (Qualcomm, 2014). This is likely to continue and at an even greater scale with the introduction of 5G (Research and Markets, 2017). The industry has been facing declining revenues and profitability because of competition within the industry as well as other alternatives from outside the sector (Abou-Zahr et al., 2016; GSMA, 2017).

This presents a challenge for operators who need to ensure that their investments for growth will provide sufficient returns for their investors. Failure to do this will render the industry unsustainable and society stands to lose as investors will stop investing in the sector. Without investment, the sector will not grow and its contribution to GDP will decline. When the GDP declines, jobs may be lost, and the unemployment rate will rise. With higher levels of unemployment, overall consumer spending is affected, and the entire economy slows down. Potential efficiency and productivity gains from more advanced communication capabilities will be lost.

The fine balance between investment, return and societal benefits requires operators of mobile telecommunications networks to think carefully about how much to invest, where they will find finances (capital structure decision) and how they will recoup their investment (financial performance). Without empirical evidence on how capital structure affects financial performance, the telecommunications industry is at risk of making ineffective capital structure decisions. These might negatively impact their already strained financial performance and fail to deliver sustainable benefits to all stakeholders.

A study to examine the impact of capital structure on financial performance for mobile telecommunication companies in sub-Saharan Africa will enable operators to make informed capital structure decisions that do not sacrifice financial performance. When financial performance is well-maintained, the sector will enhance its ability to attract investments and reward investors satisfactorily, grow the industry and its contributions to the GDP, expand employment opportunities in the sector and other industries it supports. It will be able to extend efficiencies and productivity gains through continuous evolution to a more advanced communication technology, people and situations. In view of the socio-economic benefits provided by the mobile
telecommunications industry in sub-Saharan Africa, the significant scale of required future investments, revenue pressures and intensifying competition/disruption; what will be the impact of capital structure on their financial performance? This study investigates the impact of capital structure on financial performance of sub-Saharan Africa mobile operators and seeks to provide insights for financing future investments in the sector.

1.4 Research Objectives
The main objective of the study was to determine the impact of capital structure on the financial performance of mobile operators based in the sub-Saharan Africa region for the period 2010 to 2017.

Capital structure comprises debt and equity. Extant literature suggests that the introduction and extent of debt used to finance a firm’s assets may influence financial performance. The firm’s financial performance can be measured using market indicators and/or accounting indicators. For developing countries, which face liquidity constraints, it is better to use accounting variables such as ROE, ROA and Profitability (Alum, Foo, Jamal & Karim, 2015). In line with previous research, this study used debt related ratios and accounting measures of financial performance to investigate the main objective of assessing the impact of capital structure on financial performance through the following three (3) sub-objectives:

1. Establishing the impact of short-term debts to total assets ratio (STDtTA), long-term debts to total assets ratio (LTDtTA), total debts to total assets ratio (TDtTA) on the operating margin (OM).
2. Establishing the impact of short-term debts to total assets ratio (STDtTA), long-term debts to total assets ratio (LTDtTA), total debts to total assets ratio (TDtTA) on return on total equity (ROE).
3. Establishing the impact of short-term debts to total assets ratio (STDtTA), long-term debts to total assets ratio (LTDtTA), total debts to total assets ratio (TDtTA) on return on total assets (ROA).

1.5 Significance of the Study
The mobile telecommunications industry in sub-Saharan Africa creates employment, drives innovation, promotes productivity, advances economic inclusion and some operators are among the highest tax payers in their territories.
Such benefits are important for the region to achieve the Sustainable Development Goals (SDG) as set out by the United Nations (United Nations, 2016). The sector addresses the following seven (7) of seventeen (17) SDGs:

- **Goal 1**: No Poverty – by creating employment.
- **Goal 2**: Zero Hunger – by paying taxes which are used to support social programmes.
- **Goal 3**: Good Health and Well-being – by providing access to information through the internet.
- **Goal 4**: Quality Education – by providing access to information through the internet.
- **Goal 8**: Decent Work and Economic Growth – by creating employment and contributing to economic growth.
- **Goal 9**: Industry, Innovation and Infrastructure – by building infrastructure and supporting innovation in other economic sectors.
- **Goal 10**: Reduced Inequality – by creating employment and promoting economic inclusion through various services.

The requirements for future investment in the sector will need to be decided when the revenues and profits are declining (Abou-Zahr et al., 2016; GSMA, 2017). A company’s capital structure determines the required minimum financial performance (Allen et al., 2011). When managers make capital structure decisions that impact financial performance in a negative way, they endanger their organisations, industry and society. An understanding of how capital structure decisions will impact financial performance is critical to ensure that financial performance is not sacrificed and the benefits from the industry are sustained, including its role in advancing the region towards the UN’s Sustainable Development Goals.

Insights from this study would provide the necessary guidance for management to make informed financing decisions for the benefit of all stakeholders. Managers need to ensure that introducing debt into the capital structure will not compromise the firm’s efficient use of its assets (ROA), effective use of shareholder’s funds (ROE) and general profitability of operations (Operating Margin).

### 1.6 Implications of the Study

The findings of this research have implications for the following stakeholders:
1. Managers and Boards of Directors responsible for making and influencing capital structure decisions for mobile telecommunication companies.

2. Banks and financial institutions responsible for creating lending criteria and assessing applications by mobile telecommunication companies for debt financing.

3. Investors and fund managers evaluating future performance of mobile telecommunication companies.

4. Government, regulators and policy makers responsible for making decisions which directly or indirectly impact the financial performance of mobile telecommunications companies.

1.7 Literature Overview

The value creation objective is central to the existence of firms; regardless of which dominant view one adopts, whether it is the shareholder model (Friedman, 1962), stakeholder model (Freeman, 1984) and/or enlightened shareholder model (United Kingdom Government, 2006). To achieve this, the firm must decide on which projects to pursue, how to finance them and what to do with the earned returns (Allen et al., 2011). Value is maximised through undertaking profitable projects funded by the least cost combination of debt and equity (Damodaran, 2001). How a company chooses to finance its projects and capital structure may have an influence on its financial performance.

Fundamental theories of capital irrelevance (Miller & Modigliani, 1958) and relevance theory (Miller & Modigliani, 1963), agency cost theory (Jensen & Meckling, 1976), trade-off theory (Myers, 1984), pecking order theory (Majluf & Myers, 1984) and signalling theory (Ross, 1977) have all attempted to provide insights on the relationship of capital structure and financial performance. These theories offer diverging views whereupon firms are encouraged to use more debt according to capital structure relevance theory (Miller & Modigliani, 1963) and agency costs theory (Jensen & Meckling, 1976); consider the benefits and costs of debt as per trade off theory (Myers, 1984); take into account preferred sources of funding as per pecking order theory (Majluf & Myers, 1984); or consider other things as per capital irrelevance theory (Miller & Modigliani, 1963) and signalling theory (Ross, 1977).
Empirical research has been conducted to provide evidence from different markets, industries and time periods. Unfortunately, such evidence has not been consistent because some researchers have found that capital structure has a negative, positive, insignificant or mixed impact on financial performance (Obonyo, 2017; Chimara & Ogbonnaya, 2016; Mauwa et al., 2016; Nassar, 2016; Akanni & Isola, 2015; Akeem et al., 2014; Appiadgei, 2014; Bala & Gautam, 2014; Himani & Kumar, 2014; Kipesha & Mosi, 2014; Alawwad, 2013; Fosu, 2013; Taani, 2013; Ebaid, 2009).

This lack of consensus offers very little practical guidance for mobile telecommunications companies facing critical financing decisions for future investments, including those in 5G and elevates the need for this study.

A detailed review of the relevant literature highlighted above will be presented in Chapter Two (2).

1.8 Research Methodology Overview


A convenience sampling method, which accounted for data availability and language preference, was applied on a population of mobile telecommunications companies based in sub-Saharan Africa.

Publicly available audited annual reports for the eight (8) years between 2010 and 2017 were used to provide data to calculate accounting dependent and independent variables representing measures of financial performance and capital structure respectively. This was desirable since market variables are not reliable in developing countries where the stock markets are immature and liquidity challenges exist (Alum et al. (2015).

The following variables were used as proxies for financial performance and capital structure:
i. Proxy Variables for Financial Performance
   - Return on assets (ROA),
   - Return on equity (ROE),
   - Operating profit margin (OM)

ii. Proxy Variables for Capital Structure
   - Short-term debt to total assets ratio (STDtTA),
   - Long-term debt to total assets ratio (LTDtTA)
   - Total debt to total asset ratio (TDtTA).

To provide deeper analysis of financial reports, only companies that reported in English were considered.

1.9 Delimitations of the Study
For the purposes of the study, the following delimitations were applied:

- Only mobile telecommunications companies based in sub-Saharan Africa were considered.
- Only companies with publicly available audited annual reports were considered. This facilitated transparent data collection and integrity.
- Only companies operating in English speaking countries and reporting their annual reports in English were considered. This allowed for deeper understanding of financial statements within their correct context, but beyond the reported figures.
- A sample of eight (8) mobile telecommunication companies based in 5 sub-Saharan African countries met the criteria above. These companies serve a total of more than 300 million subscribers and were considered representative.

1.10 Chapter Outline
The study is presented in five (5) chapters as outlined in Table 1-1.
**Table 1-1: Chapter Outline**

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<td><strong>Introduction</strong></td>
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<tr>
<td></td>
<td>This chapter introduced the study and set the context of the key issues the study sought to address.</td>
</tr>
<tr>
<td></td>
<td>It stated the research question, research objectives, overview of the relevant literature, research methodology and outlined the layout of the minor dissertation and highlighted the respective contents of each chapter.</td>
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<td><strong>Chapter Two (2)</strong></td>
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<td>This chapter critically reviewed relevant fundamental literature and empirical evidence to draw useful insights on the underlying dynamics influencing the relationship of capital structure and financial performance.</td>
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<td><strong>Chapter Three (3)</strong></td>
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<td>This chapter described and discussed the research methodology that was adopted for this study.</td>
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<td>This chapter provided conclusions and recommendations of the study based on the analysis of empirical evidence established by the study.</td>
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Chapter Two (2): Literature Review

2.1 Introduction
This literature review chapter provided context and critically assessed the relevant fundamental and empirical literature to provide insights of the underlying dynamics on the interaction of capital structure and financial performance. In doing so, gaps in literature were uncovered, thus supporting the relevance and significance of this study.

In this chapter, the first section considered the objective of the firm to develop a practical context within which it operates. It argued that firms primarily exist to create value, which is often reflected by its financial performance.

The second section explored the key decisions that a firm must make to deliver financial performance. These primarily related to investment, financing and dividend decisions. It established the link between financing/capital structure decision and a firm’s financial performance. It laid the foundation for a detailed review of fundamental and empirical literature on the impact of capital structure on financial performance.

The third section reviewed the literature to understand the basis and implications of relevant theory on the relationship between capital structure and financial performance. It explored empirical evidence from investigations into how capital structure has affected the financial performance of firms in Africa as well as the rest of the world. Such a detailed analysis was to identify the trends, strengths and limitations of proposed arguments as well as the consistency or divergence between theory and practice.

Finally, the fourth section of the chapter summarised the reviewed literature and identified the gap(s) in the literature, which this study sought to address.

2.2 The Objective of the Firm
To understand the context within which the firm makes its decision, it is important to understand the reason for its existence.

According to the shareholder model developed by Milton Friedman (1962), the firm’s objective is to maximise profits for its owners through the efforts of managers who are hired by the shareholders to serve their interests. He argued that, profit generation is the firm’s social responsibility (Friedman, 1970). Such a singular focus is necessary for effective managerial decision-making (Rossouw, 2009). The view assumes that
when companies do well, other stakeholders automatically benefit. Unfortunately, this is not always the case. As a result, others have criticised the approach as narrow and short-term focussed (Andersson & Maher, 1999).

In contrast, the Stakeholder Model, which was proposed by Edward Freeman (1984), asserts that the firm must directly and concurrently consider a broad range of stakeholders who affect and/or are affected by its business decisions. When stakeholders’ interests are met, the interests of shareholders are achieved in a sustainable manner. This view attempts to overcome the limitations of the shareholder model where the singular pursuit of profits has sometimes been at the expense of other stakeholders’ interests, as was the case in the Enron and Steinhoff scandals (Bonorchis, Bowker & Wild, 2018). Introducing additional, often diverging, interests from more stakeholders, complicates managerial decision-making and may generate inefficiencies (Letza, Sun & Kirkbride, 2004).

An attempt to assert shareholders’ interests within a wider consideration of stakeholders’ interests as partners of value creation resulted in the Enlightened Shareholder Value approach as outlined in section 172 of the United Kingdom’s Companies Act of 2006 (United Kingdom Government, 2006). It emphasises the need for firms to pursue long-term shareholder value while being mindful of the externalities that impact sustainability. A similar concept has been advanced by Kramer and Porter (2011:5) who argue that ‘the competitiveness of a company and the health of the communities around it are closely intertwined.’ Hence, companies must focus on creating shared value which goes beyond just shareholder value.

Whether one considers the shareholder, stakeholder or the enlightened shareholder value model; value creation for shareholders is a common consideration across all the three models and management should take it seriously. As such, this research took the perspective that an important objective for a business is to create, capture and maximise its value (Damodaran, 2001). The value created is often reflected in the company’s financial performance.

2.3 The Firm and Financial Performance
A firm creates value and achieves good financial performance when it uses its assets to undertake projects that generate a positive net present value when cash flows are
discounted at the project’s risk adjusted cost of capital (Allen et al., 2011). These assets are primarily financed by equity and debt, referred to as its capital structure.

The two components of capital structure have different characteristics. Equity creates a discretional residual claim in the form of dividends (Allen et al., 2011). Through the board, equity holders control the affairs of the firm but only receive whatever is left during liquidation. In contrast, debt is a contractually fixed/set financial claim with finite maturity. The firm must pay back the principal and interest, which is usually tax deductible. (Damodaran, 2001). While debt holders do not play any role in the management of the firm, they are first in line to receive settlement when the firm liquidates.

By providing the firm with funding; both debt and equity providers forego current consumption, assume risk and consequently require a commensurate return. This imposes a minimum hurdle rate (cost of capital) which the company’s projects must meet to reward its funders. Thus, a firm can maximise its value by minimising its cost of capital (Damodaran, 2001). This suggests that capital structure, through influencing the cost of capital, may impact a company’s reported financial performance. There are different views amongst researchers on how capital structure impacts a firm’s financial performance. The next section provides a comprehensive review of capital structure and financial performance.

2.4 Capital Structure and Financial Performance: Fundamental Literature

This section presents and discusses the fundamental theories of capital structure.

2.4.1 Capital Structure Irrelevant and Relevant Theory

Miller and Modigliani (1958) proposed that the firm’s mix of debt and equity was not important because its financial outcomes depended on investment decisions and not financing decisions. This supports Fisher’s (1930) separation theorem that argued for the separation of investments decision and financing decision. The implication is that companies must focus more on the underlying value creation potential of their projects rather than how they finance them.

Miller and Modigliani (1958) considered an environment with no tax, no transaction costs, no bankruptcy costs, homogeneous investor objectives and perfect capital markets. While these assumptions helped to clarify the fundamental dynamics in
action, none of these applied in the real world as capital markets are imperfect, while tax and transaction costs existed. This laid the foundation for further research where the conditions of the Miller and Modigliani environment were relaxed to reflect practice.

In a follow-up study, Miller and Modigliani (1963) considered the effect of tax and they found that debt financing could minimise the cost of capital since tax is not paid on interest charged. In doing so, firms could maximise their financial performance. This suggests that companies should finance their projects by as much debt as possible, a view that may have fuelled the popularity of leveraged buy-outs in the 1980s. Unfortunately, as the level of debt rises, the cost of new debt increases, the total repayment obligation also increases, and a company’s risk of bankruptcy accelerates. This observation then led to the development of the trade-off theory.

2.4.2 Trade-Off Theory

The trade-off theory argues that although debt has tax benefits, which can make it a cheaper source of funding, increasing debt levels also increases the firm’s risk of failing to generate sufficient income to meet its payment obligations (Damodaran, 2016). Myers (1984) proposed that a company’s level of borrowing is a balance between the advantages and disadvantages of using borrowed money. The implications of the trade-off theory are that each company has an optimal capital structure that maximises its financial performance and value. However, the practical challenge is that it is difficult for companies to operate at their optimal structure as they require spare debt capacity to help them deal with unexpected situations; for example, in responding to competitor’s actions or seizing new opportunities. Operating at the optimal cost of capital, means that any additional debt will increase the firm’s cost of capital and negatively affect its financial performance. Furthermore, an optimally designed capital structure does not guarantee that managers will use the funds on profitable projects. The agency theory attempts to incorporate this behavioural aspect based on the relationship between shareholders and a firm’s management.

2.4.3 Agency Costs Theory

When all the owners of a business cannot manage the company’s affairs, they elect a board of directors and appoint professional managers as agents to execute daily operations on their behalf (Damodaran, 2001). This creates a principal-agent
relationship between them. Agents do not always pursue their principals’ interests, and this creates agency costs where additional effort is needed to align interests as well as monitor their activities (Allen et al., 2011). Jensen and Meckling (1976) suggest that companies can use debt to create fixed obligations that reduces manager’s tendency to be wasteful. Reducing the available free cash flows instils discipline and constrains management’s discretionary spending power (Jensen, 1986).

The implication of the agency cost theory is that companies must take on as much debt as they can afford, especially where management has very little equity ownership in the business (Jensen, 1986). However, the risk for short-term focus at the expense of long-term value creation may be compounded. Some organisations have opted to reward managers with more ownership of the company to align their interests, so that executives will benefit if a company’s valuation improves (Minor, 2016). While this can help, it cannot fully eliminate managers’ self-interest as observed by their preference to mostly use retained earnings, as explained by the pecking order theory (Majluf & Myers, 1984).

2.4.4 Pecking Order Theory

Majluf and Myers (1984) observed that managers have a hierarchical preference for sources of finance for their projects. First and foremost, they prefer to use retained earnings, followed by debt and finally equity. It is much easier to use retained earnings than debt and external equity since retained earnings are already available in their control. When it comes to external funding, asymmetric information makes the pricing of equity more sensitive than debt. For example; when new equity is issued, investors may believe that the share price is overpriced, leading to a devaluation. Consequently, managers may prefer financing options that reveal the least information to the market. Pinegar and Wibricht (1989) surveyed US companies and found the pecking order theory to be valid. Managers cited the importance of eliminating market pricing dependencies as one of the important reasons for their preference.

The pecking order theory suggests that there is no optimal capital structure for the firm. Capital structure is a consequence of the available projects’ capital requirements in relation to available retained earnings, its borrowing capacity and manager’s preference. However, the preferences by managers can also be influenced by how the
market interprets the signals and timing of their actions. This rationale is explored by the market timing and signalling theories.

2.4.5 Market Timing and Signalling Theories

The asymmetric information problem, which the pecking order theory tries to avoid, is embraced and manipulated by the market timing and signalling theories. Managers who run the daily business have more information than outside investors, leading to asymmetry. These outside investors try to reduce the asymmetric information gap by looking for signals from management decisions (Ross, 1977). The signalling theory indicates that companies use their capital structure decisions to communicate private information. For example; taking on more debt indicates that the firm is confident it will meet required interest payments, and by buying back their own shares, managers signal their belief that the shares are undervalued.

The market timing theory acknowledges the signalling effect of a company’s policies and argues that managers may capture value by timing their decisions. Following credible information releases, managers tend to issue new equity when the quality of the firm is known (Korajczyk, Lucas & McDonald, 1991). In doing so, capital structure decisions become opportunistic manoeuvres and are not based on the fundamental premise of value creation. The marketing and signalling theory do not inform target capital structure but are rather useful theories to explain timing of decisions and transient capital structure position as the firm responds to the agency, trade-off and pecking order theories.

The theories discussed above have provided a foundation for empirical investigations into the relationship between capital structure and financial performance for various industries, stock markets and geographies. The next section will review evidence from empirical studies on the impact of capital structure and financial performance.

2.5 Capital Structure and Financial Performance: Empirical Literature

Based on the different views provided by extant literature, researchers have conducted numerous investigations into the impact of capital structure on financial performance in search of empirical evidence. The scope of these studies included different industries, geographies and stock markets, which found negative, positive, and mixed as well as insignificant relationships.
2.5.1 No Impact of Capital Structure on Financial Performance
Anojan and Velnampy (2014) examined data from the two telecommunications companies listed on Colombo Stock Exchange, Dialog Plc and Sri Lanka Telecoms, for the period from 2008 to 2012. They found no significant relationship between capital structure and financial performance and advised managers looking to enhance financial performance to consider other factors. The evidence suggested that financing decisions are irrelevant. However, these findings cannot simply be transferred to all telecommunications companies because the sample size of the study was small and may not have been fully representative of the industry dynamics.

Similar results were reported by Chimara and Ogbonnaya (2016) for the Nigerian brewery industry where only Nigerian Breweries and Guinness Nigeria are listed on the Nigerian Stock Exchange. They found no relationship between capital structure and financial performance. They argue that Nigeria’s capital markets are less developed and this translated to a very high cost of debt. As a result, companies in Nigeria preferred to use internal sources of finance in accordance with the pecking order theory. These findings are consistent with those of Obonyo (2017) who studied thirty (30) companies listed on the Nairobi Stock Exchange in Kenya. Obonyo (2017) noted that although capital structure had an insignificant relationship to financial performance, it was influenced by external trends.

A more detailed study which analysed ROA, ROE and EPS for two hundred US companies was conducted by Azeez, Olanrewaju and Saka (2015). Their results show that capital structure did not influence financial outcomes and they recommended managers to focus their attention on efficiency improvements. This suggests that good financial performance relies heavily on selecting profitable projects and implementing them well.

2.5.2 Positive Impact of Capital Structure on Financial Performance
While some found no impact of capital structure on financial performance, others have reported this relationship to be positive. Fosu (2013) used the panel regression method to investigate the impact of capital structure on financial performance for two hundred and fifty-seven (257) South African firms. Analysis of ten (10) years’ worth of data from 1998 to 2009 revealed that debt had a positive impact on financial performance. It was recommended that South African companies accumulate more
debt in line with the trade-off theory. The South African capital markets are advanced when compared to other countries in Africa (PwC, 2017). These findings may be an exception rather than the norm for African countries in general. Fosu (2013) found that the benefits of debt were greater for companies in less competitive industries than those in more competitive ones (Fosu, 2013). The role of competition in influencing the impact of capital structure was observed in the Indian construction industry. According to “Make in India” (2018), the Indian construction sector contributes 8% to the GDP, employs more than 35 million people and must satisfy the high demand for the development of the infrastructure required by the country’s growing population of more than 1.3 billion. A ready market exists for the industry’s products. The construction companies in India have retained their pricing power and are experiencing a diminishing risk of bankruptcy. When Himani and Kumar (2014) investigated twenty (20) construction companies in India over the five (5) years between 2007 and 2012, they found that capital structure had a positive relationship with financial performance.

Akanni and Isola’s (2015) study used the panel regression analysis on sixty-three (63) non-financial companies in Nigeria over the 2001-2010 period. This confirmed the positive impact of gearing on financial performance and how this is enhanced by lower levels of competition. This suggests that when competition is low, a company has limited external pressure and its risk of bankruptcy is reduced as it can increase prices. It can pass on the cost of debt-burden to consumers without significant revenue side-effects. The trade-off scale leans on benefits of debt. Companies are inclined to operate in line with Miller and Modigliani’s (1963) capital structure relevance (with tax) proposal. It is important to note that the competitive environment may change much faster than the company can redesign its capital structure position, with serious implications. These changes could be driven by a price war, new entrant, legislative directives, change in tastes or appearance of alternatives addressing the same needs better in a cheaper way.

Similarly, evidence from more than three hundred (300) restaurant companies also showed that capital structure had a positive effect on financial performance (Jang & Park, 2014). These findings were driven by a different set of dynamics from those highlighted by Akanni and Isola (2015); Himani and Kumar (2015) as well as Fosu (2013). Jang and Park (2014) assert that the benefits of debt were derived from the
ownership structure of the restaurants and not necessarily the competitive landscape. Debt was being used to instill discipline and address agency costs between managers and owners of the business. They recommended that firms should use more debt in their capital structure to enhance operational efficiency, which is in line with the agency cost theory. This is consistent with findings on the Ghana Stock Exchange, where companies used more short-term debt to boost financial performance (Appiadjei, 2014). The findings confirm that it is possible for borrowing to instill management discipline in line with the agency cost theory, especially within short horizons where management believes they have a reasonable level of control. It should also be noted that such an approach requires a strong capability in working capital management. Where such capabilities are missing or constrained by external factors, alternative ways of aligning the interests of managers and owners should be pursued. This strategy may not be effective for owner-managed companies and a different set of recommendations will be more relevant.

The cautious use of long-term debt by Ghanaian companies was also likely to be an acknowledgement of the bankruptcy cost of debt, which needed to be weighed against the tax benefits. In Nigeria, for example, the tax rate is 30% and Adesina, Adesina and Nwidobie (2015) reported that Nigerian banks used debt to improve their financial performance. For financial institutions, debt from depositors is inventory where rate of turnover directly improves financial performance and their analysis requires careful consideration.

Gharaibeh (2015) examined seventeen (17) non-financial companies in Bahrain during the period 2009 – 2013 using the multiple regression technique. He found that total liabilities had a positive relationship with ROE. There is no corporate tax in Bahrain except for the oil and gas industries (Deloitte, 2017). This eliminates the tax benefits of debt but also serves to attract multinational companies which carry significant agency costs. In this context, it is plausible that more debt will yield positive financial performance consistent with the findings in Ghana (Appiadjei, 2014).

A study of advanced capital markets by Petre (2015) considered one hundred and twenty-one (121) US and European telecommunications companies. It found that having debt in the capital structure increased the value of the firm, especially for US companies. The findings were justified by the signalling and trade-off theories. Since
the companies in the study were large and listed firms, it was important for them to send positive signals to the market to retain investor interest and maintain a desirable share price.

Evidence from these studies has important implications for telecommunications operators in sub-Saharan Africa with respect to the level of competition, tax rates, ownership structure and investment horizon.

2.5.3 Negative Impact of Capital Structure on Financial Performance

In contrast to those who found positive and no impact of capital structure on performance, researchers found that increasing the share of debt can impact financial performance negatively. Akeem et al. (2014) used ROA, ROE, Total Debt to Total Assets and Total Debt to Equity ratios to analyse ten (10) manufacturing companies listed on the Nigerian Stock Exchange between 2003 and 2012. They found that capital structure had a negative impact on financial performance and recommended companies to use more equity funding. This recommendation must be understood within the context of developing countries with underdeveloped capital markets where the cost of debt is high. The fact that equity holders have residual claim on the company’s assets suggests that the cost of equity is typically higher than the cost of debt (Damodaran, 2016). If not, then equity providers will be better off providing debt finance since they will not be rewarded for the additional risk they carry in holding equity positions. These diverging views can be reconciled by considering the differences in investment horizons for debt and equity, where equity tends to be longer term and less imposing on short-term liquidity. Nassar (2016) encountered the same dichotomy in Turkey. He remarked how the concept of capital structure remained puzzling, especially for emerging markets where companies required external financing to grow but the high cost of debt in developing countries seemed to negatively impact financial performance. This is consistent with findings of Mauwa et al. (2016). They recommended that firms in developing countries should secure their future and mitigate the high cost of debt by keeping their borrowing under control and carefully planning their working capital. Their investigation, based on the Rwanda Stock Exchange, showed that all the six (6) listed companies were in search for equity to finance their growth but their ROE and ROA declined with increased leverage. Similar findings were reported in Vietnam’s Ho Chi Minh City Stock Exchange as well as its agricultural sector by Nguyen and Nguyen (2015) and Du Ngoc (2015)
respectively. However, for Vietnam which was a communist state, Gwyther (unknown) highlighted the non-market factors of government risks and banking system inefficiencies that were the key drivers of the high cost of debt. The impact of the political environment is even clearer in Iran where the US sanctions have increased financing costs in the face of liquidity challenges (Bozorgmehr, Fifield & Hook, 2011). An analysis of eighty (80) companies listed on the Tehran Stock Exchange and operating in twelve (12) different industries revealed that capital structure had a negative impact on financial performance based on their ROA and ROE.

In a separate study, an analysis of forty-one (41) non-financial firms listed on the Nairobi Stock Exchange, using panel data from 2003 to 2013, also showed that leverage had a negative impact on ROA and ROE (Ayako et al., 2015). The same study revealed that the size of the board of directors and its independence had a positive impact on financial performance. A holistic assessment of these findings illustrates the importance of governance structures and challenges the effectiveness of agency theory as a means of addressing agency costs for markets such as Kenya. For example, a study of the banks of Bangladesh by Joghee, Kabiraj and Siddik (2017) reported similar results. It was noted that capital is more expensive in countries with less developed bond and equity markets. The benefits of increasing debt to discipline managers can be outweighed by the debt burden. These findings suggest that managers should prioritise retained earnings and support the pecking order theory. Companies in the Ukraine were found to mainly use retained earnings as per pecking order theory (lavorskii, 2013). In addition to finding the negative impact of capital structure on financial performance, lavorskii’s (2013) study also discovered that debt had a more negative effect on growth companies than their more mature counterparts. This revealed the forces of trade-off theory at work because mature companies are in a better position to use their stable earnings to repay their debt obligations and have a different bankruptcy risk profile from their younger counterparts. This is supported by findings of Eriotis, Franguoli and Neokosmides (2002), Al-Yahyae, Rao and Syed (2007) as well as Arowoshegbe and Idialu (2013) who concluded that the high cost of borrowing and doing business in developing markets could not be sufficiently offset by any tax benefits from debt. Awais, Iqbal, Iqbal and Khursheed (2016) suggested a re-arrangement of the pecking order theory when they firmly asserted that debt ought to be used as a last resort. Their research on sixty-nine (69) non-financial companies in
Pakistan between 2004 and 2012 showed that both short-term and long-term debt had a negative relationship with financial performance.

Evidence from Malaysia’s oil and gas industries supported the trade-off theory and Alum et al. (2015) concluded that too much debt can rob shareholder value. These findings can be best understood within the context of oil price volatility over the years. Brent crude oil traded at a minimum of $50 per barrel and maximum of $110 per barrel between 2005 and 2015 (Statista, 2018). A business case, which considers $110 per barrel, may struggle to hold if the price is halved and highly levered firms could struggle to meet their debt obligations.

2.5.4 Mixed Impact of Capital Structure on Financial Performance

The complexity of the impact of capital structure on financial performance became quite evident when researchers found both positive and negative results for different variables or markets within the same data set. In a comparative study of Chinese, Swedish and German companies, Tianyu (2013) found a negative impact of capital structure on financial performance for companies listed in China compared to the positive impact for companies listed in Europe (Germany and Sweden). Within Europe, earlier studies by Weill (2008) reported that debt had a positive impact on financial performance in five countries (Belgium, France, Germany, Norway and Spain), but a negative impact in Italy and no impact in Portugal. Access to credit, level of shareholder protection and level of creditor protection could not explain the relationship between leverage and financial performance; he found that the efficiency of the country’s legal system exerted the greatest influence across the sample.

Another study of manufacturing companies in Jordan showed that capital structure had a positive impact on ROA but impacted profit margins negatively (Tiaani, 2013). In contrast, ROA had a significant and negative relationship with capital structure while that with ROE and Tobin’s Q was insignificant (Ahsan, Alam, Hasan & Rahaman 2014). The researchers argued that debt is an unattractive source of funding in developing countries because of high costs, strict covenants and immature debt capital markets, thus, it should only be used when necessary.

Javed et al. (2014) considered non-financial companies listed on the Karachi Stock Exchange. They used ROA, ROE and return on sales (ROS) as financial performance variables and total debt to assets, equity to assets and long-term debt to assets as
capital structure variables. Their results showed that all measures of capital structure improved ROA but total debt to assets had a positive relationship with ROE and a negative one with ROS. Long-term debt to assets had a negative relationship with ROE and a positive one with ROS. This is consistent with findings from Tanzania’s commercial banking sector. Kipesha and Moshi (2014) found that total debt to total asset and long-term debt to total asset had a negative impact on ROA, short-term debt to asset ratio had a positive impact on ROA, and ROE was positively impacted by both short-term and long-term debt ratios. The evidence suggested that capital structure can influence different financial performance variables differently, irrespective of the industry and market. The type of leverage used may also impact financial performance differently as was discovered by Alawwad (2013) in Saudi Arabia where short-term debt enhanced performance but all other forms of debt had a negative effect.

Funmi, Olajide and Olayemi (2017) observed limited research for African countries and investigated the impact of capital structure on financial performance in sub-Saharan Africa using the Generalise Methods of Moments technique. They found that both positive and negative relationships between capital structure and financial performance exist for companies operating in Africa. They attributed the negative effects of debt to the high agency costs.

2.6 Finding a Consensus

Extant literature offers a range of possible explanations on how capital structure may impact on a firm’s financial performance. At a glance, these theories seem to have divergent views. However, evidence from empirical studies indicate that they all operate together in a complicated dynamic environment, whereupon positive, negative, mixed and no impact of capital structure on financial performance was reported. These findings are relevant to this study and have important implications for telecommunications companies in sub-Saharan Africa.

Empirical evidence has shown that the high cost of debt in less developed capital markets has led some companies to prefer internal funding to external funding. The declining revenue growth being experienced in the sub-Saharan Africa telecommunications sector means that retained earnings are likely to be insufficient to fully finance capital expenditure requirements for spectrum license renewals, network modernisation and the introduction of new technology like 5G, without external
support. A heavy reliance on internal funding can prove detrimental to the same financial performance objectives, which companies want to preserve by avoiding borrowing. A competitive advantage erodes and market share declines when customer expectations for advanced communication services are not met due to technical limitations on legacy equipment.

To close this funding gap, some firms have taken on debt and tried to benefit from its tax advantages. However, results from Nigeria, which has a high tax rate and Bahrain which has no tax for most industries show that more debt could enhance financial performance irrespective of tax rate levels (Adesina et al., 2015; Gharaibeh, 2015). In as much as telecommunications companies can take advantage of taxation, the pursuit of value creation should be based on strong fundamentals. The risk is that governments can change their tax rates much faster than the mobile operator can adjust its capital structure, especially in less developed capital markets of sub-Saharan Africa. Through their investment policies, politics and the legal systems that must protect the rights of shareholders and creditors, governments can influence important factors that affect both capital structure and financial performance of telecommunications operators (Weill, 2008; Jahnsen & Pomerleau, 2017). The continent’s political situation, which is characterised by war and conflict in certain areas, has attracted most sanctions from the United States (US), United Nations (UN) and the European Union (EU), impacts on the cost of capital (USIP, 2016). Furthermore, sudden regulatory/policy changes can affect financial performance of firms, especially those in highly competitive markets. The presence of such uncertainty from multiple sources (government, market, competition or otherwise) has made other firms opt to use more short-term debt than long-term debt to enhance financial performance, as was found in Ghana by Appiadjei (2014). However, considering that investments in telecommunications (spectrum, towers and technology equipment) are long-term assets, this approach is contrary to the maturity matching hypothesis which asserts that long-term assets should be financed by long-term liabilities (Morris, 1976, Myers, 1977; Gonzalez, 2013).

The observed benefits for using debt finance have also been linked to the agency cost theory, where ownership structure was found to affect how the borrowing influences financial performance. Due to capital intensity, most telecommunications operators in sub-Saharan Africa are owned by governments and/or firms that are listed locally or
abroad. By taking on more debt, managers are encouraged to show greater discipline as recommended by Appiadjei (2014) as well as Jang and Park (2014). However, extant literature indicates that the risk of increasing debt in developing countries might outweigh the potential benefits (Weill, 2008; Bagheri Emamgholipour, Lotfollahpour, Malekian & Pouraghajan, 2012; lavorskyi, 2013). Alternative ways of aligning managers’ and owners’ interests should be considered.

Paradoxically, some investigations reported mixed results for different measures of capital structure and financial performance within the same study: scope, period, industry or market. This means that managers must be clear of the priorities attached to the financial performance metrics they aim to deliver because different metrics are impacted differently, and such clarity will assist them in making capital structure decisions. These findings further highlight the complexity of capital structure decisions for telecommunications operators in general, and especially those in sub-Saharan Africa. Telecom operators must resist the temptation to follow capital structure trends in the market. Instead, they must critically evaluate the timing and adoption of new technologies based on the merit of their business case since not all trends create, capture and maximise value. Firms should investigate, identify and analyse the drivers of such trends and how these specifically impact their business to make more informed decisions.

Investigations done by Anojan and Velnampy (2014) as well as Chimara and Ogbonnaya (2016) on listed telecoms companies in Sri Lanka and Breweries in Nigeria respectively, revealed that single country sectoral studies for oligopolistic markets are likely to have limited generalisability due to smaller sample sizes. The telecommunications market is typically one with few players operating in each country and thus characterised by the formation of tight oligopolies (Cooper & Kimmelman, 2017; Rewheel, 2016). Multi-country studies covering regions are likely to be more insightful than those focussing only on one country.

2.7 Conclusion

Overall, empirical evidence suggests that agency costs, level of corporate tax, cost of debt, ownership structure, managerial preference, industry lifecycle, degree of competition as well as institutional factors like the efficiency of the legal system are some of the factors that act to influence the impact of capital structure on financial
performance of firms. Managers must make challenging capital structure decisions that optimise financial performance amid divergent practical considerations. The reviewed empirical evidence has reported varying conclusions and highlights the importance of undertaking specific studies because findings from other studies in different settings (region, industry and period) may not universally apply. Therefore, merely translating historical findings may be perilous. It has been observed that debt ratios for telecommunication companies are at significantly different levels from other sectors and have been increasing over the years (Fumni et al., 2017; Bala & Gautam, 2014).

From the literature reviewed, most studies examining the impact of capital structure on financial performance have focussed on specific countries and only one study looked at Africa as a region. It is also evident that most investigations have examined the banking, manufacturing, construction or the broadly defined non-financial sector. Only 2% of the reviewed empirical literature is wholly dedicated to the telecommunications sector and the sector remains under researched in sub-Saharan Africa, despite its role in the economy and impact on society. Its requirement for high capital investments and need for stronger financial performance amid a dynamic competitive landscape elevates the importance of financing decisions. The investment decision for fifth generation (5G) mobile technology is almost certain but what is unclear is the financing decisions which the mobile operators will have to make. How these decisions will impact the sector’s financial performance will determine how sustainable the numerous benefits derived from advanced telecommunications will be for sub-Saharan Africa.

Further research focussing on the telecommunications industry in sub-Saharan Africa will address this gap in the literature and inform financing decisions. It will eliminate assumptions and provide empirical evidence to guide mobile operators in their financing decisions for future investments, including those related to 5G. Decisions supported by empirical evidence will ensure informed investments that will stimulate the telecommunications industry and secure the provision of socio-economic benefits to the sub-Saharan Africa population in a sustainable way.
Chapter Three (3): Research Design and Methodology

3.1 Introduction
The study's main objective was to establish the impact of capital structure on financial performance. The telecommunications industry is experiencing declining revenues and will need additional investments to prepare for 5G introduction. Evidence from the mobile operators based in sub-Saharan Africa will provide guidance on how these firms' financing decisions will influence their financial performance. In this chapter the methodology used to achieve this objective is discussed. It outlines the research strategy, the adopted sampling approach, data sources, justifies the selected variables and empirical modelling strategy as well as provide the ethical considerations of the study.

3.2 Research Strategy
The study aimed to examine the impact of capital structure on financial performance. The research strategy utilised accounting variables of Return on Equity (ROE), Return on Assets (ROA), Operating Profit Margin (OM), Short-term Debt to Total Assets ratio (STDtTA), Long-term Debt to Total Assets ratio (LTDtTA) and Total Debt to Total Asset ratio (TDtTA) to investigate the interaction between capital structure and financial performance as shown in Figure 3-1 below:

![Figure 3-1: Research Strategy](Self-constructed)

3.2.1 Research Instrument
The study used publicly available financial reports to extract metrics, which were used to calculate financial performance and capital structure variables in a Microsoft Excel 2016 spreadsheet. This input was formatted and imported into E-Views 9.5 Student Version empirical modelling software.
3.2.2 Target Population
The study examined the impact of capital structure on financial performance for mobile telecommunications operators based in sub-Saharan Africa. Therefore, the population for the study included all mobile telecommunications operators based in sub-Saharan Africa.

3.2.3 Sampling Method
The convenience sampling method was used to ensure access to reliable input as well as correct analysis and interpretation of data based on practical constraints (Mackey & Gass, 2005). The study considered the following limitations:

1. Language – the two main official languages in sub-Saharan Africa are English and French (Corporate Council on Africa, 2011). The researcher is fluent in English and only data available from companies operating in English-speaking sub-Saharan Africa countries were considered.

2. Availability of audited financial statements – only companies with publicly available audited financial statements were considered as this is a reliable and comprehensive source of secondary data (Stangova & Vighova, 2016). While financial reporting scandals may occasionally emerge, the incidents remain relatively few in comparison to the number of companies reporting accurate information. No such incident has been recorded for mobile telecommunications operators based in sub-Saharan Africa within the study-period of interest. Furthermore, using public information also allows for the study to be repeatable.

3. Period of interest – For the study to capture recent and emerging dynamics, only the past ten (10) years from 2007 to 2017 were considered with discretion to select an optimum period of analysis that maximises the sample size.
3.2.4 Sample Size

There are fifty-four (54) countries in Africa and forty-six (46) of these are in the sub-Saharan Africa region (United Nations, 2017). In sub-Saharan Africa, the fourteen (14) countries that use English are Botswana, Ghana, Kenya, Malawi, Namibia, Nigeria, Rwanda, Sierra Leone, South Africa, Swaziland, Tanzania, Uganda, Zambia and Zimbabwe. In these countries, only nine (9) mobile operators are locally listed (ASEA, 2017). Of the nine (9), seven (7) operators are included in the sample as these had sufficient data covering the period of the study. The other two (2) companies were recently listed and did not have enough data. The remaining sixty-one (61) telecommunications operators are either privately owned or listed abroad. These were excluded from the sample except for MTC Namibia, which is not listed but has been publicly publishing its audited financial results. It has stopped making its financial statements public after the Namibian Government bought back shares from Portugal Telecoms (Namibia Sun, 2016).

Applying the sampling framework in Figure 3-2 on the population, resulted in an optimal sample size of eight (8) telecoms companies, which are based in the sub-Saharan Africa region as illustrated in Figure 3-3 below:
Figure 3-3: Application of the Sampling Framework

(Source: Self-constructed)
These eight (8) companies are based in six (6) English-speaking sub-Saharan African countries and are present in at least twenty (20) countries in and outside Africa, due to group operations as shown in Table 3-1 below. They serve a combined customer base of 355.8 million people, which is about twenty eight percent (28%) more than the combined population of Southern Africa Development Community (SADC) countries which currently stands at 277 million people (SADC, 2017). For the purposes of this study, this sample was considered adequate.

**Table 3-1: Companies in the sample**

<table>
<thead>
<tr>
<th>Country Base</th>
<th>Mobile Telecommunications Company</th>
<th>Mobile Subscribers (millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Botswana</td>
<td>BTCL</td>
<td>0.5</td>
</tr>
<tr>
<td>Kenya</td>
<td>Safaricom</td>
<td>27.7</td>
</tr>
<tr>
<td>Malawi</td>
<td>Telekom Networks Malawi (TNM)</td>
<td>3.4</td>
</tr>
<tr>
<td>Namibia</td>
<td>MTC</td>
<td>2.7</td>
</tr>
<tr>
<td>South Africa</td>
<td>MTN Group</td>
<td>240.4</td>
</tr>
<tr>
<td>South Africa</td>
<td>Vodacom Group</td>
<td>66.8</td>
</tr>
<tr>
<td>South Africa</td>
<td>Telkom</td>
<td>4.0</td>
</tr>
<tr>
<td>Zimbabwe</td>
<td>Econet Wireless Zimbabwe</td>
<td>10.3</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td><strong>355.8</strong></td>
</tr>
</tbody>
</table>


**3.2.5 Data Source and Sample Period**

To get the maximum possible sample size, the common period for the available data was between 2010 – 2016. In this period, operators expanded their 2G and 3G networks as well as launched 4G services with LTE. For example, three South African mobile operators (MTN SA, Telkom SA and Vodacom SA) invested a total of R21.7 billion in capital expenditure in the financial year ending in 2017 (MTN, 2017; Telkom, 2017; Vodacom, 2017). Analysis of how these projects were financed provided useful insights on the impact of capital structure decisions on financial performance over the period and a grounded perspective on financing future investments.

The study utilised secondary data from publicly available audited financial statements (BTC, 2010-2016); Econet Zimbabwe, 2010- 2016; MTC Namibia, 2010-2016; MTN, 2010-2016; Safaricom, 2010-2016; Telkom, 2010-2016; TNM, 2010-2016; Vodacom, 2010-2016). These sources were considered legitimate, reliable, comprehensive and
ensure replicability of the study. Data for selected mobile operators over a seven-year (7) period from 2010 to 2016 were selected.

3.3 Research Variables
This section presents and discusses the research variables used in the study.

3.3.1 Accounting Variables vs. Market Variables
From the review of empirical literature, different studies used different variables to measure capital structure and financial performance. Some researchers used market measures based on market information such as EPS, Tobin’s Q and P/E Ratio (Azeez et al., 2015; Akhtar & Mujahid, 2014; Alawwad, 2013); while others have used accounting measures like ROE, ROA and Profit Margin (Obonyo, 2017; Mauwa et al., 2016; Nassar, 2016).

Although market values may capture the latest available information, Alum et al. (2015) argue that it is better to use accounting variables in emerging markets where capital markets are under developed and often face liquidity challenges. This is applicable to sub-Saharan Africa where some stock markets are emerging, and other countries face liquidity constraints. For example, Rwanda has only six (6) companies listed on the stock exchange, while Sierra Leone has only one (1) firm. Econet Wireless operates in Zimbabwe, where the country did not have a local currency and has experienced notable liquidity challenges in the recent past (Moodys, 2016). This made market variables less effective for this study. Similar studies in Africa have used accounting variables including those by Mauwa et al. (2016), Ayako et al. (2015), Kipesha and Mosi (2014) and Fosu (2013).

The application of the sampling framework shown in Fig 3-2 illustrates that there are a limited number of mobile telecommunications companies, which are publicly listed on local stock markets in sub-Saharan Africa. To expand the sample size, the study also considered MTC, a private company which is not listed in Namibia but publishes its audited annual reports due to governance and transparency considerations. There are no market measures available for such companies and only accounting measures can be used.
3.3.2 Dependent Variables: Measures of Financial Performance

Mauwa et al. (2016), Alum et al. (2015), Ayako et al. (2015), Nguyen and Nguyen (2015), Kipesha and Mosi (2014), Javed et al. (2014), Fosu (2013), Iavorski (2013) as well as Salim and Yadav (2002), used ROA, ROE and/or Operating Profit Margin as proxies of financial performance in similar studies. These variables provided an indication of financial performance-based profitability of operations compared to the company’s assets and equity.

As per the reviewed literature, this study used similar dependent variables.

i. **Return on Equity (ROE)**
   This ratio measures financial performance by comparing the company’s profits with the equity investment of shareholders. It provides an indication of how well a company is using shareholders’ money to generate profits. It is calculated as shown below (Graham, 2007):

   \[
   \text{Return on Equity (ROE)} = \left( \frac{\text{Net Income}}{\text{Average Total Equity}} \right) \times 100
   \]

ii. **Return on Assets (ROA)**
   This ratio measures financial performance by comparing the company’s profits with the company’s assets. It provides an indication of how well a company is using its assets to generate profits. It is calculated as shown below (Graham, 2007):

   \[
   \text{Return on Assets (ROA)} = \left( \frac{\text{Net Income}}{\text{Average Total Assets}} \right) \times 100
   \]

iii. **Operating Profit Margin (OM)**
   This ratio measures financial performance by comparing the company’s operating profits with the corresponding revenues. It provides an indication of how efficiently the business is being run. It is calculated as shown below (Graham, 2007):

   \[
   \text{Operating Profit Margin (OM)} = \left( \frac{\text{Operating Profit}}{\text{Revenues}} \right) \times 100
   \]

3.3.3 Independent Variables: Measures of Capital Structure

Capital structure reflects the source of funds used to finance the business’ assets (Damodaran, 2001). This is shown in the balance sheet of a company’s financial
statements. In similar studies, Mauwa et al. (2016), Alum et al. (2015), Ayako et al. (2015), Nguyen & Nguyen (2015), Javed et al. (2014), Kipesha and Mosi (2014), Fosu (2013), Iavorski (2013) as well as Salim and Yadav (2002) used short-term debt to total assets (STDtTA), long-term debt to total assets LTDtTA and/or total debt to total assets ratio (TDtTA) as proxy measures of capital structure. These variables indicate the extent to which companies use a specific type of debt and when incorporated in this study, highlight the resulting impact on financial performance.

This study used the same dependent variables and considered all forms of liabilities to be a variant of debt, since they impose an obligation to the firm.

The variables of capital structure are calculated as follows:

i. **Short-Term Debt to Total Assets (STDtTA)**
   This ratio compares current liabilities to total assets and indicates the extent to which assets are financed by short-term liabilities. It will be calculated as shown below (Graham, 2007):
   \[
   \text{Short-term Debt to Total Assets (STDtTA)} = \frac{\text{Current Liabilities}}{\text{Average Total Assets}}
   \]

ii. **Long-Term Debt to Total Assets (LTDtTA)**
   This ratio compares non-current liabilities to total assets and indicates the extent to which assets are financed by long-term liabilities. It will be calculated as shown below (Graham, 2007):
   \[
   \text{Long-term Debt to Total Assets (LTDtTA)} = \frac{\text{Non-Current Liabilities}}{\text{Average Total Assets}}
   \]

iii. **Total Debt to Total Assets (TDtTA)**
   This ratio compares all liabilities to all assets and indicates the extent to which assets are financed by liabilities. It will be calculated as shown below (Graham, 2007):
   \[
   \text{Total Debt to Total Assets (TDtTA)} = \frac{\text{Total Liabilities}}{\text{Average Total Assets}}
   \]

### 3.3.4 Control Variables

To achieve robust results and get a true reflection of the impact of capital structure on financial performance, the study included control variables which are known to drive financial performance in organisations. Tangibility, size and number of subscribers were considered based on prior research:
i. **Tangibility**

Research has shown that companies with a greater portion of their assets being fixed assets, may use them as collateral and receive better financing terms (Vatavu, 2012, De Jong, Kabir & Nguyen, 2008). The effect is to reduce their overall cost of capital and improve their financial performance. This study considered tangibility as a control variable that is expected to influence financial performance of telecommunications operators. It is calculated as shown below:

\[
\text{Tangibility} = \frac{\text{Fixed Assets}}{\text{Total Assets}}
\]

ii. **Size**

Studies on financial performance have also found that size had a significant impact on financial performance (Mwangi, 2018; Doğan, 2013). Larger companies have stronger and more stable cashflows (De Jong et al., 2008; Vatavu, 2012). This reduced risk of bankruptcy means that they can access capital more cheaply than their smaller competitors. This study used revenue as a proxy for size.

\[
\text{Size} = \log(\text{Revenue})
\]

iii. **Number of Subscribers**

The telecommunications operators provide connectivity and other communication services to user/subscribers \((n)\) on their network. According to the laws of Metcalfe, Reed and Sarnof; the value of communication networks increases non-linearly \((\sim n^2)\), exponentially \((\sim 2^n)\) and linearly \((\sim n)\) respectively (Tongia & Wilson, 2011). Despite the differences in mathematical derivations and extent of influence, the consensus is that the number of subscribers create value. This understanding is primarily driven by the networking effects and is tracked in every mobile operator’s financial reports. In contrast to size, the number of subscribers shows the diversity of the customer base. The two variables were found not to Granger cause each other in the Chinese as well as Indian telecommunications.
sector (Venkatram & Zhu, 2012). As such, the study considered the number of subscribers as a control variable.

\[ \text{Subscribers} = \log(\text{Subscribers}) \]

### 3.3.5 Summary of Previous Studies using Similar Variables

The table below summarises previous studies that have used similar variables.

**Table 3-2: Summary of Previous Studies using Similar Variables**

<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Year of Publication</th>
<th>Country</th>
<th>Financial Performance Variables</th>
<th>Capital Structure Variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>Obonyo</td>
<td>2017</td>
<td>Kenya</td>
<td>ROA, ROE, EPS</td>
<td>Debt Ratio</td>
</tr>
<tr>
<td>Nassar</td>
<td>2016</td>
<td>Turkey</td>
<td>ROA, ROE and EPS</td>
<td>Debt Ratio</td>
</tr>
<tr>
<td>Mauwa et al.</td>
<td>2016</td>
<td>Rwanda</td>
<td>ROA, ROE</td>
<td>TDtTA</td>
</tr>
<tr>
<td>Ayako et al.</td>
<td>2015</td>
<td>Kenya</td>
<td>ROA, ROE</td>
<td>Leverage</td>
</tr>
<tr>
<td>Alum et al.</td>
<td>2015</td>
<td>Malaysia</td>
<td>ROA, ROE, Gross Margin</td>
<td>STDtTA, LTDtTA, TDtTA</td>
</tr>
<tr>
<td>Nguyen</td>
<td>2015</td>
<td>Vietnam</td>
<td>ROA, ROE</td>
<td>STDtTA, LTDtTA, TDtTA</td>
</tr>
<tr>
<td>Javed et al.</td>
<td>2014</td>
<td>Pakistan</td>
<td>ROA, ROE, ROS</td>
<td>TDtTA, TEtTA, LTDtTA</td>
</tr>
<tr>
<td>Kipesha &amp; Mosi</td>
<td>2014</td>
<td>Tanzania</td>
<td>ROE, ROA and operational cost efficiency</td>
<td>STDtTA, LTDtTA, TDtTA</td>
</tr>
<tr>
<td>Fosu</td>
<td>2013</td>
<td>South Africa</td>
<td>ROA</td>
<td>TDtTA</td>
</tr>
<tr>
<td>Iavorskyi</td>
<td>2013</td>
<td>Ukraine</td>
<td>ROA, ROS &amp; Total Factor Productivity</td>
<td>LTDtTA, TDtTA</td>
</tr>
<tr>
<td>Arowoshegbe &amp; Idialu</td>
<td>2013</td>
<td>Nigeria</td>
<td>Operating Profit Margin, Net Profit Margin</td>
<td>Debt Ratio</td>
</tr>
<tr>
<td>Al-Yahyaee et al.</td>
<td>2007</td>
<td>Omani</td>
<td>ROE, ROA, EPS, Operating Profit Margin</td>
<td>Debt Ratio</td>
</tr>
</tbody>
</table>
3.4 Hypotheses
Based on the selected variables and reviewed literature, the following hypotheses were formulated for the study:

\[ H_1: \] There is a negative relationship between capital structure (STD\(t\)TA) and financial performance (ROE).

\[ H_2: \] There is a negative relationship between capital structure (LTD\(t\)TA) and financial performance (ROE).

\[ H_3: \] There is a negative relationship between capital structure (TD\(t\)TA) and financial performance (ROE).

\[ H_4: \] There is a negative relationship between capital structure (STD\(t\)TA) and financial performance (ROA).

\[ H_5: \] There is a negative relationship between capital structure (LTD\(t\)TA) and financial performance (ROA).

\[ H_6: \] There is a negative relationship between capital structure (TD\(t\)TA) and financial performance (ROA).

\[ H_7: \] There is a negative relationship between capital structure (STD\(t\)TA) and financial performance (OM).

\[ H_8: \] There is a negative relationship between capital structure (LTD\(t\)TA) and financial performance (OM).

\[ H_9: \] There is a negative relationship between capital structure (TD\(t\)TA) and financial performance (OM).
3.5 Data Analysis
The analysis of data was done based on descriptive statistics and the output of the panel regression models to develop evidence for the conclusions and recommendations of the study.

3.5.1 Descriptive Analysis
An analysis of the sample’s descriptive statistics of capital structure and financial performance variables provided initial insights and context for interpreting the subsequent multivariate analysis.

3.5.2 Panel Regression Analysis
The data was characterised by both time series (annual firm variables from 2010 to 2016) and cross-section dimensions eight (8) mobile telecommunications companies based in sub-Saharan Africa; that created a balanced panel of data suitable for panel regression (Brooks, 2014). Using panel regression techniques, effects that cannot be observed in pure cross-section and time series can be measured; and the relationship between variables over time can be reliably examined even for smaller samples (Brooks, 2014).


In line with similar studies, this study used panel regression methodology. In addition to financial performance and capital structure variables, size (as measured by revenue and number of subscribers) and tangibility were used as control variables in line with extant literature that has shown their strong influence on financial performance.

The models are specified below:

\[ \text{ROE}_i = \alpha_i + \beta_1 \text{STDiTA}_{it} + \beta_2 \text{LTDiTA}_{it} + \beta_3 \text{Subscribers}_{it} + \beta_4 \text{Size}_{it} + \beta_5 \text{Tangibility}_{it} + \varepsilon_{it} \dots \text{ (i)} \]

\[ \text{ROE}_i = \alpha_i + \beta_1 \text{TDiTA}_{it} + \beta_2 \text{Subscribers}_{it} + \beta_3 \text{Size}_{it} + \beta_4 \text{Tangibility}_{it} + \varepsilon_{it} \dots \text{ (ii)} \]

\[ \text{ROA}_i = \alpha_i + \beta_1 \text{STDiTA}_{it} + \beta_2 \text{LTDiTA}_{it} + \beta_3 \text{Subscribers}_{it} + \beta_4 \text{Size}_{it} + \beta_5 \text{Tangibility}_{it} + \varepsilon_{it} \dots \text{ (iii)} \]
ROA$_{it}$ = $\alpha_i + \beta_1^{*}\text{STD}_{i,t} + \beta_2^{*}\text{Subscribers}_{i,t} + \beta_3^{*}\text{Size}_{i,t} + \beta_4^{*}\text{Tangibility}_{i,t} + \epsilon_{it}$…………………………. (vi)

OM$_{it}$ = $\alpha_i + \beta_1^{*}\text{STD}_{i,t} + \beta_2^{*}\text{LTD}_{i,t} + \beta_3^{*}\text{Subscribers}_{i,t} + \beta_4^{*}\text{Size}_{i,t} + \beta_5^{*}\text{Tangibility}_{i,t} + \epsilon_{it}$…. (v)

OM$_{it}$ = $\alpha_i + \beta_1^{*}\text{TD}_{i,t} + \beta_2^{*}\text{Subscribers}_{i,t} + \beta_3^{*}\text{Size}_{i,t} + \beta_4^{*}\text{Tangibility}_{i,t} + \epsilon_{it}$…………………………. (vi)

where:

ROE is a dependent financial variable representing Return on Equity

ROA is a dependent financial variable representing Return on Assets

OM is a dependent financial variable representing Operating Profit Margin

$\alpha_i$ is the constant intercept term for each company ($i$).

$\beta_i$ is the coefficient of the exploratory variables.

$\epsilon_{it}$ is the error term.

STD$_{i,t}$ is an independent capital structure variable representing Short-Term Debt to Total Assets ratio observed for individual company ($i$) in time ($t$).

LTD$_{i,t}$ is an independent capital structure variable representing Long-Term Debt to Total Assets ratio observed for individual company ($i$) in time ($t$).

TD$_{i,t}$ is an independent capital structure variable representing Total Debt to Total Assets ratio observed for individual company ($i$) in time ($t$).

Subscribers$_{i,t}$ is a control variable representing the number of subscribers served by the individual company ($i$) in time ($t$).

Size$_{i,t}$ is a control variable representing the natural log of the revenue generated by the individual company ($i$) in time ($t$).

Tangibility$_{i,t}$ is a control variable representing the ratio of fixed assets to total assets for the individual company ($i$) in time ($t$).

3.5.3 Modelling Approach

The pooled regression, fixed effects and random effects models were considered for each dependent variable. The selection of the best model was based on results of redundant fixed effects test and the Hausman test (Brooks, 2014).
The redundant effects tests were conducted to detect heterogeneity. If heterogeneity was detected, the Hausman test was done to identify the most appropriate model between the fixed effects regression model and the random effects regression model. Based on these tests, the most appropriate models were selected and used to interpret and discuss the results using a 95% confidence interval as a threshold of significance (Brooks, 2014).

3.6 Reliability and Validity
Validity and reliability are very important in research. While validity ensures what was intended to be measured is measured, reliability considers the consistency of results over time (Joppe, 2000). In this respect, the study used publicly available data from annual reports and can be replicated. Diagnostic testing and a detailed review of literature ensured the most appropriate models were selected and correct inferences made when the results were interpreted. According to Mouton (2001), validity and reliability can be compromised at each stage of the research process, including sampling, data collection and analysis. These risks were considered in the study. The following measures ensured valid and reliable outcomes:

1. The sampling was not biased and aimed to include all mobile operators with valid data over the period of analysis.
2. Independently audited and publicly available annual reports of companies were used in the study. These were a reliable source of data and readily available (Ntim, 2013).
3. Validation checks were done on the data to eliminate capturing and calculating errors and missing values.
4. Diagnostics tests were conducted to objectively select the appropriate regression model to interpret the results. Inferences were examined through relevant theoretical frameworks, available empirical research and within the context of evidence.

3.7 Ethical Considerations
This research was guided by the following ethical considerations as highlighted by Christians (2005):
(i) Informed Consent - the study was based on secondary data from publicly available audited company financial statements, which do not require consent or the respective companies to be informed.

(ii) Deception – the study was quantitative and outlined the formulas of all calculations used. The input data was based on publicly available information to ensure the research was transparent, repeatable, and mitigated the risk of deception so that there were no deliberate misrepresentations of any part of the study.

(iii) Privacy and Confidentiality – the study was based on publicly available secondary data and privacy/confidentiality was therefore not necessary. If additional insight was provided by individuals, their identity, confidentiality and privacy was respected.

(iv) Accuracy – the researcher ensured the integrity of the data used, as well as accuracy of all calculations and empirical modelling was conducted through revisions and triangulation.

At all times, the study ensured no deliberate harm to any person(s), companies or the environment.

3.8 Conclusion
This chapter explained the methodological approach adopted in the study to achieve its purpose. The purpose of the study was to establish the impact of capital structure on financial performance, based on evidence from the mobile telecommunications companies based in countries of the sub-Saharan Africa region. Taking into consideration the availability of publicly available financial reports, language proficiency and a period of analysis that maximise the sample size; eight (8) operators based in six (6) countries and serving 350 million subscribers constituted the sample of analysis for the period 2010 to 2016.

The degree of stock market maturity and liquidity challenges faced by some sub-Saharan countries meant that market variables could not be used. Instead, accounting variables from audited annual financial reports were used. To account for individuality and consistent with previous studies; a panel regression analysis of Return on Equity (ROE), Return on Assets (ROA), Operating Profit Margin (OM), Short-Term Debt to
Total Asset ratio (STDtTA), Long-Term Debt to Total Asset ratio (LTDtTA) and Total Debt to Total Asset ratio (TDtTA) was conducted.

In the next chapter, Chapter Four (4), the empirical analysis is presented together with a detailed discussion of results.
Chapter Four (4): Empirical Analysis, Discussion and Interpretation of Results

4.1 Introduction
This chapter presents the empirical analysis of annual data for mobile telecoms operators in sub-Saharan Africa from 2010 to 2016, to examine the impact of capital structure on financial performance using E-views Software. Accounting variables were used as measures of capital structure (short-term debt to total assets, long-term debt to total assets and total debt to total assets) and financial performance (return on equity, return on assets, operating profit margin).

This chapter has six (6) sections. First, the research data is presented and examined using the graphical method to detect trending patterns in the second (2nd) section. Thereafter, in section three (3) the descriptive statistics are analysed and interpreted. In section four (4), the hypotheses set out in Chapter 3 are recapped before conducting a detailed empirical modelling process based on pooled regression, fixed effects model and random effects model to guide the decision of accepting or rejecting the hypotheses in the fifth (5th) section. The findings are interpreted and discussed alongside their practical implications for mobile operators. Finally, the key points of the chapter are summarised.

4.2 Research Data
The study analyses panel data for eight mobile operators based in sub-Saharan Africa over a seven-year period from 2010 to 2016. It examines the variables outlined in Table 4-1 below and discloses the measurement unit, applied transformation and data source:

<table>
<thead>
<tr>
<th>Variable</th>
<th>Measurement</th>
<th>Transformation</th>
<th>Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Return on Equity (ROE)</td>
<td>percentage (%)</td>
<td>n/a</td>
<td>Company Annual Reports</td>
</tr>
<tr>
<td>Return on Assets (ROA)</td>
<td>percentage (%)</td>
<td>n/a</td>
<td>Company Annual Reports</td>
</tr>
<tr>
<td>Operating Profit Margin (OM)</td>
<td>percentage (%)</td>
<td>n/a</td>
<td>Company Annual Reports</td>
</tr>
<tr>
<td>Short-term Debt to Total Assets (STDtTA)</td>
<td>percentage (%)</td>
<td>n/a</td>
<td>Company Annual Reports</td>
</tr>
<tr>
<td>Long-term Debt to Total Assets (LTDtTA)</td>
<td>percentage (%)</td>
<td>n/a</td>
<td>Company Annual Reports</td>
</tr>
<tr>
<td>Total Debt to Total Assets (TDtTA)</td>
<td>percentage (%)</td>
<td>n/a</td>
<td>Company Annual Reports</td>
</tr>
</tbody>
</table>
The next section provides trend analyses of the individual variables’ time series data.

4.2.1 Trend Analysis of the Research Variables

In this section, time series data for each variable is analysed in terms of trends and patterns.

4.2.1.1 Return on Equity (ROE)

Figure 4-1 below shows the time series graphs for return on equity (ROE) of the eight (8) sample mobile operators based in sub-Saharan Africa from 2010 to 2016.

![Figure 4-1: Return on Equity (ROE)](image)

(Source: Calculated from company annual reports)

The return on equity for companies in the sample, ranges from -47% to 112%. Telkom’s return on equity has been the most volatile over the period, indicative of its turnaround initiative. Econet Zimbabwe reported a declining return on equity over the period, reflecting worsening market conditions in that country. All other operators in
the sample had a stable performance with the Vodacom Group showing a consistently strong performance.

Panel unit root tests using individual Fisher-PP test type, which include the intercept and trend in the test equation, showed a p-value of 0.00. This means that the underlying hypothesis is rejected as the data has a unit root at the 95% confidence interval. Therefore, it is concluded that the return on equity data in the sample is stationary.

4.2.1.2 Return on Assets (ROA)

Figure 4.2 below shows the time series graphs for return on assets (ROA) of the eight (8) sample mobile operators based in sub-Saharan Africa from 2010 to 2016.

![Return on Assets (ROA) Graph]

**Figure 4-2: Return on Assets (ROA)**
*(Source: Calculated from company annual reports)*

The return on assets for companies in the sample, ranges from -24% to 53%. Like return on equity, Telkom reported the most volatile figures over the period, indicative of its turnaround initiative. Using this metric, BTC Botswana showed deteriorating performance while all other operators remained stable.

Panel unit root tests using individual Fisher-PP test type, which include the intercept and trend in the test equation, showed a p-value of 0.00. This means that the underlying hypothesis is rejected as the data has a unit root at the 95% confidence
interval. Therefore, it is concluded that the return on assets data in the sample is stationary.

4.2.1.3 Operating Profit Margin (OM)

Figure 4-3 below shows the time series graphs for operating profit margin (OM) of the eight (8) sample mobile operators based in sub-Saharan Africa from 2010 to 2016.

The operating profit margin for companies in the sample, ranges from -33% to 45%. Similar to the return on equity and return on assets, Telkom reported the most volatile figures over the period, indicative of its turnaround initiative. In 2016, several operators experienced notable operating expense pressure in relation to their revenues, especially BTC Botswana and Econet Zimbabwe.

Panel unit root tests using individual Fisher-PP test type, which include the intercept and trend in the test equation, showed a p-value of 0.03. This means that the underlying hypothesis is rejected as the data has a unit root at the 95% confidence interval. Therefore, it is concluded that the operating profit margin data in the sample is stationary.
4.2.1.4 Short-term Debt to Total Assets ratio (STDtTA)

Figure 4-4 below shows the time series graphs for short-term debt to total assets ratio (STDtTA) of the eight (8) sample mobile operators based in sub-Saharan Africa from 2010 to 2016.

The short-term debt to total assets ratio for companies in the sample, ranges from 10% to 60%. However, by 2016 none of the operators had a short-term debt to total assets ratio above 50%. Except for 2011, TNM Malawi has consistently reported the highest use of short-term debt in relation to total assets. The Malawian Kwacha has been volatile over the period, posing a long-term foreign exchange risk for TNM Malawi and thus, influencing the decision to prefer using more short-term debt. In 2010, 150 Malawian Kwachas could buy 1 US dollar, compared to 724 Kwachas in 2016.

Vodacom’s debt profile changed over the period as short-term debt was reduced and long-term debt increased. For most operators, the short-term debt to total assets ratio did not change significantly.

Panel unit root tests using individual Fisher-PP test type, which include the intercept in the test equation, showed a p-value of 0.00. This means that the underlying
hypothesis is rejected, as the data has a unit root at the 95% confidence interval. Therefore, it is concluded that the short-term debt to total assets (STDTtTA) data in the sample is stationary.

4.2.1.5 Long-term Debt to Total Assets ratio (LTDtTA)

Figure 4-5 below shows the time series graphs for long-term debt to total assets ratio (LTDtTA) of the eight (8) sample mobile operators based in sub-Saharan Africa from 2010 to 2016.

![Figure 4-5: Long-term Debt to Total Assets Ratio (LTDtTA)](Source: Calculated from company annual reports)

It can be observed that Safaricom has been trying to reduce its debt and associated financing costs to boost dividends. Econet Zimbabwe also reduced its use of long-term debt. This contrasts with Vodacom whose long-term debt to total assets rose from 17.3% in 2013 to 38% in 2016. This can be understood within the context of a declining short-term debt to total assets ratio from 45% to 33% over the same period, suggesting a debt restructuring. For MTN, however, this was to support network modernisations.

Panel unit root tests using individual Fisher-PP test type, which includes the intercept and trend in the test equation, showed a p-value of 0.00. This means that the underlying hypothesis is rejected as the data has unit root at the 95% confidence
interval. Therefore, it is concluded that the long-term debt to total assets (LTDtTA) data in the sample is stationary.

4.2.1.6 Total Debt to Total Assets ratio (TDtTA)

Figure 4-6 below shows the time series graphs for total debt to total assets ratio (TDtTA) of the eight (8) sample mobile operators based in sub-Saharan Africa from 2010 to 2016.

![Graph of Total Debt to Total Assets Ratio (TDtTA)](image)

**Figure 4-6: Total Debt to Total Assets Ratio (TDtTA)**

(Source: Calculated from company annual reports)

The total debt to total assets ratio for companies in the sample, ranges from 20% to 70%. BTC Botswana consistently reported the lowest metric whereas Vodacom reported the highest metric most times over the period. Safaricom and Econet Zimbabwe showed a downward trend because their efforts aimed at reducing the cost of debt. In contrast, MTN increased its total debt total assets ratio, driven by increasing long-term debt to support network expansion.

Overall, a stable total debt to total assets ratio was observed. Panel unit root tests using individual Fisher-PP test type, which include the intercept and trend in the test equation, showed a p-value of 0.03. This means that the underlying hypothesis is rejected as the data has unit root at the 95% confidence interval. Therefore, it is concluded that total debt to total assets (TDtTA) data in the sample is stationary.
4.2.1.7 Number of Subscribers

Figure 4-7 below shows the time series graphs for the number of subscribers (Subscribers) of the eight (8) sample mobile operators based in sub-Saharan Africa from 2010 to 2016.

Figure 4-7: Number of Subscribers
(Source: Calculated from company annual reports)

The number of subscribers for companies in the sample, ranges from five hundred thousand to two hundred and forty (40) million. The MTN Group had the largest number of subscribers, followed by Vodacom, as they operate in multiple markets. MTN, Vodacom and Safaricom showed a steady increase in the number of subscribers over the period, benefitting from the network effects of their scale as well as growth in some of their diversified markets. In contrast, smaller operators, especially those operating in single markets, had a stable subscriber base. The level of investment in fixed assets required to build and maintain a telecommunications network suggests that, within limits, companies with a stronger customer base are likely to have better economies of scale than their competitors (De Fontenay, Liebenau & Savin, 2005; Besanko, Dranove & Mark, 2000; Beauvais & Foreman, 1999). Furthermore, unlike revenue (size), the number of subscribers reflect customer diversity and the extent of the ‘network effects’ given that interconnect fees make it more expensive for users to
call across different networks. Products like Vodacom’s Africa Roaming, which offers preferential rates when a Vodacom customer roams on other Vodacom networks in Africa, are extending these benefits to subscribers across country boundaries. Venkatram and Zhu (2012) found that the number of telecommunication subscribers did not Granger cause revenue. This study had similar findings as subscribers did not Granger cause revenue and vice versa (see Table 4-2 below). Thus, both variables are used in this study without the risk of double counting.

Table 4-2: Engel-Granger Causality Test Results for Subscribers and Revenue

<table>
<thead>
<tr>
<th>Null Hypothesis:</th>
<th>F-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOG_SUBS does not Granger Cause LOG_REV</td>
<td>0.44185</td>
<td>0.65</td>
</tr>
<tr>
<td>LOG_REV does not Granger Cause LOG_SUBS</td>
<td>0.92675</td>
<td>0.41</td>
</tr>
</tbody>
</table>

(Source: E-views output)

Given the wide range of subscriber numbers for each mobile operator, this variable was normalised through a logarithmic transformation for empirical modelling purposes.

4.2.1.8 Size

Figure 4-8 below shows the time series graphs for year-on-year revenue growth to reflect how the companies in the sample changed in size over the period between 2010 and 2016.

Figure 4-8: Year-on-Year Revenue Growth

(Source: Calculated from company annual reports)

Between 2010 and 2016, revenue growth showed a steady decline because of increased competition, increased adoption of alternative communication methods (e.g. WhatsApp) and regulatory interventions to make data affordable. Notable exceptions
are Telkom, Safaricom and Telecom Network Malawi who benefitted from subscriber growth. In this study, the logarithm of revenue was used as a size control variable for modelling the impact of capital structure on financial performance.

### 4.2.1.9 Tangibility

Figure 4-9 below shows the time series graphs for tangibility for the eight (8) sample mobile operators based in sub-Saharan Africa from 2010 to 2016.

![Figure 4-9: Tangibility](source: Calculated from company annual reports)

Companies with more tangible assets can securitise their fixed assets at favourable conditions that optimise their cost of capital (De Jong et al., 2008; Vatavu, 2012). Over the period, the tangibility of larger operators such as MTN, Vodacom and Safaricom, remained stable due to a larger asset base. BTC Botswana went through an asset separation exercise to accelerate the privatisation mandate (BTC, 2014). Similarly, the Telkom restructuring exercise saw the company shedding and acquiring some fixed assets between 2012 and 2014 (Telkom, 2013). However, changes in MTC Namibia and TNM Malawi were largely driven by an increase in current assets, particularly cash and cash equivalents. In contrast, the changes in Econet Zimbabwe are a result of a rise in intangible assets based on its software and licenses, possibly related to its successful Ecocash payment system (Econet, 2012).
4.2.2 Descriptive Statistics

Table 4-3 below provides a summary of descriptive statistics, which shows that the dataset was a balanced panel with 56 observations comprising the annual data of eight (8) companies over seven (7) years.

Table 4-3: Descriptive Statistics

<table>
<thead>
<tr>
<th>Variable</th>
<th>Obs</th>
<th>Mean</th>
<th>Median</th>
<th>Max.</th>
<th>Min.</th>
<th>Std. Dev.</th>
<th>Skewness</th>
<th>Kurtosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROE (%)</td>
<td>56</td>
<td>28.48</td>
<td>27.29</td>
<td>111.58</td>
<td>-47.55</td>
<td>0.25</td>
<td>0.39</td>
<td>5.34</td>
</tr>
<tr>
<td>ROA (%)</td>
<td>56</td>
<td>14.05</td>
<td>13.63</td>
<td>52.71</td>
<td>-24.42</td>
<td>0.12</td>
<td>-0.11</td>
<td>5.88</td>
</tr>
<tr>
<td>OM (%)</td>
<td>56</td>
<td>19.42</td>
<td>22.09</td>
<td>44.74</td>
<td>-33.36</td>
<td>0.16</td>
<td>-1.26</td>
<td>5.17</td>
</tr>
<tr>
<td>STDtTA (%)</td>
<td>56</td>
<td>28.05</td>
<td>27.19</td>
<td>59.69</td>
<td>10.84</td>
<td>0.11</td>
<td>0.69</td>
<td>3.11</td>
</tr>
<tr>
<td>LTDtTA (%)</td>
<td>56</td>
<td>17.06</td>
<td>16.05</td>
<td>38.28</td>
<td>0.00</td>
<td>0.09</td>
<td>0.43</td>
<td>2.88</td>
</tr>
<tr>
<td>Subscribers (millions)</td>
<td>56</td>
<td>45.61</td>
<td>46.90</td>
<td>70.75</td>
<td>20.01</td>
<td>0.14</td>
<td>-0.11</td>
<td>2.14</td>
</tr>
<tr>
<td>Tangibility (%)</td>
<td>56</td>
<td>59.96</td>
<td>60.18</td>
<td>84.32</td>
<td>34</td>
<td>0.13</td>
<td>-0.28</td>
<td>2.25</td>
</tr>
<tr>
<td>Size (Revenue)</td>
<td>56</td>
<td>14.73</td>
<td>14.22</td>
<td>20.44</td>
<td>10.39</td>
<td>3.42</td>
<td>0.30</td>
<td>1.69</td>
</tr>
</tbody>
</table>

(Source: E-views output)

ROE had a mean of 28.48% and on average, mobile operators earned a ROE that is above the sub-Saharan Africa inflation of 5.5% in 2016 (World Bank, 2016). However, the value creation capacity needs to be judged against each company’s respective cost of capital. For example, in their 2016 financial results, Econet Zimbabwe reported a weighted cost of capital of 10.6%, while BTCL Botswana and Safaricom Kenya used 13% and 9.25% respectively. This suggests that on average, telecommunication companies could be creating value to their shareholders. However, the reported range over the period was a minimum of -47.55% and a maximum of 111.58%, reflecting that not all operators were financially healthy during this time. Telkom SA had the most volatile ROE as it reported both the maximum and minimum values for the period, reflecting the need and effects of the company’s 3-year turnaround strategy between 2011 and 2013. Vodacom had a consistently strong average ROE of 53.97%, while BTCL had the lowest average of 6.83% over the period.

Both ROA and operating profit margin (OM) were consistent with the findings of ROE. The average ROA was 14.05%, across the range of -24.42% and 52.71%; while the average operating profit margin (OM) was 19.42%, across a -33.36% to 44.74% range.
On average, mobile operators use more short-term debt (28.05%) than long-term debt (17.06%). Given the long-term investment requirements for the sector, the maturity matching hypothesis would imply more use of long-term debt, contrary to the observation of the study. The diverging findings highlight the extremely dynamic context of the mobile operators’ operating environment due to rapid disruptive technological-, competitive-, regulatory- and consumer trends impacting on the sector. Under such circumstances for an uncertain long-term future, it is difficult for companies to commit to long-term obligations. Instead, most managers will prefer to use more short-term debt against clearer short-term forecasts.

Mobile operators seem to maintain a total debt ratio between 20% and 71%. The low standard deviation on variables measuring capital structure indicate that perhaps, mobile operators believe there exists an optimal capital structure range and acknowledge the trade-off theory. Within this range, each company’s capital structure is constrained by its strategic position. Operators that had a stronger financial performance registered a higher total debt to total asset ratio than those with weaker financial performance. For example, the Vodacom Group was more aggressive in its borrowing (TDtTA:70.75% in 2016) in comparison to BTCL, which was conservative (TDtTA: 20.01% in 2016). By looking at the descriptive statistics, it is not clear if the performance was enhanced by capital structure or if it was the better financial performance that informed the managers’ risk appetite, leading to each company’s capital structure levels.

Although the MTN Group had the biggest number of subscribers (240 million across 21 countries), its average ROE (21.41%) over the period is only better than that of Telkom SA and BTC in the research sample; yet worse than that of MTC Namibia’s single market operation (ROE: 37.22%, Subscribers: 2.7 million in 2016). This raises important questions about the role and relationship between subscriber base as well as market diversification and financial performance of mobile operators in sub-Saharan Africa.

On average, 59% of operators’ total assets are fixed assets. However, this ranged from 34% to 84% for individual operators, depending on their market position, value of intangible assets and operating model. To a great extent, the revenues were largely
stable for individual operators and on average grew approximately 6.5% over the period, reflecting the difficulties associated with monetising data growth.

In the next section, the research hypotheses which were formulated in Chapter three (3), are revisited before the regression models are developed to test them.

4.3 Research Hypotheses
Based on the selected variables and reviewed literature, the following hypotheses are therefore formulated for the study and will be tested against the outcome of panel regression analysis:

**H₈:** There is a negative and significant relationship between capital structure (STDtTA) and financial performance (ROE).

**H₉:** There is a negative and significant relationship between capital structure (LTDtTA) and financial performance (ROE).

**H₁₀:** There is a negative and significant relationship between capital structure (TDtTA) and financial performance (ROE).

**H₁₁:** There is a negative and significant relationship between capital structure (STDtTA) and financial performance (ROA).

**H₁₂:** There is a negative and significant relationship between capital structure (LTDtTA) and financial performance (ROA).

**H₁₃:** There is a negative and significant relationship between capital structure (TDtTA) and financial performance (ROA).

**H₁₄:** There is a negative and significant relationship between capital structure (STDtTA) and financial performance (OM).

**H₁₅:** There is a negative and significant relationship between capital structure (LTDtTA) and financial performance (OM).

**H₁₆:** There is a negative and significant relationship between capital structure (TDtTA) and financial performance (OM).

In the next section, separate models for each dependant financial performance variable are developed and the relevant hypothesis tested to determine the impact of
capital structure on financial performance. Similar to comparable studies, the panel regression approach is used.

4.4 Panel Data Analysis
The analysis of panel data considers three separate models for each measure of financial performance, namely return on equity, return on assets and operating profit margin. The independent variables representing capital structure are short-term debt to total assets, long-term debt to total assets and total debt to total assets, in line with similar studies (Alum et al., 2015; Nguyen & Nguyen, 2015; Kipesha & Mosi, 2014). Furthermore, literature suggests size and tangibility to explain financial performance; in this study, both variables are used (Mouton & Smith, 2016; Vatavu, 2012; De Jong et al., 2008). The number of subscribers, reflecting customer diversity and the extent of network effects, which is often tracked to reflect the number of customers served, is also included (GSMA, 2017).

This section outlines the modelling process in detail and considers the models of pooled regression, fixed effects and random effects. While the pooled regression model does not distinguish any differences between the companies in the sample, the fixed effects regression model accounts for the heterogeneity assuming a correlation between company-specific effects and the independent variable (Brooks, 2014). In this model, model parameters are fixed. However, the random effects regression model assumes no correlation between company-specific effects and the independent variable, and model parameters are not fixed (Brooks, 2014). Diagnostic tests are applied to guide the selection of the most appropriate model, which is then used to interpret the results. The redundant fixed effects diagnostic test is performed on the fixed effect model to determine the existence of time and/or cross-sectional effects. The underlying assumption is that there are no period and cross-section effects. The Hausman diagnostic test is performed on the random effect model to compare the random effects model with the fixed effect model. The underlying hypothesis is that the random effects errors are not correlated with the independent variables and the random effects regression model is the preferred model (Brooks, 2014).

4.4.1 Panel Data Analysis – Return on Equity (ROE) Models
In modelling the impact of capital structure on financial performance as measured by return on equity (ROE), short-term debt to total assets (STDtTA), long-term debt to
total assets (LTDtTA), total debt to total assets (TDtTA), the number of subscribers, tangibility and size were used. The proxies of capital structure are separated to formulate two models to avoid double counting. The first model uses short-term debt to total assets as well as long-term debt to total assets, while the other only uses total debt to total assets.

4.4.1.1 Return on Equity Models using STDtTA and LTDtTA

Return on equity was modelled using short-term debt to total assets (STDtTA) and long-term debt to total assets (LTDtTA). The results of the pooled, fixed effects and random effects models are summarised in Table 4-4 below:

Table 4-4: Model results for ROE using STDtTA and LTDtTA

<table>
<thead>
<tr>
<th>Variable</th>
<th>Pooled Regression</th>
<th>Fixed Effects Regression</th>
<th>Random Effects Regression</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coefficient</td>
<td>P-value</td>
<td>Coefficient</td>
</tr>
<tr>
<td>STDtTA</td>
<td>0.6177</td>
<td>0.07***</td>
<td>0.1967</td>
</tr>
<tr>
<td>LTDtTA</td>
<td>0.8659</td>
<td>0.04***</td>
<td>-0.5347</td>
</tr>
<tr>
<td>Tangibility</td>
<td>-0.0738</td>
<td>0.86</td>
<td>0.7096</td>
</tr>
<tr>
<td>Size</td>
<td>0.0211</td>
<td>0.45</td>
<td>0.9836</td>
</tr>
<tr>
<td>Subscribers</td>
<td>-0.0040</td>
<td>0.94</td>
<td>-0.9747</td>
</tr>
<tr>
<td>R-squared</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adj R-squared</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F-Stat</td>
<td>1.97</td>
<td>0.10*</td>
<td>4.54</td>
</tr>
</tbody>
</table>

(Source: E-views output)

*, **, *** significant at confidence interval 90%, 95% and 99% respectively

The pooled regression model explains 8% of financial performance as measured by return on equity (ROE). Short-term debt to total assets (STDtTA) and long-term debt to total assets (LTDtTA) are significant independent variables at the 90% and 95% confidence interval, respectively. All the other variables are insignificant. In this model, the coefficient for long-term debt to total assets (LTDtTA) is positive and indicates that return on equity increases with each type of debt.

The redundant effects diagnostic test was applied on the fixed effects model and the results showed p-values of 0.00 and 0.53 for cross-sectional effects and period effects respectively. Therefore, the hypothesis that there are no cross-sectional effects is rejected. This means that the data only has company specific effects that need to be accounted for. The cross-sectional fixed effects regression model explains 44% of
financial performance as measured by return on equity (ROE). However, the p-values indicate that only size and number of subscribers were significant at the 99% confidence interval. Short-term debt to total assets (STDTTA), long-term debt to total assets (LTDTTA), and tangibility are both insignificant at the 95% confidence interval. In this model, return on equity reduces as long-term debt increases.

The cross-section random effects regression model is too poor to explain financial performance as measured by return on equity (ROE). The p-values indicate that all variables are insignificant at the 95% confidence interval.

Finally, the Hausman diagnostic test results showed a p-value of 0.00 and therefore the hypothesis that the random effects errors are not correlated with the independent variables is rejected. This means that the cross-section fixed effects regression model is the preferred model selected to interpret the impact of capital structure and financial performance as measured by return on equity (ROE).

**4.4.1.2 Return on Equity Models using TDtTA**

Return on equity was modelled using total debt to total assets ratio (TDtTA). The results of the pooled, fixed effects and random effects models are summarised in Table 4-5 below:

<table>
<thead>
<tr>
<th>Variable</th>
<th>Pooled Regression</th>
<th>Fixed Effects Regression</th>
<th>Random Effects Regression</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coefficient</td>
<td>P-value</td>
<td>Coefficient</td>
</tr>
<tr>
<td>c</td>
<td>-0.0832</td>
<td>0.72</td>
<td>-5.2457</td>
</tr>
<tr>
<td>TDtTA</td>
<td>0.6354</td>
<td>0.03**</td>
<td>-0.2801</td>
</tr>
<tr>
<td>Tangibility</td>
<td>-0.1073</td>
<td>0.79</td>
<td>0.5012</td>
</tr>
<tr>
<td>Size</td>
<td>0.0220</td>
<td>0.43</td>
<td>0.9588</td>
</tr>
<tr>
<td>Subscribers</td>
<td>0.0022</td>
<td>0.97</td>
<td>-0.9487</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.14</td>
<td>0.55</td>
<td>0.00</td>
</tr>
<tr>
<td>Adjusted R-squared</td>
<td>0.07</td>
<td>0.44</td>
<td>0.53</td>
</tr>
</tbody>
</table>

(Source: E-views output)

*, **, *** significant at confidence interval 90%, 95% and 99% respectively

The pooled regression model explains 7% of financial performance as measured by return on equity (ROE). However, the p-values indicate that only total debt to total...
assets (TDtTA) is significant at the 95% confidence interval, while all other independent variables are insignificant.

The redundant effects diagnostic test was applied on the fixed effects model and the results showed p-values of 0.00 and 0.58 for cross-sectional effects and period effects respectively. Therefore, the hypothesis that there are no cross-sectional effects is rejected. This means that the data only has company specific effects that need to be accounted for.

The cross-sectional fixed effects regression model explains 44% financial performance as measured by return on equity (ROE). However, the p-values indicate that only size and number of subscribers are significant at the 99% confidence interval. Both total debt to total assets (TDtTA) and tangibility are insignificant.

The cross-section random effects regression model is too poor to explain the relationship between capital structure and financial performance as measured by return on equity (ROE). All independent variables are insignificant at the 95% confidence interval.

Finally, the Hausman diagnostic test results showed a p-value of 0.00 and therefore the hypothesis that the random effects errors are not correlated with the independent variables is rejected. This means that the cross-section fixed effects regression model is the preferred model selected to interpret the impact of capital structure and financial performance as measured by return on equity (ROE).

4.4.1.3 Hypotheses Testing Outcomes for Return on Equity (ROE)

The outcome for the hypotheses tests related to return on equity (ROE) are best described by cross-section fixed effects models in Table 4-4 and Table 4-5 which explains 44% and 44% respectively. The results, at the 95% confidence interval, are summarised as follows:

(i) Short-term debt to total assets ratio has a positive and insignificant impact on financial performance as measured by ROE of mobile operators based in sub-Saharan Africa. The hypothesis $H_1$ states that there is a negative and significant relationship between capital structure (STDtTA) and financial performance (ROE) and is therefore rejected.
(ii) Long-term debt to total assets ratio has a negative and insignificant impact on financial performance as measured by ROE of mobile operators based in sub-Saharan Africa. The hypothesis H$_2$ states that there is a negative and significant relationship between capital structure (LTDtTA) and financial performance (ROE) and is therefore rejected.

(iii) Total debt to total assets ratio (TDtTA) has a negative and insignificant impact on financial performance as measured by ROE of mobile operators based in sub-Saharan Africa. The hypothesis H$_3$ states that there is a negative and significant relationship between capital structure (TDtTA) and financial performance (ROE) and is therefore rejected.

In this section, the hypotheses related to return on equity (ROE) were tested. H$_1$, H$_2$ and H$_3$ were all rejected. Thus, capital structure was found to have an insignificant impact on financial performance as measured by return on equity (ROE) for mobile operators in sub-Saharan Africa.

The next section presents the empirical modelling and tests the hypotheses related to return on assets (ROA).

4.4.2 Panel Data Analysis – Return on Assets (ROA) Models

In modelling the impact of capital structure on financial performance as measured by return on assets (ROA), the same process outlined in the previous section will be applied and all the independent variables are maintained.

4.4.2.1 Return on Assets Models using STDtTA and LTDtTA

The results of the ROA models are presented in table 4-6 below. The Redundancy test showed that there were heterogenous effects only across the cross-sections (p-value of 0.00) and the Hausman test results (p-value of 0.00) indicated the cross-section fixed effects (FE) model was preferred to the random effects (RE) model.
Table 4-6: Model results for ROA using STDtTA and LTDtTA

<table>
<thead>
<tr>
<th>Variable</th>
<th>Pooled Regression</th>
<th>Fixed Effects Regression</th>
<th>Random Effects Regression</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coefficient</td>
<td>P-value</td>
<td>Coefficient</td>
</tr>
<tr>
<td>c</td>
<td>0.0237</td>
<td>0.85</td>
<td>-2.7994</td>
</tr>
<tr>
<td>STDtTA</td>
<td>0.0672</td>
<td>0.69</td>
<td>0.0355</td>
</tr>
<tr>
<td>LTDtTA</td>
<td>0.1450</td>
<td>0.49</td>
<td>-0.4978</td>
</tr>
<tr>
<td>Tangibility</td>
<td>-0.0516</td>
<td>0.80</td>
<td>0.5533</td>
</tr>
<tr>
<td>Size</td>
<td>0.0155</td>
<td>0.27</td>
<td>0.4770</td>
</tr>
<tr>
<td>Subscribers</td>
<td>0.0061</td>
<td>0.83</td>
<td>-0.4502</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.05</td>
<td></td>
<td>0.54</td>
</tr>
<tr>
<td>Adjusted R-Squared</td>
<td>-0.05</td>
<td></td>
<td>0.42</td>
</tr>
<tr>
<td>F-Stat</td>
<td>0.51</td>
<td>0.77</td>
<td>4.27</td>
</tr>
</tbody>
</table>

(Source: E-views output)

*, **, *** significant at confidence interval 90%, 95% and 99% respectively

The cross-section fixed effects regression model explains 42% of financial performance as measured by return on assets (ROA). The p-values indicate that only tangibility and size are significant at the 95% confidence interval. However, long-term debt to total assets (LTDtTA) and tangibility are significant at the 90% confidence interval, while short-term debt to total assets (STDtTA) is insignificant.

4.4.2.2 Return on Assets Models using TDtTA

Return on assets (ROA) was modelled using total debt to total assets ratio (TDtTA) and the results are summarised in Table 4-7 below:

Table 4-7: Model results for ROA using TDtTA

<table>
<thead>
<tr>
<th>Variable</th>
<th>Pooled Regression</th>
<th>Fixed Effects Regression</th>
<th>Random Effects Regression</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coefficient</td>
<td>P-value</td>
<td>Coefficient</td>
</tr>
<tr>
<td>c</td>
<td>0.0446</td>
<td>0.70</td>
<td>-2.4972</td>
</tr>
<tr>
<td>TDtTA</td>
<td>0.0571</td>
<td>0.68</td>
<td>-0.3344</td>
</tr>
<tr>
<td>Tangibility</td>
<td>-0.0538</td>
<td>0.79</td>
<td>0.3968</td>
</tr>
<tr>
<td>Size</td>
<td>0.0148</td>
<td>0.29</td>
<td>0.4534</td>
</tr>
<tr>
<td>Subscribers</td>
<td>0.0093</td>
<td>0.74</td>
<td>-0.4259</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.04</td>
<td></td>
<td>0.52</td>
</tr>
<tr>
<td>Adjusted R-squared</td>
<td>-0.03</td>
<td></td>
<td>0.40</td>
</tr>
<tr>
<td>F-Stat</td>
<td>0.54</td>
<td>0.71</td>
<td>4.36</td>
</tr>
</tbody>
</table>

(Source: E-views output)

*, **, *** significant at confidence interval 90%, 95% and 99% respectively
The Redundancy test showed that there were heterogenous effects only across the cross-sections (p-value of 0.00) and the Hausman test results (p-value of 0.00) indicated the cross-section fixed effects (FE) model was preferred to the random effects (RE) model.

The cross-section fixed effects regression model explains 40% of financial performance as measured by return on assets (ROA). However, the p-values indicate that size and the number of subscribers are the only significant independent variables at the 95% confidence interval, while all others are insignificant.

### 4.4.2.3 Hypotheses Testing Outcomes for Return on Assets (ROA)

The outcome for hypotheses tests related to return on assets (ROA) are best described by cross-section fixed effects models in Table 4-6 and Table 4-7 which explains 42% and 40% of financial performance respectively. The results, at the 95% confidence interval, are summarised as follows:

(i) Short-term debt to total assets ratio (STDtTA) has a positive and insignificant impact on financial performance as measured by return on assets (ROA) of mobile operators based in sub-Saharan Africa. The hypothesis H₄ states that there is a negative and significant relationship between capital structure (STDtTA) and financial performance (ROA) and is therefore rejected.

(ii) Long-term debt to total assets ratio (LTDtTA) has a negative and insignificant impact on financial performance as measured by return on assets (ROA) of mobile operators based in sub-Saharan Africa. The hypothesis H₅ states that there is a negative and significant relationship between capital structure (LTDtTA) and financial performance (ROA) and is therefore rejected.

(iii) Total debt to total assets ratio (TDtTA) has a negative and insignificant impact on financial performance as measured by return on assets (ROA) of mobile operators based in sub-Saharan Africa. The hypothesis H₆ states that there is a negative and significant relationship between capital structure (TDtTA) and financial performance (ROA) and is therefore rejected.

In this section, the hypotheses related to return on assets (ROA) were tested. H₄, H₅ and H₆ were all rejected. Thus, capital structure was found to have an insignificant
impact on financial performance as measured by return on assets (ROA) for mobile operators in sub-Saharan Africa.

The next section presents the empirical modelling and tests the hypotheses related to operating profit margin (OM).

**4.4.3 Panel Data Analysis – Operating Profit Margin (OM) Models**

In modelling the impact of capital structure on financial performance as measured by operating profit margin (OM), the same process previously outlined in section 4.4.1 will be applied and all the independent variables are maintained.

**4.4.3.1 Operating Profit Margin Models using STDtTA and LTDtTA**

The results are presented in table 4-8 below. The Redundancy test showed that there were heterogenous effects only across the cross-sections (p-value of 0.00) and the Hausman test results (p-value of 0.00) indicated the cross-section fixed effects (FE) model was preferred to the random effects (RE) model.

**Table 4-8: Model results for OM using STDtTA and LTDtTA**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Pooled Regression</th>
<th>Fixed Effects Regression</th>
<th>Random Effects Regression</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coefficient</td>
<td>P-value</td>
<td>Coefficient</td>
</tr>
<tr>
<td>c</td>
<td>-0.4896</td>
<td>0.00***</td>
<td>-2.9636</td>
</tr>
<tr>
<td>STDtTA</td>
<td>0.0879</td>
<td>0.61</td>
<td>-0.1376</td>
</tr>
<tr>
<td>LTDtTA</td>
<td>0.4873</td>
<td>0.03**</td>
<td>-0.7467</td>
</tr>
<tr>
<td>Tangibility</td>
<td>0.5364</td>
<td>0.01***</td>
<td>0.9884</td>
</tr>
<tr>
<td>Size</td>
<td>0.0266</td>
<td>0.08*</td>
<td>0.4695</td>
</tr>
<tr>
<td>Subscribers</td>
<td>0.1030</td>
<td>0.00***</td>
<td>-0.3327</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.44</td>
<td></td>
<td>0.70</td>
</tr>
<tr>
<td>Adjusted R-squared</td>
<td>0.38</td>
<td></td>
<td>0.62</td>
</tr>
<tr>
<td>F-Stat</td>
<td>7.86</td>
<td>0.00***</td>
<td>8.33</td>
</tr>
</tbody>
</table>

(Source: E-views output)

*, **, *** significant at confidence interval 90%, 95% and 99% respectively

The cross-section fixed effects regression model explains 62% of financial performance as measured by operating profit margin (OM). Long-term debt to total assets ratio (LTDtTA) is significant at 95% confidence interval and short-term debt to total assets (STDtTA) is insignificant. However; tangibility, number of subscribers and size are all significant at the 99% confidence interval. In this model, operating profit margin (OM) deteriorates with rising long-term debt.
4.4.3.2 Operating Profit Margin Models using TDtTA

Operating profit margin (OM) was modelled using total debt to total assets ratio (TDtTA) and the results are summarised in Table 4-9 below:

Table 4-9: Model results for OM using TDtTA

<table>
<thead>
<tr>
<th>Variable</th>
<th>Pooled Regression</th>
<th>Fixed Effects Regression</th>
<th>Random Effects Regression</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coefficient</td>
<td>P-value</td>
<td>Coefficient</td>
</tr>
<tr>
<td>c</td>
<td>-0.4266</td>
<td>0.00***</td>
<td>-2.5123</td>
</tr>
<tr>
<td>TDtTA</td>
<td>0.2045</td>
<td>0.17</td>
<td>-0.6763</td>
</tr>
<tr>
<td>Tangibility</td>
<td>0.4843</td>
<td>0.03**</td>
<td>0.7927</td>
</tr>
<tr>
<td>Size</td>
<td>0.0240</td>
<td>0.11</td>
<td>0.4356</td>
</tr>
<tr>
<td>Subscribers</td>
<td>0.1020</td>
<td>0.00***</td>
<td>-0.3019</td>
</tr>
</tbody>
</table>

R-squared | 0.41 | 0.69 | 0.16 |
Adjusted R-squared | 0.36 | 0.62 | 0.09 |
F-Stat     | 8.68 | 0.00*** | 9.03 | 0.00*** | 2.43 | 0.06* |

(Source: E-views output)

*, **, *** significant at confidence interval 90%, 95% and 99% respectively

The Redundancy test showed that there were heterogenous effects only across the cross-sections (p-value of 0.00) and the Hausman test results (p-value of 0.00) indicated the cross-section fixed effects (FE) model was preferred to the random effects (RE) model.

The cross-section fixed effects regression model explains 62% of financial performance as measured by operating profit margin (OM). The p-values indicate that total debt to total assets ratio (TDtTA), tangibility and number of subscribers are significant at the 95% confidence interval, while the size is significant at 99%. In this model, total debt to total assets (TDtTA) is negatively related to operating profit margin (OM) and a 1% rise in total debt to total asset ratio (TDtTA) induces a 0.7% decline in operating profit margin (OM).

4.4.3.3 Hypotheses Testing Outcomes for Operating Profit Margin (OM)

The outcome for hypotheses tests related to operating profit margin (OM) are best described by cross-section fixed effects models in Table 4-8 and Table 4-9. Both models explain 62% of operating profit margin. The results, at the 95% confidence interval, are summarised as follows:
(i) Short-term debt to total assets ratio (STDtTA) has a negative and insignificant impact on financial performance as measured by operating profit margin (OM) of mobile operators based in sub-Saharan Africa. The hypothesis $H_7$ states that there is a negative and significant relationship between capital structure (STDtTA) and financial performance (OM) and is therefore rejected.

(ii) Long-term debt to total assets ratio (LTDtTA) has a negative and significant impact on financial performance as measured by operating profit margin (OM) of mobile operators based in sub-Saharan Africa. The hypothesis $H_8$ states that there is a negative and significant relationship between capital structure (LTDtTA) and financial performance (OM) and is therefore not rejected.

(iii) Total debt to total assets ratio (TDtTA) has a negative and significant impact on financial performance as measured by operating profit margin (OM) of mobile operators based in sub-Saharan Africa. The hypothesis $H_9$ states that there is a negative and significant relationship between capital structure (TDtTA) and financial performance (OM) and is therefore not rejected.

In this section, the hypotheses related to operating profit margin (OM) were as follows: $H_7$ was rejected, while $H_8$ and $H_9$ are not rejected. Thus, capital structure was found to have a mixed impact on financial performance as measured by operating profit margin (OM) for mobile operators in sub-Saharan Africa.

In the next section, the findings are discussed within the context of literature and mobile operators in sub-Saharan Africa.

4.4 Synopsis and Discussion of Results
The panel regression analysis in the previous section modelled the impact of capital structure on financial performance and table 4-10 below summarises the results.
## Table 4-10: Summary of Hypotheses Test Results

<table>
<thead>
<tr>
<th>Hypotheses</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>H₁: There is a negative and significant relationship between capital</td>
<td>Reject</td>
</tr>
<tr>
<td>structure (STDtTA) and financial performance (ROE).</td>
<td></td>
</tr>
<tr>
<td>H₂: There is a negative and significant relationship between capital</td>
<td>Reject</td>
</tr>
<tr>
<td>structure (LTDtTA) and financial performance (ROE).</td>
<td></td>
</tr>
<tr>
<td>H₃: There is a negative and significant relationship between capital</td>
<td>Reject</td>
</tr>
<tr>
<td>structure (TDtTA) and financial performance (ROE).</td>
<td></td>
</tr>
<tr>
<td>H₄: There is a negative and significant relationship between capital</td>
<td>Reject</td>
</tr>
<tr>
<td>structure (STDtTA) and financial performance (ROA).</td>
<td></td>
</tr>
<tr>
<td>H₅: There is a negative and significant relationship between capital</td>
<td>Reject</td>
</tr>
<tr>
<td>structure (LTDtTA) and financial performance (ROA).</td>
<td></td>
</tr>
<tr>
<td>H₆: There is a negative and significant relationship between capital</td>
<td>Reject</td>
</tr>
<tr>
<td>structure (TDtTA) and financial performance (ROA).</td>
<td></td>
</tr>
<tr>
<td>H₇: There is a negative and significant relationship between capital</td>
<td>Reject</td>
</tr>
<tr>
<td>structure (STDtTA) and financial performance (OM).</td>
<td></td>
</tr>
<tr>
<td>H₈: There is a negative and significant relationship between capital</td>
<td>Not rejected</td>
</tr>
<tr>
<td>structure (LTDtTA) and financial performance (OM).</td>
<td></td>
</tr>
<tr>
<td>H₉: There is a negative and significant relationship between capital</td>
<td>Not rejected</td>
</tr>
<tr>
<td>structure (TDtTA) and financial performance (OM).</td>
<td></td>
</tr>
</tbody>
</table>

(Source: Self-constructed)

In this section, these results are discussed in detail and recommendations formulated to guide the financing decisions of future investments for mobile operators in sub-Saharan Africa.

Overall, the evidence shows that capital structure has a mixed impact depending on the proxy of financial performance. Capital structure had an insignificant impact when financial performance was measured by return on equity (ROE) and return on assets (ROA). This is consistent with findings of Obonyo (2017), Azeez et al. (2015) as well as Anojan and Velnampy (2014) among others. However, the study also found that capital structure as measured by long-term debt to total assets ratio (LTDtTA) and total debt to total assets ratio had a significant negative impact on operating profit margin (OM). These findings are consistent with those reported by Arowoshegbe and Idialu (2013), Al-Yahyaee et al. (2007) and Eriotis et al. (2002). In addition, size (revenue) and number of subscribers were significant at the 95% confidence interval across all models in a positive and negative way respectively. This is consistent with extant literature which argues that size matters and the network effects from subscribers have their limits (Beauvais & Foreman, 1999). According to Herrán, Reitenspiess and
Tortosa (2012), competition intensity and improved saturation in the telecoms industry is making it more expensive to acquire new subscribers profitably. They warn that excessive subsidies for devices and dealer commissions which are used to pursue new subscribers may have a negative impact on profitability.

The results from the panel regression analysis provide four (4) important findings for mobile operators in sub-Saharan Africa:

(i) Capital Structure has a mixed impact depending on the proxy for financial performance.
(ii) The number of subscribers has a negative and significant impact on financial performance.
(iii) Size has a positive and significant impact on financial performance.
(iv) Tangibility has a mixed impact depending on the proxy of financial performance.

4.5 Conclusion
This chapter presented the empirical analysis of the study and discussed the results in detail. The descriptive statistics showed that mobile operators in sub-Saharan Africa use more short-term debt than long-term debt to finance their assets. The panel regression analysis showed that capital structure had mixed impact on financial performance depending on the proxy for financial performance. Short-term debt to total assets (STDtTA), long-term debt to total asset ratios (LTDtTA) and total debt to total assets ratios (TDtTA) had an insignificant impact on return on equity (ROE) and return on assets (ROA). However, long-term debt to total assets ratio (LTDtTA) and total debt to total assets ratio (TDtTA) had a negative and significant impact on operating profit margin (OM). Both size (revenue) and number of subscribers were significant across all models and their impact on financial performance was positive and negative, respectively.

These findings are consistent with those of Ahsan et al. (2014), Javed et al. (2014), Kipesha and Moshi (2014), Alawwad (2013), Tiaani (2013), Tianyu (2013) and Weill (2008) who found mixed results depending on the proxy variable used.

The final chapter concludes and summarises the findings and recommendations.
Chapter Five (5): Conclusion

5.1 Introduction
The study examined the impact of capital structure on financial performance of mobile operators based in sub-Saharan Africa. Chapter one (1) provided the background of the telecommunications industry and outlined the context of the research question. It highlighted the importance of the sector in sub-Saharan Africa and how it has contributed to economic and social development, including those related to the United Nations Sustainable Development Goals. As the industry continues to evolve and bring new capabilities, investment is required. Future investments, especially those related to 5G, are expected to be significant. Companies must decide how they will fund these requirements considering that their revenue growth and profitability is constrained. As such, operators need empirical evidence to guide them in designing their capital structure in a manner that does not compromise financial performance.

Chapter two (2) discussed the relevant fundamental theory and extant empirical literature on capital structure and financial performance. It argues that the main objective of a firm is to create value as measured by financial performance and this ought to guide its decisions, including those related to capital structure. Fundamental theories offer diverging views whereupon firms are encouraged to use more debt, less debt, compromise between the two or time their actions to exploit market opportunities (Majluf & Myers, 1984; Myers 1984; Ross, 1977; Jensen & Meckling, 1976; Miller & Modigliani, 1963). Similarly, empirical evidence is inconsistent and reported mixed, positive, and negative as well as insignificant impact of capital structure on financial performance. Most of these studies primarily focused on the financial and construction sectors, as well as entire stock markets. It was noted that such studies have not focussed much of their attention on the telecommunication industry, hence the need for this research in sub-Saharan Africa to complement existing literature.

Chapter three (3) outlined and justified the research methodology. Firstly, the sampling approach was presented, which resulted in a sample of eight (8) companies based in English speaking sub-Saharan African countries. Accounting variables were used to overcome the limitations of market variables in emerging markets (liquidity and underdeveloped capital markets). Data from publicly available audited financial
statements over a seven-year period from 2010 to 2016 provided reliable input for panel regression analysis to test the presented hypotheses.

Chapter four (4) explained the panel regression analysis and derived models that address the hypotheses. The findings are summarised and discussed in section 5.4 below.

This final chapter has seven (7) sections, including the introduction. In the next section, the reviewed literature is summarised. This is followed by the presentation of results from the developed regression models and makes conclusions. The importance of these findings is discussed in section 5.5 before highlighting the study’s limitations and making recommendations for further research.

5.2 Synopsis of the Literature Review
Theories from fundamental literature offer broad and diverging insight on how capital structure impacts on financial performance. Miller and Modigliani (1958) suggested the source of funds are irrelevant to value creation. They later considered tax and argued that debt brings tax benefits, thus companies ought to use more debt to enhance their financial performance (Miller & Modigliani, 1963). In support of using more debt, Jensen and Meckling (1976) argued that debt created obligations, which encouraged managers to be more disciplined to deliver better financial performance. However, Myers (1984) highlighted that it was prudent to consider both the positive and negative effects of debt. In as much as debt can provide tax benefits and encourage managers to be more disciplined, it creates a burden for the firm and removes its financial flexibility in a way that may negatively impact financial performance. Practice has since shown that some managers neither consider these fundamental costs and benefits of debt. Instead, they have a predetermined preference to use retained earnings, debt and then equity to meet their financial needs. Ross (1977) also posited that managers are closer to the business and use capital structure decisions to signal their views to the market.

Unfortunately, empirical studies have not provided consistent evidence as different studies have found that capital structure has a negative, positive, insignificant or mixed impact on financial performance (Obonyo, 2017; Chimara & Ogbonnaya, 2016; Nassar, 2016; Akanni & Isola, 2015; Akeem et al., 2014; Kipesha & Mosi, 2014; Alawwad, 2013; Fosu, 2013; Taani, 2013; Ebaid, 2009).
The lack of agreement in literature means that the existing body of knowledge does not offer instructive guidance to mobile operators in sub-Saharan Africa who are confronted with key financing decisions to fund their next wave of investments. This research sought to address this gap in the literature. The next section summarises the results from the empirical models which were developed by the study.

5.3 Results from the Models
The descriptive statistics showed that mobile operators in sub-Saharan Africa use more short-term debt rather than long-term debt to finance their assets. Cross-section fixed models were preferred and explained between 40% and 62% of the financial performance. Short-term debt to total assets (STDTA), long-term debt to total asset ratios (LTDtTA) and total debt to total asset ratios (TDtTA) had an insignificant impact on return on equity (ROE) and return on assets (ROA) in line with findings of Anojan and Velnampy (2014), Azeez et al. (2015) as well as Obonyo (2017) among others. However, long-term debt to total assets ratio (LTDtTA) and total debt to total assets ratio (TDtTA) had a negative and significant impact on operating profit margins (OM). These findings are consistent with those reported by Arowoshegbe and Idialu (2013), Al-Yahyae et al. (2007) as well as Eriotis et al. (2002). While size had a positive impact on financial performance, the number of subscribers had a negative one. Tangibility had a positive or an insignificant impact when different proxies for financial performance were used. This is consistent with extant literature which argues that size matters and the network effects from subscribers have their limits (Beauvais & Foreman, 1999).

These findings provide evidence to formulate important conclusions about the impact of capital structure on financial performance of sub-Saharan Africa’s telecommunications industry.

5.4 Conclusion
From the findings, it can be concluded that:

(i) Capital Structure has mixed impact depending on the proxy for financial performance;
(ii) Mobile operators use more short-term debt than long-term debt to finance their assets;
(iii) The number of subscribers has a negative and significant impact on financial performance;
(iv) Size has a positive and significant impact on financial performance; and
(v) Tangibility has a mixed impact on financial performance.

These conclusions have important implications for telecommunications operators in sub-Saharan Africa.

5.5 The Importance of the Study

The conclusions presented in the previous section (section 5.4) have five (5) important implications for mobile operators, governments and policy makers in sub-Saharan Africa:

i. Capital Structure has mixed impact on financial performance

Overall, the study reveals that capital structure has a mixed impact on financial performance. On one hand, capital structure did not influence return on equity and return on assets. These findings support the view that the main source of value creation is developing a sustainable competitive advantage, undertaking profitable projects and executing them well (Brealey et al., 2012; Porter, 1985). Financial engineering initiatives do not create value by themselves but are necessary optimisation tools required to support core value creating activities. On the other hand, long-term debt to total assets ratio (LTDtTA) and total debt to total assets ratio had a significant negative impact only on operating profit margin (OM). A 1% rise in long-term debt to total assets ratio and total debt to total assets ratio induces a 0.8 and 0.9 decline on operating profit margin respectively; indicating that the benefits of debt are not able to offset the accompanying costs for mobile operators in sub-Saharan Africa. This suggests that managers of companies with more long-term debt and total debt, who are afraid to slip into bankruptcy, may be too cautious to pursue opportunities that have the potential of enhancing their operating profit margin to the extent that their financial performance can start to deteriorate. Some of this debt may also have covenants attached to them, constraining management flexibility even further. Although short-term debt to total assets ratio had a positive relationship with financial performance, this relationship was not significant and therefore fails to provide strong evidence for the agency costs theory (Jensen & Meckling, 1976).

The implications of this finding for mobile operators in sub-Saharan Africa are that they should focus on other factors that drive performance, while avoiding long-term debt and remaining disciplined in ensuring that the total debt position does not overburden the organisation. This will assist to avoid the deterioration of their operating profit margin and provide them with sufficient flexibility on their capital structure. This is required to respond to changes in the competitive landscape and/or pursue strategic initiatives such as acquisitions, network modernisation or bid for new spectrum.

ii. **Operators use more short-term debt than long-term debt to finance their assets**

The study found that mobile operators in sub-Saharan Africa use more short-term debt than long-term debt and they should continue to do so. This is supported by the evidence that long-term debt had a negative and significant impact on the operating profit margin. Managers in the telecoms industry seem to be aware of the multifaceted risks which confront the sector and their market environments. Consequently, they are reluctant to make long-term commitments and prefer to use more short-term debt than long-term debt, in contrast with the maturity matching hypothesis.

In addition to the competitive pressures that are fuelled by new entrants such as Rain in South Africa and Viettel in Burundi, Cameroon, Mozambique and Tanzania; the policy and political uncertainty in some African markets makes it difficult for operators to commit to long-term obligations (Ligodi & Mwarabu, 2017; Shapshak, 2016, Miyungu, 2014). For example, in June 2018, the regulatory authority in Zimbabwe (POTRAZ) reduced the average out-of-bundle data tariffs by 60% (Razemba, 2018). When similar action on interconnect fees was taken by ICASA in South Africa, Vodacom’s revenues declined by R2 billion as a direct result (Vodacom, 2015). The South African telecoms industry has had to deal with eight (8) ministers in eight (8) years. Politically, the
Democratic Republic of Congo was waiting to conduct its 2016 elections and Zimbabwe had a sudden change of government following the resignation of that country’s president amid mounting threats of impeachment (Kumbuka, Latham & Marawanyika, 2018; Ligodi & Mwarabu, 2017).

As operators in sub-Saharan Africa prepare for 5G investments, governments and policy makers must play their role in creating policy stability and market environments that are conducive for players to take a longer-term view. However, any long-term borrowing should be done in a responsible way that accounts for the sector’s dynamics, including consideration of its stage in the industry life cycle. To achieve this effectively, a strong understanding of underlying drivers, which shape trends in industry, is important. External consultants with extensive experience of advanced markets provide valuable insights to guide executive decisions.

iii. **The number of subscribers has negative impact on financial performance**

The number of subscribers was used as a control variable to capture the influence of network effects on financial performance. However, there is no evidence to support that this currently holds for mobile operators in sub-Saharan Africa. In contrast, the financial performance of the sub-Saharan Africa’s telecommunications industry, deteriorated with an increasing number of subscribers between 2010 and 2016. This finding is consistent with the view that there are limits to economies of scale and network effects (Beauvais & Foreman, 1999). Although new subscribers can bring new revenues, they can be costlier to reach and acquire in markets where growth is driven by coverage extension in outlying areas or churn in mature markets. Additional subscribers also bring additional capacity requirements, which may negatively affect the experience of customers in congested networks and/or trigger capacity upgrades that require additional investment. Traditional metrics of number of subscribers and average revenue per user (ARPU) are useful; but when considered in isolation, do not provide a complete representation of profitability as they neglect the accompanying marginal costs. Instead, mobile operators ought to equally focus on the average profit per subscriber (APPU). This can be measured based on free cash flows, net profit or operating profit to provide
useful insights on the contribution of each subscriber. For example, in the year ending 2018, both the Telkom Group and Vodacom Group reported growth in revenue and subscribers, but the operating profit of the Telkom Group declined while that of the Vodacom Group rose (Telkom, 2018; Vodacom, 2018). Subscribers are not all equal and it is the profit that one extracts from each subscriber that creates value (Damodaran, 2018). In July 2018, Rain South Africa stopped adding new Fixed-LTE subscribers but continued attracting new mobile subscribers to optimally manage the available network capacity (McKane, 2018). Such smart strategies recognise that it matters which subscriber you add and when. Operators are encouraged to develop a profitability mindset, exercise discipline, offer more value-added services and focussed propositions that maximise the spread at the margin (marginal revenue less marginal cost) to unlock value. Vodacom’s ‘segmented proposition’ strategy enabled it to grow the Group’s customer base (+10.5%) and revenue at a declining ARPU (-3.8%) but raised its profit per user metrics (Vodacom, 2018:20). Average Operating Profit Per User, Average Net Profit per User and Average Free Cash Flows per User rose by 1%, 7.3% and 12.7% respectively. Looking ahead to 5G, such micro-segmentation should be supported and inform how networks need to be rolled out. Operators also need to re-examine their pricing strategy, particularly the flat-rate pricing model where a user can use as much as they wish at a flat fee. The challenge with such a pricing model is that it attracts subscribers, which provides an initial revenue growth but caps future growth. This will not scale up in line with the capital expenditure necessary to maintain an acceptable quality of service. In the end, profitability is at risk. For this reason, mobile operators in South Korea are considering abandoning the flat fee models when they introduce 5G (Waring, 2018). However, not all operators in all markets will have insufficient pricing power to make such adjustments and they should find alternative ways of monetising their subscriber base towards other industries who are willing to pay for it, while evolving themselves to become platform businesses. In similar fashion, Facebook and LinkedIn, among others, have grown their earnings without collecting money from their subscribers. Furthermore, not all markets create value. MTN has operations in twenty-two (22) countries but the study notes that this has hardly given it a financial performance advantage. Over the
period of analysis, its average ROE was lower than the Vodacom Group and MTC Namibia who operate in five (5) countries and one (1) country respectively (MTC Namibia, 2016; Vodacom, 2016). When stretched too far, geographic diversification spreads management attention and exposes the operator to various risks, including those related to governance like the $5.2 billion fine in Nigeria (BBC, 2015). Therefore, companies operating in many countries must constantly reassess the value of each operation in the group and take the necessary steps to optimise their footprint in a way that maximises their value creation. In this respect, the decision by MTN to review the value of its presence in each market is prudent (Prinsloo, 2018). This should be an on-going exercise for all diversified telecommunications groups.

iv. **Size has a positive and significant impact on financial performance**

The study used size (revenues) as an additional control variable in line with extant empirical literature. It found that size had a positive and significant impact on financial performance. This may seem to contradict the findings that subscribers have a negative impact on financial performance since it is the subscribers who bring in the revenue. To understand this apparent dichotomy, it is important to acknowledge that revenue is driven by two main types of subscribers; an existing subscriber and a new subscriber. As such, revenue growth does not necessarily imply subscriber growth. As discussed earlier, an existing subscriber does not incur acquisition costs and tends to be more profitable. Therefore, operators are advised to primarily drive revenue growth from their existing subscribers rather than new subscribers, while adopting strategies discussed in the previous finding (iii) to ensure growth in both average revenue per user and average profit per user. New subscribers are important as they eventually become future existing subscribers, but their pursuit must be selective and the company should consider their potential value over their lifetime. This new mindset is key: although historical growth has automatically resulted in improved financial performance, the increasing competitive landscape should raise caution to management, who must distinguish between growth for the sake of growth and profitable growth, with the aim to pursue the latter.
v. **Tangibility has a mixed impact on financial performance**

The study used tangibility as an additional control variable and found that it either had a positive or an insignificant impact on financial performance, depending on the variables used. Some studies have shown that tangibility enables companies to access cheaper debt based on their wide range of collateral assets (Himmelberg, Hubbard & Palia, 1999). However, Deloof (2003) as well as Nucci, Pozzolo and Schivardi (2005) argued that companies with more intangible assets tend to be more innovative and flexible compared to their counterparts with more fixed assets. Telecommunications seem to represent both these views considering the scale of fixed assets that mobile operators require to operate and how their performance has suffered at the hands of alternative competitors like WhatsApp. Such competitors have more intangible assets and are more innovative. Mobile telecommunications require spectrum, tower masts, base stations, core network elements and the transmission network. This finding suggests that they do not need to own all their assets since these may not always be used efficiently.

The implications for operators in sub-Saharan Africa are that managers need to exercise discipline and wisdom to determine which fixed assets to own and which to share or lease. While operators should strive to own those assets that are critical in driving business performance, under-utilised assets lead to a poor return on these. Such assets should be considered for sharing with competitors and partners and vice versa. Network Sharing (passive and active) can potentially reduce capex by 40%. At the end of 2017, only ten (10) operators were sharing their networks in Africa compared to forty (40) shared networks in Europe (Grijpink, Ménard, Sigurdsson & Vucevic, 2018). Operators in South Korea announced plans to share their 5G networks and save 1 trillion won (~US$890million) over ten (10) years (Tomas, 2018). New business models based on ‘x-as-a-service’, network slicing and wholesale networks can also help operators use their assets more efficiently. The findings therefore, suggest that it can be more beneficial to be the provider of these shared services than to be the consumer. The speed and timing of the investment of strategic fixed assets is of critical importance. Wholesale networks are likely to benefit the wholesale network provider more than other players in the sector. Such
initiatives need a more detailed analysis before being adopted as policy. Policy makers have an important role to play in creating an environment that supports such initiatives, while ensuring that healthy competition and industry performance is enhanced. Furthermore, operators must acknowledge that in a digital industry, there are multiple ways of gaining the competitive advantage that extend beyond the accumulation of fixed assets. Thus, operators are encouraged to enhance innovation and deliberately build intangible assets alongside their fixed asset base.

5.6 Limitations

study made use of accounting variables to examine the impact of capital structure on financial performance. Consideration was given to eight (8) telecommunication companies with financial statements available to the public from 2010 to 2016. These companies are based in English speaking sub-Saharan Africa.

The approach adopted for this research presents certain limitations. Firstly, Damodaran (2001) argued that market variables should provide more recent information of both capital structure and financial performance. All things being equal, using variables such as market value of debt, market value of equity, earnings per share and P/E ratio could provide more robust findings. However, the liquidity challenges and underdeveloped capital markets in emerging markets undermine the reliability of market variables (Alum et al. (2015). Furthermore, this might reduce the sample size and compromise the statistical representativeness of the study.

Secondly, the study focused on English speaking sub-Saharan Africa to provide depth in analysis of financial statements that go beyond just figures and numbers. The sample size could have increased if companies based in non-English speaking sub-Saharan Africa countries were included. This could be done using translators or collaborators, both which were not possible given the study is an individual research project which needed to be completed in a specified timeframe in accordance with the programme’s regulations.

Thirdly, the study used information available to the public and excludes companies with privately audited financial statements. Including these would have increased the sample size and period of analysis. However, with such an approach, the requisite access to information would need appropriate clearance and strategies to mitigate the
risk of using unreliable information. Furthermore, it would be difficult to repeat such a study as access to private information will be limited.

5.7 Possible Future Improvements/Studies
As discussed in the previous section (section 5.6), future studies could address the limitations of this study by using market variables, including non-English speaking sub-Saharan countries in the sample and increasing the period of analysis. While this could improve the research outcomes, new limitations that such approaches will introduce such as those highlighted in section 5.6 need to be considered.

In addition, the findings of this study have raised further questions that deserve further exploration, both quantitatively and/or qualitatively.

Further research is recommended to consider the following:

1. Impact of capital structure on financial performance of telecommunication companies in sub-Saharan Africa using a bigger sample size that includes French speaking markets and private companies.
2. Impact of capital structure on financial performance of telecommunication companies in sub-Saharan Africa using market variables.
3. A similar study using a different proxy for value other than financial performance.
4. Impact of geographic diversification on financial performance of telecommunication companies based in sub-Saharan Africa.
5. Qualitative investigation on impact of capital structure on financial performance.
References


