https://dspace.org/

Essays on firm finance, performance and growth: the case of selected African countries

Nyanchama, Arisa Linet

2019
https://hdl.handle.net/10539/29686

Downloaded from a DSpace repository. https://dspace.org/

ESSAYS ON FIRM FINANCE, PERFORMANCE AND GROWTH: THE CASE OF SELECTED AFRICAN COUNTRIES

Arisa Linet Nyanchama

Student Number: 911263

Supervisor: Prof. Tendai Gwatidzo

PhD Thesis for Degree of Doctor of Philosophy in Economics in the

School of Economic and Business Sciences

University of the Witwatersrand

Contents

List of Figures v

CHAPTER ONE 1

Introduction 1

1.1 Background to the study 1

1.2 Research Problem 3

1.3 Research questions 5

1.4 Objectives of the study 6

1.5 Results and benefits of the study 6

1.6 Limitations of the study 8

1.7 Organization of the study 9

CHAPTER TWO 10

FINANCIAL CONSTRAINTS AND GROWTH 10

2.1 Introduction 10

2.2 Financial Constraints 13

2.3 Research Questions 14

2.4 Objectives of the study 14

2.5 Scope of the Study 15

2.6 Justification of the study 15

2.7 Literature review 16

2.7.1 Theoretical literature 16

2.7.2 Definition of financial constraints 16

2.7.3 Theories explaining the existence of financial constraints 17

2.7.4. Measuring financial constraints 21

2.7.5 Measuring financial constraints using firm level self-evaluation data 28

2.8 Empirical Literature 32
2.9 Data and Methodology 36
2.9.1 Data sources and definition of variables 36
2.9.2 Definition of variables 36
2.9.3 The Matching Technique 38
2.9.4 Data Sources and descriptive statistics 41
2.10 Regression Results 47
2.10.1 Covariate Balance 47
2.11 Matching estimation results 55
2.12 Sensitivity analysis for hidden bias 63
2.13 Robustness checks 65
2.14 Conclusion 68
Appendix 69
CHAPTER THREE 70
FORMAL VERSUS INFORMAL FINANCE: EVIDENCE FROM SELECTED AFRICAN FIRMS 70
3.0 Introduction 70
3.1 Research Questions 73
3.2 Study Objectives 73
3.3 Scope of the study 73
3.4 Justification of the study 74
3.5 Literature Review 75
3.5.1 Theoretical Literature 75
3.5.2 Empirical Literature 79
3.6 Data and Methodology 85
3.6.1 Data sources and definition of variables 85

3.6.2 Definition of variables 86
3.6.3 Methodology 87
3.6.4 Summary statistics 91
3.7 Regression Results 99
3.7.1 Relative distribution results 99
3.8 Recentered Influence Function (RIF) Results 110
3.9 Robustness checks 121
3.10 Conclusion and Policy Recommendations 123
CHAPTER FOUR 131
CHOICE BETWEEN DEBT AND EQUITY FINANCING: DOES IT MATTER FOR GROWTH? 131
4.0 Introduction 131
4.1 Research Questions 133
4.2 Objectives of the study 133
4.3 Scope of the Study 134
4.4 Justification of the study 134
4.5 Literature review 135
4.5.1 Theoretical literature 135
4.5.2 Empirical Literature 139
4.6 Data and Methodology 143
4.6.1 Data sources and definition of variables 144
4.6.2 Definition of variables 144
4.6.3 Methodology 145
4.6.4 Summary Statistics 148
4.7 Regression Results 153
4.8 Robustness checks 163

4.8 Conclusion 164

CHAPTER FIVE 166

CONCLUSION AND POLICY RECOMMENDATIONS 166

5.0 Introduction 166

5.1 Financial constraints 167

5.2 Financing choice decisions 168

5.3 Corporate financing decisions in Africa 170

5.4 Policy Recommendations 171

5.5 Further Research Areas 172

Bibliography 174

List of Figures

Figure 1.1: Perceived obstacles by firms 123

Figure 1.2: Extent of financial constraints in a sample of 11 African countries 134

Figure 3.7.1: Relative density function, with sales growth outcome and formal1 categorization of firms 101

Figure 3.7.2: Relative density function, with labor productivity outcome and F*ormal1* categorization of firms 103

Figure 3.7.3: Relative density function, with sales growth outcome and formal2 categorization of firms 106

Figure 3.7.4: Relative density function with the Allen et al. (2005) s*elffinancing/bank dummy* categorization variable 108

Figure 3.8.1: Graphical display of the Unconditional Quantile partial effects 116

List of Tables

Table 1.1: Summary of the financial constraint measures 313

Table 2.2: Description of key variables 37

Table 2.4: Number of firms by size 425

Table 2.5: Descriptive statistics by country 457

Table 2.6: Financially constrained firms across different African countries..... 468

Table 2.7: Pairwise correlation between variables at 5% significance level.....48

Table 2.10.1: Covariate balance at the baseline between constrained and unconstrained firms in the unmatched sample 50

Table 2.10.2: Comparison of mean differences between constrained and unconstrained firms in the matched sample.....51

Table 2.10.3: Logistic regression results for calculating the propensity score (First measure of financial Constraints).....54

Table 2.10.4: Logistic regression results for calculating the propensity score (Second measure of financial Constraints).....55

Table 2.10.5: Logistic regression results for calculating the propensity score (Third measure of financial Constraints).....56

Table 2.11.1 Regression results for the first measure of financial constraints, (Sales growth dependent variable).....60

Table 2.11.2 Regression results for the first measure of financial constraints, (Labor productivity dependent variable).....61

Table2.11.3 Regression results for the second measure of financial constraints, (Sales growth dependent variable).....62

Table2.11.4 Regression results for the second measure of financial constraints, (Labor productivity dependent variable).....63

Table 2.11.5 Regression results for the third measure of financial constraints, (Sales growth dependent variable).....64

Table 2.11.6 Regression results for the third measure of financial constraints, (Labor productivity dependent variable).....65

Table 2.12.1: Sensitivity analysis test results.....66

Table 2.13.1: Pairwise comparison effects for Not financially constrained vs Financially constrained (Sales growth Outcome).....68

Table 2.13.2: Pairwise comparison effects for Not financially constrained vs financially constrained (Labor productivity outcome).....69

Table A1: Matched sample that falls in the common support across 11 countries……71

Table 3.1: Description of key variables 879

Table 3.2: Financing patterns across African Countries (% of firms using each financing source on Working Capital)……94

Table 3.3: Financing patterns across African Countries (% of firms using each financing source on new investment)……..95

Table 3.4: Descriptive statistics by country……96

Table 3.5: Percentage of firms using formal/informal finance on both working capital and investment (using our categorization variables)……98

Table 3.6: Correlation between performance measures and financing variables……100

Table 3.8.1: RIF regression estimates (Formal1 measure of formal versus informal finance)…….113

Table 3.8.2: RIF regression estimates (Formal2 measure of formal versus informal finance)…….114

Table3.8.3: RIF regression estimates (bank dummy/self-financing measure of formal versus informal finance)……..115

Table 3.8.4: Estimates of the effect of other firm characteristics on firm performance (using formal1 measure of formal/informal financing source)……119

Table 3.9.1: Propensity score matching results 1223

Table A3.1: RIF regression estimates for other firm characteristics using *formal2* categorization model ……126

Table A3.2: RIF regression estimates for other firm characteristics using *the Bank dummy* categorization model……129

Table 4..6.1 Description of key variables……..……146

Table 4.6.2: Financing sources across 13 African countries……..150

Table 4.6.3: Financing source by firm size……151

Table 4.6.4: Descriptive statistics by country……151

Table4.7.1 RIF regression estimates (Use of debt versus equity in financing new investment with sales growth as the outcome variable)……..155

Table 4.7.2 RIF regression estimates (Use of debt versus equity in investment with labor productivity as the outcome variable)……..157

Table 4.7.3 RIF regression estimates (Use of debt versus equity in working capital, with sales growth as the outcome variable)……..……..…159

Table 4.7.4 RIF regression estimates (Use of debt versus equity in working capital, with labor productivity as the outcome variable)……..……161

Table 4.8.1: Propensity Score Matching results 1644

CHAPTER ONE

Introduction

1.1 Background to the study

Evidence has proven that financial development is central to economic growth and development (Levine, 1997). However, for financial development to have the desired impact, it has to be channeled to the right sector. Economists have however not resolved the theoretical underpinnings about the right distributional channels through which finance can impact on growth. For instance it has been documented that if finance is channeled towards growth of business enterprises, it will impact positively on growth of the economy. This is because it is believed that firms are important avenues for jobs and employment creation both in developed, emerging and developing economies (World Bank, 2017).

Finance has been documented as the most important resource in firm growth, since it helps firms in expanding their operations, innovation of new ideas, investment opportunities and even new staff (Allen, Carletti, Cull, Qian, & Senbet, 2010). However, most firms that have growth potential experience difficulties in financing their businesses. This is more common in developing countries, in which African countries are the most hit due to their underdeveloped financial systems (Allen et al., 2012; Beck, Demirgu, & Honohan, 2009). This makes the firm financing gap more severe in African developing countries, thus the need to analyze the influence of this on firm growth and performance, and the likely interventions that may be needed.

With the advancement in technology and financial sector reforms, African countries are now more connected to the outside world, thus experiencing growth in the recent past, despite the challenges that they face in terms of low capitalization and liquidity (World Bank, 2017). Sub-Saharan Africa for instance, is the second fastest growing region in the world after Asia (World Bank, 2017). This has been as a result of a good macroeconomic management, increased investment and more favorable commodity prices (World Bank, 2017). Despite this growth, Africa as a region is subjected to a number of challenges, such as: emerging markets slowdown, fluctuations in commodity prices, limited export base, climatic changes, internal conflicts and political instability. Most of these challenges stem from the implementation of wrong economic policies that result

into economic setbacks (Allen et al., 2010). This in the long run may impact in derailing the growth and development process.

The growth rates in Africa however need to be sustainable and predictable. This calls for measures that can place the African continent in competitive thresholds at the global market environment. Concentration needs to be placed in sectors that can create more jobs through modern innovation and those that involve the young population so as to actively participate in the development process. One of such sectors is business enterprising. Business enterprises/firms can promote innovation and create jobs especially to the young generation that is energetic enough to steer the economy's growth process.

Despite this fact, firms especially in the developing countries face a number of obstacles, some of which include, corruption, competition, crime, property rights, high electricity and water bill, bureaucratic business registration processes, political instability, lack law enforcement, inadequate financing among other obstacles. Of all these obstacles, finance has been documented as the major obstacle especially in Africa where the financial systems are underdeveloped. The African financial system is dominated by informal finance due to information asymmetry. This makes firm financing in the African setting a little complicated.

Formal institutions tend to finance larger firms and neglect smaller firms due to lack of financial history, and unbuilt relationships with the financial institutions (Beck, Demirguc-kunt, Laeven, & Levine, 2008). Financing as an obstacle therefore may not be the same to larger firms as in small firms. In addition, contract enforcements cannot be guaranteed in Africa due to unstable legal systems (Demirguc-Kunt & Maksimovic, 1998). This makes credit from financial and nonfinancial institutions hard to come by, and highly rationed.

This study seeks to analyze firm financing in African countries. We examine the extent to which these firma are financially constrained and its impact on firm growth. We also assess the use of formal and informal finance by firms, and analyze the mode of financing that is more growth enhancing. We also try to examine the extent of the use of debt financing as compared to equity financing, across African firms. African firms form a unique sample since African firm financing is also unique. Unlike the developed countries where most firma are listed, African firms are not

listed due to the underdeveloped financial system and other obstacles. In this case, African firms are much dependent on retained earnings and informal financing sources. In this context, the question arises on whether informal financing sources and retained earnings are more growth enhancing than equity financing and formal sources. If not, what can be done to enable the African firms grow competitively, in order to effectively participate in the global market environment.

This study contributes to this debate by analyzing African firms, their financing sources and the extant of growth via each financing source. Despite the fact that African firms can be similar to those in developed and emerging countries, they provide us with independent samples to enable us test the applicability of some theories. This will help in developing theories that are applicable to African context. The dissertation dwells on three related issues that have a bearing on firm financing and growth. We investigate the extent to which African firms re financially constrained and its impact on firm growth. We also analyze the use of different sources of finance by firms and investigate the form of financing that is more growth enhancing. We specifically analyze the use of formal versus informal financing, and debt versus equity financing. We give this study a micro outlook by using rich micro data and micro-econometric techniques, to analyze these cross cutting issues.

1.2 Research Problem

Africa has been among the fastest growing regions for the past decade, prompting researchers and analysts to argue that it has attained its turning point in the growth and development history (UNCTAD, 2014). The continent however continues to face economic challenges fueled by global trends and specific risks like disease and fall in oil, gas, metals, and mineral prices. For instance, Africa's growth rate fell from 4.5 percent in 2014 to 3.0 percent in 2015, reflecting that the growth rates experienced in the past are possibly unsustainable (World Bank, 2014). Just like in other developing countries, Africa has undergone financial sector reforms for a couple of decades. However, some studies have found that the finance-growth nexus does not hold in Africa like in other developing countries (See for example Allen et al., 2010).

Since the beginning of the new millennium, the international community in collaboration with African governments has adopted initiatives aimed at addressing these economic and development challenges. Among the major initiatives adopted are the millennium development goals (MDGs)

in which reducing by half the proportion of people living in poverty by 2015, was a major goal. Despite the previous MDG initiatives, the continent is still grappling with the problem of extreme poverty and unemployment among other development challenges. In the wake of a new set of Sustainable Development Goals (SDGs), aiming to end poverty and hunger by 2030, the continent is still vulnerable to shocks which increase uncertainty in the cost of doing business. These high costs of doing business have hampered productivity and growth (World Bank, 2017). There is therefore need for policy makers to put proper strategies in place, and capitalize on growth opportunities in Africa to ensure that the SDGs are attained as anticipated.

One of the channels through which these goals can be attained is by the promotion of private sector development and entrepreneurship. The key factor that is critical for private sector development is the access to finance. Access to finance both to individuals and firms is important because it spurs the development of a productive private sector. It will also enable firms to easily take up investment opportunities as they arise. The private sector creates employment opportunities (Haltiwanger, Jarmin, & Miranda, 2013), and increases tax contributions for public investment thus promoting growth and development. It also facilitates firm growth especially small and medium enterprises (Beck, Demirguc-Kunt, & Maksimovic, 2005), facilitates new business creation as well as start-ups and growth of existing firms (Klapper, Laeven, & Rajan, 2006).

Despite the evidenced importance of firms, accessing finance for operations and investment remains elusive especially in Africa, with quite a number relying on informal sources (Klapper & Singer, 2015). This could be due to information asymmetries, too much collateral requirements by banks and underdeveloped bond markets, poor institutions, among other obstacles. For instance, in Sub-Saharan Africa, 58% of small enterprises, 41% medium enterprises and 29% of the large enterprises are credit constrained (World Bank, 2014). As a result 42% of these firms finance their working capital using informal sources like money lenders, family and friends, among others. There is therefore need to investigate the extent of these financial constraints among firms and their dependence on informal and non-bank financial sources. It is also important to investigate the impact of such constraints on firm performance and growth.

Previous research has reported access to finance to be a major obstacle to firm growth (See for example Chavis, Klapper, & Love, 2010; Oliveira & Fortunato, 2006). However, most of these

studies have tended to be macro in nature, and even those using survey data have mostly focused on small and medium enterprises, thus ignoring the larger firms (See for example Calderón & Liu, 2003; Carpenter & Petersen, 2002; Kar, Nazlioğlu, & Ağir, 2011; Majid & Mahrizal, 2007). In addition, most studies in this area have employed time series data and methodologies, since they use aggregate data from financial statements. This data is however not rich across most of the African countries. As a result of this, this study is in handy to fill these gaps since it uses survey data and micro econometric techniques.

The study seeks to investigate the link between firm financing and growth in terms of labor productivity and sales growth. We shall use the World Bank's Enterprise Survey data to establish the extent to which African firms are financially constrained, assess the segment of the firms excluded from formal financing sources, and those depending on debt and equity financing sources, and investigate those financing sources that are more growth enhancing. This study will add and bring new evidence to the existing literature on firm financial constraints, firm financing sources and growth.

1.3 Research questions

This study seeks to answer the following three questions:

1. Are African firms financially constrained? If this is the case, what is the extent of the problem, and how does this impact on firm growth?

2. What determines the choice between formal and informal finance among African firms? Which form of finance is most preferred and/or more growth enhancing among African firms?

3. Between debt and equity financing, which financing source is most preferable among African firms? And which form of financing is more growth enhancing than the other?

1.4 Objectives of the study

Against this background, this thesis is a collection of three separate essays addressing a common theme. It focuses on finance and growth at firm level across African countries. The study seeks to achieve the following specific objectives:

4. Analyze the extent to which African firms are financially constrained, and investigate the impact of financial constraints on firm growth. The aim here is to assess whether African firms are financially constrained, and if this is the case, analyze the extent of the problem. Using various firm characteristics, we analyze the impact of these financial constraints on firm performance and growth.

5. Assess the use of formal versus informal finance by firms and how these financing patterns affect firm performance and growth. Here, we want to figure out what determines the choice between formal and informal finance, which form of finance is most preferred by African firms and finally analyze the form of finance that is more growth enhancing.

6. Analyze the extent of the use debt versus equity sources of finance by firms, and examine the impacts of each financing source on firm growth. We would like to investigate the extent to which African firms rely on either debt or equity financing. Which financing source is most preferable among African firms, and which form of financing is more growth enhancing than the other.

1.5 Results and benefits of the study

This research broadly explains how African firms are financially constrained. It helps to explain the role of informal vis-vis formal financing in the growth and performance of firms. It also helps in understanding how African firms make their capital structure decisions, specifically on the use of debt versus equity, in their operational and investment decisions. More importantly, given the fact that most African firms are not listed in the securities exchange, retained earnings and informal finance form the greatest part of their source of financing. This makes African firms unique in their own respect. This research will help policy makers to put their strategies right when financing firms, in order to reduce financial constraints. It will help in informing policy on measures to impose on the right segment of firms, considering the specific country where the policy is being implemented. This is due to the fact that different countries face different financial challenges and therefore need to be given separate policy interventions.

Extending the financial constraints debate to the micro level and specifically to Africa is important. The debate on firm financing has concentrated more around the developed and Asian countries,

mostly using time series data. In Africa, stock markets are underdeveloped, meaning firms raise most of their capital from informal sources and private debt from banks and other financial and non-financial institutions. For example, in the developing African countries in our study, firms are more likely to use equity and informal financing than debt and formal financing. Results from the World Bank Enterprise Survey conducted between 2013 and 2016, reveals that 56% of firms used internal sources in form of retained earnings to finance new investment, 11% came from banks, and the rest from trade credit and other informal finance sources. The research finds formal and debt financing to be more growth enhancing than informal and equity financing. The growth differential is however different at different levels of labor productivity and sales growth outcome distributions.

Given that the problem of information asymmetry in Africa is more severe, most firms turn to informal financing sources as a last resort. These sources sometimes can be too costly and limited, thus curtailing the growth and performance of firms. There is therefore need for policy makers to better understand how to deal with the information asymmetry problem, in order to increase credit uptake by firms, which will give firms a professional outlook in terms of close monitoring and to be result oriented. There is also need for perception change so that formal financial sources like banks can be viewed positively by firms. This will increase reliance on formal financing sources, since the study reveals that formal sources are more growth enhancing than informal sources. This research therefore aims at informing policy makers on the importance of formal financing sources in form of debt, especially from banks and other financial intermediaries. Right strategies need to be put in place to promote the use of such finances in both new investment and working capital. This will be very crucial for the growth of African firms and can impact on the efficiency due to the close monitoring by banks and other financial institutions.

1.6 Limitations of the study

Chapter two of this research looks at the effect of financial constraints on firm performance and growth. If more recent data was available for all African countries, it would be more interesting to look at more/all African countries. For example South Africa was dropped because there was no recent survey for the period under study. The country if included could be having more listed firms since it is more developed than most African countries. The chapter also uses cross sectional data

from the World Bank Enterprise Survey. If data permits, it would be more interesting to use experimental or panel data in order to take care of the effect of unobservable factors and other growth dynamics and to better infer a causal link between finance and growth.

Chapter three looks at the choice between formal and informal finance by African firms. The research also uses the World Bank Enterprise survey data. The chapter was limited to cross sectional data which implies that we could not take into considerations the possibility of firms changing from using one form of financing into another form of financing over time. It would therefore be more interesting to use panel data in order to capture these dynamics. The inclusion of more countries will also be crucial if data availability permits.

Chapter four of this research looks at the choice between debt and equity financing among African firms. The data used did not have information on the issue of dividends by African firms. With this information in place, one can effectively study and analyze the capital structure theories and if they apply in the African context. The data was also limiting since there was no information on the cost of capital. It can be very interesting to use such information to analyze elaborately the capital structure for African firms. Just as other chapters, the study would be more interesting if all African countries were included in the study. We were however limited since some countries did not have a survey within the period under study. The research will also be more informative if panel data is available or even experimental. Similar studies can however be done on time series data from annual reports in African firms, and take care of the listed firms. The research results are however not compromised by the use of the survey data used, since more robust checks have been carried out using micro-econometric techniques.

1.7 Organization of the study

This thesis is made up of five chapters. The first chapter comprises of the introduction and background of the study, the research problem, specific study objectives and the overall study results. This chapter is followed by three independent chapter essays on firm financing and growth. The last chapter concludes and gives policy recommendations for the research.

In chapter two, we look at financial constraints and firm performance. Using the World Bank Enterprise Survey data set, we investigate the extent of financial constraints in 11 African

countries, and assess the impact of these constraints on performance and growth. We employ different matching techniques and find a significant and strong positive effect of firm financing on labor productivity and sales growth. We however recognize the diverse relationship across the various countries especially on sales growth. We also find that firm financing impacts on firm growth and labor productivity differently, depending on whether the firm is in the lower, middle or higher level of labor productivity and sales growth distributions. Despite the fact that all firms benefit from financing, the effect is more significant and felt on the highly productive firms.

Chapter three looks at formal versus informal financing among African firms. Using the World Bank Enterprise Survey dataset for 13 African countries, we employ the Relative Distribution methods by Handcock and Morris (1998) and Recentered Influence Function techniques by Firpo, Fortin and Lemieux (2009), to evaluate whether there exists a growth differential among firms that source their working capital through formal finance relative to those using informal financing sources, and investigate which financing source is more growth enhancing. The study finds formal financing sources to be more growth enhancing than informal financing. The growth differential is however different at different levels of labor productivity and sales growth outcome distributions.

Chapter four looks at the choice between equity and debt finance. Here we also use the World Bank Enterprise Survey dataset for 13 African countries, and employ the Recentered Influence Function techniques by Firpo et al. (2009), to evaluate whether there exists a growth differential among firms that source their working capital and investment through debt finance relative to those using equity financing sources. We also investigate which financing source is more growth enhancing among the two sources. The study found that the use of debt to finance investment lowers firm performance and growth, while the use of debt in working capital raises firm growth and performance. This result was evident in all countries except Nigeria and Namibia whose results portrayed a decline in growth for firms using debt financing in both working capital and investment financing. The growth differential is also different at different levels of labor productivity and sales growth outcome distributions. Chapter five concludes with policy recommendations and cites potential areas for further research.

CHAPTER TWO

FINANCIAL CONSTRAINTS AND GROWTH

2.1 Introduction

Research on the finance growth nexus can be traced back to the time of Schumpeter, and has been growing since then (Kar, Nazlioğlu, & Ağir, 2011; King & Levine, 1993; Levine, 1997; Levine, 2005; Levine & Zervos, 1998; Patrick, 1966). Most studies found that financial development accelerates economic growth (King & Levine, 1993; Levine, 1997; Levine, 2005; Levine & Zervos, 1998), with some finding the relationship questionable (Chandavarkar, 1992; Lucas, 1988; Singh & Weisse, 1998; Stern, 1989; Stiglitz, 1993). The other debate has been on the channel through which finance drives growth (Rajan & Zingales, 1998). Most of these studies have however tended to be macro in nature, with some concentrating on the direction of causality

(Calderón & Liu, 2003; Kar et al., 2011; Majid & Mahrizal, 2007). To the best of our knowledge, not many studies seek to use micro data with micro-econometric approaches to investigate the link between finance and growth, especially via the firm financing channel. This study fills this gap by using firm level survey data that permits the use of micro-econometric techniques, to infer causality between finance and growth via the firm financing channel.

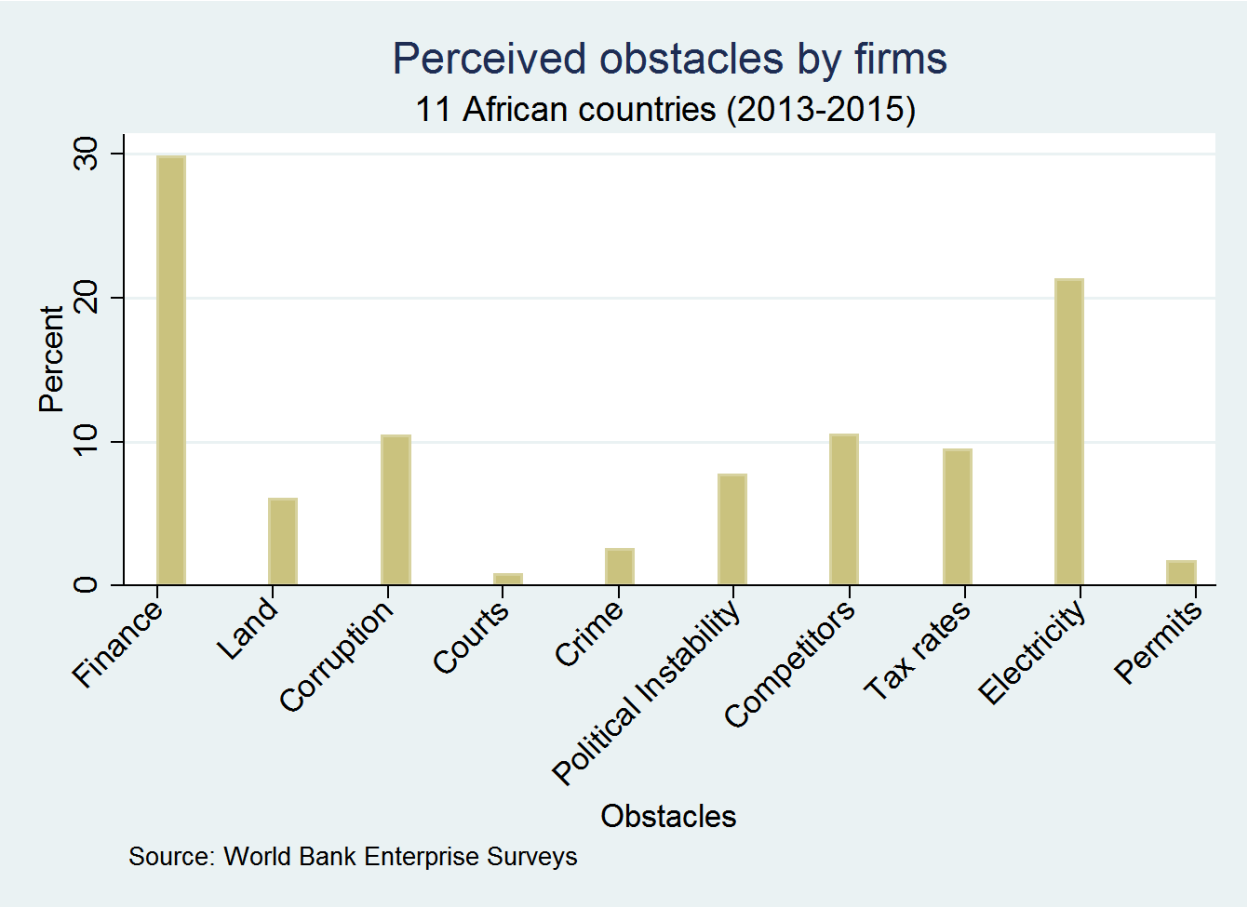
Financing sustainable enterprises forms one of the channels through which finance can impact on growth. It has always been argued that financial intermediaries promote technological innovation by financing entrepreneurs with viable investment projects. This is achieved by financial intermediaries monitoring managers and projects after channeling funds to them. This also eases information asymmetry (King & Levine, 1993; Levine, 1997), making it easier and cheaper to finance viable enterprises, thus promoting growth. Financing firms also eases financial constraints and raises investment in profitable ventures (Levine, 1997).

This indirectly implies that financing firms promotes faster economic growth through more investment, since it eases financial constraints. This is because firms play an important role in the economy, serving as agents of change by their entrepreneurial activities, being the source of innovative activities, stimulating industrial evolution and creating new jobs (X. Huang, Zhang, Liu, & Hu, 1997). Firms also play an important role in job creation and poverty reduction (Aga, Francis, & Meza, 2015; Ayyagari, Beck, & Demirguc-Kunt, 2007; Ayyagari, Demirgüç-kunt, & Maksimovic, 2011; Haltiwanger, Jarmin, & Miranda, 2013; Haltiwanger, Scarpetta, & Schweiger, 2014; Kuntchev, Ramalho, Rodriguez-Meza, & Yang, 2014). Firms also contribute taxes to the economy and generate export earnings.

Despite the important role that they play, firms face obstacles to their growth. These obstacles include: level of technology, trade regulations, corruption, tax rates, labor regulations, financial constraints, underdeveloped financial markets, insecurity and crime, poor infrastructure, poor governance and law enforcement, economic and political instability among others (Ayyagari, Demirgüç-Kunt, & Maksimovic, 2008; Kuntchev, Ramalho, Rodriguez-Meza, & Yang, 2014). However, even though firms report all these obstacles to growth, not all are binding. Researchers have found finance to be the most binding obstacle to firm growth (Ayyagari et al., 2008; Carpenter & Petersen, 2002; Chavis, Klapper, & Love, 2010; Winker, 1999). The World Bank enterprise

survey data also shows that on average, finance is a binding obstacle. For instance in a sample of 11 African countries, 36% of firms perceived finance to be their biggest obstacle, compared to 3% and 2% of firms reporting crime and law enforcement to be major obstacles respectively (see Figure 1.1)

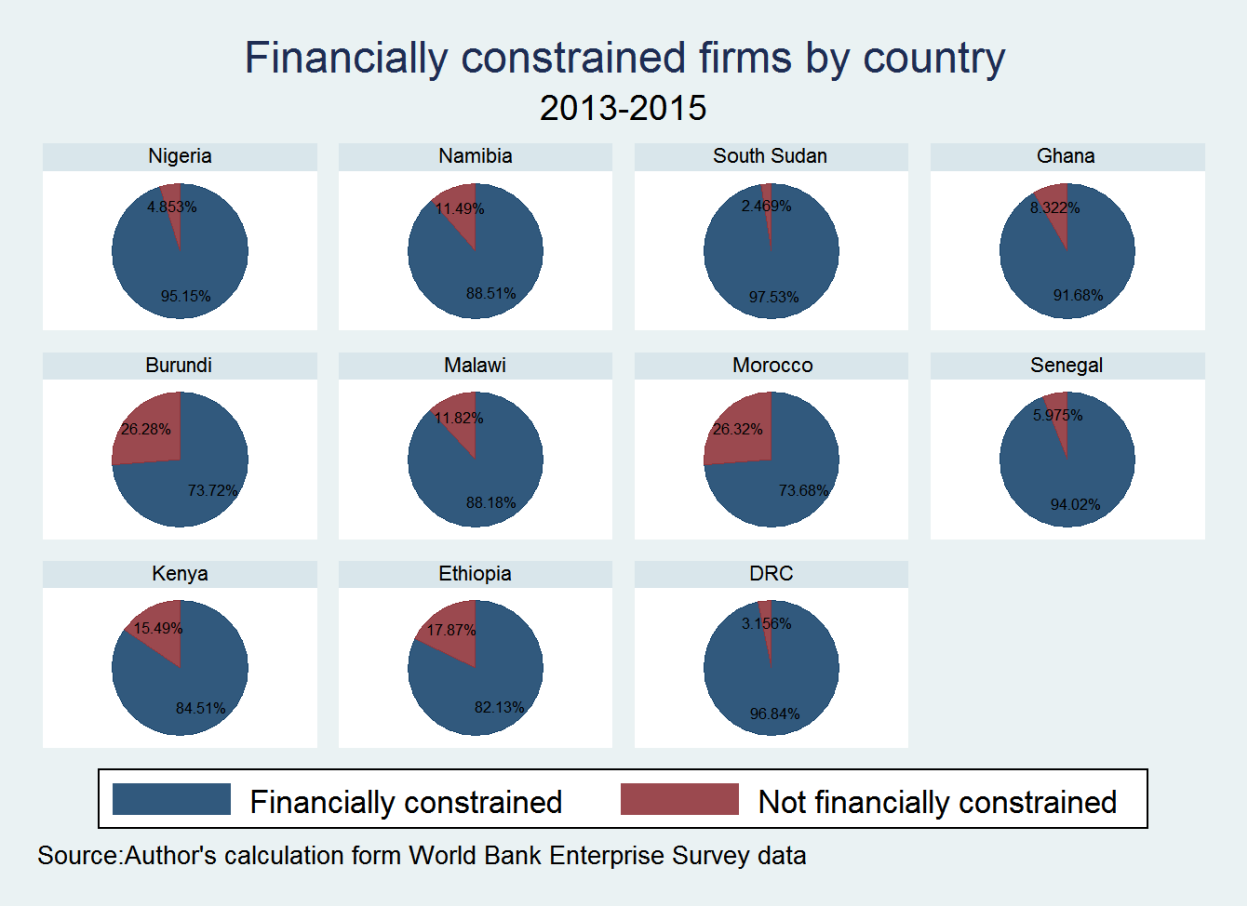
Figure 1.1: Perceived obstacles by firms



From earlier historical research, there has been a long standing theory that small firms' performance and growth is constrained by the amount of internally generated finances (Carpenter & Petersen, 2002). Many firms, even those with promising investment and growth opportunities, find it difficult to raise capital from external sources at reasonable and favorable terms. This forces most of them to finance their operations and investment through internal funds or retained earnings. If internal resources are not enough, financially constrained firms may be forced to pass up positive Net Present Value projects, thus affecting their growth potential.

In addition, recent World Bank Enterprise Surveys between 2013 and 2015 show that firms in Africa, highly perceive themselves to be financially constrained. For instance in Nigeria 95% of firms in 2013 reported to be financially constrained and in South Sudan 97% were constrained (see Figure 1.2).

Figure 1.2: Extent of financial constraints in a sample of 11 African countries



2.2 Financial Constraints

Financial constraints are frictions that hinder firms from financing desired investment projects (Lamont, Polk, & Saa-Requejo, 2001). They can be as a result of credit constraints, inability to issue equity, illiquidity of assets or dependence on bank loans (Lamont et al., 2001). Financial constraints can also be as a result of capital market imperfections due to information asymmetry and incentive problems. This results in differences between internal and external financing which

forces firms to substitute future investment for current investment, thus hindering their growth (Love, 2003).

Most of the research done on financial constraints has been based on quantitative data from financial statements. In this case the researchers use constructed indices to group firms as either financially constrained or unconstrained (Hadlock & Pierce, 2010; Kaplan & Zingales, 1997; Whited & Wu, 2006). These measures however, have been analyzed and found to be lacking in one way or the other. According to Farre-mensa and Ljuungqvist (2015), the measures do not actually identify well those firms that are either financially constrained or unconstrained. Some firms grouped as constrained portray unconstrained firms behavior. For instance, some firms considered constrained do not have difficulty obtaining credit and even tapping the equity market.

In this paper, we use the World Bank Enterprise survey data to build on the existing survey data measures to establish the link between finance and growth via the firm financing channel. The data is advantageous because it provides more information on a firm's perception on whether it is constrained financially or not. The data also has other finance related variables, and unlike most studies which focus only on listed firms, the data also comprises various kinds of firms (both listed and unlisted). Therefore we can measure the firm's financing obstacles directly from the data unlike previous studies which have always inferred financial constraints from financial statements and reports. This will also enable us to use micro econometric methodologies which helps reduce bias as we try to establish the link between finance and growth. We will therefore be able to study financial constraints not only across firms but also across various kinds of firms.

2.3 Research Questions

The specific research questions that the study aims to answer include:

i. To what extent are African firms financially constrained?

ii. How do financial constraints affect firm growth and productivity?

2.4 Objectives of the study

The main aim of this study is to analyze financial constraints in African firms, and how it impacts on firm growth. To this end, the following specific objectives have been set:

i. To analyze the extent to which African firms are financially constrained.

ii. To investigate the impact of financial constraints on firm growth.

2.5 Scope of the Study

The study focuses on both listed and unlisted firms in 11 African countries, namely: Kenya, Ethiopia, Ghana, Malawi, Namibia, Nigeria, the Democratic Republic of Congo, South Sudan, Burundi, Morocco and Senegal. Most studies of this nature have concentrated on developed countries, and mostly on listed firms. The reason for this could be due to data availability, because these studies have mostly used quantitative data from the annual reports and other financial statements. Unfortunately, this kind of data may not be available when it comes to developing countries. This study concentrates on firm level survey data which will enable us to analyze and investigate some issues that may be difficult to delineate at a macro perspective. We specifically utilize the World Bank Enterprise Survey data sets. Where available, the data covers the 2013-2015 periods.

2.6 Justification of the study

Despite the important role that firms play in the economy, they face many obstacles. Some of the obstacles include: excessive regulation, high corruption, high tax rates, labor regulations, financial constraints, underdeveloped financial markets, insecurity and crime, poor infrastructure, poor governance and law enforcement, economic and political instability (Kuntchev et al., 2014). However, not all these reported obstacles are binding. Inadequate finance has been found to be the most binding obstacle to firm growth[1].

Most of the studies that have been done on financial constraints and firm growth have been done in developed countries, and mostly on listed firms. They have been mostly based on data from financial statements[2], which can pose data challenges when it comes to African firms. In addition, most of the available measures of financial constraints are applicable to traded firms which can

[1] See for example(Ayyagari et al., 2008; Carpenter & Petersen, 2002; Chavis et al., 2010; Winker, 1999).

[2] See for example Brown and Earle (2015) in U.S firms using SBA loans, Hoberg and Maksimovic (2014) uses the 10-K data on equity and debt issuing firms, and Fazzari et al. (1988), Hadlock and Pierce (2010), Kaplan and Zingales (1997), Whited and Wu (2006) measures.

easily issue equity and debt. These measures may not be used for African firms due to data limitations and the fact that African Stock Markets are underdeveloped. Little is therefore known about the extent to which African firms' growth is affected by financial constraints. Furthermore, some studies done in Africa have indicated that the finance growth nexus does not hold in Africa, and the macroeconomic and institutional quality measures associated with financial development in other countries are less important in Africa (Allen et al., 2010). This makes Africa a unique case of study. Considering the macro data limitations in African firms due to the informality of most of the enterprises, the present study uses the Enterprise Survey data by building on the Angelini and Generale (2005) and Kuntchev et al. (2014) measures of financial constraints, to examine the extent to which the African firms are financially constrained, and whether this affects growth.

2.7 Literature review

This section reviews the literature on financial constraints and firm growth. It starts by looking at the theories explaining the existence of financial constraints. It then proceeds to give the various measures of financial constraints and finally looks at the empirical literature.

2.7.1 Theoretical literature

This sub-section looks at the theoretical framework of financial constraints. We first define financially constrained and unconstrained firms in terms of effective demand and supply of credit, then proceed to explain the concept of financial constraints in theory, and how it has been defined in the extant literature. The firm's ultimate objective function given financial constraints is also looked at. We also track the history and development of the existence of financial constraints, thereby establishing the link between existing theory and the objective of the study.

2.7.2 Definition of financial constraints

Defining constraint status

The constraint categories can be defined on the basis of whether a firm is constrained due to excess demand or limited supply of credit. Almeida, Campello and Weisbach (2004), define financially unconstrained firms as those firms that are able to get external finance or those whose internal funds are sufficient for all their investment opportunities. According to this definition, financially constrained firms are those firms whose internal finance is not enough, and are unable to access

external funds. Beck and Demirguc-kunt (2006) also regard firms as financially constrained if a windfall increase in the supply of internal funds results in a higher level of investment spending. In this regard, financially constrained firms are those firms in case they get funds they use it to expand production while the unconstrained firms will use the funds as a substitute for other borrowing (Bannerjee & Duflo, 2004). Financial constraints can also be viewed as restricted access to bank loans (Winker, 1999), or when a firm cannot borrow as much as it would like to, at the going market rate (Bannerjee & Duflo, 2004). All these definitions portray financially constrained firms as those whose available funds are not enough to finance all their operations including investment.

2.7.3 Theories explaining the existence of financial constraints

This section looks at the various theories that explain the existence and development of financial constraints in credit markets.

Information asymmetry and Credit rationing theory

Economic theory suggests that credit constraints hinder liquidity strapped entrepreneurs from undertaking profitable investment. This implies that the level of investment and profitability of the firm can be attributed to credit constraints. In a perfect capital market, funds should always be available to all firms regardless of size or age, in order to finance positive net present value projects. In these perfect markets, banks and other lending institutions are aiming at maximizing profit, so one expects the demand for credit to be fully met by the supply and thus attain equilibrium (Stiglitz & Weiss, 1981). But in practice, there is disequilibrium between demand and supply for credit due to credit rationing that is as a result of perceived riskiness of the loan. Due to information asymmetry, banks are forced to screen out some borrowers, which leads to adverse selection (Stiglitz & Weiss, 1981). However, an entrepreneur can sometimes face a positive supply of credit but not have positive effective demand. This is because the entrepreneur may choose not to borrow due to transaction costs or the risk involved in collateral requirement, which may lower the expected utility (Boucher et al., 2009).

Due to information asymmetry, it is difficult for lenders to differentiate between good and bad borrowers. This makes price discrimination difficult since high interest rates will cause a drop in

good borrowers, increase the proportion of bad borrowers, and thus increase the probability of default (Stiglitz & Weiss, 1981). In this case some borrowers/firms are left out and as a consequence, these borrowers/firms are not able to borrow enough capital at affordable rates (Petersen & Rajan, 1993). Information asymmetry in the market for loans may result in credit rationing (Stiglitz & Weiss, 1981), which means some firms/borrowers do not get as much credit as they require even if they are willing to pay the prevailing interest rates, and meet the lending conditions set by financial institutions (Rien, 2003).

Credit constraints can arise through different types of non-price rationing. That is, quantity rationing, transaction cost and risk rationing (Boucher et al., 2009). All these rationing types arise as a result of contract enforcement and information problems, and they hinder the firm from engaging in profitable investment projects. The problems of adverse selection and moral hazard come as a result of information asymmetries. In most circumstances, creditors respond to these problems by requiring entrepreneurs to pledge collateral, in order to steer the incentive for entrepreneurs to exercise high effort to reduce the probability of project failure. It also serves as a mechanism to screen out "bad" borrowers, thus addressing both moral hazard and adverse selection (Boucher et al., 2009). The entrepreneurs who cannot post the minimum required collateral will be excluded from the credit market thus becoming credit constrained.

Jensen and Meckling (1976) emphasize the role of contractual relations between firm owners and banks. They argue that due to problems of moral hazard, firms may engage in risky projects even if the projects have negative and decreasing value. This is more common when the firm is not wholly owned and managed by the owner. In this case the manager tends to make decisions that maximize his own utility. This will alter the price of credit since it will incorporate monitoring costs, as the banks already anticipate this divergence of interests (Jensen & Meckling, 1976). When lenders predict such behavior they restrict issue of loans and this results in some firms being credit constrained. This may eventually result in underinvestment by firms and thus lowering their growth capacity.

Unlike larger firms which are more visible, small firms tend to face information asymmetry problems (Berger & Udell, 1995). In addition, large firms tend to have long term relationships with banks, which bridge the information gap. Banks acquire information during the long term

relationship and use it to offer cheaper contract terms. Banks demand less collateral requirements and give attractive interest rates to firms which have built a relationship with them over time. This is because they gather private information about the firms during this period (Berger & Udell, 1995).

Debt overhang

Debt overhang is a situation whereby a firm has existing debts that are so large to an extent that it cannot be easy to borrow more money due to high risks of default, even if the debt is intended for a good investment that has positive net value. Lenders shy off from financing firms whose debt levels are too high, even though the new debt is good for the firm's investment. Lenders perceive that the outstanding debt may reduce the firm's incentive to invest (Myers, 1977). This makes banks reduce debt maturity so as to induce firm managers to invest in profitable ventures. The resultant short term debt is however disadvantageous since most firms cannot meet the repayment rates. Reducing the debt maturity also increases the market value of debt and firm's market leverage, leading to more debt overhang (Myers, 1977).

Higher leverage increases the probability of firms not taking up future positive net present value projects, leading to underinvestment. Firms with financial distress will not have the incentive to invest due to the perception that the investment will in the overall sense benefit the creditors (Myers, 1977). This is likely to result in the reduction in firm value and growth options. When a firm is subjected to possibilities of debt overhang, future cash flows are affected and thus future investment. Banks on the other hand cut on their lending due to increased riskiness, since their lending is pegged on the performance of their loans. In addition, the new lenders are more likely to shy away due to fear that the existing lenders may grab the benefits from new investment. This affects the flow of funds for new investment, thus resulting in financial constraints among such firms.

Contract Enforcement

Debt financing is constrained by the likelihood of default, which varies across different firms and economies with different degrees of contract enforcement (Arellano, Bai, & Zhand, 2007). Contract enforcement and the general respect of property rights are key elements in the lending

market. This is because lending institutions lend expecting future repayment. In this arrangement, both parties maximize their utility from achieving their respective objectives. Lenders charge interest on the extended credit and firms get profit by investing the funds in positive net present value investment projects. However, these gains from trade cannot be achieved unless the parties involved enter into enforceable agreements to ensure that repayment is made as agreed.

Enforceable loan contracts are possible in countries with efficient judicial systems. In less efficient judicial systems, bank financing tend to be costlier and thus may result in credit rationing. That is, firms willing to offer interest rates higher than prevailing rate may fail to get loans due to bad contract enforcement. On the other hand in well collateralized credit contracts, default is costly especially in efficient courts (Fabbri, 2010). Inefficient courts reduce the recovery value of collateral assets. This means that those firms in countries with efficient judicial systems tend to have access to less costly external finance and thus may be less financially constrained and vice versa (Fabbri, 2010). For instance, in developing countries with weak public institutions, enforcing contracts can be a challenge. Where contracts cannot be enforced, firms are left with no option but to rely on internal finance. This affects the rate of investment since firms will be constrained financially, forcing them to pass up positive NPV projects, underinvest and thus hindering firm growth (Fabbri, 2010).

The Evolutionary Theories

Evolutionary theories argue against neoclassical models on cash flow sensitivity and financial constraints. Evolutionary theories consider firms to be heterogeneous, and therefore argue that not all firms can be expected to grow (Coad, 2007). They postulate that firms have different propensities to grow, and therefore a firm's growth will depend on its fitness or strength, and not its financial position. Firms cannot be generalized as one single profit maximizing firm. This is because some firms are weaker than others, implying that they grow at different rates. Weak firms are forced to exit, while the stronger firms are left to grow naturally (Coad, 2007). In this context, evolutionary theorists advocate that resources be allocated to the more productive and stronger firms.

According to these theories, firms are rational in that they act on presently available information rather than in the future. They believe that firms exist to grow, and their growth is limited by financing. There is therefore an attempt to grow firms until the point whereby their financial position cannot allow more growth. Due to their desire to always want to grow, all firms will always be financially constrained irrespective of information asymmetries because they want to be a little bigger than they currently are (Coad, 2007). The evolutionary economists therefore agree that firm growth is constrained by available funds. They are however of the view that the mainstream literature has exaggerated the problem of financial constraints because cash flow sensitivity just portrays health workings of the economy.

The Penrose growth theories

The Penrose theory of firm growth postulates that the resources available to a particular firm will shape the productive services its managers are capable of rendering (Penrose, 1956). The theory permits both internal and external resources which may sometimes limit the growth of the firm whenever the productive opportunity is limited. This permits the analysis of the growth rate changes, as firms grow through different stages in a dynamically changing economy (Penrose, 1956). In this case, the size of the firm is measured by the productive resources that it employs like plant, equipment, land and human resources.

The Penrose theories therefore imply that finance, as one of the major resources of the firm, is very crucial for firm growth. In addition, the amount of these resources (hereby finance), determine the firm size. This implies that a resource constrained firm is more likely to experience less growth. The theories also demonstrate that financial constraints can be as a result of credit rationing by banks. These credit constraints tend to be more common in countries with inefficient judicial systems. These propositions inform the study on the key variables to consider when analyzing the extent of financial constraints among firms. These variables include firm size and the quality of institutions, especially the country's judicial systems.

2.7.4. Measuring financial constraints

In this section we discuss both quantitative and survey measures of financial constraints. Financial constraint measures need to be firm specific and time varying (Silva & Carreira, 2012). This is

because a firm can at one point be financially constrained, access finance at another point and become unconstrained in future. However, it is difficult to identify constrained and unconstrained firms in reality considering data limitations especially in Africa. In this regard, the available measures have raised theoretical issues and criticism but all the same they have helped to clarify the level of financial constraints in firms. Some of the measures proposed in the literature include: Investment to cash flow sensitivity measure, Kaplan and Zingales (1997) measure, measures based on multiple discriminant analysis, cash flow sensitivity measure, Euler equation measure, Hadlock and Pierce (2010) measure, Angelini and Generale (2005) measure and Kuntchev et al. (2014) measure. In this section, we briefly look at each one of them.

Investment to cash flow sensitivity measure:- Can be traced back to the seminal work of Fazzari et al. (1988). Firms are grouped into 3 classes based on their dividend payout history. The low dividend paying firms are assumed to be those firms which do not have income to distribute, or they need more investment finance than the available internal cash flow. They are thus forced to retain all the cash that they generate. Fazzari et al. (1988)'s findings were that low dividend firms exhibit higher investment to cash flow sensitivity than high dividend payers[3].

The argument is that in an environment with imperfect capital markets, internal and external finance are not perfect substitutes because debt and equity finance are costly due to information asymmetry. In this case, firms cannot obtain external finance as much as they need, or if they obtain the finances they do so at very high costs (Silva & Carreira, 2012). This means that firms have to rely on their own internally generated funds (referred here in as cash flows) which they retain to finance investment opportunities, implying they pay lower dividends. Their sample comprised of only large and publicly traded firms. Many studies have used this measure. See for example, Audretsch & Elston, 2002; Bond, Elston, Mairesse, & Mulkay, 2003; Guariglia, 2008; Hadlock, 1998; Kadapakkam, Kumar, & Riddick, 1998.

The measure has however been criticized on grounds that the dividend policy is an inaccurate sorting variable, due to precautionary savings and risky adverse management (Silva & Carreira,

[3] Here low dividend payers are classified as financially constrained while high dividend payers are classified as unconstrained.

2012). It is also impossible to measure the marginal Q (which is a major variable in this measure) and thus the average Q is mis-measured[4]. In addition, when a firms probability to default increases, investors provide large amounts to mitigate the risk of default implying that a decrease in internal funds would lead to an increase in investment (Silva & Carreira, 2012). This brings a lot of doubt on the robustness of the measure.

Kaplan and Zingales (1997) Measure (KZ Measure):- They estimate the same model as Fazzari et al. (1988), only that they compute the Tobin's Q as the market value of assets divided by the book value of assets, unlike Fazzariet al. (1988) who compute the Tobin's Q based on replacement costs. Kaplan and Zingales (1997) also use the same sample of firms used by Fazzari et al. (1988),[5] only that they analyzed these firms' annual reports, by looking at the management's discussion on liquidity status of the firms. Using this information they grouped firms into 5 classes: Not financially constrained (NFC), likely not financially constrained (LNFC), possibly financially constrained (PFC), likely financially constrained (LFC) and financially constrained (FC)[6].

They lay the theoretical basis to demonstrate that higher investment cash flow sensitivities do not always imply increasing financial constraints. They demonstrated this in a one period model, based on the argument that external funds are more costly than internal funds. The model assumes that the objective of all firms is to minimize the cost of capital and maximize profit, by choosing the right investment projects. The return to investment I is presented with a production function $F(I)$, where $F'>0$ and $F''<0$. In this case investment can either be financed using internal or external finance. The opportunity cost of internal finance is the cost of capital which is as a result of interest charged on external financing, agency costs, information problems and other transaction costs. Assuming that the interest rate equals to 1, then the cost can be expressed as $C(E,k)$, where E is the external financing and k is the cost difference between internal and external financing. Also denote the amount of internal finance as W. This yields the following model:

[4] See Fazzari et al. (1988) for a detailed explanation of the Q variable.
[5] They analyze the 49 low dividend paying firms that were portrayed to be having high investment to cash flow sensitivity by the (Whited & Wu, 2006) paper.
[6] Detailed explanation of these categorization of the measure can be found in (Hadlock & Pierce, 2010).

$$MaxF(I) - C(E,k) - I \tag{2.1}$$

Such that

$$I = W + E \tag{2.2}$$

By assuming that $C(E,k)$ is convex in E. The first order condition for equation (1) is:

$$F'(I) = I + C'(I - W, k) \tag{2.3}$$

The second implicit differentiation gives:

$$\frac{dI}{dW} = \frac{C''}{C'' - F''} > 0 \tag{2.4}$$

Since $C(.)$ is convex, this is positive, meaning that in an imperfect capital market investments are sensitive to internal funds. On the other hand, in a frictionless market world with zero opportunity cost of external finance they are not since $C(.) = 0$, resulting in $C''(.) = 0$ (Kaplan & Zingales, 1997). An implicit differentiation of equation (2) with respect to k gives:

$$\frac{dI}{dk} = \frac{-C''}{C'' - F''}. \tag{2.5}$$

This is negative, meaning that the monotonic relationship between cash flow sensitivities and financial constraints may not hold in all kinds of firms.

Unlike the Fazzari et al. (1988) measure, the KZ measure includes in its cost function a parameter (k for that matter) to take care of a firm's intrinsic characteristics which may make a firm more constrained than another (Kaplan & Zingales, 2000). The measure however still uses Tobin's Q which has a measurement error, even though Kaplan and Zingales (1997) argue that their results were robust to the use of Euler test, which is not affected by this mismeasurement. They also use a sample of only 49 firms which they subdivide into 5 classes of financial constraints. This could not make a good sample to draw general conclusions. This measure has been used by Lamont, Polk and Saa-Requejo (2001), on data from a broad sample of firms to construct a synthetic KZ index (Whited & Wu, 2006).

Measure based on Multiple Discriminant Analysis:- This measure was implemented by Cleary (1999), and does not require a structural model. It closely follows the approach of Kaplan and Zingales (1997), whereby two or more mutually exclusive groups are identified according to some classification criteria, using multiple discriminant analysis. The classification allows for changes in firms' financial status over time. This classification yields 3 groups of firms: group 1 firms increase dividends and are unconstrained, group 2 cut dividends and are likely to be constrained, and group 3 do not change dividend payments. In the classification, the Altman's Z factor (Z_{FC}) is used:

$$Z_{FC} = \beta_1 currentratio + \beta_2 FCCov + \beta_3 slack / K + \beta_4 NI\% + \beta_5 salesgrowth + \beta_6 debtratio \qquad (2.6)$$

Where *FCCov* is fixed charge coverage, *Slack* is net fixed assets and *NI* is net income margin. He estimated the Fazzari et al. (1988) equation using fixed effects:

$$\left(I/K\right)_{it} = \beta_{M/B}\left(M/B\right)_{it} + \beta_{CF/K}\left(CF/K\right)_{it} + u_{it} \qquad (2.7)$$

Where *t* is the time period, *I* is the investment in plant and equipment at the beginning of the period, *CF* is cash flow for current period, M/B is equity market to book ratio.

In this discriminant measure of financial constraints, firms with lowest discriminant scores are grouped as financially constrained, those with highest scores are categorized as not financially constrained, and the partially financially constrained fall in between the two groups. This measure has been criticized due to its segmenting variable. Using dividends as a segmenting variable requires information from financial markets which may result in biases (Silva & Carreira, 2012).

Cash flow sensitivity of Cash:- Was proposed by Almeida et al. (2004). They define cash flow sensitivity as the firm's propensity to save for future investment. They used a dynamic model for 3 periods (period 0, 1 and 2). For financially constrained firms, it will not be optimal to pay dividends in time 0 and 1. This is a time when the firm has even exhausted its credit sources and cannot borrow beyond its capacity. The firm therefore achieves its objective by solving the following optimization problem:

$$\max_{C,h^L} f\left(\frac{c_0 - C}{I - q + \tau q}\right) + pg\left(\frac{c_1^H - \frac{1-p}{p}h^L + C}{1 - q + \tau q}\right) + (1-p)g\left(\frac{c_1^L + h^L + C}{1 - q + \tau q}\right) \tag{2.8}$$

Where h^H and h^L is hedging in states *H* and *L* (representing high and low, respectively), *q*,*g* and τ are parameters, *C* is cash flow, with c_0 and c_1 being cash flows in period 0 and 1 respectively,.

The optimal cash policy C^* is expressed as:

$$f'\left(\frac{c_0 - C^*}{\lambda}\right) = g'\left(\frac{E_0[c_1] + C^*}{\lambda}\right). \tag{2.9}$$

Where $\lambda = 1 - q + \tau q$. The cash flow sensitivity of cash can be obtained as $\frac{\partial C^*}{\partial c_0}$, which is positive for financially constrained firms and indeterminate for financially unconstrained firms.

Their argument is that if a firm is financially constrained, liquidity management becomes important, in that it will safeguard against future investment by hoarding cash. For unconstrained firms, liquidity management is irrelevant since they have unrestricted access to external finance. They therefore do not need to safeguard against future investment opportunities (Almeida et al., 2004). They further argue that financially constrained firms will have a positive cash flow sensitivity of cash since they will have a propensity to save cash as precaution for future investment opportunities. The measure has been used by Baum, Schäfer and Talavera (2009); Han and Qiu (2007).

This measure has however been criticized by Lin (2007) and Pál and Ferrando (2005), on grounds that all firms are constrained to some extent by the imperfect market environment. This can be explained by the fact that both constrained and unconstrained firms save for future favorable investment opportunities, even though constrained firms are believed to save to hedge against the fluctuations in cash flows (Pál & Ferrando, 2005).

Euler Equation Measure:- Whited and Wu (2006) use a structural model to construct an index of financial constraints based on a standard intertemporal investment model. After several derivations with appropriate assumptions, they estimate the following model[7]:

$$\begin{aligned}\lambda_{i,t+1} &= b_0 + b_1 TLTD_{i,t+1} + b_2 DIVPOS_{i,t+1} + b_3 SG_{i,t+1} \\ &+ b_4 LNTA_{i,t+1} + b_5 ISG_{i,t+1} + b_6 CASH_{i,t+1} + b_7 CF_{i,t+1} \\ &+ b_8 NA_{i,t+1} + b_9 IDAR_{i,t+1}\end{aligned} \tag{2.10}$$

Where *TLTD* is the ratio of long term debt to total assets, *DIVPOS* is dividend payment indicator, SG is sales growth, *LNTA* is the natural log in total assets, *ISG* is industry sales growth, *CASH* is the ratio of liquid assets to total assets, *CF* is the ratio of cash flow to total assets, *NA* is the number of firm analysts (proxy for information asymmetry) and *IDAR* is industry debt to assets ratio (Whited & Wu, 2006). In this model, the higher the value of $\lambda_{i,t+1}$, the more financially constrained the firm is, and vice versa.

The Whited and Wu (2006) model predicts that external financial constraints affect the intertemporal substitution of current investment for future investment via the shadow value of scarce internal funds. They use system GMM which avoids sample selection, simultaneity and measurement error problems (Whited & Wu, 2006). This measure uses data from the firms' balance sheets and does not require measuring Q. The index is however based upon a large number of assumptions and on highly parametric models, and does not produce a variable that can be used in subsequent estimations (Silva & Carreira, 2012).

The Hadlock and Pierce (2010) Measure:- Hadlock and Pierce's measure of financial constraints is an update of the Kaplan and Zingales (1997) measure. They use a randomly selected sample of 356 firms. Using a text-based approach by searching for firms which identify themselves as constrained, they create their own index based on firm size and age characteristics[8]. They argue that firm size and age are closely related to financial constraints, since older firms tend to be less

[7] See (Hadlock & Pierce, 2010) for detailed explanation and derivation of this model.

[8] Size here is the log of inflation-adjusted book assets while age is the number of years the firm is listed (Paolo Angelini & Generale, 2005).

constrained. In their context, the age and size firm characteristics are intuitively appealing and more exogenous (Hadlock & Pierce, 2010).

They extract every statement that pertains to a firm's ability to raise funds for current and future operations and assign each statement an integer code from 1-5. Higher numbers indicate presence of constraints and vice versa. From the code, they derived qualitative schemes to categorize firms into five mutually exclusive groups: Not financially constrained (NFC), likely not financially constrained (LNFC), potentially financially constrained (PFC), likely financially constrained and financially constrained[9].

2.7.5 Measuring financial constraints using firm level self-evaluation data

One way of identifying financially constrained firms is to allow individual firms to self-evaluate. These measures allow financial constraints to be detected directly from the answers to the survey questions. This approach has been used by Angelini et al. (1998), Angelini and Generale (2005) and Kuntchev et al. (2014). In this section we briefly discuss these survey based measures, as proposed by the above authors.

Financial constraint measure proposed by Angelini et al. (1998):- This measure is based on answers to the liquidity questions posed during the survey carried out on Italian firms in the year 1995. The measure categorizes firms into four groups, by assigning integer values from zero to three, with increasing order of financial constraints. The firms assigned zero are those that do not wish to have any additional credit, 1 represents those that would like to get more credit at current lending rates, 2 stands for those willing to pay higher rates but have not applied for credit, and 3 represents those that have applied for credit and the bank has denied to offer. In this case, zero implies those not financially constrained while three are the financially constrained firms. They use a multinomial probit to analyze their model, but they also group firms into two classes in a binomial probit: those firms that wish to get additional credit versus those that do not (Angelini, Salvo, & Ferri, 1998).

[9] *NFC* are those firms with more than sufficient liquidity, *LNFC* have adequate but not excessive liquidity, *PFC* have financial strength with possible financial weaknesses, *LFC* indicate some current liquidity problems, and FC clearly indicate the presence of constraints.

Angelini and Generale (2005) Measure:- For this measure, Angelini and Generale (2005) use questions from their survey questionnaires of a series of four survey data sets for Italian firms, to construct their measure of financial constraints[10]. Their baseline definition of financially constrained is any firm that answered yes to the question of whether they had applied for bank loan and was not granted. They added into the financially constrained, those firms that answered yes to the question of whether they wished to get additional finance. They had a category of discouraged borrowers: those who needed funds but did not attempt to request the bank because they believed that it will be declined anyway (Angelini & Generale, 2005). From the World Business Environment Survey (WEBS), Angelini and Generale (2005) define financially constrained firms as those firms who perceive finance to be a major obstacle. Beck and Demirguc-kunt (2006) also used the WBES data set and used the same measure of whether a firm perceives finance to be a major obstacle, to proxy financially constrained firms.

Kuntchev et al. (2014) Measure:- Using the World Bank enterprise survey data, Kuntchev et al. (2014) developed a measure of credit constrained firms. Their measure classified firms into four categories: Not credit constrained (NCC), partially credit constrained (PCC), maybe credit constrained (MCC) and fully credit constrained (FCC).

FCC firms are those firms that did not have outstanding loans during the survey period, they do not use external finance, had applied for loan during the previous year and/or did not apply for loan the previous year and the reason for not applying was any other than having enough capital. PCC firms are those that use external sources of finance, had not applied for loan in the previous year and the reason for not applying was any other than having enough capital or had applied for loan and was rejected. MCC firms are those that use external sources of finance, had applied for and obtained loan, and/or have an outstanding loan at the time of survey. NCC firms are those who did not apply for loan in the previous year and the reason for not applying was that they have enough capital (Kuntchev et al., 2014). Table 2.1 presents a summary of these financial constraint measures.

[10] The four survey data sets on Italian firms were carried out by Mediocredito in 1992, 1995, 1998 and 2001. On coming up with this measure, they borrowed a lot from a previous study by (Paolo Angelini & Generale, 2005).

Most of these measures of financial constraints used previously have indeed been effective. However, they are more suitable for firms from developed economies, and more specifically for listed firms. Applying these measures in African context where most firms are small and not listed in the stock exchange may leave much to be desired. The current study therefore will borrow from the previous survey data measures, and construct a measure of financial constraints that accommodates firms of all sizes, to enable us achieve the objectives set. These measures have an advantage since they are firm specific and time varying. We however recognize the fact that survey data measures are very subjective and qualitative in nature. Some firms may perceive themselves as constrained than others, when in the actual sense they may not. This means that potential biases may exist in the self-assessed variables.

Table 2.1: Summary of the financial constraint measures

Constraint Measure	How the extent of financial constraints is measured	Author(s)	Critique
Investment to cash flow sensitivity	Based on dividend payment Constrained firms retain internal funds (cash flows) to finance investment opportunities, meaning they pay lower dividends	Fazzari, Hubbard, Petersen, Blinder, & Pterba (1988)	Dividend policy is an inaccurate sorting variable The use of Tobin's Q which is subject to measurement error
KZ Measure	An in-depth analysis of annual reports and management discussions of the Fazzari sample of constrained firms	Kaplan & Zingales (1997)	It still uses Tobin's Q which has measurement error
Cash flow Sensitivity of Cash	Constrained firms hoard cash as precautionary for future investment	Almeida et al. (2004)	Both constrained and unconstrained firms can save to hedge for future fluctuations in cash flow
Euler Equation Measure	Uses a structural model basing on a standard intertemporal investment model augmented to account for financial frictions	Whited & Wu (2006)	Does not produce a variable that can be used in subsequent estimations
HP Measure	Is an update of the KZ measure whose index is based on firm size and age	Hadlock & Pierce (2010a)	The index is likely to be subjective
Firm level evaluation measures	Is a ranking assigned to firms depending on their willingness to get additional credit, and how they perceive finance to be a major obstacle.	P Angelini, Salvo, & Ferri (1998); Paolo Angelini & Generale (2005); Kuntchev et al. (2014)	Self-evaluation of firms may be subjective

2.8 Empirical Literature

Research on the finance growth nexus can be traced back to Schumpeter (1911), and has been growing since then (Kar et al., 2011; King & Levine, 1993; Levine, 1997; Levine, 2005; Levine & Zervos, 1998; Patrick, 1966). Most studies found that financial development accelerates economic growth (see for example King & Levine, 1993; Levine, 1997; Levine, 2005; Ross Levine & Zervos, 1998). Some found the relationship questionable (Chandavarkar, 1992; Lucas, 1988; Singh & Weisse, 1998; Stern, 1989; Stiglitz, 1993). Most of these studies have tended to be macro in nature, with some concentrating on the direction of causality (Calderón & Liu, 2003; Kar et al., 2011; Majid & Mahrizal, 2007).

Finance impacts growth through a number of channels. One of these channels is firm growth. Holding everything else constant, an increase in finance to firms should enhance firm performance which stimulates economic growth. However, firms experience a number of obstacles that hinder their growth (Ayyagari et al., 2008). The challenge has however been how to identify those obstacles that are more binding and constraining. According to Ayyagari, Demirgüç-Kunt and Maksimovic (2008), an obstacle is regarded as binding if it has a significant effect on growth. Using the directed acyclic graph (DAG) methodology, Ayyagari, Demirgüç-Kunt and Maksimovic (2008) found finance to be a binding obstacle for firm growth.

Most surveys also report inadequate finance to be a major obstacle to firm growth, especially start-ups (Chavis et al., 2010; Oliveira & Fortunato, 2006). Access to adequate financing is necessary for firm growth since it reduces financial constraints that restrict efficient firm investment (Love, 2003). Globally, 38 percent of firms are financially constrained (Kuntchev et al., 2014). According to Kuntchev et al. (2014) , 53 percent of firms in Sub-Saharan Africa are either fully or partially credit constrained,[11] Among which 40 percent of them are young firms of less than three years old. On the other hand, in the Latin America and the Caribbean only 32 percent of firms are credit

[11] Fully constrained firms according to (Kuntchev et al., 2014), are those firms which applied for loan in the previous year but do not have an outstanding loan during the time of the survey, and at the same time they do not use.

constrained (World Bank, 2014). This suggests that there are more credit constrained firms in Sub-Saharan Africa than in other regions (Kuntchev et al., 2014).

The effect of financing as an obstacle varies with firm characteristics. For instance, small firms are more susceptible to internal financial constraints than larger firms (Angelini & Generale, 2005; Carpenter & Petersen, 2002; Oliveira & Fortunato, 2006). Using a baseline definition of financial constraints as those firms that applied for credit and were not granted, Angelini and Generale (2005) confirmed this on Italian firms, in which they found financially constrained firms to be smaller and younger. They used graphical analysis and nonparametric tests to prove this proposition. Oliveira and Fortunato (2006) also used dynamic panel data techniques (GMM estimator) to investigate the contribution of financial constraints on the relationship between firm size and growth among Portuguese manufacturing firms. They used cash flows to measure financial constraints. Consistent with the literature, they also found that smaller and younger firms had growth-cash flow sensitivities than older and larger firms.

In addition, using four different definitions of financial constraints, Kuntchev et al. (2014) used a logit model to investigate the extent of financial constraints among firms. They found small and medium enterprises to be more fully financially constrained than larger firms. They also found firm sector to be a determinant of whether firms are constrained or not, and it varied by region. For instance in Sub-Saharan Africa, firms in retail sector were more constrained than those in manufacturing sector, while the reverse was true in the East Asia and Pacific countries. They also found labor productivity to be negatively related to financial constraints. The same results were confirmed even after using a different definition of financial constraints based on firms' perception of the degree of credit constraints. Age was however found to be insignificant in their sample.

Firms with greater internal finance are more likely to get external funding, since financial institutions perceive them as less risky as compared to those with limited internal finance (Guariglia, 2008). Using data of unquoted manufacturing firms, Guariglia (2008) used the error correction model to group firms depending on whether they had internal or external financial constraints. If firms were classified on the basis of internal funds, the investment – cash flow relationship was U-shaped, in that those with negative cash flow display negative investment cash

flow sensitivities. The sensitivities also tended to increase monotonically with increasing external financial constraints (Guariglia, 2008).

The effects of financial constraints on firm growth tend to be inversely related to development of the financial system within a country (Angelini & Generale, 2005). Firms in more financially developed economies are less likely to be financially constrained (Silva & Carreira, 2009; Beck & Demirguc-kunt, 2006). The same also applies to firms from "backward" regions (Donati & Sarno, 2014). This implies that well developed financial systems facilitate the flow of funds from surplus to deficit units with relative ease. Financial constraints are also severe in countries or regions with underdeveloped financial and imperfect functioning of capital markets (Oliveira & Fortunato, 2006). This is as a result of slackness of the institutional environment (Donati & Sarno, 2014). In addition, those firms in countries with efficient legal system and developed stock markets experience less financial constraints.

Foreign owned firms experience less financial obstacles as compared to domestically owned firms (Beck & Demirguc-Kunt, 2006). This could be because foreign owned firms are able to access financing from foreign capital markets through their parent companies (Blalock, Gertler, & Levine, 2008). Their growth is therefore not dependent on the availability of internal finance. Foreign owned firms are also perceived by lenders to be having higher investment return potential and higher probability of business success than native entrepreneurs (Ruiz-vargas, 2000). On the other hand, domestically owned firms have limited access to capital since they mainly depend on national capital markets, which are mostly underdeveloped especially in an African set up (Blalock et al., 2008; Silva & Carreira, 2009).

Another strand of literature in this area has concentrated on measuring financial constraints (Almeida et al., 2004; Farre-mensa & Ljuungqvist, 2015; Fazzari, Hubbard, Petersen, Blinder, & Poterba, 1988; Kaplan & Zingales, 1997; Whited & Wu, 2006).The literature has been divided on which should be the right measure of financial constraints. Some researchers have used the dividend payout criteria (Cleary, 1999; Kaplan & Zingales, 1997; Whited & Wu, 2006), while others use firm characteristics like firm size, age, ability to meet interest payments, credit rating and leverage levels (Hadlock & Pierce, 2010; Lamont, Polk, & Saa-Requejo, 2001), others have used self-evaluation survey data to construct measures and/or proxies (see for example, Angelini

& Generale, 2005; Beck & Demirguc-Kunt, 2006; Kuntchev, Ramalho, Rodriguez-Meza, & Yang, 2014).

Using these various measures of financial constraints, some authors argue that cash flow sensitivity of cash savings provides no evidence to distinguish constrained firms from unconstrained firms (Pál & Ferrando, 2005). This is because all firms are constrained to some extent by the imperfect market environment and thus all have a determined cash policy. The explanation to this could be because both constrained and unconstrained firms save for future favorable investment opportunities. Even though constrained firms are believed to save to hedge against fluctuations in cash flows and for precautionary motive, both constrained and unconstrained firms save due to market imperfections where liquidity is relevant to the intertemporal allocation of capital (Pál & Ferrando, 2005).

Carpenter and Petersen (2002)'s measure assesses how financial constraints affect growth. In this model, high growth cash flow sensitivities imply high financial constraint problems. They found the growth cash flow sensitivity of firms that used external finance to be lower than that of firms that used less external finance. So according to Carpenter and Petersen (2002), financial constraints seem to be more pronounced in firms that use less external finance. Their study however excluded small firms since it only dealt with listed firms.

The measures also establish that firms with positive cash flow sensitivity face higher costs of external capital, are more likely to be smaller and younger, pay low dividends and have lower asset tangibility (Fazzari et al., 1988). They also maintain high levels of financial slack due to anticipation of liquidity problems. They issue more equity and debt to cover their higher investment expenditures. They also have high capital investment especially in research and development. They therefore grow faster than the cash flow insensitive firms, but they happen to be more financially constrained (Hovakimian, 2009).

Survey and self-evaluation measures establish that finance impacts on firms differently depending on the nature of the firms. For instance small and young firms may face more financial constraints than large and older firms, due to less available cash-flows especially in underdeveloped capital markets (Angelini & Generale, 2005; Beck & Demirguc-kunt, 2006; Casey & O'Toole, 2014).

Summing up, the literature portrays small, younger and domestically owned firms to be more financially constrained than large, older and foreign owned firms. Due to this proposition, most researchers, especially those using survey data have shifted their focus to smaller and medium enterprises, ignoring the segment of large firms. Those using quantitative data have concentrated on only quoted firms, most of which are not much constrained financially. This study will fill this gap by looking at firms of all sizes across African countries.

Despite the many empirical studies in the area of finance and growth, the channel through which finance promotes growth has remained controversial. In addition, the degree to which finance impacts growth still remains inconclusive. Most empirical studies in this area, have employed time series techniques and have been macro in nature due to the difficult in measuring financial constraints (Basu & Guariglia, 2002; Guariglia, 2008; Oliveira & Fortunato, 2006). This is because the existing measures of financial constraints rely on aggregate data which do not permit the use of micro-econometric techniques. This study fills this gap by using firm level survey data to establish measures of financial constraints (and thus assess the extent to which firms are financially constrained), and then use the matching micro-econometric technique to analyze the impact of finance on growth, via the firm financing channel.

2.9 Data and Methodology

This study looks at both listed and unlisted firms in Kenya, Ethiopia, Ghana, Malawi, Namibia, Nigeria, the Democratic Republic of Congo, South Sudan, Burundi, Morocco and Senegal. The choice of the countries was based on those with most current survey data, and also a regional representation was considered. The regional country representation is as follows: Northern Africa(Morocco); East and horn of Africa(Kenya, South Sudan, Ethiopia); Central Africa(Burundi, DRC Congo); Southern Africa(Malawi, Namibia); West Africa(Nigeria, Ghana, Senegal). The available data on these countries is between 2013 and 2015. In terms of methodology, we use the matching techniques with a binary treatment variable model.

2.9.1 Data sources and definition of variables

2.9.2 Definition of variables

Dependent variables

The dependent variables are the firm performance or growth measures. In this paper, we use two growth/performance measures as dependent variables. According to Al-matari, Al-Swidi and Bt Fadzil (2014), there are various ways of measuring firm performance. These include: return on investment, growth in sales, market-to-book value, labor productivity, return to sales, profit per employee, return to investment, sales to assets, and cost of capital, among others. We chose sales growth and labor productivity as measures of firm performance since we are able to measure them from the available data. Growth in sales is measured as the change in sales for a three year period, while labor productivity is the ratio of sales to the total number of employees in the firm.

Explanatory Variables

Financial constraint variable

This is the treatment variable of whether the firms are financially constrained or not. We constructed both objective and subjective measures of financial constraints. The objective measure takes into consideration whether a firm had a loan and/or overdraft or not, and if the firm applied for a loan. If a firm had a loan and did not apply for one, then the firm is grouped as not financially constrained. On the other hand if the firm did not have a loan or overdraft and they had applied for one, they were grouped as financially constrained. On the other hand the subjective measures emanate from firms' perception of whether they are financially constrained or not. The firms were asked on how severe finance was an obstacle. It was measured in a scale of 0 to 4 whereby 0 signified no obstacle and 4 signified severe obstacle. If a firm stated that finance was not an obstacle, it was grouped as not constrained while those that stated that finance was an obstacle were grouped as financially constrained. Other key variables used as covariates are summarized in Table 2.2

Table 1.2: Description of key variables

Variable	Description
Age	This is the difference between the year of the survey and the year when a firm began its operations.
Ownership	Dummy variable=1 if firm is foreign owned and 0 if domestically owned
Legal status	Dummy variable=1 if listed in stock markets 0 otherwise

Firm size	Dummy variable for small (5-19 workers), medium (20-99 workers) and large(100+)
Industry	Dummy variable for sector (manufacturing, service or retail)
Export	Dummy variable for export status (1 if firm exports and 0 otherwise)
Manager Experience	Manager's years of experience in the firm
Sales Growth	Real annual sales growth
Labor productivity	Ratio of sales to number of employees

Source: Author's compilation based on the enterprise survey data

2.9.3 The Matching Technique

We seek to estimate the impact of financial constraints on firm performance and growth. The general model we are estimating can be expressed as:

$$Firmgrowth = \beta_0 + \beta_1 Finance + \beta_2 X + \varepsilon \qquad (2.11)$$

Where *Finance* is the financial access variable (0 if a firm is financially constrained and 1 if not), X represents a set of firm characteristics (firm size, age, sector, ownership, listing status, export status, manager's experience) and ε is a well behaved error term. Our coefficient of interest is β_1. We recognize the fact that we are likely to experience bias as a result of self-selection, since we are using cross sectional data to estimate β_1. To correct for this sample selection bias, we use the matching technique to estimate the effect of financial constraints on firm growth. Matching involves pairing financially constrained and unconstrained firms that are similar in terms of their characteristics, and then comparing their outcomes. We provide a detailed explanation of this matching technique below.

Identification problem

Whether a firm is constrained or not is a function of both observable and unobservable characteristics. Access to finance is a function of both demand and supply factors. Receipt of

finance depends on the ability of the firm to repay and secure the loan, among other factors which are still unobservable. Firm performance and growth can also be as a result of both observables as well as un-observables. It can be as a result of entrepreneurial ability, motivation, risk aversion, or even quality of management, all of which may be difficult to measure from the available data. This makes it difficult to establish a direct causal link between financial constraints and growth among the firms.

In order for us to mitigate the problem of counterfactuals, we use the propensity score matching technique (Rosenbaum & Rubin, 1984). This method helps us to construct counterfactuals using the survey data being used. The propensity score matching technique helps in reducing the bias that may be caused by lack of distributional overlap. In this paper, the financially constrained firms are the un-treated sample while the treated sample is the unconstrained firms. The outcomes of interest are the changes in annual sales and labor productivity. We chose this outcome variables since they are supported by the literature and they are good proxies to signify growth.

We are interested in the individual causal treatment effect of finance on firm performance and growth. We shall first consider a binary treatment variable in which $D_i = 0$ if firm i did not receive treatment and $D_i = 1$ if firm i received treatment. And the treatment in this case is having received finance. Assuming Y_i is the outcome variable then we have:

$$Y_i = Y_i(D_i) = \begin{cases} Y_i(0) if D_i = 0 \\ Y_i(1) if D_i = 1 \end{cases} \tag{2.12}$$

We first calculate the propensity score which is the conditional probability of the unit firm receiving treatment. We are conditioning on covariates or firm characteristics denoted by X. These covariates include firm size, age, sector/industry, firm ownership, listing status, export status and manager's experience.

$$P(x) = \Pr(D = 1 \mid X = x) = E[D \mid X = x] \tag{2.13}$$

In this case we are interested in average treatment effect (ATE):

$$\tau = E[Y(1) - Y(0)] \tag{2.14}$$

The interest is also in the average treatment effect on the treated (ATET):

$$\tau_T = E[Y(1) - Y(0) \mid D = 1] \tag{2.15}$$

In this analysis, we assume that given the covariates X, firms with same characteristics have equal opportunity of receiving or not receiving treatment. This is the overlap assumption:

$$0 < P(x) < 1 \tag{2.16}$$

We also assume that the treatment is ignorable (unconfoundedness):

$$Y(0), Y(1) \perp D \mid X \tag{2.17}$$

This assumption rules out the pretreatment differences between the treated and untreated firms in the sample. Biases due to observed pretreatment differences will be removed by conditioning solely on the propensity score. In this case equation 6 becomes:

$$Y(0), Y(1) \perp D \mid P(x) \tag{2.18}$$

We implement this by weighting observations by the propensity score, to create balance between treated firms in the sample. We can then take the difference in average outcomes for the two groups as:

$$\hat{\beta} = \frac{\sum D_i Y_i}{\sum D_i} - \frac{\sum (1 - D_i).Y_i}{\sum 1 - D_i} \tag{2.19}$$

This estimator relies on the following equalities:

$$E\left[\frac{DY}{P(X)}\right] = E\left[\frac{DY(1)}{P(X)}\right] = E\left\{E\left[\frac{DY(1)}{P(X)} \mid X\right]\right\} = E\left[\frac{P(X).E[Y(1) \mid X]}{P(X)}\right] = E[Y(1)] \tag{2.20}$$

Using the unconfoundedness and considering that $E\left[\frac{DY}{P(X)}\right] = E[Y(1)]$ then:

$$E\left[\frac{(1-D).Y}{1-P(X)}\right] = E[Y(0)] \text{ Implying:}$$

$$\hat{\beta} = E\left[\frac{D.Y}{P(X)} - \frac{(1-D).Y}{1-P(X)}\right] \tag{2.21}$$

Since these weights do not add to 1, the estimator is not attractive in this form. We need to normalize the weights to unity leading to an estimator proposed by Hirano, Imbens and Ridder (2003), which uses nonparametrics to estimate the propensity score. By using this estimated propensity score as weights, we estimate the average treatment effect as:

$$\hat{\beta}_i = \frac{\sum_{i-1}^{N} \frac{D_i Y_i}{P(X_i)}}{\sum_{i=1}^{N} \frac{D_i}{P(X_i)}} - \frac{\sum_{i=1}^{N} \frac{(1-D_i)Y_i}{1-P(X_i)}}{\sum_{i=1}^{N} \frac{1-D_i}{1-P(X_i)}} \tag{2.22}$$

For more robustness checks, we also carry out a joint inference on quantile effects using semi-parametric efficient influence function estimator proposed by Cattaneo (2010). We achieve this by contrasting the potential outcome distributional parameters that the outcome variables would take under each treatment level. The estimator is asymptotically normal, consistent and semiparametric efficient under the same assumptions made in the propensity score matching technique.

With this estimator, we carry out the quantile treatment effects since the effect may differ at low, middle and upper quantiles of the outcome distributions. This helps in investigating the potential difference in firm growth and performance across different levels of outcome distribution, which may not be revealed when using normal matching techniques.

2.9.4 Data Sources and descriptive statistics

In this paper, we use the World Bank enterprise survey data. This is cross sectional data and it covers firms of all sizes from small, medium to large firms from several countries. It also covers all sectors (manufacturing, services, transport and construction sectors). The data is standardized, comparable across countries and time, due to the global standard methodology used in the data collection. It covers major regions in each country which are largest centers of business enterprises. The data is advantageous for our study since it has information on firms' characteristics and the

nature of severity of finance as an obstacle, including other finance access related questions. The data is however subject to some caveats, especially non response. This is due to the fact that the survey questions are voluntarily answered, and sometimes the questions posed may be perceived differently by the respondents.

The study sample covers African countries which have data in more recent years (2013-2015), and those with same and globally comparable variables with uniform methodology of implementation of the core questionnaires. The sample comprises of firms from Kenya, Tanzania, Ethiopia, Ghana, Malawi, Namibia, Nigeria, Democratic Republic of Congo, South Sudan, Burundi and Morocco. The sample has a total of 8,560 firms, among which 10% are micro, 47% small, 30% medium and 13% large (see Table 2.4). As explained in the literature, firm size plays an important role when it comes to access to finance. This is because small and medium firms are believed to be more financially constrained than large firms (Beck & Demirguc-kunt, 2006).

Firm size was measured in terms of the number of employees in the firm. We follow the World Bank definition of firm size where micro firms are those with less than 5 employees, small firms are those with 5-19 workers, medium firms have 20-99 workers and large firms have more than 100 employees. Nigeria had the largest number of firms in the sample with a total of 2,676 of which 13% were micro, 53% were small, 28% medium and only 6% large firms. On the other hand Burundi had the least number of firms totaling 157, of which only 2% were micro, 44% small, 44% medium and 2% large. On average, most firms in the sample are small and medium, with very few large and micro. Table 2.4 shows the summary of the sample size and its constituents.

Table 2.4: Number of firms by size

Country	**Number of firms by size**				
	Micro %	Small %	Medium %	Large %	**Total**
Nigeria	13.16	52.71	27.76	6.37	**2,676**
Namibia	9.68	58.06	26.73	5.53	**580**
South Sudan	10.54	74.05	12.97	2.43	**738**
Ghana	11.50	46.90	33.19	8.41	**720**
Ethiopia	7.75	31.02	35.06	26.17	**848**
Burundi	2.21	44.12	44.12	9.56	**157**
DRC	13.11	56.28	23.50	7.10	**529**
Malawi	9.42	47.08	30.52	12.99	**523**
Morocco	1.51	31.93	39.16	27.41	**407**
Senegal	18.18	44.55	25.45	11.82	**601**

Kenya	5.17	32.67	35.50	26.67	**781**
Total	**10.18**	**46.89**	**29.77**	**13.16**	**8,560**

Source: Author calculation from the WBES data set

Age also plays an important role since older firms are more likely to be less financially constrained than younger firms, as demonstrated in the reviewed literature[12]. Furthermore, age is a proxy for reputation. Most larger firms have been in existence for some time, and have had sufficient time to build relationships with lending institutions, making it easier for them to access external finance[13]. Being large increases visibility and thus comes with lower information asymmetry. In our sample, the average age of firms is 18 years with some firms being less than a year old. The oldest firms reported to be 170 years especially in Nigeria (see Table 2.5). The mean (logarithm) sales growth was 15.11 with the highest sales growth being reported in the Democratic Republic of Congo, with 28.84 sales growth on average. Labor productivity also varies across the countries, and tends to be higher in countries with many older firms. Nigeria reports the highest labor productivity of 24.84, with Ghana having the least on average.

Manager's experience in the firm is also another factor that is expected to influence access to finance. In the sample, there are managers who are less than a year old in the firm surveyed, while others are up to 72 years old in their firms, which may imply that they are owner managers. The number of employees in the firm helps us to group firms into different sizes. In the sample there are firms with no employee at all, while others have up to 18,452 employees[14].This indicates that the sample consists of firms of all sizes. Table 2.5 shows how these variables vary across the different countries.

Out of the 8,560 firms in our sample across the 11 countries, some firms were dropped due to missing data issues, as a result of non-response. Of the remaining 7,992 firms, 91% were financially constrained, while 9% were unconstrained, when using the first measure of financial constraints (see Table 2.6). 78% were financially constrained, while 22% were unconstrained, when using the second measure of financial constraints, and 57% were financially constrained,

[12] (See for example Angelini & Generale, 2005; Carpenter & Petersen, 2002; Kuntchev et al., 2014).
[13] (See for example Berger & Udell, 1995).
[14] The number of employees consists of both permanent and temporary employees at the year of the survey.

while 43% were unconstrained, when using the third measure of financial constraints[15]. The percentage however differs when we analyze each country separately.

For instance when using the third measure of financial constraints, the percentage of constrained firms exceeds that of unconstrained firms for all the countries except for Nigeria, Kenya, Morocco and Ethiopia. However, when using the first three measures of financial constraints, financially constrained firms exceed unconstrained firms across all the countries (see Table 2.6). This shows a cross country diversity due to country specific factors such as financial development and corruption levels among other factors.

[15] The first measure of financial constraints takes into consideration whether a firm had a loan and/or overdraft or not, and if the firm applied for a loan. If a firm had a loan and did not apply for one, then the firm was grouped as not financially constrained. On the other hand if the firm did not have a loan or overdraft and they had applied for one, they were grouped as financially constrained. On the other hand the second and third measures are subjective measures based on firms' perception of whether finance is an obstacle or not.

Table 2.5: Descriptive statistics by country

Variable	Statistics	Nigeria	Namibia	Sudan	Ghana	Burundi	Malawi	Morocco	Senegal	Kenya	Ethiopia	DRC	Total
Sales Growth	Mean	15.01	13.98	13.05	11.52	18.53	16.82	15.25	17.16	17.01	14.52	16.74	**15.11**
	Std. Dev	2.96	2.24	2.25	2.51	1.90	2.52	2.14	2.71	2.74	2.37	3.13	**3.19**
	Min	9.21	9.90	8.99	5.30	13.87	11.51	10.82	11.70	10.31	9.35	10.04	**5.30**
	Max	27.24	20.18	19.75	19.74	23.72	24.82	22.51	25.35	25.15	22.57	28.84	**28.84**
Labor Productivity	Mean	12.10	11.33	10.30	9.53	16.48	14.42	12.55	15.60	14.09	12.08	14.86	**12.53**
	Std. Dev	2.32	1.73	1.43	1.82	1.44	1.81	1.56	1.68	1.71	1.53	2.32	**2.61**
	Min	5.16	6.32	5.14	4.92	12.83	8.13	7.96	11.51	7.64	7.49	9.77	**4.92**
	Max	24.84	17.15	16.24	16.23	21.90	20.68	19.62	23.96	20.36	18.14	22.69	**24.84**
Age	Mean	19.01	13.64	6.53	18.12	17.08	20.66	25.91	18.79	25.93	15.50	14.37	**17.81**
	Std. Dev	12.54	11.10	4.11	11.71	13.73	13.75	17.15	13.61	18.07	12.85	10.76	**13.76**
	Min	2.00	2.00	2.00	4.00	3.00	2.00	4.00	3.000	4.00	2.00	4.00	**2.00**
	Max	170.00	122.00	43.00	107.00	89.00	109.00	92.00	168.00	110.00	91.00	88.00	**170.00**
Manager Experience	Mean	12.72	13.99	7.44	16.24	12.78	15.67	23.09	19.44	18.36	15.78	13.85	**14.69**
	Std. Dev	9.08	9.57	6.38	9.32	9.46	9.83	10.89	10.55	10.86	10.68	10.32	**10.24**
	Min	0.00	1.00	1.00	2.00	1.00	1.00	3.00	1.00	1.00	1.00	1.00	**0.00**
	Max	72.00	54.00	42.00	64.00	46.00	60.00	64.00	60.00	57.00	60.00	66.00	**72.00**
Total Employment	Mean	42.98	38.70	16.50	39.86	63.28	69.24	158.80	53.61	122.18	141.51	37.75	**65.61**
	Std. Dev	219.12	155.54	30.64	87.56	161.04	249.25	507.91	220.92	445.26	755.96	189.69	**343.48**
	Min	0.00	1.00	1.00	2.00	1.00	1.00	3.00	1.00	1.00	1.00	1.00	**0.00**
	Max	5000.00	2114.00	567.00	800.00	1592.00	4030.00	6300.00	3500.00	8000.00	18452.00	3900.00	**18452.00**

Source: Author calculation from the WBES data set

Table 2.6: Financially constrained firms across different African countries

Country	1st measure of financial constraints		2nd measure of financial constraints		3rd measure of financial constraints		Total
	Financially Constrained	Not financially constrained	Financially Constrained	Not financially constrained	Financially Constrained	Not financially constrained	
Nigeria	95.15	4.85	76.98	23.02	48.69	51.31	**2,514**
Namibia	88.51	11.49	80.52	19.48	62.76	37.24	**348**
Sudan	97.53	2.47	91.33	8.67	78.18	21.82	**729**
Ghana	91.68	8.32	88.89	11.11	78.19	21.81	**709**
Burundi	73.72	26.28	80.25	19.75	61.78	38.22	**156**
Malawi	88.18	11.82	80.11	19.89	59.66	40.34	**499**
Morocco	73.68	26.32	54.05	45.95	43.73	56.27	**380**
Senegal	94.02	5.98	88.02	11.98	74.54	25.46	**569**
Kenya	84.51	15.49	70.29	29.71	42.64	57.36	**736**
Ethiopia	82.13	17.87	68.16	31.84	47.52	52.48	**845**
DRC	96.84	3.16	78.45	21.55	63.33	36.67	**507**
Total	**90.57**	**9.43**	**78.00**	**22.00**	**57.39**	**42.61**	**7,992**

First measure of financial constraints is the subjective measure which takes a value of 1 if a firm had a loan and did not apply for one and 0 if a firm did not have a loan but had applied for it. Second measure takes a value of 1 if it stated that finance is not an obstacle and 0 if it is a minor, moderate and severe obstacle. The third measure takes a value of 1 if a firm stated finance to be no obstacle or minor obstacle, and 0 if finance is a moderate and severe obstacle.

Table 2.7: Pairwise correlation between variables at 5% significance level

	Sales	LPP	Finance	Listed	Ownership	Age	Export	Size	Manager
Sales	1.0000								
LPP	0.8559*	1.0000							
Finance	0.1372	0.0770	1.0000						
Listed	0.1066	0.0478	-0.0390	1.0000					
Ownership	0.1202	0.1063	-0.0680	0.1444*	1.0000				
Age	-0.0032	0.0655	-0.0551	-0.0135	0.0230	1.0000			
Export	0.2604*	0.0013	-0.0115	0.0383	0.0071	0.0184	1.0000		
Size	0.1725*	0.1463*	-0.0063	-0.0204	-0.0230	-0.0190	0.2030*	1.0000	
Manager	0.1654*	0.2367*	0.0531	-0.0134	0.0790	0.0193	0.0519	0.2998*	1.0000

Table 2.7 shows the pairwise correlation matrix between the key variables. The results in the Table indicate that there is a positive correlation between the log of sales and labor productivity outcome, significant at 5% significance level. The same positive correlation is also portrayed in the correlation between firm size and sales, labor productivity, manager's experience and export status.

2.10 Regression Results

2.10.1 Covariate Balance

It is assumed that financially constrained and unconstrained firms will have the same distribution of measured baseline firm characteristics. However, in our case the propensity score is not known since we are using survey data. We therefore need to carry out balance diagnostics to help us in ascertaining whether the model is well specified. In the sample, the financially constrained firms (untreated group) are more than the unconstrained firms (treated group). Our interest is to match the unconstrained (treated) firms, with the constrained (untreated) firms which possess similar baseline characteristics in order to reduce bias. For each covariate, we derive standardized mean differences on the unmatched and matched sample. Standardized mean difference is the ratio of the difference between the means of the treatment and control samples, to the standard deviation. We prefer to use standardized mean differences for balance diagnostics because it does not depend on the sample size and unit of measurement. The baseline standardized differences in mean results for one representative country is presented in Table 2.10.1[16].

The mean differences help us to understand how different the two groups of firms are at baseline and after matching. As shown in Table 2.10.1, there is a considerable difference in means at baseline before matching, especially when using the objective first measure of financial constraints. This is however expected since it is an observational study. We have presented standardized mean differences for one country using the three different measures of financial constraints (treatment variable). Other countries' results have not been presented in the paper but the other country specific results portray the same information.

[16] The standardized mean differences are reported in absolute values. So directionality of the difference is ignored.

Table 2.10.1: Covariate balance at the baseline between constrained and unconstrained firms in the unmatched sample at 95% confidence interval.

Variable	Unconstrained (Treated) firms	Constrained (untreated)firms	Standardized differences
First measure of financial constraints			
Size	1.92	1.62	0.303
Age	21.47	16.02	0.375
Industry	26.00	32.54	-0.323
Ownership	1.10	1.16	-0.164
Export	0.09	0.03	0.259
Legal status	0.06	0.03	0.153
Manager Experience	18.11	14.44	0.344
Second measure of financial constraints			
Size	1.79	1.53	0.276
Age	19.39	16.90	0.177
Industry	23.89	27.24	0.161
Ownership	1.16	1.12	0.096
Export	0.10	0.06	0.138
Legal status	0.05	0.02	0.151
Manager Experience	15.46	14.70	0.073
Second measure of financial constraints			
Size	1.70	1.51	0.199
Age	19.17	16.22	0.213
Industry	24.33	28.05	0.180
Ownership	1.15	1.12	0.089
Export	0.09	0.05	0.130
Legal status	0.04	0.02	0.093
Manager Experience	15.17	14.66	0.049

First measure of financial constraints is the subjective measure which takes a value of 1 if a firm had a loan and did not apply for one and 0 if a firm did not have a loan but had applied for it. Second measure takes a value of 1 if it stated that finance is not an obstacle and 0 if it is a minor, moderate and severe obstacle. The third measure takes a value of 1 if a firm stated finance to be no obstacle or minor obstacle, and 0 if finance is a moderate and severe obstacle.

By using the propensity score as the matching variable, we are able to balance the observed covariates between financially constrained and unconstrained firms. In this case the matching produces a control group which is similar to the unconstrained firms in terms of the observed characteristics. Table 2.10.2 shows the characteristics of constrained and unconstrained firms after matching. After matching by the propensity score, the standardized differences are below 0.1, except for the legal status and export variables, and only when using the first measure of financial constraints. This implies that the propensity score matching improved the balance considerably.

We can now see that the standardized mean differences all reduce significantly, showing an improvement in the balance of covariates for the matched sample (Table 2.10.2).

Table 2.10.2: Comparison of mean differences between constrained and unconstrained firms in the matched sample at 95% confidence interval

Variable	Unconstrained (Treated) firms	Constrained (untreated) firms	Standardized differences
First measure of financial constraints			
Size	1.93	2.01	0.074
Age	21.83	21.24	0.041
Industry	25.82	24.25	0.078
Ownership	1.10	1.08	0.056
Export	0.09	0.07	0.103
Legal status	0.06	0.04	0.103
Manager Experience	18.52	18.17	0.033
Second measure of financial constraints			
Size	1.82	1.84	-0.017
Age	19.45	20.53	-0.077
Industry	24.30	24.91	-0.029
Ownership	1.15	1.14	0.002
Export	0.10	0.10	-0.028
Legal status	0.06	0.05	0.068
Manager Experience	15.50	15.51	-0.001
Second measure of financial constraints			
Size	1.73	1.71	0.017
Age	19.06	19.05	0.001
Industry	25.23	24.50	0.035
Ownership	1.14	1.12	0.036
Export	0.09	0.09	0.003
Legal status	0.04	0.04	0.035
Manager Experience	15.23	15.05	0.017

First measure of financial constraints is the subjective measure which takes a value of 1 if a firm had a loan and did not apply for one and 0 if a firm did not have a loan but had applied for it. Second measure takes a value of 1 if it stated that finance is not an obstacle and 0 if it is a minor, moderate and severe obstacle. The third measure takes a value of 1 if a firm stated finance to be no obstacle or minor obstacle, and 0 if finance is a moderate and severe obstacle.

As indicated in the standardized difference in means before and after matching, the balancing score improves the balance in covariates. We therefore condition on the propensity score as opposed to individual firm characteristics during the matching process. This helps us to circumvent the curse of dimensionality. We estimated the propensity score using a logit model (Rosenbaum, 2005):

$$P(x) = \Pr(D=1 \mid x) = \frac{\Pr(D=1)\Pr(x \mid D=1)}{\Pr(D=1)\Pr(x \mid D=1) + \Pr(D=0)\Pr(x \mid D=0)} \tag{2.26}$$

In this case we regress the treatment variable as a function of all other regressors:

$$P(D=1) = \alpha + \beta X_{i,k} + \varepsilon_{i,k} \tag{2.27}$$

Where D is the treatment variable, which takes a value of 1 if a firm is not financially constrained and 0 if constrained, and X are the other firm characteristics. The covariates we use are: firm size, age, sector/industry of operation, exporting status (whether a firm exports or not), manager's experience at the firm, firm ownership (domestic or foreign) and legal status (whether a firm is listed on the stock exchange or not). The logistic regression results for the financial constraint variable as a function of firm characteristics are presented in Tables 2.10.3, 2.10.4 and 2.10.5.

In the regressions, we use three different measures of financial constraints. The first measure is an objective one, in the sense that it is based on survey questions which ask whether a firm has a loan or not, and if it had applied for credit. The other two measures are subjective, based on the perception by firms on whether finance is an obstacle or not. If a firm had or did not have a line of credit and did not apply for funding, then the firm is regarded as unconstrained. Those firms that perceive finance to be an obstacle are also grouped as constrained in the subjective measures of financial constraints.

The regression results have been done for each country separately. From the logistic regression results, we find that whether a firm is financially constrained or not is influenced by firm size. Even in previous research, it is evident that smaller firms are more likely to be constrained relative to larger firms[17]. From our logistic regression results older firms also are shown to be more constrained than younger firms. This is contrary to the evidence in previous literature which has found larger and older firms to be having access to finance since they can have collateral, and can easily borrow from banks since they have built reputation and long standing relationship with

[17] See for example Angelini and Generale (2005); Beck and Demirguc-kunt (2006); Carpenter and Petersen (2002); Casey and O'Toole (2014); Kuntchev et al. (2014); Oliveira and Fortunato (2006).

banks[18]. Older and larger firms are also perceived to be creditworthy by financial institutions, due to the perceived experience.

Foreign owned firms are also less likely to be constrained compared to domestically owned firms. Foreign owned firms have access to even foreign financial markets in which they can easily get credit from a multiple of sources. The same applies to those firms which export their produce. They are also less likely to be financially constrained, because of their broad customer base and diversification. The experience of the top manager in the firm also improves chances of the firm being unconstrained. This is because as he or she gains experience, financing institutions gain confidence in the firm and it improves its credit score and reputation. In addition, firm listing in the stock exchange influences firm's financial constraint status. Industry of operation, that is, whether a firm is operating as retail, manufacturing or service, also influences a firm's financial constraint position. Those firms engaging in the retail and service sector are more likely to be constrained as compared to those firms engaging in the manufacturing sector.

Whether a firm is constrained or not is also influenced by different factors, which tend to vary across different countries. For instance, firm size significantly influences a firm's probability of being financially constrained in all countries in the sample, except Ghana, Morocco and Nigeria (see Table 2.10.3). Firms which export directly or indirectly are more likely to be financially constrained in all countries except in Kenya (see Tables 2.10.3, 2.10.4 and 2.10.5). This shows a cross country diversity and evidence that there could be some country specific factors that could be driving these results.

[18] See for example Angelini and Generale (2005); Beck and Demirguc-kunt (2006); Casey and O'Toole (2014); and Oliveira and Fortunato (2006).

Table 2.10.3: Logistic regression results for calculating the propensity score (With first measure of financial Constraints as the dependent variable)

Variables	Burundi	DRC	Ethiopia	Ghana	Malawi	Morocco	Namibia	Nigeria	Senegal	Sudan	Kenya
Size	3.254***	2.818**	0.955**	-0.359	1.761**	-0.453	3.815***	0.357	2.319***	3.231**	1.008*
	(1.255)	(1.171)	(0.411)	(0.729)	(0.822)	(0.445)	(1.150)	(0.812)	(0.726)	(1.469)	(0.574)
Industry	-0.424	-0.557	0.494*	-0.245	0.722	-0.622	1.993**	-0.596**	1.381***	-2.264**	0.501
	(0.946)	(0.736)	(0.255)	(0.564)	(0.530)	(0.441)	(0.789)	(0.272)	(0.456)	(1.101)	(0.406)
Age	0.662	-0.340	0.377	0.039***	-0.244	0.409	0.576	0.345*	-0.281	0.483	0.012**
	(0.571)	(0.413)	(0.297)	(0.014)	(0.369)	(0.297)	(0.455)	(0.179)	(0.495)	(1.025)	(0.006)
Ownership	1.150	-0.214	-0.286	-0.080	-1.138*	-0.579	-1.319*	-0.015	1.133	0.490	0.386
	(0.814)	(0.692)	(0.903)	(0.524)	(0.617)	(0.629)	(0.774)	(0.686)	(0.846)	(1.022)	(0.985)
Legal Status	-1.637	0.018	-1.109	0.728	-0.259	-0.0217	0.000	-0.935	1.025	-4.014**	0.851
	(1.127)	(0.842)	(1.513)	(1.145)	(2.008)	(0.437)	0.000	(1.176)	(1.072)	(1.682)	(0.980)
Manager's	0.023	0.027	0.0115	0.000	-0.001	-0.004	0.019	0.0204*	0.004	-0.049	0.005
Experience	(0.021)	(0.029)	(0.009)	(0.017)	(0.017)	(0.012)	(0.020)	(0.011)	(0.019)	(0.057)	(0.010)
Export	0.866	0.799*	0.198	-0.258	0.398	0.322	-0.047	0.443	0.818	1.729	-1.152***
	(0.723)	(0.409)	(0.362)	(0.645)	(1.102)	(0.352)	(1.124)	(0.354)	(0.809)	(1.151)	(0.389)
Constant	-2.310	-4.562***	-1.416	-2.183***	-1.742	-0.564	-5.723***	-5.253***	-2.427	-0.212	-3.327**
	(2.043)	(1.571)	(1.724)	(0.696)	(2.348)	(1.162)	(1.854)	(1.312)	(2.140)	(2.531)	(1.492)
Observations	153	435	821	684	461	354	271	1,827	510	699	679

*Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1*. The first measure of financial constraints groups firms as constrained if the firm had no loan or overdraft but had applied for credit. Unconstrained are those who did not or had loans or overdraft but had not applied for any.

Table 2.10.4: Logistic regression results for calculating the propensity score (With the Second measure of financial Constraints as the dependent variable)

Variables	Burundi	DRC	Ethiopia	Ghana	Malawi	Morocco	Namibia	Nigeria	Senegal	Sudan	Kenya
Size	-4.051**	-1.026**	-0.943	2.842**	2.929***	0.411	1.465*	-0.815**	1.590**	-0.374	0.574
	(2.011)	(0.475)	(0.990)	(1.138)	(1.135)	(1.181)	(0.870)	(0.399)	(0.732)	(0.877)	(0.487)
Industry	-0.124	0.172	-0.315	1.208**	-0.106	-0.652	-0.555	0.153	-1.347*	1.072**	0.428*
	(0.647)	(0.437)	(0.492)	(0.554)	(0.610)	(0.405)	(0.919)	(0.540)	(0.720)	(0.230)	(0.250)
Age	0.052***	-0.084	0.570	0.027**	0.133	0.141	0.052**	-0.024***	0.109	0.156	-0.238
	(0.017)	(0.259)	(0.451)	(0.014)	(0.481)	(0.298)	(0.023)	(0.009)	(0.248)	(0.704)	(0.153)
Ownership	1.593**	0.434	-0.157	1.285***	0.960**	-1.954***	2.225***	-0.020	1.701***	0.010	0.743*
	(0.622)	(0.392)	(0.854)	(0.468)	(0.441)	(0.681)	(0.842)	(1.463)	(0.493)	(0.910)	(0.411)
Legal Status	-0.966	0.785	-0.965	1.009	3.286***	1.000***	1.184	0.593	1.069	-1.341	-0.580
	(1.505)	(0.640)	(1.424)	(0.919)	(0.524)	(0.288)	(1.032)	(1.193)	(0.982)	(1.057)	(0.970)
Manager's	-0.018	-0.017	-0.020**	-0.056***	-0.013	-0.006	0.009	-0.006	0.006	0.030	-0.003
Experience	(0.025)	(0.016)	(0.008)	(0.017)	(0.015)	(0.011)	(0.014)	(0.007)	(0.013)	(0.020)	(0.008)
Export	1.087	-0.590	0.778**	0.005	-0.431	-0.431	0.378	0.514***	1.406**	1.091	-0.379
	(0.798)	(1.103)	(0.303)	(0.537)	(0.832)	(0.328)	(0.846)	(0.189)	(0.576)	(0.885)	(0.237)
Constant	-0.735	-0.870	-0.204	-5.752***	-4.830***	0.112	-4.886***	0.441	-4.868***	-2.004	-0.451
	(3.089)	(0.830)	(1.943)	(1.177)	(1.754)	(1.596)	(1.893)	(1.343)	(1.501)	(1.780)	(1.320)
Observations	154	457	824	695	478	377	460	1,892	533	708	712

*Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1.* The second measure of financial constraints groups firms as constrained if they stated finance to be an obstacle, and unconstrained if they stated that finance was not an obstacle.

Table 2.10.5: Logistic regression results for calculating the propensity score (With the Third measure of financial Constraints as the dependent variable)

Variables	Burundi	DRC	Ethiopia	Ghana	Malawi	Morocco	Namibia	Nigeria	Senegal	Sudan	Kenya
Size	-0.794	0.627	1.082***	1.990**	1.248*	-1.049	6.175***	-0.924**	0.995	-0.448	1.301**
	(1.866)	(0.677)	(0.393)	(0.785)	(0.664)	(1.078)	(1.467)	(0.365)	(1.083)	(1.230)	(0.547)
Industry	-0.197	-0.320	-0.548	-0.848*	0.143	-0.339	-0.288	0.170	0.520	0.460	1.385***
	(1.011)	(0.351)	(0.583)	(0.505)	(0.497)	(0.422)	(0.684)	(0.468)	(0.779)	(0.669)	(0.379)
Age	0.040**	-0.136	0.947***	0.331*	0.151	0.355	0.130	-0.016**	0.295	-0.400	-0.117
	(0.018)	(0.225)	(0.362)	(0.177)	(0.304)	(0.310)	(0.448)	(0.007)	(0.316)	(0.427)	(0.160)
Ownership	1.508**	0.856***	0.361	0.777**	0.300	-1.594*	2.489***	1.642	1.245***	0.064	0.456
	(0.595)	(0.329)	(0.765)	(0.365)	(0.520)	(0.859)	(0.905)	(1.091)	(0.464)	(0.590)	(0.808)
Legal Status	0.878	1.130**	-1.070	0.115	3.080***	0.761***	1.142	-3.005*	1.509***	-1.173*	0.348
	(0.921)	(0.468)	(1.231)	(0.904)	(0.744)	(0.295)	(1.229)	(1.687)	(0.464)	(0.644)	(0.890)
Manager's	-0.015	-0.007	-0.022***	-0.045***	-0.016	-0.015	0.001	-0.009	0.010	0.003	0.009
Experience	(0.021)	(0.013)	(0.007)	(0.013)	(0.011)	(0.011)	(0.012)	(0.006)	(0.011)	(0.016)	(0.008)
Export	0.840	-0.596	0.427	-0.028	0.025	-0.517	-0.601	0.463**	1.072*	1.135	-0.005
	(0.735)	(0.860)	(0.313)	(0.417)	(0.675)	(0.323)	(0.855)	(0.182)	(0.557)	(0.722)	(0.209)
Constant	-2.751***	-1.834***	-0.787**	-2.497***	-1.608***	-0.732	-1.767***	-0.998***	-3.247***	-3.864***	-0.176
	(0.845)	(0.466)	(0.397)	(0.435)	(0.427)	(0.630)	(0.542)	(0.243)	(0.502)	(0.660)	(0.426)
Observations	154	457	824	695	478	377	460	1,892	533	708	712

*Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1.* The third measure of financial constraints groups firms as constrained if they reported finance to be a moderate, major and severe obstacle, and unconstrained if they reported finance to be a minor or no obstacle.

2.11 Matching estimation results

Country specific regression analysis was carried out, in order to unmask specific country differences that may influence the results. We carried out various matching regression methods including nonparametric matching techniques, nearest neighbor matching (Mahalanobis and Euclidean) and inverse probability weighted regression adjustment (IPWRA) method, across 11 countries. The regression results are presented in Tables 2.11.1, 2.11.2, 2.11.3, 2.11.4, 2.11.5, and 2.11.6. In each country, we carry out regressions using the three measures of financial constraints and two dependent variables as measures of firm growth and performance.

Our discussions will be based on the results of the first measure of financial constraints that is objective. The other two measures will be used as robustness checks. We shall also base our discussions on labor productivity outcome variable results, since labor productivity has been derived as sales per unit of labor, we believe it is a good representation of growth. We shall however refer to the sales growth outcome results for robustness checks to ascertain whether the results are portraying the same information.

We analyze the results by looking at the impact of financial constraints on the growth of firms. Using a treatment variable of whether a firm is financially constrained or not, firms were matched based on their propensity scores. Nigeria had the highest number of firms being matched while Burundi had the lowest. Table A1 shows the number of successfully matched firms across all the countries. Some firms were dropped due to missing data problems as a result of non-response. The regression results across all the countries in the sample show that access to finance improves firm performance and growth. For instance in Nigeria, the productivity of firms that are not financially constrained is shown to be higher by approximately 0.5, compared to those firms that are constrained financially. The growth is even higher when using sales growth as the outcome variable.

Burundi had the least number of firms in the sample, and only 100 financially constrained firms were matched with 50 unconstrained firms (Table A1). The productivity of financially unconstrained firms in Burundi is higher by 0.5 compared to those firms that are constrained (see Table 2.11.2). Just like in Nigeria, the growth is higher when sales growth outcome is used (see Table 2.11.1). This trend is the same across all countries with the highest growth being experienced

in Morrocco, where the productivity of firms not financially constrained is higher by 0.9 as compared to the financially constrained firms, on average (Table 2.11.2).

In Ghana, 486 financially constrained firms were matched with 233 financially unconstrained firms (Table A1). The results were statistically significant in all the matching methods, with nearest neighbor (Mahalanobis) and local linear regression matching showing the highest productivity growth of 0.7, on average (Table 2.11.2). This demonstrates that firms not financially constrained experience higher productivity compared to those that are financially constrained in Ghana, *ceteris paribus*.

We had 523 firms in the sample for Malawi. 344 financially constrained firms are matched with 149 unconstrained firms on the sales growth outcome variable, and 316 financially constrained against 199 not constrained when using labor productivity outcome (Table A1). The results were not statistically significant in the Mahalanobis nearest neighbor matching but were significant across all the other matching methods (Table 2.11.2). These regression results show that financially unconstrained firms' productivity is higher by 0.4 on average, as compared to those that are financially constrained. The growth is even higher and more significant at 5% significance level, when using the sales growth outcome (Table 2.11.1).

Out of the 407 firms in the sample from Morocco, we matched 245 financially constrained firms with 152 unconstrained firms when using labor productivity outcome, and the objective first measure of financial constraints. Among all the countries in the sample, Moroccoan firms demonstrated the highest growth across all the matching techniques used. Firms not financially constrained have a productivity of 0.9 higher on average, compared to those that are financially constrained (Table 2.11.2). Just as in other countries, the growth is higher when sales growth outcome is used and highly significant at 1% significance level (Table 2.11.1). The impact is positive across all the three measures of financial constraints.

The sample had 601 firms in Senegal, we matched 337 financially constrained firms with 257 unconstrained firms when using labor productivity outcome, and the objective first measure of financial constraints. Other firms were trimmed because they were off the support. The regression results indicate a consistent positive impact of firm financing on labor productivity and sales

growth, across the different measures of financial constraints. For instance in Table 2.11.2, firms that are not financially constrained had a productivity growth of 0.8 higher than the financially constrained firms on average, *ceteris paribus* (Table 2.11.2). The results are significant at 1% significance level. The growth is higher when using sales growth outcome than labor productivity.

The sample had 781 firms from Kenya, among which 466 financially constrained firms were matched against 256 unconstrained firms using labor productivity outcome and the first measure of financial constraints (see Table A1). The productivity of firms that are not financially constrained is higher by 0.3 compared to those that are financially constrained (Table 2.11.2). The effect is however not statistically significant when using sales growth outcome (Table 2.11.1). The effect is positive across all the measures of financial constraints, demonstrating that financing firms improves firm growth and performance.

Results in Ethiopia portray a positive effect of financing on firms' growth using the objective measure of financial constraints. The sample had 848 firms, among which 480 financially constrained firms were matched against 361 treated firms using labor productivity outcome measure of firm growth and performance (Table A1). The productivity of firms that are not financially constrained is higher by 0.6 compared to those that are financially constrained, on average. These results however, get contrasted when using the subjective measures of financial constraints, which indicated a negative effect (Tables 2.11.4 and 2.11.5).

In the Democratic Republic of Congo we had 529 firms in the sample, 522 and 508 firms were within the support during the matching process, when using the labor productivity and sales growth outcome respectively. The regression results for the DRC indicate a significant positive impact of firm financing on labor productivity and sales growth, regardless of the measure of financial constraints used. For instance, when using the objective measure of financial constraints, the results show a growth in sales which is higher by 2.2 for the firms that are not financially constrained, as compared to the firms that are financially constrained (Table 2.11.1).

Summing it up, the matching regression results suggest a strong and significant effect of financing on growth, with an exception of Ethiopia and Kenya which portrays mixed results depending on the measure of financial constraints used. They however portray positive effect when using the

first measure of financial constraints which is the objective measure among the measures used (Tables 2.11.1 and 2.11.2).

Table 2.11.1 Regression results for the first measure of financial constraints, (Sales growth dependent variable)

	Nearest Neighbor			Nonparametric Matching	
Country	Mahalanobis	Euclidean	IPWRA	Kernel	Local_Linear
Namibia	1.461***	1.794***	1.327***	1.147**	1.153
	(0.531)	(0.465)	(0.352)	(0.532)	(7.150)
Nigeria	1.214**	1.170**	0.662	0.571	0.415
	(0.616)	(0.511)	(0.446)	(0.554)	(0.480)
South Sudan	1.313	1.621**	0.830	0.894	1.122
	(1.557)	(0.740)	(0.710)	(1.177)	(1.452)
Ghana	1.590***	0.627**	1.629***	0.393	0.793
	(0.485)	(0.318)	(0.460)	(0.461)	(0.521)
Burundi	1.113**	1.284***	0.613	0.325	0.366
	(0.470)	(0.489)	(0.414)	(0.547)	(0.554)
Malawi	0.731	0.959**	0.819**	0.958**	0.948**
	(0.516)	(0.472)	(0.369)	(0.459)	(0.446)
Morocco	1.176***	1.085**	0.592**	0.691**	0.803
	(0.424)	(0.434)	(0.295)	(0.327)	(0.965)
Senegal	0.993**	1.133**	0.890***	0.822**	0.767
	(0.484)	(0.513)	(0.343)	(0.408)	(0.665)
Kenya	0.181	0.318	0.278	0.261	0.239
	(0.549)	(0.551)	(0.389)	(0.429)	(0.463)
Ethiopia	1.075***	1.064***	0.956***	0.852***	0.905***
	(0.242)	(0.265)	(0.216)	(0.230)	(0.184)
DRC Congo	2.178***	2.076***	2.214***	-1.424	-1.609
	(0.658)	(0.624)	(0.760)	(2.060)	(1.969)

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Note: Sales growth is the log of the difference between sales 3 years ago and current sales. IPWRA is the inverse probability weighted regression adjustment. The first measure of financial constraints groups firms as constrained if the firm had no loan or overdraft but had applied for credit. Unconstrained are those who did not or had loans or overdraft but had not applied for any.

Table 2.11.2 Regression results for the first measure of financial constraints, (Labor productivity dependent variable)

	Nearest Neighbor			Nonparametric Matching	
Country	Mahalanobis	Euclidean	IPWRA	Kernel	Local_Linear
Namibia	0.832***	0.724***	0.708***	0.770**	0.726**
	(0.302)	(0.277)	(0.269)	(0.311)	(0.353)
Nigeria	0.443	0.518*	0.494**	0.374	0.344
	(0.415)	(0.296)	(0.250)	(0.282)	(0.221)
South Sudan	0.0619	0.934***	0.433	0.498	0.486
	(0.631)	(0.346)	(0.403)	(0.447)	(0.456)
Ghana	0.707*	0.597*	0.497*	0.511*	0.722**
	(0.400)	(0.339)	(0.263)	(0.294)	(0.339)
Burundi	0.334	0.365	0.496**	0.552**	0.625
	(0.265)	(0.347)	(0.223)	(0.268)	(0.494)
Malawi	1.243	0.636**	0.467*	0.400**	0.480*
	(0.769)	(0.281)	(0.272)	(0.178)	(0.279)
Morocco	1.046***	0.902***	0.891***	0.879***	0.870***
	(0.272)	(0.297)	(0.190)	(0.190)	(0.186)
Senegal	0.486	0.563	0.769***	0.819***	0.797***
	(0.340)	(0.364)	(0.236)	(0.282)	(0.297)
Kenya	0.339**	0.339**	0.329**	0.199	0.189
	(0.165)	(0.165)	(0.146)	(0.169)	(0.165)
Ethiopia	0.637***	0.689***	0.665***	0.615***	0.620***
	(0.166)	(0.158)	(0.141)	(0.132)	(0.147)
DRC Congo	-0.927	-0.117	-0.451	-0.379	-0.487
	(0.970)	(0.455)	(0.470)	(0.415)	(0.646)

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Note: Labor productivity is the log of the ratio of sales to the number of employees, IPWRA is the inverse probability weighted regression adjustment. The first measure of financial constraints groups firms as constrained if the firm had no loan or overdraft but had applied for credit. Unconstrained are those who did not or had loans or overdraft but had not applied for any.

Table2.11.3 Regression results for the second measure of financial constraints, (Sales growth dependent variable)

	Nearest Neighbor			Nonparametric Matching	
Country	Mahalanobis	Euclidean	IPWRA	Kernel	Local Linear
Namibia	1.447**	0.886**	0.732*	0.203	-2.648
	(0.715)	(0.425)	(0.398)	(0.412)	(2.184)
Nigeria	1.249***	0.916**	0.750**	0.835***	0.809**
	(0.423)	(0.356)	(0.310)	(0.281)	(0.329)
South Sudan	0.813	1.543*	0.804	2.240***	2.298***
	(0.834)	(0.915)	(0.943)	(0.658)	(0.682)
Ghana	1.309**	1.465**	0.990**	1.284**	1.223***
	(0.564)	(0.574)	(0.478)	(0.524)	(0.398)
Burundi	-0.0579	0.0265	0.258	-0.335	-0.703
	(0.989)	(0.731)	(0.481)	(0.466)	(0.433)
Malawi	0.0316	0.336	0.0841	0.0686	0.0656
	(0.492)	(0.464)	(0.408)	(0.374)	(0.329)
Morocco	1.268*	0.559*	0.345	0.254	0.298
	(0.664)	(0.315)	(0.263)	(0.375)	(0.346)
Senegal	0.881**	0.941**	1.603***	0.276	0.0984
	(0.377)	(0.381)	(0.467)	(0.361)	(0.602)
Kenya	0.983	1.314**	1.073***	1.041	0.978*
	(0.732)	(0.541)	(0.398)	(0.636)	(0.568)
Ethiopia	-0.467	-0.386	-0.248	-0.276	-0.381
	(0.298)	(0.252)	(0.208)	(0.229)	(0.243)
DRC Congo	0.0113	-0.257	-0.0969	-0.0248	-0.189
	(0.734)	(0.675)	(0.497)	(0.611)	(0.542)

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Note: Sales growth is the log of the difference between sales 3 years ago and current sales., IPWRA is the inverse probability weighted regression adjustment. The second measure of financial constraints groups firms as constrained if they stated finance to be an obstacle, and unconstrained if they stated that finance was not an obstacle.

Table2.11.4 Regression results for the second measure of financial constraints, (Labor productivity dependent variable)

	Nearest Neighbor			Nonparametric Matching	
Country	Mahalanobis	Euclidean	IPWRA	Kernel	Local Linear
Namibia	0.866**	0.877***	0.913***	0.956**	2.511**
	(0.401)	(0.328)	(0.276)	(0.415)	(1.074)
Nigeria	-0.154	0.362*	0.194	0.167	0.181
	(0.253)	-0.215	(0.173)	(0.176)	(0.152)
South Sudan	-0.137	-0.0735	-0.0809	-0.256	-0.236
	(0.586)	(0.370)	(0.365)	(0.288)	(0.347)
Ghana	0.850*	0.758**	0.607*	0.618*	0.599*
	(0.501)	(0.381)	(0.346)	(0.326)	(0.307)
Burundi	-0.359	-0.272	-0.00447	-0.275	2.441*
	(0.543)	(0.618)	(0.307)	(0.359)	(1.456)
Malawi	-0.127	-0.339	0.165	0.511*	0.262
	(0.441)	(0.310)	(0.307)	(0.304)	(0.293)
Morocco	0.331*	0.331*	-0.185	-0.174	-0.193
	(0.173)	(0.173)	(0.206)	(0.228)	(0.233)
Senegal	0.742***	0.745***	0.102	0.202	0.122
	(0.234)	(0.257)	(0.248)	(0.245)	(0.435)
Kenya	0.485	0.322	0.383**	0.366*	0.382*
	(0.314)	(0.222)	(0.179)	(0.191)	(0.195)
Ethiopia	-0.307*	-0.276*	-0.213	-0.215	-0.226
	(0.166)	(0.155)	(0.141)	(0.132)	(0.152)
DRC Congo	0.338	0.0938	-0.218	-0.180	-0.283
	(0.654)	(0.486)	(0.405)	(0.360)	(0.430)

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Note: Labor productivity is the log of the ratio of sales to the number of employees, IPWRA is the inverse probability weighted regression adjustment. The second measure of financial constraints groups firms as constrained if they stated finance to be an obstacle, and unconstrained if they stated that finance was not an obstacle.

Table 2.11.5 Regression results for the third measure of financial constraints, (Sales growth dependent variable)

	Nearest Neighbor			Nonparametric Matching	
Country	Mahalanobis	Euclidean	IPWRA	Kernel	Local Linear
Namibia	1.181***	1.679***	1.102***	0.820**	3.524*
	(0.382)	(0.366)	(0.421)	(0.351)	(2.029)
Nigeria	1.102***	0.807***	0.725***	0.00784	0.0326
	(0.421)	(0.313)	(0.262)	(0.232)	(0.236)
South Sudan	-0.449	-0.504	-0.676	-0.118	-0.185
	(1.193)	(0.722)	(0.652)	(0.753)	(0.889)
Ghana	0.998**	1.018**	0.581*	0.664*	0.671*
	(0.473)	(0.428)	(0.343)	(0.356)	(0.365)
Burundi	0.557	-0.183	0.405	0.112	0.160
	(0.705)	(0.637)	(0.705)	(0.472)	(0.493)
Malawi	0.579	0.945*	0.714**	0.795**	0.718*
	(0.454)	(0.487)	(0.351)	(0.362)	(0.389)
Morocco	0.839*	-0.284	-0.293	-0.214	-0.195
	(0.469)	(0.458)	(0.302)	(0.364)	(0.775)
Senegal	1.069***	1.283***	0.687**	0.811**	0.863
	(0.380)	(0.382)	(0.331)	(0.378)	(3.294)
Kenya	0.252	0.463	0.172	0.0580	-0.0434
	(0.480)	(0.442)	(0.354)	(0.429)	(0.450)
Ethiopia	-0.286	-0.378	-0.249	-0.288	-0.349*
	(0.285)	(0.265)	(0.197)	(0.281)	(0.201)
DRC Congo	1.156**	1.156**	0.330	0.234	0.188
	(0.480)	(0.480)	(0.469)	(0.470)	(0.609)

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Note: Sales growth is the log of the difference between sales 3 years ago and current sales. IPWRA is the inverse probability weighted regression adjustment. The third measure of financial constraints groups firms as constrained if they reported finance to be a moderate, major and severe obstacle, and unconstrained if they reported finance to be a minor or no obstacle.

Table 2.11.6 Regression results for the third measure of financial constraints, (Labor productivity dependent variable)

	Nearest Neighbor			Nonparametric Matching	
Country	Mahalanobis	Euclidean	IPWRA	Kernel	Local Linear
Namibia	0.794**	1.162***	1.132***	1.155***	1.124
	(0.340)	(0.262)	(0.233)	(0.220)	(0.837)
Nigeria	-0.150	-0.0865	-0.125	-0.167	-0.147
	(0.217)	(0.148)	(0.129)	(0.116)	(0.136)
South Sudan	-0.584**	-0.514*	-0.343*	-0.399***	-0.410**
	(0.291)	(0.293)	(0.199)	(0.155)	(0.193)
Ghana	0.784*	0.433	0.295	0.294	0.289
	(0.415)	(0.281)	(0.250)	(0.233)	(0.280)
Burundi	0.667**	0.661*	0.425*	0.498**	0.843**
	(0.288)	(0.366)	(0.248)	(0.245)	(0.348)
Malawi	0.154	0.210	0.479**	0.442**	0.407*
	(0.251)	(0.261)	(0.221)	(0.182)	(0.245)
Morocco	-0.259	-0.249	-0.290	-0.242	-0.305
	(0.277)	(0.241)	(0.214)	(0.245)	(0.187)
Senegal	0.705*	0.778***	0.719***	0.795***	0.830***
	(0.377)	(0.278)	(0.259)	(0.256)	(0.283)
Kenya	0.120	0.297	0.367**	0.374**	0.348**
	(0.199)	(0.193)	(0.155)	(0.146)	(0.168)
Ethiopia	-0.120	-0.104	-0.00471	-0.0123	-0.00748
	(0.163)	(0.155)	(0.133)	(0.117)	(0.123)
DRC Congo	0.551*	0.551*	0.114	0.170	0.159
	(0.293)	(0.293)	(0.378)	(0.370)	(0.473)

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Note: Labor productivity is the log of the ratio of sales to the number of employees; IPWRA is the inverse probability weighted regression adjustment. The third measure of financial constraints groups firms as constrained if they reported finance to be a moderate, major and severe obstacle, and unconstrained if they reported finance to be a minor or no obstacle.

2.12 Sensitivity analysis for hidden bias

Considering that firm performance and growth may be affected by unobserved variables that we have not included in the model, this may result into hidden bias, due to deviations from the identifying assumption. The hidden bias may either lead to overestimation or underestimation of the results. The bias may be as a result of simultaneous effect of unobservable variables that affect

both financial constraints as well as firm performance. We address this by carrying out sensitivity analysis test using the Rosenbaum Bounds recommended by (Rosenbaum, 2005).

In this method of sensitivity analysis, we introduce a sensitivity parameter Γ (gamma), that measures the degree of departure from random treatment assignment (Cattaneo, 2010). At a value of Γ equal to 1, no sensitivity analysis is needed since this is equivalent to random assignment of treatment. However, in an observational study like this one, the value of Γ is unknown, since we are not certain of how the unobserved covariates differ between the treated and untreated firms at baseline.

We therefore introduce various values of Γ to assess how sensitive our results are at different values of Γ and how it can affect our conclusions. The question we ask here is "can small departures from random assignment affect our conclusion or we need very large departures from random assignment to affect our conclusions?" This can be answered by varying the value of Γ and assessing the statistical significance of the resulting P-value of the lower and upper bounds. If the P-value is small even at higher values of Γ, then our results are not sensitive to hidden bias and vice versa (Cattaneo, 2010). In our analysis, we vary the value of Γ between 1 and 7, and find very low P-values (Table 2.12.1). This shows that our results are not very sensitive to hidden bias, implying that we can draw conclusions based on our matching results (Table 2.12.1).

Table 2.12.1: Sensitivity analysis test results

Gamma (Γ)	**P-critical**		
	First measure of financial constraints	**Second measure of financial constraints**	**Third measure of financial constraints**
1	0.2118	0.1035	0.5742
2	0.0000	0.0017	0.0131
3	0.0784	0.0000	0.0000
4	0.0296	0.0000	0.0000
5	0.0114	0.0000	0.0000
6	0.0044	0.0000	0.0000
7	0.0000	0.0000	0.0000

Note: These results are for one representative country (Senegal), but the same trend is portrayed across the 11 countries in the sample.

2.13 Robustness checks

For purposes of verifying our results, we estimate the quantile effects across the potential outcome distributions. We do the matching at different quantiles to establish whether the financial access effect is the same across the distributions. We estimate the pairwise contrast effect in which we jointly estimate the effect of firm financing assuming all the firms were treated. For instance if all firms were offered credit, what effect would it create to those at lower, middle and higher productivity and sales distributions. In this case we use semi-parametric efficient estimators proposed by Cattaneo (2010). We use a properly re-weighted inverse-probability weighted estimator and an efficient influence function, both of which are consistent, efficient and asymptotically normal due to the double robustness property that they possess (Cattaneo, 2010).

Using the three measures of financial constraints as used in the propensity score matching, we estimate the pairwise treatment effects with labor productivity and sales growth as dependent variables. Results in Table 2.13.1 indicate that financing impacts on firms differently depending on the productivity level of the firm. The p-values represent results of a joint hypothesis test within and across treatment levels. The null hypothesis is that the effects are equal across all quantiles. As per the results, we reject the null hypothesis that the effects are all the same, across all the three quantiles.

Highly productive firms seem to benefit more from financing than low productive firms. This can be clearly seen in results for Morocco, Ethiopia, Malawi, Kenya, Ghana, Burundi and DRC in Table 2.13.2. Like in the Democratic Republic of Congo, the firms at the lower sales growth distribution even experience declining sales growth if financed. Table 2.13.2 results portray financing to be a key ingredient for growth. The results are in line with the matching regression results. Labor productivity improves when all firms are financed, but highly productive firms benefit more than low productive firms. But in both cases, finance improves growth of firms.

Table 2.13.1: Pairwise comparison effects for Not financially constrained vs Financially constrained (Sales growth Outcome)

Financial Constraint Measure	Q25	Q50	Q75	Prob>chi2	Q25	Q50	Q75	Prob>chi2
	Namibia				**Morocco**			
FC1	0.6653	0.9614	0.6931	0.0000	0.6931	0.4055	0.9985***	0.0002
FC2	1.6098**	1.3471***	0.4873	0.0000	0.0629	0.8109***	0.0870	0.0004
FC3	1.7272***	1.8372***	1.3762***	0.0000	0.0363	0.6931***	-0.3102	0.0006
	Nigeria				**Senegal**			
FC1	0.2624	0.5621	-0.2231	0.0008	0.8755**	-0.0953	0.4890	0.0007
FC2	0.0000	-0.1566	1.2591***	0.0040	0.6931	0.2231	0.4308	0.0050
FC3	-0.0408	-0.5500***	0.2877	0.0020	0.6931*	0.3010	1.6094***	0.0010
	South Sudan				**Kenya**			
FC1	0.3452	0.0000	-2.0685	0.0014	0.2877	-0.2336	-0.9591*	0.0000
FC2	3.3646***	2.3548**	1.6024	0.0021	-0.2168	0.6391	1.3822**	0.0000
FC3	-1.0325	-0.3465	-1.7898	0.0004	-0.5596**	-0.0279	0.2970	0.0000
	Ghana				**Ethiopia**			
FC1	0.1519	0.8910*	1.3218*	0.0000	0.4308	1.0432***	1.2040	0.0000
FC2	-0.0488	-0.3798	1.3483	0.0007	-0.1823	-0.0455	-0.2745	0.0000
FC3	0.1744	-0.2301	0.4898	0.0004	-0.1881	-0.2393	-0.3567	0.0000
	Burundi				**DRC**			
FC1	-0.0021	0.5445	1.1475**	0.0002	0.5614	-0.2288	-0.4905	0.0002
FC2	0.2231	-0.4453	-0.8777	0.0017	-0.4202	-0.0797	1.6069**	0.0004
FC3	0.5108	-0.4514	0.6477	0.0005	-0.6025*	0.0316	1.8285***	0.0000
	Malawi							
FC1	0.6931	1.4917***	0.4055	0.0000				
FC2	-0.3376	-0.2007	0.0465	0.0006				
FC3	-0.2064	0.4700	1.1672***	0.0008				

*** p<0.01, ** p<0.05, * p<0.1 **Note:** FC1 is financial constraint measure 1, FC2 is measure 2, and FC3 is measure 3. The P-values represent results of a joint hypothesis test within and across treatment levels

Table 2.13.2: Pairwise comparison effects for Not financially constrained vs Financially constrained (Labor productivity outcome)

Financial Constraint Measure	Q25	Q50	Q75	Prob>chi2	Q25	Q50	Q75	Prob>chi2
	Namibia				**Morocco**			
FC1	0.9904***	0.6539**	0.5563	0.0006	0.7564***	0.7340***	1.0844***	0.0000
FC2	1.3110***	1.3863***	1.0761***	0.0030	0.1178	0.0672	0.6099***	0.0000
FC3	1.3575***	1.5581***	1.6740***	0.0000	0.1054	0.0593	0.3907*	0.0020
	Nugeria				**Senegal**			
FC1	0.4986***	0.3747*	0.2231	0.0000	1.0536***	1.0042***	0.7314*	0.0000
FC2	-0.1229	-0.2187**	0.1023	0.0004	1.0704**	0.6061**	-0.2640	0.0007
FC3	-0.1360	-0.2076*	-0.1956	0.0000	0.7621***	0.8961***	0.5361**	0.0000
	South Sudan				**Kenya**			
FC1	0.1013	-0.2231	0.2271	0.0009	0.3080	0.2995**	-0.1574	0.0001
FC2	-1.5783**	-0.2231	-0.0945	0.0000	0.0000	0.0984	0.2187	0.0011
FC3	-0.7885***	-0.3556**	-0.1209	0.0003	0.0905	0.2045	0.2624*	0.0021
	Ghana				**Ethiopia**			
FC1	0.3567	0.5941	0.5845**	0.0000	0.6568***	0.6041***	0.8798***	0.0070
FC2	-0.4182	-0.1888	0.1178	0.0050	-0.1460	-0.0678	-0.0534	0.0000
FC3	-0.0843	-0.1585	-0.0588	0.0000	-0.1460	-0.0228	0.2470	0.0008
	Burundi				**DRC**			
FC1	0.1805	0.3501	1.0033***	0.0006	0.1279	-0.1482	-1.3306**	0.0002
FC2	-0.0891	0.2753	-0.3924	0.0050	-0.5044	-0.0715	1.0475	0.0004
FC3	0.4230	0.5355***	-0.0220	0.0010	-0.7819***	0.1726	1.1104***	0.0000
	Malawi							
FC1	0.4543*	0.4925**	0.7156***	0.0008				
FC2	-0.4318	-0.3201	0.4402	0.0003				
FC3	0.2231	0.3900**	0.6268**	0.0004				

*** p<0.01, ** p<0.05, * p<0.1 **Note:** FC1 is financial constraint measure 1, FC2 is measure 2 and FC3 is measure 3. The P-values represent results of a joint hypothesis test within and across treatment levels.

2.14 Conclusion

Using a sample of 8,560 firms from the World Bank Enterprise survey data set, we investigated the extent to which firms in 11 African countries were financially constrained. Furthermore, we also investigated the impact of financial constraints on firm growth. The study found that approximately 91% of the firms in the sample were financially constrained when using the objective measure of financial constraints, 78% and 57% of the firms were financially constrained when using the second and third subjective measures of financial constraints respectively. This means that at least 57% of the firms in Sub-Saharan Africa were financially constrained. This problem of financial constraints may be associated with information asymmetry, lack of collateral, inadequate credit history to ascertain credit worthiness by banks, and even high risk premiums. Financial constraints therefore continue to prevail despite various interventions made in Africa, by both national and international organizations.

Having found evidence of the extent of financial constraints, we developed both objective and subjective measures of financial constraints based on firm level survey data. These measures are firm specific and take care of firm heterogeneity unlike the aggregate measures used in previous studies. We used these measures to classify firms as either financially constrained or unconstrained, which formed our treatment variable in the propensity score matching technique. The study found a positive effect of firm financing on labor productivity and sales growth, implying that access to finance promotes firm growth. We however recognize the diverse relationship across the various countries especially on sales growth.

The study also found that firm financing impacts on firm growth and labor productivity differently, depending on whether the firm is in the lower, middle or higher level of labor productivity and sales growth distribution. Despite the fact that all firms benefit from financing, the effect seems to be more significant and felt on the highly productive firms. It is therefore advisable for policy makers, banks and other financing agencies to target financing the right segment of firms to ensure sustainable growth.

We however note that the study was limited to cross sectional data which implies that we could not take care of the effect of unobservable factors and other growth dynamics. We therefore

recommend the use of experimental or panel data in future studies in order to better infer a causal link between finance and growth, and deal with the endogeneity problem as a whole.

Appendix

Table A1: Matched sample that falls in the common support across 11 countries

	Sales Growth			**Labor Productivity**		
	FC1	FC2	FC3	FC1	FC2	FC3
Nigeria						
Untreated	1,735	1,568	1,846	1,788	1,678	1,554
Treated	851	840	811	824	940	954
Namibia						
Untreated	340	274	352	276	347	321
Treated	131	172	211	247	221	223
South Sudan						
Untreated	424	416	419	452	437	434
Treated	281	312	286	275	232	258
Ghana						
Untreated	378	389	458	466	486	449
Treated	302	324	243	230	223	226
Burundi						
Untreated	100	98	89	94	100	77
Treated	50	46	52	61	42	65
Malawi						
Untreated	340	344	313	304	327	316
Treated	155	149	159	215	159	199
Morocco						
Untreated	284	204	286	245	254	232
Treated	120	188	101	152	137	159
Senegal						
Untreated	330	340	331	337	355	316
Treated	238	227	252	257	237	274
Kenya						
Untreated	452	439	485	466	462	419
Treated	261	280	291	256	260	303
Ethiopia						
Untreated	406	478	484	480	481	481
Treated	343	365	356	361	399	320
DRC						
Untreated	318	301	326	305	311	316
Treated	190	217	187	217	213	204

The table presents the number of firms that were matched after trimming those which were off the common support, using each dependent variable (Sales growth and labor productivity outcome measures).

Note: FC1 is the first measure of financial constraints, FC2 is the constraint measure two and FC3 is the third constraint measure.

CHAPTER THREE

FORMAL VERSUS INFORMAL FINANCE: EVIDENCE FROM SELECTED AFRICAN FIRMS

3.0 Introduction

Firms play a very important role in the economy. They serve as agents of change by their entrepreneurial activity and they are a source of innovative activity. They also stimulate industrial evolution and create new jobs (X. Huang et al., 1997). In addition, firms contribute in poverty reduction, since they are major job creators across the world (Ayyagari, Beck, & Demirguc-Kunt, 2007; Ayyagari, Demirguc-Kunt, & Maksimovic, 2011; Haltiwanger et al., 2013; Haltiwanger, Scarpetta, & Schweiger, 2014; Kuntchev et al., 2014). Firms also increase tax contributions for public investment and generate export revenue which helps in promoting growth and development. In this regard, the growth of firms can provide clear insights on the growth of the aggregate economy.

One important factor when it comes to firm growth and performance is the availability of financing. Firm financing sources can be either formal or informal. Formal financing sources comprise those institutions regulated both by the government and the central bank, while the informal markets operate beyond the regulatory framework of the financial system (Zeller, 1994). Informal sources include loans from unregistered money lenders, family and friends, savings and credit associations, suppliers' credit and non-governmental organizations. On the other hand, formal sources include: bonds, equity premium and capital, and borrowings from banks and other non-bank financial institutions.

In developing countries, the formal and informal sectors coexist despite the spirited efforts of financial liberalization. These two sectors complement each other, implying that firms can simultaneously benefit from both sources. In most circumstances, formal sectors provide capital for fixed investment, since they are well suited for long term credit, while informal sector complements this by providing the firm with working capital (Ghate, 1992). Furthermore, sometimes they complement each other by financing the same purpose. The banks may ration credit to minimize risk of adverse selection and meeting the credit control regulations, but

borrowers will resort to informal credit for the unmet demand. The banks also act as a source of funds to the moneylenders who on lend the money informally (Ghate, 1992).

The informal markets develop under circumstances where the formal financial institutions are either depressed or there exists some credit rationing as a result of informational asymmetries (Stiglitz & Weiss, 1981). They however cannot fully substitute the formal markets, because their monitoring and enforcement skills are ill equipped to serve the higher end of the market (Ayyagari, Demirgüç-Kunt, & Maksimovic, 2010). They only provide credit to those targets that have either been ignored by the formal markets or have not had enough satisfaction from financial institutions. Especially in rural areas, where distance to formal lending institutions is a key barrier to financial access, and small and medium enterprises that need short term small loans.

Differences in lending terms and conditions influence the choice between formal and informal credit among firms. The unique characteristics of services offered by formal and informal markets bring about the segmentation and co-existence of both (Atieno, 2001). Informal finance is regarded as residual finance that caters for the excess demand of those excluded from formal finance. However, the informal and formal sector offer similar but not homogenous products (Atieno, 2001). Informal finance has an informational advantage while formal finance is scalable depending on demand (Degryse, Lu, & Ongena, 2016a).

In addition, it is highly personalized with face-to-face interactions between lenders and borrowers, very flexible on loan rescheduling and even the interest rates charged (Ghate, 1992). It is mostly preferred by small firms, since it is easily accessible at the doorstep with minimal regulation and collateral requirements, and for the fact that it can be given in smaller amounts with flexible repayment period. In this case reliance on informal finance avoids regulatory scrutiny and harassment in the formal sector which is highly regulated (Safavian & Wimpey, 2007).

The informal sector also reduces many selection and enforcement problems which may not be handled by the formal financial markets. They are therefore able to cater for the small enterprises that lack collateral and the required documentation to secure the loans. Informal finance is however limited in the sense that informal loans tend to be short term with high interest rates (Degryse et al., 2016a). They also tend to cater for the social networks and relationships which result in other

entrepreneurs being excluded due to lack of social networks and relations with the money lenders (Christensen, 1993).

The formal finance on the other hand offers low interest rates since they are allowed to take deposits. They can as well scale up credit to keep up with demand (Degryse et al., 2016a). They are also able to offer long term loans since they rely on pooling deposits. This mostly caters for the large firms since they can only service the needs of the enterprise owners who can provide collateral or documented references. In this case, small and poor entrepreneurs will seek alternative financing since they may not have collateral needed, or they may need small loans which may render high administration costs for the banks (Tang, 1995). In addition, the formal sector loans are highly standardized with regulations relating to auditing and monitoring, liquidity requirements and regulated interest rates, which at the end increases transaction costs. The higher transaction costs are reflected in the lending terms and conditions, which may make it unattractive.

Previous research on firm financing patterns reveal that firms source more than half of their working capital from external financial sources (Safavian & Wimpey, 2007). Of this half, 54% of the external finance is sourced formally while 46% is from informal sources, and on average, an approximate of 14% of these enterprises exclusively prefer informal finance (Safavian & Wimpey, 2007). In Africa for instance, only 20 percent of households have access to formal financial services (Aterido, Beck, & Iacovone, 2013). This reflects directly to firms' access since individual households are the entrepreneurs.

Research has however been divided on which form of finance contributes more to growth. For instance Ayyagari et al. (2010), found that firms that have access to more formal external financing tend to perform well and thus grow faster than those using informal finance. However, other researchers have found alternative financing other than formal bank finance to be the major drivers of firm growth especially in China (Allen, Qian, & Qian, 2005; Linton, 2006). This makes the debate inconclusive and this study seeks to contribute to this unresolved debate. We also note that much of the analysis that has been done previously has been limited to small and medium enterprises. This is due to the fact that small and medium firms are regarded as the ones who mostly use informal finance, and are regarded to be financially constrained. We note that the use of formal

versus informal finance cuts across all kinds of firms regardless of size. It will therefore be prudent to consider all kinds of firms regardless of size or financial status.

This study fills these gaps by using the World Bank Enterprise Survey data to examine firms of all sizes across 13 African countries. The study uses the relative distribution and recentered influence function methodologies to examine the extent to which firms choose informal financing sources, analyze the factors that influence their choices, and whether there are factors unique to those using informal/formal finance, and if this contributes to the difference in their performance and growth.

3.1 Research Questions

We contribute to the financing literature by seeking to answer the following questions:

i. What is the extent of the use of informal financing sources in relation to formal financing by African firms?

ii. Is there a growth differential between firms that use informal forms of finance and those that use formal financing sources?

iii. If the differential exists, which form of financing is more growth enhancing?

3.2 Study Objectives

The main objectives of this study include:

i. To analyze the extent of the use of informal financing sources in relation to formal financing by African firms,
ii. To investigate which form of financing is more growth enhancing between formal and informal financing sources.

3.3 Scope of the study

The study covers 13 African countries which have data in more recent years (2013-2016), those with same globally comparable variables and uniform methodology of implementation in the core questionnaires. We also take note of regional representation in the Sub-Saharan region; Northern Africa(Morocco); East and horn of Africa(Kenya, South Sudan, Ethiopia); Central Africa(Burundi, Cameroon, DRC Congo); Southern Africa(Malawi, Namibia, Zimbabwe); West

Africa(Nigeria, Ghana, Senegal). Most studies done in this area have focused on small and medium enterprises, maybe because they are believed to be the ones financing their working capital using informal sources. Others have only considered traded firms in which they use macro-level quantitative data, in which all firms are still large even though some are grouped to be small. This study takes into consideration all firms regardless of size, using the World Bank enterprise survey data set. We give this a micro approach to investigate issues that would be difficult to understand on a macro perspective.

3.4 Justification of the study

A number of studies have been done that examine the differences and interlinkages between formal and informal finance. Due to data limitations, empirical studies in the existing literature have concentrated on bank debt Ghosh (2007; Hooks (2003), not taking into account the possibility of firms substituting other forms of finance like money lenders and supplier (trade) credit. In addition, most researchers in this area have given emphasis to Chinese firms (Allen, Qian, & Qian, 2005; Ayyagari, Demirgüç-Kunt, & Maksimovic, 2010; Degryse, Lu, & Ongena, 2016; Kensuke & Molnar, 2008; Yang, 2011). This study contributes to this literature by giving it an African firms' dimension.

Within this literature there is no consensus on whether the formal-informal finance divide exists, and if it does which form of financing is most highly associated with high firm growth and performance. For instance, Ayyagari et al. (2010) argue that firms that have access to more formal external financing tend to perform well and thus grow faster, while Allen et al. (2005) and Linton (2006) report that alternative financing other than formal bank finance are the major drivers of firm growth. On the other hand, Degryse et al. (2016) report a differentiated impact on growth for small and large firms, whereby informal finance seems to be promoting sales growth among small firms and lower sales growth in large firms. This makes the debate inconclusive. This study extends this literature by analyzing this concept in the context of African firms where informal finance is dominant. The study findings add to the results reported by Allen et al. (2005), Ayyagari et al. (2010) and Degryse, Lu, & Ongena (2016), but we give an African firms' dimension, using firm level survey data which has globally comparable variables.

The study employs micro-econometric techniques to investigate the extent of the usage of informal financing as opposed to formal financing by African firms, find out if there exists a growth differential between firms using informal finance relative to those using formal finance. Alternatively, we want to find out which financing source is more growth enhancing between the two sources.

3.5 Literature Review

Introduction

This chapter reviews the development of past studies on formal versus informal firm financing and firm growth. It begins by highlighting the theoretical underpinnings behind the use of formal and informal firm financing. It then proceeds to give the empirical literature regarding this subject matter.

3.5.1 Theoretical Literature

In this section we explain the theoretical model and explanations for the existence of formal and informal sectors in the credit market, how it impacts on firms' choice between the two, and its eventual effect on firm growth and performance.

Informal credit as a choice Vis a Vis last resort

The theoretical literature portray informal lenders as recipients of the spillover demand from the formal sector (S. Boucher & Guirkinger, 2007). This explains the informal sector as a lender of last resort for firms that are quantity-rationed in the formal sector (Stiglitz & Weiss, 1981). The quantity rationing can be as a result of limited information by formal sectors which make them demand collateral to overcome moral hazard. Those firms that do not have collateral will be involuntarily excluded from formal credit and eventually turn to informal lenders, who will finance them on grounds of informational advantage which in this case substitutes for collateral (Stiglitz, 1990).

The informal sector can also be a sector of choice other than being viewed as a sector of last resort. This is because informal loans especially those from family, friends and relatives may be cheaper to borrowers. In addition, high transaction costs on formal loans like application fees results in some entrepreneurs preferring informal credit. Due to informational advantage by informal

lenders, application procedures are easier and less costly. As a result the effective cost of informal loans is below the effective cost of formal loans, and thus making the informal loans a preference for some entrepreneurs, despite the high interest rates (Guirkinger, 2008).

Informal sector may also be preferred because of contractual risks involved. Informal sector contracts are not as risky to borrowers as the formal sector contracts. Informal lenders write contacts that are more state-contingent than those in the formal sector, making it less risky for informal credit, thus becoming a preference for some borrowers (Guirkinger, 2008). In addition, informal lenders offer direct screening and close monitoring and thus are efficient in loan recovery. This results in more generous restructuring of loans by informal lenders, making it less risky and thus preferred to formal loans (Guirkinger, 2008).

Agency costs and information asymmetry

In a frictionless and perfect market, funds will always be available to all firms regardless of size or age. But in practice, most firms are not able to borrow enough capital at affordable rates (Petersen & Rajan, 1993). This can be explained by economic theories of agency costs and information asymmetry. Informational asymmetries in the loans market may result into credit rationing (Stiglitz & Weiss, 1981), which means they do not get as much credit as they require even if they are willing to pay prevailing interest rates, and lending conditions set by financial institutions (Rien, 2003).

Enterprises are active borrowers in both the formal and informal sectors. However, there exists an informational difference between the informal and formal lenders. Informal lenders have more information about borrowers than formal lenders. Formal lenders screen out borrowers by partially financing projects, forcing borrowers to turn to informal financing for the remainder of the project financing (Jain, 1999). The two sectors face a tradeoff between informational advantage and ability to mobilize funds through deposits. Formal lenders have more funds while informal lenders have information about borrowers.

Due to adverse selection, it is difficult for lenders to differentiate between good and bad borrowers. This makes price discrimination difficult since high interest rates will drop good borrowers and thus increase the probability of default. On the other hand, an increase in interest rates has no effect

on the borrower in case of bankruptcy as long as they are protected by limited liability (Tirole, 2006). This induces moral hazard by demotivating the borrower thereby neglecting the project. Jensen and Meckling (1976) also argue that due to problems of moral hazard, firms may engage in risky projects even if the projects have negative and decreasing value. When lenders predict such behavior they restrict issue of loans and thus result into some firms being excluded from formal financing. This gives rise to the informal lenders who fund the excluded segment of firms.

The existence of the informal lenders is as a result of informational differences between the formal and informal lenders. The informal lenders have more information about borrowers putting them into an advantageous position to offer credit, since their transaction costs are minimized (Jain, 1999). The lack of information by banks is not about project characteristics, but the ability of the firm managers to implement the proposed project. Banks therefore ration firms whose projects have negative present value and do not meet credit requirement threshold (Jain, 1999). This leaves some firms out who are thereby funded by informal lenders.

This can be well explained by a three sided model, with enterprises (borrowers), Moneylenders (informal) and the bank (formal lenders). The model assumes that laws are well enforced; transactional costs are insignificant, and firms are risk neutral (Jain, 1999). Since firms are heterogeneous, we can assume two types of entrepreneurs, $i = a, b$, and assume that a is engaged in a safer project with higher returns than b. Each entrepreneur is endowed with a project that requires fixed capital K, with probability p_i of success and X_i returns to a successful project (Jain, 1999).

These two types of entrepreneurs finance their projects from bank, and/or informal credit sources. Here it is assumed that the bank can observe the type of project but not the type of borrower. The informal sector offers credit equal to q_i and the bank offers $K - q_i$. So the informational differences are not on the project itself but in the borrower's ability to implement the project. Since informal lenders have information about the types of entrepreneurs that they lend to, q_b will always be equal to zero.

We can denote the cost of funds for the bank as c and that of informal lenders as d; and we assume that $d \geq c$. This is because the bank can raise funds more cheaply by taking deposits, unlike

informal lenders who may even take credit from banks again to lend it out to entrepreneurs. The bank and the informal sector will fund bad project if $p_b X_b \geq Kc$ and $p_b X_b \geq Kd$ respectively. But since good entrepreneurs have lower reservation utility, they will be funded by both formal and informal lenders. The necessary condition for financing to take place is for the expected return to the project to exceed the cost. That is, $p_a X_a \geq Kc$ and $p_a X_a \geq Kd$.

If the bank uses loan size as an instrument to screen off bad borrowers, then banks will offer partial financing for projects which yield a co-financing of good borrowers by the formal and informal sectors. In this case bad type entrepreneurs who find it difficult to obtain financing from the informed informal lenders are more willing to accept higher interest rates as long as they get funds from banks. But in a worst case scenario, both informal and formal lenders will fail to fund the bad type projects leading to reliance on internal funds or equity.

Growth of the firm theories

Since the seminal work of Edith Penrose's (1959) resource based theory of the growth of the firm, her contributions still remain important for the contemporary firm growth theory. The Penrose theory of the growth of the firm postulates that the resources accustomed to a particular firm will shape the productive services its managers are capable of rendering. The theory permits both internal and external resources which may sometimes limit the growth of the firm whenever the productive opportunity is limited. This permits the analysis of the growth rate changes, as firms grow through different stages in a dynamically changing economy (Penrose, 1956). In this case, the size of the firm is measured by the productive resources that it employs like plant, equipment, land and human resources.

The growth cycle theory of small firm financing also postulates that firms have different financing options at different stages of their organizational lives (Berger & Udell, 1998). This is because the financial needs and financial options are dynamic and they change as the firm grows and becomes informationally opaque (Berger & Udell, 1998). For instance, small enterprises rely on private and informal markets for financing and as they grow older and more experienced, they turn into more formal finance, like venture capital and equity markets (Berger & Udell, 1998).

On the contrary, Gibrat's law of proportionate effect states that the growth rate of a given firm is independent of its size. This implies that firm size should not be a concern, and each firm's growth rate depends on random shocks to its current size (Mundt, Alfarano, & Milakovic, 2015).

This paper intends to prove the growth of the firm theories by analyzing the financing options of firms. We shall analyze the extent to which firms rely on informal and/or formal financing sources, and if firm characteristics as well as country level characteristics matter. The study shall also investigate among the two financing sources, which could be more growth enhancing.

3.5.2 Empirical Literature

Evidence has shown that finance causes growth and development (Ross Levine, 2005). One of the channels through which finance can impact on growth is through financing potential enterprises. Access to finance by firms affects growth because it eases liquidity constraints thereby enabling firms to exploit their full potential on innovation and investment opportunities (Beck, Demirgüç-kunt, & Maksimovic, 2006). It also promotes many start-up businesses which are a source of employment and innovation. The provision of employment results in more revenue through tax contribution thus helping the economy to grow. However, despite the important role that these enterprises play in the economy, entrepreneurs especially those with small firms are considered to be un-creditworthy by most credit institutions (Atieno, 2001).

Access to formal financial services facilitates investment in productive activities such as entrepreneurship (Demİrgüç-kunt & Klapper, 2013). When finances are inadequate, individuals are forced by circumstances to rely on their own limited and unreliable informal financial sources, thus unable to exploit promising and viable enterprise growth opportunities (Demİrgüç-kunt & Klapper, 2013). This in the long run is more likely to contribute to continued income inequality and slower economic growth (King & Levine, 1993). Using the global Findex dataset, Demirgüç-Kunt & Klapper (2013) found that 50% of adults use banks for their financial services. This however varies across the countries depending on the level of economic development. The respondents in this survey cited distance to nearest bank, documentation and lack of money as some of the reasons why they use informal financing (Demİrgüç-kunt & Klapper, 2013).

Financial services are provided by various intermediaries which can be grouped as either formal or informal financial services. Formal financial services are based on a legal infrastructure that provides recourse to lenders and protection to depositors (Ayyagari et al., 2010). The complementarity or simultaneous use of both formal and informal finance is the optimal choice for small firms especially in developing countries (Degryse et al., 2016a). Although small firms rely on informal credit institutions, their limited resources cannot adequately satisfy the overwhelming credit demand by entrepreneurs (Atieno, 2001). This prompts the simultaneous use of both sources of financing. Informal finance therefore acts as a complement to formal finance and cannot substitute for formal finance since their monitoring systems are ill equipped and cannot scale up to the higher end borrowers, especially those who require long term and large amounts of credit (Ayyagari et al., 2010).

Using the 2013 enterprise survey data on 729 Ghanaian firms, Amissah & Gyeke-Dako (2016) examined the financing options for informal firms and how these options impacted on firm growth. They found bank finance to be more growth enhancing on large firms than small firms. They used the Heckman selection model and instrumental variable technique to draw their justification for self-selection. They found a positive effect of formal financing on firm performance. Firm size and age also had a positive impact on performance, whereby bigger firms had higher growth than smaller firms. They however found firm ownership to be insignificant.

In their study on Chinese firms, Degryse et al. (2016) found a differentiated impact on growth for small and large firms. They found informal finance to be promoting sales growth among small firms but lower sales growth in large firms. In addition, large firms do not seem to complement formal finance with informal finance. To some extent, informal finance from family and friends promote sales growth, while that from money lenders just exploits the borrowers (Allen, Chakrabarti, De, & Qian, 2012). This could be because informal financiers focus more on current firm operations than past history, thus lowering their monitoring costs. Despite this fact, informal finance plays a crucial role in developing economies. For instance, a large number of Chinese firms rely on informal financing sources. In a database of 2,400 Chinese firms, Ayyagari et al. (2010) found that alternative financing other than formal finance support the growth of Chinese

firms, and the economy as a whole. These two financing options however co-exist and supplement each other (Kensuke & Molnar, 2008).

There usually exists systematic cross-country differences in firms' access to external finance (Allen et al., 2005). Most cross country studies that have been done have shown that specific country factors influence firm financing decisions (Demirgüç-Kunt & Maksimovic, 1999; Rajan & Zingales, 1995). Specifically, stock market development, financial development and legal infrastructure have been found to be key determinants of financing decisions by firms (Allen et al., 2005; Beck, Demirgüç-Kunt, & Maksimovic, 2008;Demirguc-Kunt & Maksimovic, 1998; Fan, Titman, & Twite, 2010; Rajan & Zingales, 1998). In China for instance, small firms in non-manufacturing sectors have less chance of accessing formal financing due to the lower profitability and lack of credit history (Kensuke & Molnar, 2008). Formal financing institutions focus on past firm performance, tax payment, credit rating and history. This forces most of these firms to draw their financing from retained earnings. In addition, it is difficult to obtain bond financing due to industrial policies which makes it difficult for small firms to be listed in the stock exchange markets (Kensuke & Molnar, 2008).

Firm financing choices depend on the investment climate within the country itself and the region where the firm operates (Ayyagari et al., 2010). Firms from countries with weak financial and legal systems tend to obtain less external financing which impacts negatively on growth (Beck, Demirguc-Kunt, & Maksimovic, 2008). For a firm to obtain formal external funding there is need for a covenant or legal credibility. If the country's legal system is weak or inefficient, then firms may be forced to depend on informal sources to finance their operations (Allen et al., 2005). Using Tobit regression models, Beck et al. (2008) found that in developing countries where financial and legal institutions are underdeveloped, smaller firms use less formal finance in their investment projects as compared to large firms. These informal sources however do not relax the liquidity constraints that firms face due to their limited supply.

In some countries like China for example, the private sector has been blocked from accessing formal financing because most banks finance state-owned businesses (Zhang, 2008). Using a logit and ordered logit model on a survey dataset from Chengdu-China, Zhang (2008) found that formal financing is based of firm's reputation and relationships which makes it difficult for the small and

medium firms whose credit history is not known, to prove to banks that they are creditworthy. As a result of this, most firms heavily rely on informal financing (Allen et al., 2005).

Formal financing is more preferred by large firms from regions with an investment climate that facilitates access to bank sources of finance. After controlling for endogeneity using instrumental variables and matching techniques, Ayyagari et al. (2010) found that firms financed by banks grow faster and have high investment rates than those financed by the informal sector. On the other hand, Allen et al. (2005) in their study on Chinese firms, found that those firms that used alternative financing sources rather than formal financing in their working capital, grew faster than those who relied on formal financing.

Formal finance fosters innovation among firms in developing countries than in developed countries (Ullah, 2019). In a study done on 5,982 firms in 30 economies using fixed effects technique, Ullah (2019) examined whether formal/informal finance is associated with firm innovation. The study concentrated mainly on small and medium enterprises both in developed and developing countries. The study found that formal finance is associated with new product development, new services, new methods of production and marketing, and new management practices. However, the study found no link between informal financing an innovation (Ullah, 2019).

Various firm characteristics like size and age determine the type of funds the firm uses to finance its operations. In proving their financial growth model, Berger and Udell (1998) stated that financing options and preferences are more likely to change as the business grows. Young firms get financing from trade credit and insider financing and as they grow older they gain access to public equity and long term bank debt (Berger & Udell, 1998). Due to information asymmetry, most lenders avoid funding small and young firms, forcing them to seek alternative financing. Using the multinomial logistic model, Gregory, Rutherford, Oswald and Gardiner (2005) while testing the Berger and Udell (1998) financial growth cycle model, analyzed the effect of firm size, age and information availability of choice of financing source. Contrary to the model, they found only firm size to be the significant determinant of firm financing decision. Other firm characteristics yielded contrary results. This implies that problems related to financing are more prevalent in small and medium enterprises.

Formal credit markets tend to favor big and large firms in their allocation of credit (Tang, 1995). Large private firms get the huge share of credit from the formal financial institutions, while medium and small firms obtain most of their finances from informal money lenders (Tang, 1995). This could be due to the fact that formal lenders require collateral for them to grant credit, which may be lacking in small and medium firms (Zeller, 1994). It could also be as a result of poor legal and institutional framework, whereby formal finance induces high tax burden, penalties, licensing requirements and demand for bribes which makes formal financing unnecessarily expensive (Safavian & Wimpey, 2007).

Considering the transaction costs involved in credit allocation, informal finance could be more advantageous (Allen et al., 2005). The allocation process of formal finance may be subject to various selection, enforcement and incentive problems (Tang, 1995). This may give the informal sector a comparative advantage over the formal sector due to its ability to utilize social networks and relationships to solve the transaction problems (Tang, 1995). Otherwise, the informal financing performs a complementary role by filling the credit rationing gap left by the formal financial markets (Tang, 1995). They therefore cater for the small and medium enterprises which play a major role of employment creation in the economy thus promoting economic growth and development.

Using the compustat dataset, Petersen and Rajan (1997) used OLS regressions to confirm that firms tend to resort for alternative financing when credit from financial institutions is constricted. For instance trade credit from suppliers lend to constrained firms since they have the information advantage, and can even liquidate assets or re-possess supplied goods more efficiently (Petersen & Rajan, 1997). In addition, in a study done by Atieno (2001) in Kenya, 87% of enterprises got their operating capital from informal sources. Of these informal sources, the use of money lenders was found to be less than 5%, meaning that although informal finance is easily accessible, it also has unattractive lending terms that makes it unpopular to most entrepreneurs (Atieno, 2001).

Casey and O'Toole (2014) however, hold the view that there is little reliance on alternative financing sources among the Euro area firms. They specifically assert that credit rationed firms are 9% more likely to use trade credit, and 4% more likely to use informal lending than non-constrained firms. On the other hand, the self-rationed firms are nearly 8% more likely to use

informal financing as well[19]. Contrary to other studies, Casey and O'Toole (2014) find that applications for alternative financing other than bank financing increase with firm size on the constrained firms.

At a macro perspective, monetary tightening leads to reduction in bank lending, forcing firms to resort to alternative financing (Mateut, Bougheas, & Mizen, 2006). In their empirical analysis of UK firms, Mateut et al. (2006) used a model linking trade credit and monetary policy, and found that monetary tightening results in reduction in bank lending leading to increased volumes of trade credit. Yang (2011) also confirmed this assertion that during monetary tightening trade credit substitutes bank credit, while during monetary easing they complement each other. Individual country studies also confirm this assertion in China and Spain respectively (Carbo-Valverde et al., 2012; Huang, Shi, & Zhang, 2010).

Policy interventions in developing countries have been geared towards subsidizing credit for the benefit of small firms. Surprisingly these policies seem not to be benefiting the targeted firms (Beck, Demirguc-Kunt, et al., 2008). Instead small firms do not finance their investment through government sources or development banks. This is because these alternative sources do not fill the gap of collateral requirements and information asymmetry (Beck, Demirguc-Kunt, et al., 2008).

From the existing literature, it can be argued that access to finance is one of the key impediments to growth of firms regardless of size (Gregory et al., 2005). It is however difficult to ascertain which form of finance is more growth enhancing. For instance, some researchers have found that firms that have access to more formal external financing tend to perform well and thus grow faster (Ayyagari et al., 2010). While others have found alternative financing other than formal bank finance to be the major drivers of firm growth especially in China (Allen et al., 2005; Linton, 2006). This makes the debate on financing and growth inconclusive and thus calling for more research to resolve the debate.

[19] Casey & O'Toole (2014) describe credit rationed firms as those who applied for credit and were denied, while self-rationed are those firms that applied for credit and were offered, but declined to take it up on grounds of high interest rates.

In addition, much of the analysis has been concentrated on small and medium firms, because they are the ones assumed to be using informal finance. And most of these studies rely on quantitative dataset of listed firms, so that even their grouping of firms as either large or small does not bring much difference since all the listed firms are relatively large (Rajan & Zingales, 1998). We use firm level survey data with all sizes of firms. Using relative distribution and unconditional quantile regressions, we contribute to the inconclusive debate of finding out the form of financing that is more growth enhancing, between formal and informal financing sources.

3.6 Data and Methodology

This study looks at African firms of all sizes, both listed and unlisted. We specifically focus on firms from in Kenya, Cameroon, Zimbabwe, Ethiopia, Ghana, Malawi, Namibia, Nigeria, South Sudan, Burundi, Morocco, Senegal and the Democratic Republic of Congo. The choice of the countries was based on those with most current survey data, and also a regional representation was considered. Regions and respective countries are as follows: Northern Africa(Morocco); East and horn of Africa(Kenya, South Sudan, Ethiopia); Central Africa(Burundi, Cameroon, DRC Congo); Southern Africa(Malawi, Namibia, Zimbabwe); West Africa(Nigeria, Ghana, Senegal). The available cross sectional data on these countries is between 2013 and 2016. We make use of the relative distribution methods as proposed by Handcock and Morris (1998). Since the relative distribution methods are limited to one covariate at a time, we employ the use of Recentred Influence Function (RIF) to account for covariates (Firpo et al., 2009).

3.6.1 Data sources and definition of variables

This paper uses the World Bank micro enterprise survey dataset, which comprises of economic data on 130,000 enterprises in 135 countries. The survey covers firms of all sizes from small, medium to large firms. It also covers the manufacturing, services, transport and construction sectors. The data is comparable across countries and time due to the global standard methodology used in the data collection. It covers major regions in each country which are largest centers of business enterprises. The data is advantageous for our study since it has information on firms' characteristics and the financing sources that firms use to finance their working capital.

The sample for our study comprises of African countries which have data in more recent years, those with same comparable years and globally comparable variables with uniform methodology of implementation of the core questionnaires.

3.6.2 Definition of variables

Dependent variables

For this study, we use firm performance as the dependent variable. According to Al-matari, Al-Swidi and Bt Fadzil (2014), there are various ways of measuring firm performance, some of which include: return on investment, growth in sales, market-to-book value, labor productivity, return to sales, profit per employee, return to investment, sales to assets, and cost of capital among others. Given data constraints, we chose sales growth and labor productivity as measures of firm performance since we are able to measure them from the available data set. Growth in sales is measured as the change in sales for a three year period. Firms report both the current levels of sales and the level of sales they had three years ago. Labor productivity is the ratio of sales to the total number of employees in the firm.

Explanatory Variables

Financing source

We define and measure formal finance in three different ways. The first definition (*Formal1)* measures the dominance of formal financing when funding working capital and investment. Formal1 is a dummy variable taking a value of 1 if the financing of working capital and investment done through bank, non-bank financial institutions and retained earnings were equal to or greater than 50%. That is, if formal finance dominates alternative sources (informal). It takes a value of zero if informal sources of finance dominate the formal sources. The informal sources include: trade credit, informal finance from informal lenders, friend and relatives. For the second indicator, we adopt the Ayyagari et al. (2010) variable which takes the value 1 if a firm has a loan or overdraft, 0 if a firm does not have either loan or overdraft. We call this measure *Formal2*. For the third indicator variable, we adopt the Allen et al. (2005) measure, which takes the value of 1 if

financing of working capital and investment is through bank and non-bank financial institutions, 0 if financing is through any other sources other than bank and non-bank financial institutions. Other key variables used as covariates are summarized in Table 3.1

Table 3.1: Description of key variables

Variable	Description
Age	Age of the firm based on the year in which the firm began operations
Ownership	Dummy variables for firm ownership; whether foreign or domestically owned
Listed	Dummy variable=1 if listed in stock markets 0 otherwise
Firm size	Dummy variable for small (5-19 workers), medium (20-99 workers) and large(100+)
Export	Dummy variable for export status (1 if firm exports and 0 otherwise)
Manager Experience	Manager's years of experience in the firm
Industry	Dummy variable for sector
Sales growth	Real annual sales growth
Labor Productivity	Ratio of sales to number of employees

Source: Author's compilation based on the enterprise survey data

3.6.3 Methodology

We seek to estimate the effect of formal versus informal finance on firm growth. Whether it is informal or formal finance that enhances firm growth to a greater extent, still remains an empirical debate. More often the traditional methods that have been previously used leave much of the distributional information untapped. Relative distribution methods go beyond means and variance difference, by analyzing changes in upper and lower tails of the sales growth and labor productivity distributions. They also decompose the effect into location and shape differences. This makes the framework more general and flexible especially in identifying where much of the growth differential emanates from.

The relative distribution methods make use of the probability density functions (PDF) and the cumulative distribution functions (CDF). We use this to evaluate firm growth differential across firms, by analyzing sales distribution and labor productivity between firms using informal financing sources relative to those using formal financing sources. The relative distribution methods are advantageous since the graphical output is easy to understand, they are robust to outliers, and need fewer assumptions. They are also scale invariant to all monotonic

transformations, making it less restrictive in terms of the assumptions that need to be made (Handcock & Morris, 1998).

The relative distribution methods are fully nonparametric in which the statistical framework uses graphical tools and decomposition to analyze data from a distributional perspective (Handcock & Morris, 1998). The relative density is a density ratio or random variable that is obtained by analyzing distributional differences between two groups (comparison and reference groups). It transforms a variable from comparison group by the CDF of the reference group.

Using these methods, we let the CDF for sales growth and labor productivity of the reference group (firms which rely on informal finance form our reference group) be denoted by F_{inf} (y). We also denote the corresponding CDF for the comparison group as F_f (y). Let Y_{inf} and Y_f be random samples from F_{inf} and F_f respectively. We make the assumption that F_{inf} and F_f are continuous with a common support. In this case we can express the grade transformation of Y_f to Y_{inf} as:

$$R=F_{inf}(Y_f) \tag{3.1}$$

Where *R* is a random variable obtained from Y_f after being transformed by the function F_{inf}. *R* is continuous and lies within the [0,1] outcome space (Handcock & Morris, 1998).

Taking the relative data *r* to mean the realization of *R*, we can express the CDF for *R* as:

$$G(r)=F_f(F_{inf}^{-1}(r)) \qquad r\epsilon[0,1] \tag{3.2}$$

And the corresponding probability density function (PDF) can be expressed as:

$$g(r)=\frac{f_f\left(F_{\inf}^{-1}(r)\right)}{f_{\inf}\left(F_{\inf}^{-1}(r)\right)} \qquad r\in[0,1] \tag{3.3}$$

Where r is the percentile rank of sales and labor productivity distribution that firms using formal finance could have if placed in the informal finance group. The g(r) is just a density ratio, which can be argued to be the ratio of the fraction of firms in the informal finance group to the fraction in the formal finance group at a given level of sales growth or labor productivity outcome.

If we denote the rth quantile of *R* as y_r, the relative PDF becomes:

$$g(r) = \frac{f_f(y_r)}{f_{\inf}(y_r)} \qquad y_r \geq 0 \qquad (3.4)$$

If the sales growth and labor productivity distribution for the firms using formal financing is identical to that of firms using informal financing source, then the CDF of their relative distribution will be expected to be a 45^0 line, while the corresponding PDF will be a uniform distribution. Therefore, for each quantile of the outcome variable (Sales growth and labor productivity) we expect three possible results: If g(r) is equal to one, we have a distributional equivalence across quantiles such that firm performance is the same across all quantiles regardless of the financing source. If g(r) is greater or less than one, then the two PDFs are different, implying that there is a growth difference between firms using informal financing and those using formal financing. This approach has been used in the literature. See for example Moshoeshoe (2016), Chi and Li (2007), Essama-Nssah and Lambert (2011).

The relative distribution method however poses heaping challenges especially if sales were reported in decimals. It also requires huge amounts of data, so if the sample size is small, we are likely to get misleading results. In addition, there is the problem of accounting for the contribution of covariates. The relative distribution requires that we account for each covariate independently which is cumbersome and may not yield the results as when the covariates are accounted for, together as an interaction.

So in addition to the relative distribution approach, we also use the recentered influence function (RIF) to account for the contribution of various covariates towards sales growth and performance in terms of labor productivity. We compute the RIF by modelling unconditional quantiles of the dependent variable as a function of covariates. This helps in analyzing how the distribution of the outcome variable (in this case sales growth and labor productivity) responds to changes in the regressors. In this case we carry out a regression of a transformation of sales growth or labor productivity on all other covariates to evaluate the influence of a single observation on the overall firm performance.

Our interest is to estimate the Unconditional Quantile Partial Effect (UQPE) on the unconditional quantiles of Y, given a small change in X covariates. Assume that we observe Y (firm

performance), in the presence of X covariates (firm characteristics). Assume that X and Y are jointly distributed, and Y is a function of observables X and unobservables ε, as in the equation below:

$$Y = h(X, \varepsilon) \tag{3.5}$$

Since our interest is in the effect of a small increase t in the explanatory variables on the unconditional quantile of Y, we define the model as:

$$\alpha(\tau) = \lim_{t \downarrow 0} \frac{Q_\tau[h(X+t,\varepsilon)] - Q_\tau[Y]}{t} \tag{3.6}$$

Where $Q_\tau[Y]$ is the τth quantile of the unconditional distribution of the performance variables, and $\alpha(\tau)$ is the unconditional quantile partial effect (UQPE).

To compute the RIF for unconditional quantiles, we express the influence function (IF) as follows:

$$IF(Y, q_\tau) = \frac{(\tau - \mathbf{1}\{Y \le q_\tau\})}{f_Y(q_\tau)} \tag{3.7}$$

We also express the RIF as:

$$\begin{aligned} RIF(Y; q_\tau) &= q_\tau + IF(Y; q_\tau) \\ &= q_\tau + \tau - \frac{\mathbf{1}\{y \le q_\tau\}}{f_Y(q_\tau)} \\ &= \frac{\mathbf{1}\{y \succ q_\tau\}}{f_Y(q_\tau)} + q_\tau - \frac{1-\tau}{f_Y(q_\tau)} \end{aligned} \tag{3.8}$$

Where $\mathbf{1}\{.\}$ is an indicator function which is a 0-1 dummy variable representing the covariates (X), $f_Y(.)$ is the density of the marginal distribution of the outcome variable (which in our case is firm performance), and q_τ is the unconditional quantile of the distribution of sales growth and labor productivity. In this case, our RIF regression model is a conditional expectation of the RIF as a function of the explanatory variables. That is:

$$E[RIF(Y;v)|X] = m_v(X). \quad (3.9)$$

In terms of quantiles, we regress our RIF function $RIF(Y;q_\tau)$ on X covariates to consistently estimate the effect of X on unconditional τ-quantile of Y. In this case the unconditional quantile regression model becomes: $E[RIF(Y;q_\tau)|X] = m_\tau(X)$. Since our main interest is on the effect of the particular form of financing on firm performance, the unconditional quantile regressions will give us the effect of specific financing source, at different quantiles of the sales and labor productivity distribution (Firpo, Fortin, & Lemieux, 2007).

3.6.4 Summary statistics

Tables 3.2 and 3.3 provide summary of the financing patterns of firms' working capital and investment respectively, across 13 African Countries. These summary tables stem from the survey question in which enterprise managers were asked for the percentage of working capital or investment that they finance from each of the sources. In each case, the sum of the proportions adds up to 100%. The sample has a total of 8,932 firms, with Nigeria having the highest number of firms and Cameroon the lowest. Most firms reported to be using retained earnings and internal finance in their working capital, as well as in investment making it the most dominant source of financing (see Tables 3.2 and 3.3).

For the percentage of funds used as working capital, approximately 74% of firms reported to be relying on internal finance/retained earnings, 18% rely on money lenders, friends and relatives, 8% use trade credit, and only 9% relying on bank financing (see Table 3.2). The data also confirms what has been explained in the literature that many small firms finance their working capital through informal sources (Berger & Udell, 1998). For instance in our sample, other than internal financing, most micro and medium sized firms rely on informal money lenders, family and friends to finance their working capital (see Table 3.2).

Across the countries in the sample, Nigeria has the highest percentage of firms relying on informal money lenders and friends to finance their working capital. On the other hand, Namibia and Kenya report a higher percentage of firms relying on bank finance, in financing their working capital (Table 3.2).

Table 3.2: Financing patterns across African Countries (% of firms using each financing source on Working Capital)

Country	Total Number of Firms	Retained Earnings & Equity	Banks	Non-Bank Financial Institutions	Trade Credit	Other Money Lenders, Relatives and Friends
Nigeria	2,396	64.67	4.80	4.24	8.99	17.30
Namibia	481	64.36	28.79	.19	3.26	3.40
Sudan	725	89.95	2.03	.86	3.37	3.80
Ghana	708	74.25	10.01	1.73	11.98	2.00
Ethiopia	848	81.33	13.50	1.03	2.83	1.30
Cameroon	155	65.70	22.81	1.06	8.57	1.79
Burundi	344	71.53	10.82	4.20	7.16	6.97
DRC	522	89.68	2.07	1.33	4.23	2.69
Malawi	422	68.86	11.78	2.44	11.42	5.19
Morocco	405	64.63	15.61	.27	11.28	1.69
Senegal	585	82.70	4.64	1.33	8.27	2.89
Kenya	741	62.67	17.74	2.16	14.75	2.59
Zimbabwe	600	75.05	6.28	1.34	6.27	10.64
Total	**8,932**	**74.30**	**9.47**	**2.21**	**7.97**	**17.75**
By firm size						
Micro	329	67.18	3.09	2.81	10.91	16.01
Small	4719	86.90	7.90	2.33	7.58	8.72
Medium	2284	80.76	10.77	2.40	7.66	10.36
Large	1600	77.74	13.58	1.45	8.94	4.24

Firm size was measured in terms of the number of employees in the firm. Micro firms are those with less than 5 employees, small firms are those with 5-19 workers, medium have 20-99 workers and large are those with more than 100 employees.

In Table 3.3, we present the percentage of financing used for new investment. One country (Cameroon) has information on quasi equity, and we combine this with owner issued equity for consistency purposes. The sample size in this investment variables reduced considerably due to nonresponse in the survey questions. In our regressions we combine the investment and working capital variables to mitigate against this missing data problem.

Table 3.3: Financing patterns across African Countries (% of firms using each financing source on new investment)

Country	Total Number of Firms	Internal/ Retained Earnings	Owner Issued/ Equity	Banks	Non-Bank Financial Institutions	Trade Credit	Other Money Lenders, Relatives & Friends
Nigeria	1,539	30.90	7.78	2.03	1.72	3.79	16.80

Namibia	243	45.35	1.67	49.79	.82	.29	2.10
Sudan	256	87.42	2.75	2.25	.44	2.50	4.45
Ghana	356	75.46	4.54	12.31	1.61	3.89	2.13
Ethiopia	336	81.68	2.86	12.84	1.13	.15	1.34
Cameroon	62	68.05	4.60	16.79	3.41	4.29	2.70
Burundi	129	70.47	6.51	7.97	54.47	4.47	5.39
DRC	221	91.51	2.35	1.27	.72	2.37	1.78
Malawi	188	65.37	8.62	16.03	1.34	5.70	2.74
Morocco	172	56.31	3.81	22.66	3.02	5.20	1.42
Senegal	124	73.91	3.25	9.07	4.23	6.90	2.32
Kenya	339	59.01	6.45	26.97	1.14	5.23	1.31
Zimbabwe	151	70.44	8.65	10.15	2.28	5.14	2.64
Total	**4,116**	**56.02**	**7.41**	**11.13**	**1.80**	**3.58**	**11.34**
By Firm size							
Micro	219	21.58	4.77	1.99	.96	2.53	19.89
Small	1995	57.44	7.40	9.46	2.05	3.44	10.52
Medium	1109	55.71	6.17	12.20	1.72	3.99	15.52
Large	814	62.27	9.20	16.25	1.56	3.64	7.71

Firm size was measured in terms of the number of employees in the firm. Micro firms are those with less than 5 employees, small firms are those with 5-19 workers, medium have 20-99 workers and large are those with more than 100 employees.

Just like in the working capital financing case, most firms rely on internal sources and retained earnings to fund new investment opportunities. From Table 3.3, 56% of firms in the sample financed their new investment through internal sources and retained earnings, followed by money lenders and bank financing with 11% of firms, then 7% of the firms used equity/owner issued finance, 4% of the firms used trade credit, and only 2% of the firms used non-bank financial institutions to finance their new investment. In addition, small, medium and micro sized firms rely heavily on retained earnings and informal sources such as money lenders to finance their investment (see Table 3.3). Across the countries in our sample, Nigeria has the highest percentage of firms relying on informal money lenders and friends to finance investment. On the other hand, Namibia and Kenya report a higher percentage of firms relying on bank finance in their investment financing (see Table 3.3). In Burundi the data shows a heavy reliance on non-bank financial institutions in funding investment.

Table 3.4: Descriptive statistics by country

Country	Statistic	Sales Growth	Labour Productivity	Total Employment	Age	Manager's Experience
Nigeria	Mean	15.01	12.10	42.98	19.01	12.72
	Std.Dev	2.96	2.32	219.12	12.54	9.08
	Min	9.21	5.16	0.00	2.00	0.00
	Max	27.24	24.84	5000.00	170.00	72.00
Namibia	Mean	13.98	11.33	38.70	13.64	13.99
	Std.Dev	2.24	1.73	155.54	11.10	9.57
	Min	9.90	6.32	1.00	2.00	1.00
	Max	20.18	17.15	2114.00	122.00	54.00
South Sudan	Mean	13.05	10.30	16.50	6.53	7.44
	Std.Dev	2.25	1.43	30.64	4.11	6.38
	Min	8.99	5.14	5.00	2.00	1.00
	Max	19.75	16.24	567.00	43.00	42.00
Ghana	Mean	11.52	9.53	39.86	18.12	16.24
	Std.Dev	2.51	1.82	87.56	11.71	9.32
	Min	5.30	4.92	5.00	4.00	2.00
	Max	19.74	16.23	800.00	107.00	64.00
Ethiopia	Mean	14.52	12.08	141.51	15.50	15.78
	Std.Dev	2.37	1.53	755.96	12.85	10.68
	Min	9.35	7.49	1.00	2.00	1.00
	Max	22.57	18.14	18452.00	91.00	60.00
Burundi	Mean	18.53	16.48	63.28	17.08	12.78
	Std.Dev	1.90	1.44	161.04	13.73	9.46
	Min	13.87	12.83	5.00	3.00	1.00
	Max	23.72	21.90	1592.00	89.00	46.00
Cameroon	Mean	15.83	14.66	36.93	19.55	18.63
	Std.Dev	2.15	1.44	101.83	13.81	10.49
	Min	10.82	11.18	1.00	0.00	1.00
	Max	23.25	20.09	1500.00	86.00	68.00
DRC	Mean	16.74	14.86	37.75	14.37	13.85
	Std.Dev	3.13	2.32	189.69	10.76	10.32
	Min	10.04	9.77	1.00	4.00	1.00
	Max	28.84	22.69	3900.00	88.00	66.00
Malawi	Mean	16.82	14.42	69.24	20.66	15.67
	Std.Dev	2.52	1.81	249.25	13.75	9.83
	Min	11.51	8.13	2.00	2.00	1.00
	Max	24.82	20.68	4030.00	109.00	60.00
Morocco	Mean	15.25	12.55	158.80	25.91	23.09
	Std.Dev	2.14	1.56	507.91	17.15	10.89
	Min	10.82	7.96	2.00	4.00	3.00
	Max	22.51	19.62	6300.00	92.00	64.00
Senegal	Mean	17.16	15.60	53.61	18.79	19.44
	Std.Dev	2.71	1.68	220.92	13.61	10.55
	Min	11.70	11.51	2.00	3.00	1.00
	Max	25.35	23.96	3500.00	168.00	60.00

Kenya	Mean	17.01	14.09	122.18	25.93	18.36
	Std.Dev	2.74	1.71	445.26	18.07	10.86
	Min	10.31	7.64	2.00	4.00	1.00
	Max	25.15	20.36	8000.00	110.00	57.00
Zimbabwe	Mean	12.04	10.11	149.24	29.39	16.18
	Std.Dev	2.12	1.31	1863.87	25.92	11.02
	Min	7.17	6.35	3.00	1.00	1.00
	Max	17.69	15.26	45000.00	125.00	59.00
Total	Mean	15.00	12.43	70.13	18.62	14.93
	Std.Dev	3.17	2.62	580.90	15.11	10.33
	Min	5.30	4.92	0.00	0.00	0.00
	Max	28.84	24.84	45000.00	170.00	72.00

Sales growth is the log of the difference between sales 3 years ago and current sales, while labor productivity is the log of the ratio of sales to the number of employees. Total employment includes both temporary and permanent employees, while manager's experience is the number of years the manager has been in a firm.

From Table 3.4, the average age of firms in the sample is approximately 19 years, with the oldest firms being as old as 170 years, while the youngest in the sample is less than a year old. Since total number of employees reflects on firm size, the average firm size in our sample is medium, and there are other firms in the sample that have no employee at all.

The highest average log of sales growth was 18.53 in Burundi, with the least sales growth being 11.52 in Ghana. The same trend prevails in labor productivity since Burundi still reports the highest labor productivity in the sample and Ghana the lowest. On the manager's experience, some of the managers are less than a year old in the firm, while others have been in a firm for up to 72 years. We believe these could be those who are owner managers.

Table 3.5: Percentage of firms using formal/informal finance on both working capital and investment (using our categorization variables)

		Fomal 1		***Formal2*: Ayyagari et al. (2010) Categorization**		***Bank dummy:* Allen et al.(2005) Categorization**	
Country	**Number of firms**	**Informal %**	**Formal %**	**Informal %**	**Formal %**	**Self -financing**	**Bank Financing**
Nigeria	2,676	75.30	24.70	76.15	23.85	99.78	0.22
Namibia	580	59.66	40.34	18.01	81.99	82.76	17.24
Sudan	738	68.02	31.98	82.99	17.01	100.00	0.00
Ghana	720	55.69	44.31	67.61	32.39	98.06	1.94

Ethiopia	848	61.67	38.33	50.59	49.41	97.76	2.24
Burundi	157	61.78	38.22	11.54	88.46	94.90	5.10
Cameroon	361	67.04	32.96	49.05	50.95	98.61	1.39
DRC	529	58.79	41.21	72.64	27.36	100.00	0.00
Malawi	523	67.88	32.12	50.90	49.10	98.09	1.91
Morocco	407	62.22	37.78	20.80	79.20	95.82	4.18
Senegal	601	82.20	17.80	52.29	47.71	99.50	0.50
Kenya	781	60.31	39.69	44.79	55.21	96.54	3.46
Zimbabwe	600	78.50	21.50	68.99	31.01	98.83	1.17
Total	**9,521**	**68.07**	**31.93**	57.30	42.70	**97.86**	**2.14**
By firm size							
Micro	377	84.08	15.92	82.22	17.78	99.73	0.27
Small	4,994	70.72	29.28	66.54	33.46	97.90	2.10
Medium	2,430	65.64	34.36	49.02	50.98	97.82	2.18
Large	1,718	60.30	39.70	40.35	59.65	97.38	2.62

Note: *Formal1* takes the value of 1 if financing of working capital and investment through bank, non-bank financial institutions and retained earnings is greater or equal to 50%, and the firm has a loan or overdraft. It takes a value of zero if financing of working capital and investment through trade credit, other money lenders, friend and relatives is greater or equal to 50%. *Formal2* takes the value 1 if a firm has a loan or overdraft, 0 if a firm does not have either loan or overdraft. The *Bank dummy* takes the value of 1 if financing of working capital and investment is through bank and non-bank financial institutions, 0 if financing is through any other sources other than bank and non-bank financial institutions. Firm size was measured in terms of the number of employees in the firm. Micro firms are those with less than 5 employees, small firms are those with 5-19 workers, medium have 20-99 workers and large are those with more than 100 employees.

Table 3.5 shows how financing patterns vary across various countries and firm sizes, using the categorization variables. We classified firms as using either formal or informal sources both for working capital and investment. The first categorization (*Formal1*), takes the value of 1 if financing of working capital and investment through bank, non-bank financial institutions and retained earnings is greater or equal to 50%, and the firm has a loan or overdraft. It takes a value of zero if financing of working capital and investment through trade credit, other money lenders, friend and relatives is greater or equal to 50%. In this categorization, 68% of firms rely on informal finance and only 32% rely on formal financing sources for both investment and working capital.

Across all countries, firms financing their working capital and investment through informal finance exceed those using formal finance (see Table 3.5).

The second categorization (*Formal2*) is the Ayyagari et al. (2010) measure which takes the value 1 if a firm has a loan or overdraft, and 0 if a firm does not have either loan or overdraft. In this categorization, 57% of firms use informal finance, while 43% use formal financing for their working capital and investment. In this categorization, more firms from Kenya, Burundi, Morocco, Cameroon and Namibia use formal finance than informal finance. This means that firms in these countries have more access to bank credit thus lessening the spillovers that go to informal money lenders. In the other 6 countries however, those firms using informal finance exceed those using formal finance. Firms in countries like South Sudan, Nigeria, the Democratic Republic of Congo, Zimbabwe and Ghana heavily rely on informal finance to fund their investment and working capital. This could be as a result of the level of financial development in these countries (Beck, Demirguc-Kunt, et al., 2008).

The third categorization (*Bank dummy*) is the Allen et al. (2005) measure, which takes the value of 1 if financing of working capital and investment is through bank and non-bank financial institutions, 0 if financing is through any other sources other than bank and non-bank financial institutions. In this categorization, 98% of the firms across all countries use self-financing sources unlike formal bank sources. Only 2% reported to be relying on bank formal sources. In countries like South Sudan and the Democratic Republic of Congo, all firms rely on self- financing sources.

Across all the categorization, micro and small firms almost entirely rely on informal finance and self-financing. As the firms grow, they tend to shift to formal financing sources. This is consistent with the previous literature that found small and medium firms to be relying on informal finance, while large firms rely on formal sources both for working capital and investment[20]. This could be because large firms can easily get bank financing due to transaction cost, collateral and reputational advantages (Allen et al., 2005).

[20] See for example Berger and Udell (1998); Gregory et al. (2005) and Tang (1995).

Table 3.6: Correlation between performance measures and financing variables

	Formal1	Formal2	Bank dummy	Sales	Labor productivity
Formal1	1.0000				
Formal2	0.2070*	1.0000			
Bank dummy	0.2161*	0.1857*	1.0000		
Sales	0.1318*	0.2912*	0.0375	1.0000	
Labor productivity	0.0505*	0.2339*	-0.0180	0.8735*	1.0000

***** p<0.01, ** p<0.05, * p<0.1;** Bank dummy takes the value of 1 if financing of working capital and investment is through bank and non-bank financial institutions, 0 if financing is through any other sources other than bank and non-bank financial institutions. *Formal1* takes the value of 1 if financing of working capital and investment through bank, non-bank financial institutions and retained earnings is greater or equal to 50%, and the firm has a loan or overdraft. It takes a value of zero if financing of working capital and investment through trade credit, other money lenders, friend and relatives is greater or equal to 50%. *Formal2* takes the value 1 if a firm has a loan or overdraft, 0 if a firm does not have either loan or overdraft. Sales growth is the log of the difference between sales 3 years ago and current sales, while labor productivity is the log of the ratio of sales to the number of employees.

Table 3.6 shows the correlation matrix for financing variables and firm growth and performance measures. From the table it can be seen that all financing variables are positively correlated with sales growth and labor productivity outcomes, significant at 10% significance level. The bank dummy's correlation is however indeterminate and not significant at any level.

3.7 Regression Results

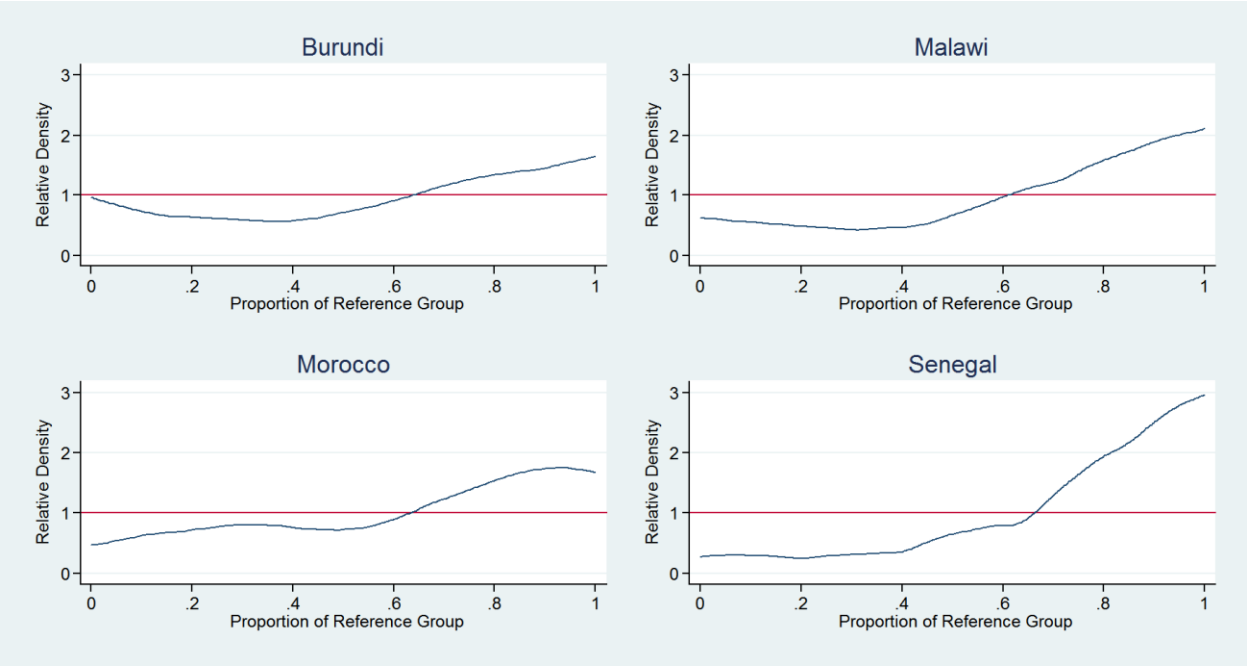
In this section, we discuss regression results obtained from two methods. The relative distribution method results are shown in graphical PDF overlays, while the unconditional quantile regression results are both graphical and parametric estimates.

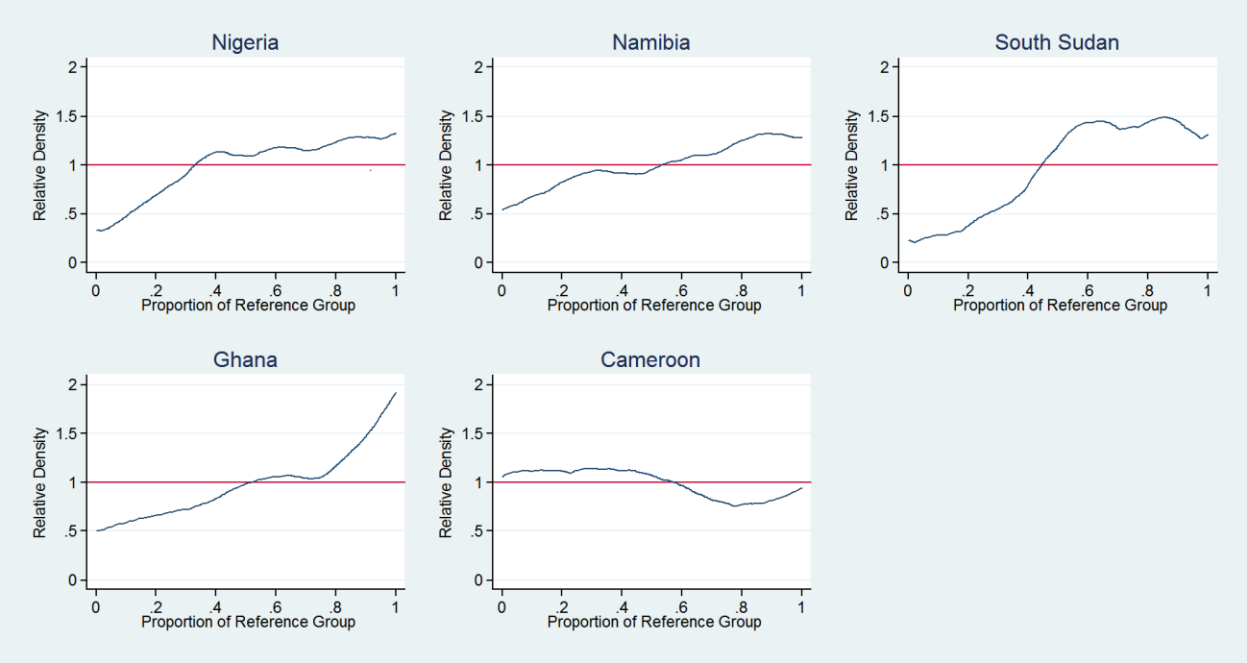
3.7.1 Relative distribution results

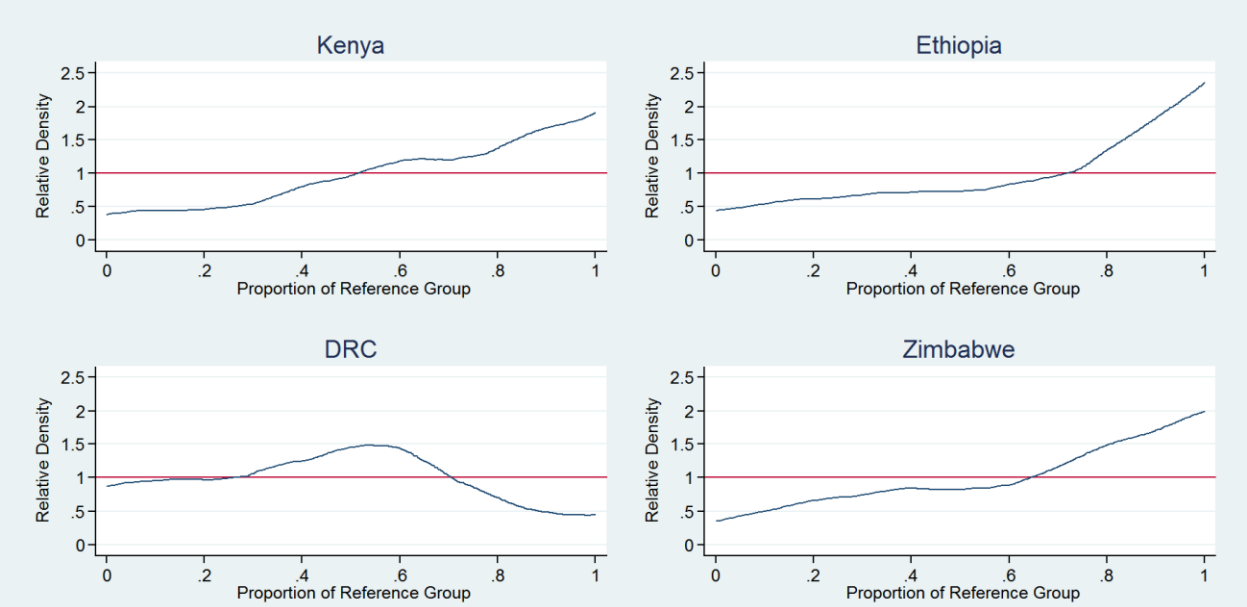
In this approach we compare firms using informal financing versus those using formal financing sources to fund their working capital and investment opportunities. The results are presented in PDF overlays, in which firms using informal finance form the reference group, while those using formal finance form the comparison group. If the two distributions are identical, the relative density would equal to 1 since in this circumstance we expect the PDFs to be uniform. Any deviations from uniform distribution indicate a distributional difference between the two groups

of firms, which in our case demonstrates a growth differential between firms using informal finance and those using formal finance.

Figure 3.7.1: Relative density function, with sales growth outcome and formal1 categorization of firms





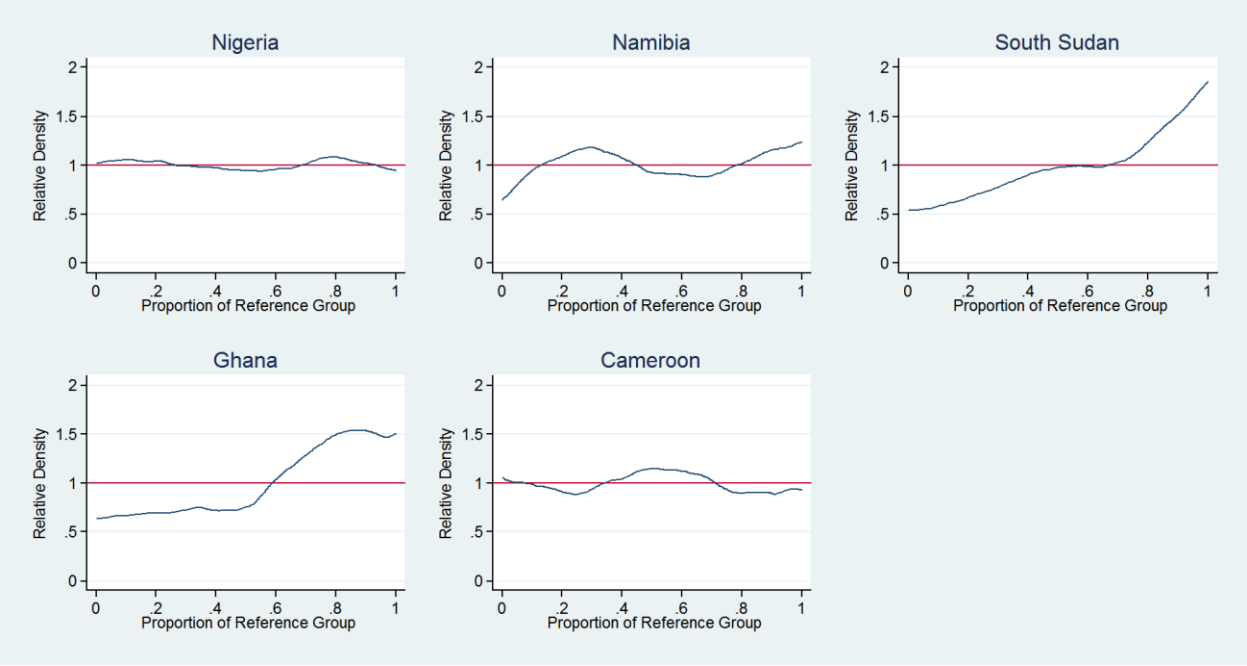


Source: Own calculations based on the WBES data.

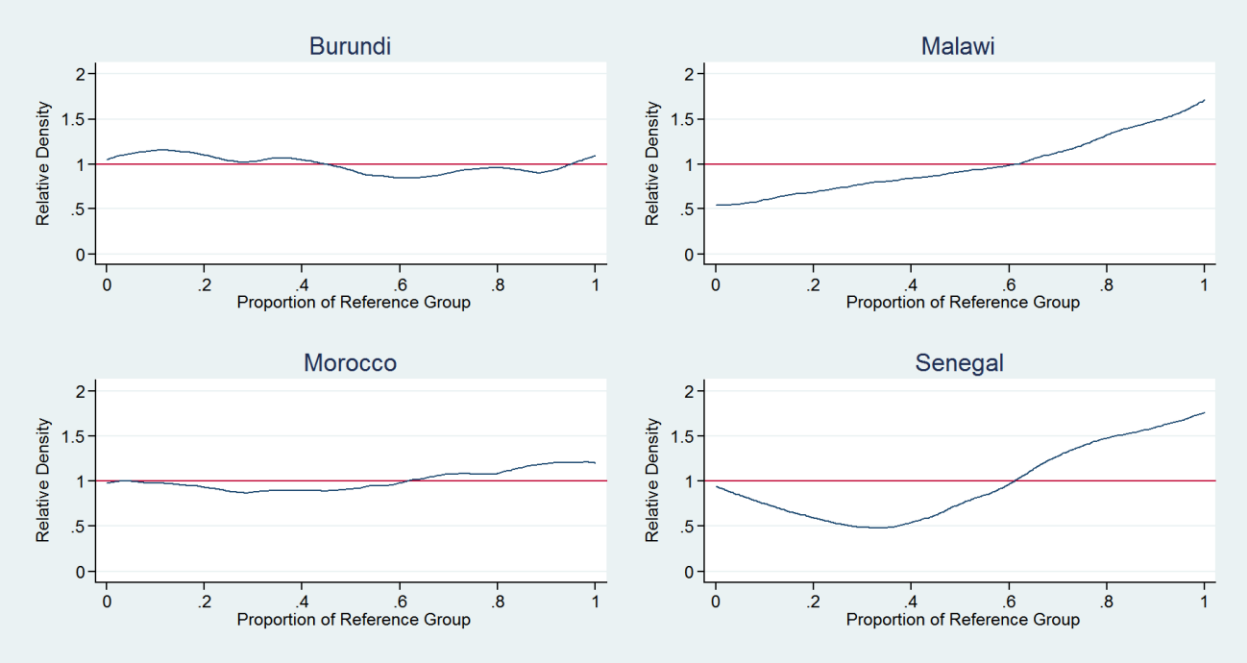
Note: *Formal1* takes the value of 1 if financing of working capital and investment through bank, non-bank financial institutions and retained earnings is greater or equal to 50%, and the firm has a loan or overdraft. It takes a value of zero if financing of working capital and investment through trade credit, other money lenders, friend and relatives is greater or equal to 50%.

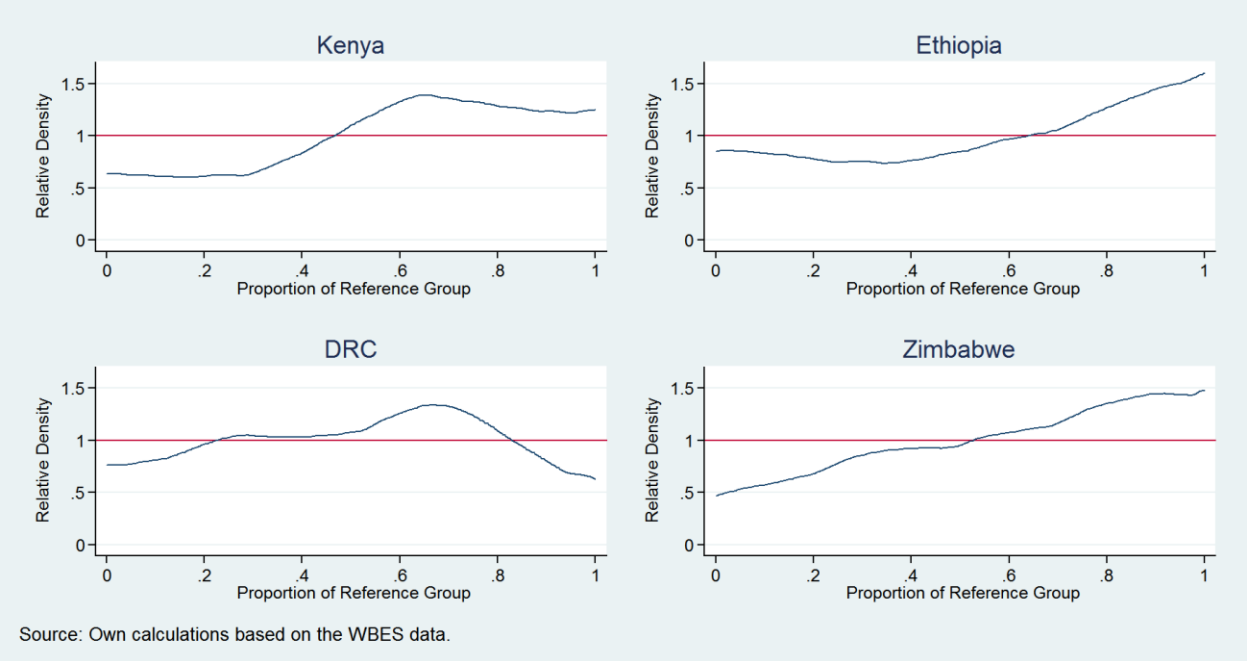
We present results for 13 African countries (Kenya, Senegal, Namibia, South Sudan, Nigeria, Burundi, Malawi, Morocco, Cameroon, Ghana, Zimbabwe, Ethiopia and the Democratic Republic of Congo), using the World Bank Enterprise Survey data between 2013 and 2016. Figure 3.7.1 shows the relative distribution results with sales growth as the dependent variable and *Formal1*[21] categorization variable for the two groups under comparison. As shown in Figure 3.7.1, there is evidence of a growth differential between the two groups of firms across all the countries. Figure 3.7.2 also demonstrates the same using labor productivity outcome variable. However, in Nigeria, Burundi and Morocco the PDFs are almost uniform showing that the difference in growth may not be very significant. This could be due to complementarity or simultaneous use of both formal and informal finance by some firms.

Figure 3.7.2: Relative density function, with labor productivity outcome and F*ormal1* categorization of firms



[21] *Formal1* takes the value of 1 if financing of working capital and investment through bank, non-bank financial institutions and retained earnings is greater or equal to 50%, and the firm has a loan or overdraft. It takes a value of zero if financing of working capital and investment through trade credit, other money lenders, friend and relatives is greater or equal to 50%.





Source: Own calculations based on the WBES data.

Note: *Formal1* takes the value of 1 if financing of working capital and investment through bank, non-bank financial institutions and retained earnings is greater or equal to 50%, and the firm has a loan or overdraft. It takes a value of zero if financing of working capital and investment through trade credit, other money lenders, friend and relatives is greater or equal to 50%.

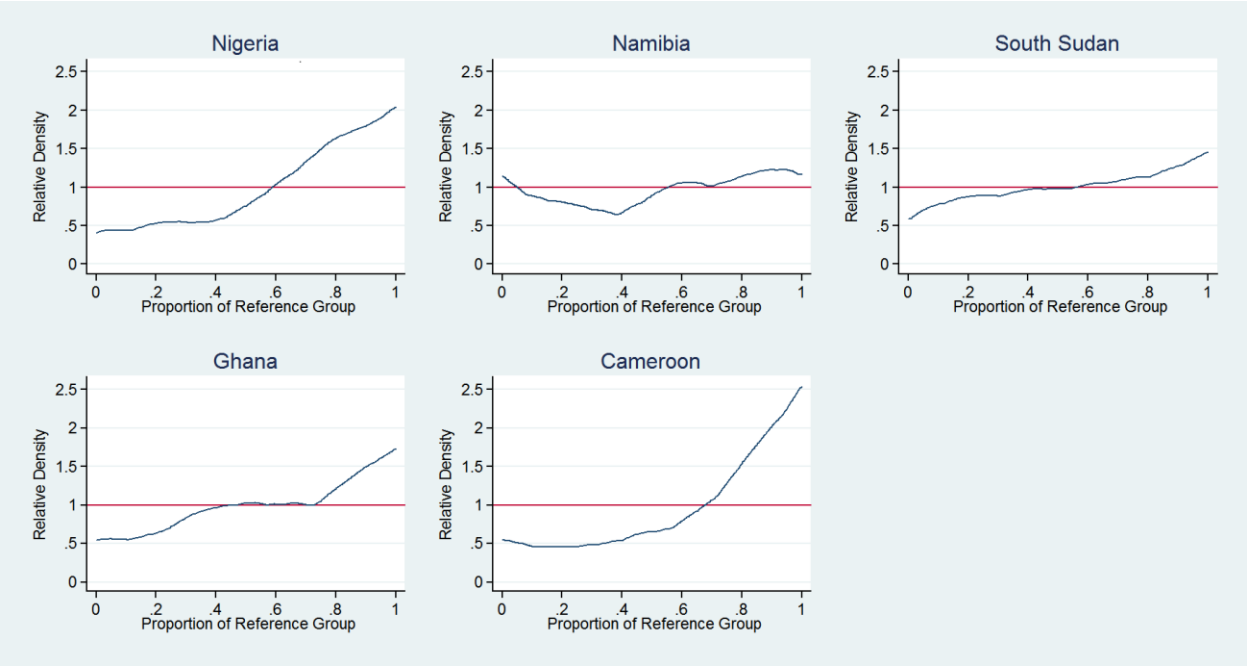
Figure 3.7.3 shows the relative distribution results with sales growth as the dependent variable and *Formal2*[22] categorization variable for the two groups under comparison. Across all the 13 countries, there is a significant evidence of a growth differential between the firms using informal finance and those using formal finance. Since firms using informal finance form the reference group, the PDFs demonstrate a positive differential in growth, which increases as we move towards the upper quantiles of the distribution.

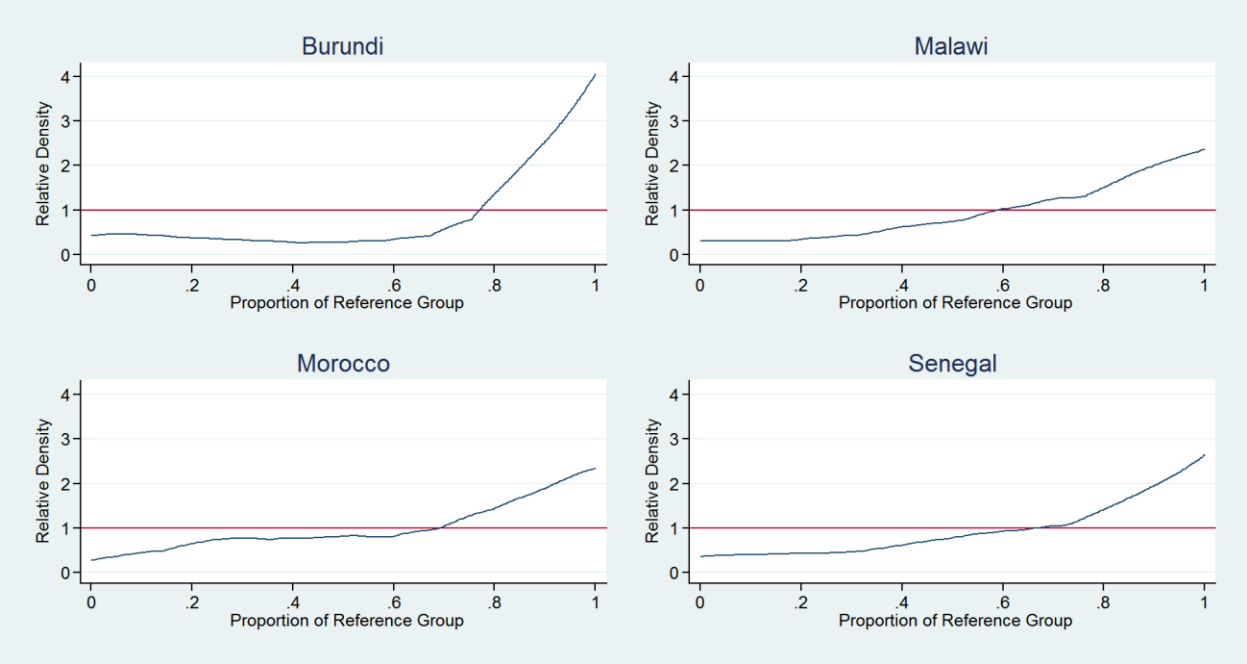
In all the 13 countries, the g(r) line is less than one in lower quantiles, and greater than one in upper quantiles. This implies that formal financing improves firm growth and performance differently across the quantiles. Specifically, those firms using formal finance are more likely to experience more growth if their sales and labor productivity is at the upper quantiles. For those whose sales and labor productivity is at the lower quantiles, they may not experience as much growth as those at the upper quantiles. This affirms the results reported by Degryse et al. (2016), on different growth impact of formal finance among small and large firms.

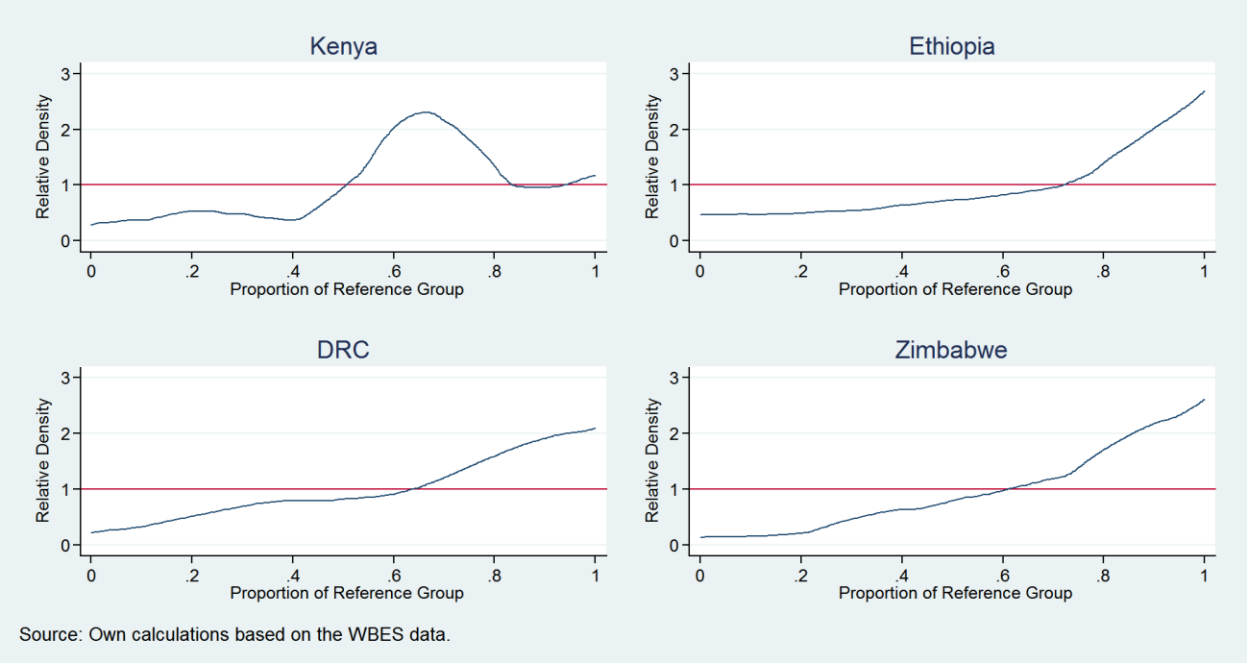
The effect is however positive, implying that formal finance if used to finance new investment and working capital, improves performance more as compared to informal finance (see Figure 3.7.4). In all the 13 countries, formal financing improves growth at the upper quantiles of the distribution, as compared to informal finance (Figures 3.7.3 and 3.7.4). This means that formal finance is more beneficial for highly productive firms than less productive firms. This could be as a result of economies to scale, whereby it is less costly for productive firms to get formal financing and repay, as compared to less productive firms.

[22] *Formal2* is the Ayyagari et al. (2010) categorization variable, which takes the value 1 if a firm has a loan or overdraft, and 0 if a firm does not have either loan or overdraft.

Figure 3.7.3: Relative density function, with sales growth outcome and formal2 categorization of firms

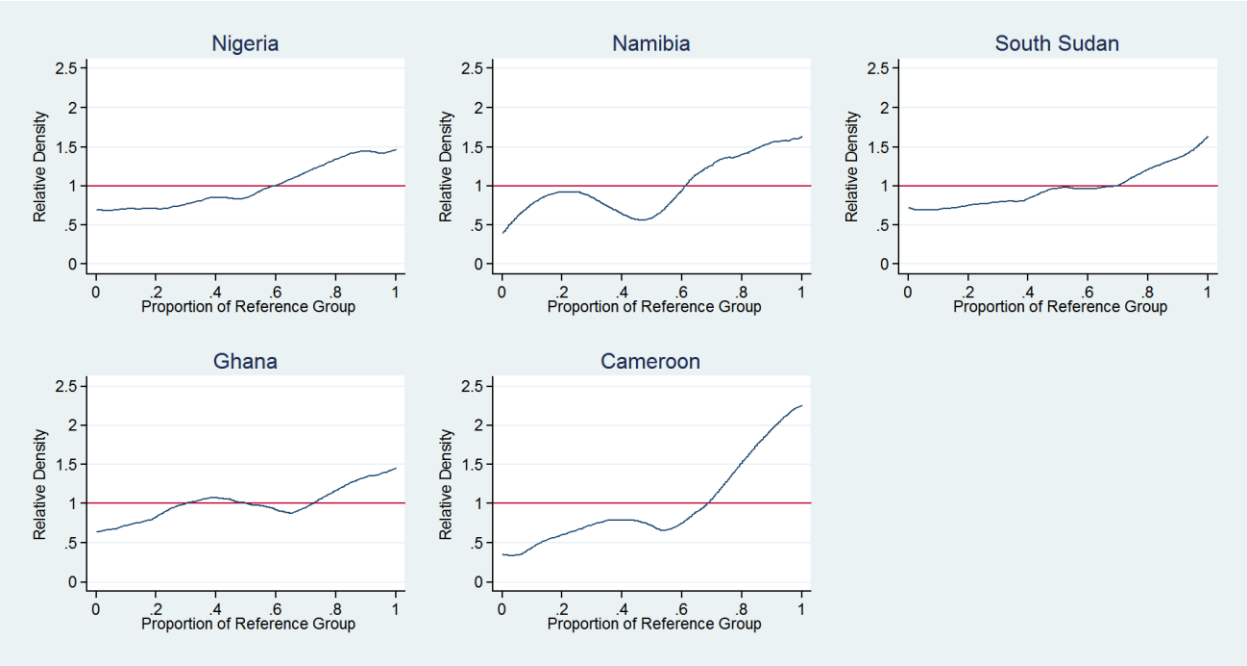


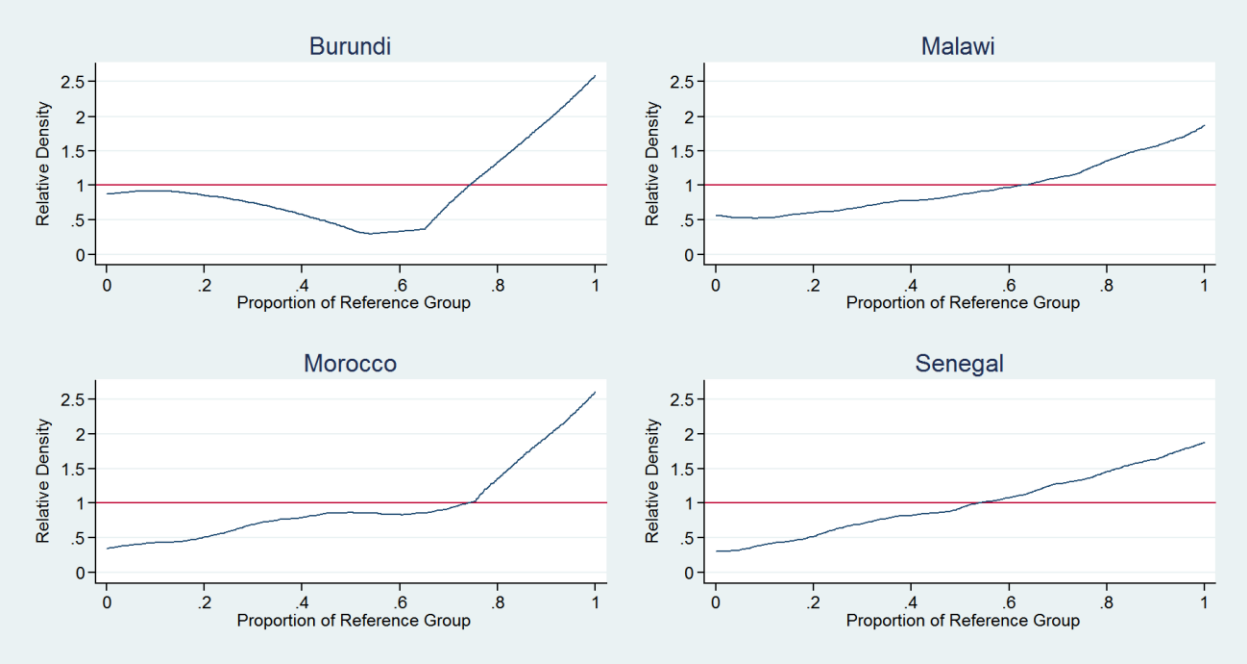


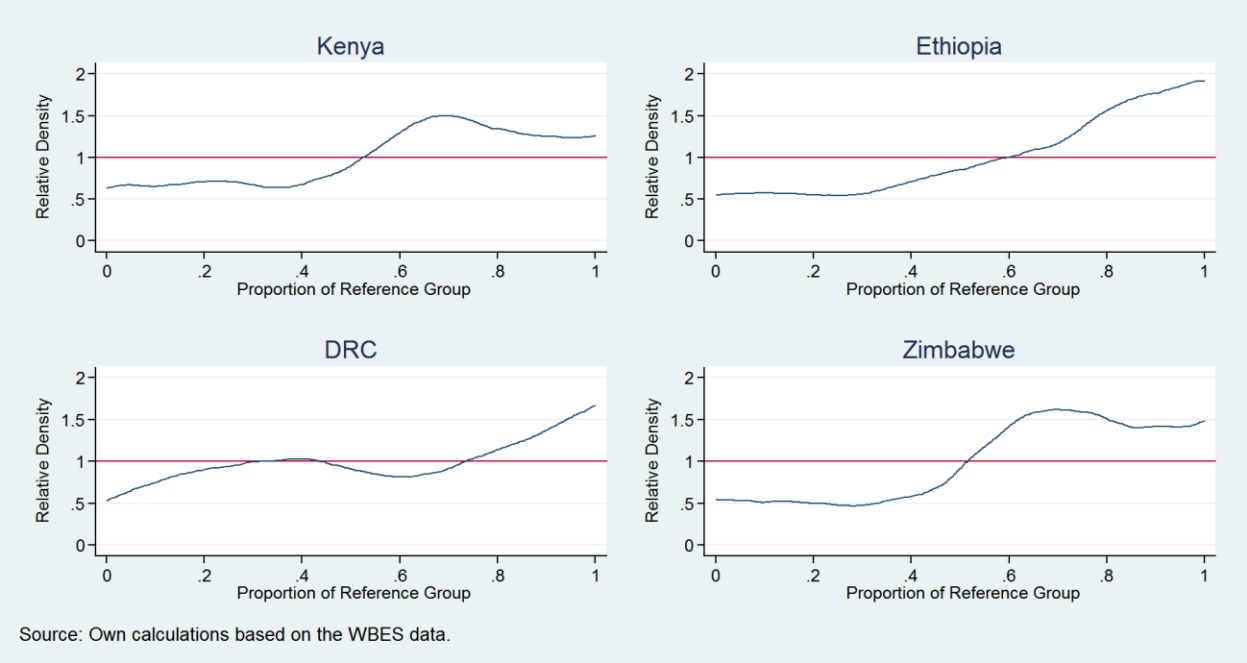


Note: *Formal2* takes the value 1 if a firm has a loan or overdraft, 0 if a firm does not have either loan or overdraft

Figure 3.7.4: Relative density function, with labor productivity outcome and f*ormal2* categorization of firms





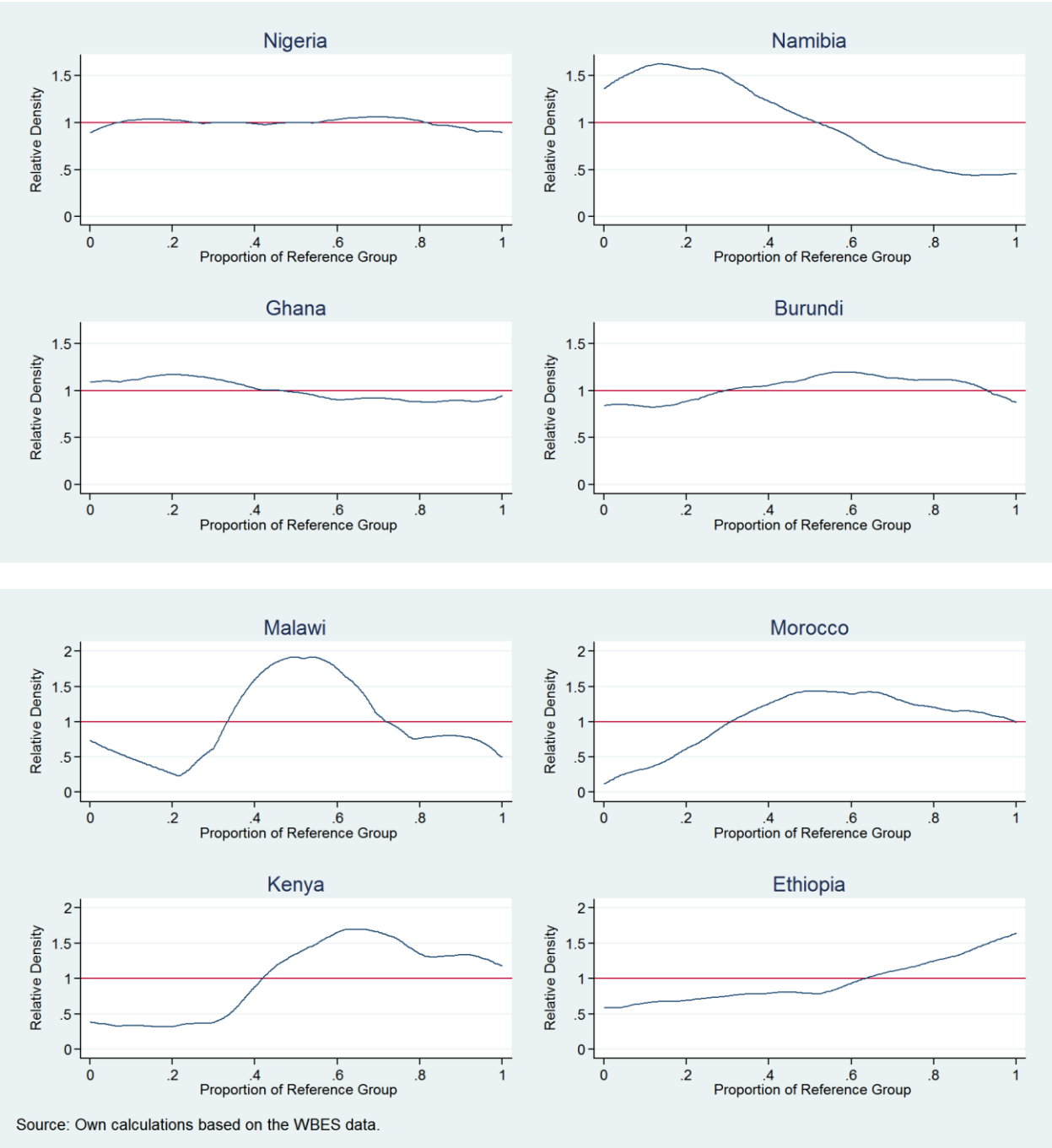


Note: *Formal2* takes the value 1 if a firm has a loan or overdraft, 0 if a firm does not have either loan or overdraft

Figure 3.7.5 shows the relative density results with the Allen et al. (2005) *self-financing* categorization variable[23]. We however note that results from this categorization variable may be biased due to lack of enough firms in the comparison group. Almost all firms use self-financing unlike bank and non-bank financial institutions (see Table 3.7.5). The variable yields mixed results across different countries. For instance in Namibia, Ghana, Morocco and Malawi, the results show that Bank financing decreases firm growth as compared to self-financing sources. This is consistent to the Allen et al. (2005) finding that alternative financing is superior to bank financing, implying that their results could have been as a result of the measure of financing they used. However the results are not the same across the distribution. For instance in Morocco, formal finance increases firm performance in the lower tail of the distribution and starts to decline at the upper tails of the distribution. This also applies to Burundi, Nigeria and Malawi (see Figure 3.7.5).

[23] The Allen et al. (2005) measure takes the value of 1 if financing of working capital and investment is through bank and non-bank financial institutions, 0 if financing is through any other sources other than bank and non-bank financial institutions.

Figure 3.7.5: Relative density function with the Allen et al. (2005) *selffinancing/bank dummy* categorization variable.



Note: The *bank dummy* measure takes the value of 1 if financing of working capital and investment is through bank and non-bank financial institutions, 0 if financing is through any other sources other than bank and non-bank financial institutions.

3.8 Recentered Influence Function (RIF) Results

In order to incorporate the effect of other covariates, we employ the Recentered Influence Function. In this case, we investigate the effect of formal finance (relative to informal finance) on the sales and labor productivity distribution. This is helpful especially if formal/informal finance affect firms differently depending on their level of productivity and sales distribution. In the RIF regressions we capture the changes in the unconditional quantiles of Y (Firm performance measures), as a result of small changes in X covariates (firm characteristics). We believe that the estimates are non-parametrically identified, assuming that the distribution of the outcome variable does not change in response to the changes in the covariates.

Our main interest here is to obtain the effect of formal/informal financing at different quantiles of the unconditional distribution of the performance and growth measures. We report our results based on the three categorizations of formal versus informal finance. In each case, we control for firm characteristics, whose results we report in Tables 3.8.4, A3.1 and A3.2. The results portray a positive association between formal finance and the proxies of firm performance and growth. Regardless of the categorization measure used, formal finance has been portrayed to be improving firm performance and growth.

Table 3.8.1 shows the Unconditional Quantile Regression results across 13 African countries, using the first categorization variable *Formal1* which takes the value of 1 if financing of working capital and investment through bank, non-bank financial institutions and retained earnings is greater or equal to 50%, and the firm has a loan or overdraft, and a value of zero if financing of working capital and investment through trade credit, other money lenders, friend and relatives is greater or equal to 50%. Using this categorization variable, the results portray a positive association between formal finance and the proxies of firm performance and growth.

For instance in Senegal, firms using formal finance experience growth in sales and labor productivity by 2.7 and 0.9 units more respectively, as compared to same firms with same characteristics but using informal finance (Table 3.8.1). It can also be noted that the effect is not the same across the distribution. For instance in Senegal only firms at the median of the sales growth and labor productivity distribution experience significant improvement in performance while other quantiles are not significant. In Zimbabwe, only firms at the lower and upper tails of

the distribution experience growth as a result of using formal finance, as compared to those using informal finance. However, in Cameroon and Burundi, there is no significant association between firm performance, and the use of informal versus formal finance (see Table 3.8.1). However, in Ethiopia, the effect of formal finance on growth is portrayed throughout all the quantiles. It however increases in units towards the upper tails of the distribution. This is in tandem with the results that were portrayed by the relative distribution method, and it still affirms the Degryse et al. (2016) results.

The effect is even more significant and pronounced when we use the *formal2* categorization variable (Ayyagari et al. (2010) measure of formal finance), which takes the value 1 if a firm has a loan or overdraft and 0 if a firm does not have either loan or overdraft . In Table 3.8.2, the effect is highly positive and significant. For instance in Senegal, Ethiopia and Cameroon, the effect is significant across the quantiles except the 10th quantile, and it increases towards the upper tails of the distribution (Table 3.8.2). In Malawi it is significant across all the quantiles. Burundi where the effect was not significant when using the first categorization, now has a positive effect of formal finance on firm performance. It portrays that firms using formal finance and are at the middle quantile in their sales distribution, have higher performance of almost 2 units as compared to firms of similar characteristics using informal finance.

In Table 3.8.3, we use the third categorization variable *bank dummy/self-financing* measure. This measure takes the value of 1 if financing of working capital and investment is through bank and non-bank financial institutions, 0 if financing is through any other sources other than bank and non-bank financial institutions. We recognize the fact that in this categorization, almost all firms use self-financing unlike bank and non-bank financial institutions (see Table 3.5). But the trend remains the same unlike this fact. The results portray positive effect which increases as you move towards the upper tails of both distributions. So regardless of the categorization measure used, formal finance is superior to informal finance in terms of sales growth and labor productivity. Only that the effect is different across different levels of outcome distribution.

Table 3.8.1: RIF regression estimates (*Formal1* measure of formal versus informal finance)

	Sales Growth			Labor Productivity		
VARIABLES	**Q10**	**Q50**	**Q90**	**Q10**	**Q50**	**Q90**
			Senegal			
Formal1	0.334	2.695***	1.152	-0.152	0.972***	0.488
	(0.334)	(0.654)	(0.768)	(0.326)	(0.293)	(0.465)
			Zimbabwe			
	0.697**	0.428	1.348	0.492***	0.197	0.670**
	(0.269)	(0.583)	(0.932)	(0.146)	(0.189)	(0.294)
			Cameroon			
	-0.216	-0.404	0.401	-0.256	-0.0505	-0.136
	(0.372)	(0.331)	(1.000)	(0.269)	(0.221)	(0.364)
			Namibia			
	0.916*	1.401*	0.782	0.562	-0.0793	0.344
	(0.551)	(0.758)	(0.812)	(0.363)	(0.259)	(0.274)
			Ethiopia			
	0.667***	1.322***	1.604***	0.174	0.410***	0.740***
	(0.252)	(0.336)	(0.384)	(0.191)	(0.142)	(0.248)
			Kenya			
	0.290	0.809	0.901	0.353	0.409**	0.318
	(0.499)	(0.521)	(0.720)	(0.245)	(0.174)	(0.274)
			DRC			
	0.258	-0.0538	-0.833	0.398	0.452*	-0.590
	(0.445)	(0.481)	(0.827)	(0.306)	(0.252)	(0.621)
			Malawi			
	0.206	1.470***	1.945***	0.489	0.652***	0.760*
	(0.436)	(0.501)	(0.617)	(0.342)	(0.237)	(0.427)
			Burundi			
	-0.524	0.311	0.850	-0.0318	0.0756	0.120
	(0.755)	(0.543)	(0.899)	(0.261)	(0.315)	(0.498)
			South Sudan			
	0.829	1.597	1.545	0.660***	0.318**	0.587**
	(1.174)	(1.263)	(1.714)	(0.238)	(0.138)	(0.288)
			Ghana			
	1.083***	0.875**	1.191**	0.435	0.757***	0.407*
	(0.375)	(0.388)	(0.479)	(0.270)	(0.226)	(0.240)
			Morocco			
	0.776	0.691*	0.654	0.0366	0.310	0.0928
	(0.492)	(0.400)	(0.678)	(0.243)	(0.215)	(0.349)
			Nigeria			
	0.601***	0.542*	0.109	0.00248	-0.0948	-0.455
	(0.172)	(0.308)	(1.083)	(0.181)	(0.136)	(0.321)

*Bootstrapped standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1)*

Formal1 takes the value of 1 if financing of working capital and investment through bank, non-bank financial institutions and retained earnings is greater or equal to 50%, and the firm has a loan or overdraft. It takes a value of zero if financing of working capital and investment through trade credit, other money lenders, friend and relatives is greater or equal to 50%.

Table 3.8.2: RIF regression estimates (*Formal2* measure of formal versus informal finance)

	Sales Growth			Labor Productivity		
VARIABLES	**Q10**	**Q50**	**Q90**	**Q10**	**Q50**	**Q90**
			Senegal			
Formal2	0.352	1.679***	1.525***	0.654***	0.803***	0.637**
	(0.440)	(0.583)	(0.519)	(0.219)	(0.261)	(0.311)
			Zimbabwe			
	0.649**	0.387	0.505	0.0396	0.490***	0.338
	(0.251)	(0.561)	(0.851)	(0.178)	(0.158)	(0.278)
			Cameroon			
	0.0587	0.883*	2.649**	0.615***	0.540**	0.834*
	(0.301)	(0.454)	(1.145)	(0.233)	(0.241)	(0.426)
			Namibia			
	0.283	0.612	1.238	1.353	0.825	0.388
	(1.225)	(1.270)	(1.442)	(0.983)	(0.578)	(0.559)
			Ethiopia			
	0.399	1.404***	1.242***	0.117	0.568***	0.561**
	(0.337)	(0.332)	(0.311)	(0.224)	(0.145)	(0.255)
			Kenya			
	0.753	1.383***	-0.263	0.720**	0.728***	0.449
	(0.502)	(0.513)	(0.795)	(0.339)	(0.169)	(0.286)
			DRC			
	0.619	0.916**	0.902	0.535	0.249	1.270*
	(0.384)	(0.451)	(1.197)	(0.345)	(0.303)	(0.768)
			Malawi			
	1.201**	1.944***	2.403***	0.790**	0.862***	1.463***
	(0.470)	(0.511)	(0.609)	(0.322)	(0.238)	(0.404)
			Burundi			
	1.350	2.387***	1.885*	-0.0359	1.449***	0.356
	(1.237)	(0.786)	(1.095)	(0.526)	(0.546)	(0.574)
			South Sudan			
	0.234	-0.0364	-0.324	0.397	0.370**	0.835**
	(0.656)	(1.377)	(2.595)	(0.314)	(0.156)	(0.421)
			Ghana			
	0.931**	0.196	0.869	0.404	0.0897	0.157
	(0.365)	(0.359)	(0.659)	(0.258)	(0.229)	(0.285)
			Morocco			
	1.680*	0.923**	0.470	0.474	0.755***	0.640*
	(0.869)	(0.454)	(0.822)	(0.387)	(0.259)	(0.331)
			Nigeria			
	0.413	0.952*	0.852	0.465*	0.385	-0.109
	(0.353)	(0.501)	(1.499)	(0.282)	(0.258)	(0.451)

Bootstrapped standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Formal2 is the Ayyagari et al. (2010) measure of formal finance, which takes the value 1 if a firm has a loan or overdraft, 0 if a firm does not have either loan or overdraft

Table3.8.3: RIF regression estimates (*bank dummy/self-financing* measure of formal versus informal finance)

	Sales Growth			Labor Productivity		
VARIABLES	**Q10**	**Q50**	**Q90**	**Q10**	**Q50**	**Q90**
			Senegal			
Bank dummy				1.153**	-1.728**	-0.225
				(0.581)	(0.828)	(0.174)
			Zimbabwe			
	0.331	0.0737	2.117	0.658***	0.980*	0.640
	(0.331)	(1.596)	(3.464)	(0.144)	(0.547)	(1.381)
			Cameroon			
				0.618*	-0.178	-1.405
				(0.330)	(0.938)	(1.000)
			Namibia			
	0.488	-0.494	0.909	0.191	-0.613*	-0.286
	(0.521)	(0.746)	(1.000)	(0.423)	(0.313)	(0.318)
			Ethiopia			
	0.981***	1.345	1.280	0.0984	0.324	2.628**
	(0.276)	(0.883)	(1.616)	(0.596)	(0.523)	(1.239)
			Kenya			
	-0.591	0.494	-0.785	0.748*	1.202***	-0.116
	(0.918)	(1.282)	(2.655)	(0.442)	(0.361)	(0.654)
			Malawi			
	0.812**	2.779***	0.0329	-0.113	-0.0173	-1.221***
	(0.364)	(0.626)	(2.883)	(1.536)	(0.867)	(0.417)
			Burundi			
	0.821	1.734**	-0.279	-0.262	0.222	-0.991
	(0.512)	(0.754)	(2.068)	(0.786)	(0.648)	(0.901)
			Ghana			
	1.041***	0.258	1.291	0.998***	0.0682	0.0915
	(0.355)	(1.227)	(2.310)	(0.207)	(0.808)	(1.068)
			Morocco			
	0.937**	1.120*	-0.292	0.637***	0.432	-0.355
	(0.362)	(0.593)	(1.547)	(0.195)	(0.440)	(1.073)
			Nigeria			
	0.746**	-0.330	4.998	1.075***	-1.138	2.529
	(0.344)	(1.160)	(7.232)	(0.280)	(1.220)	(4.080)

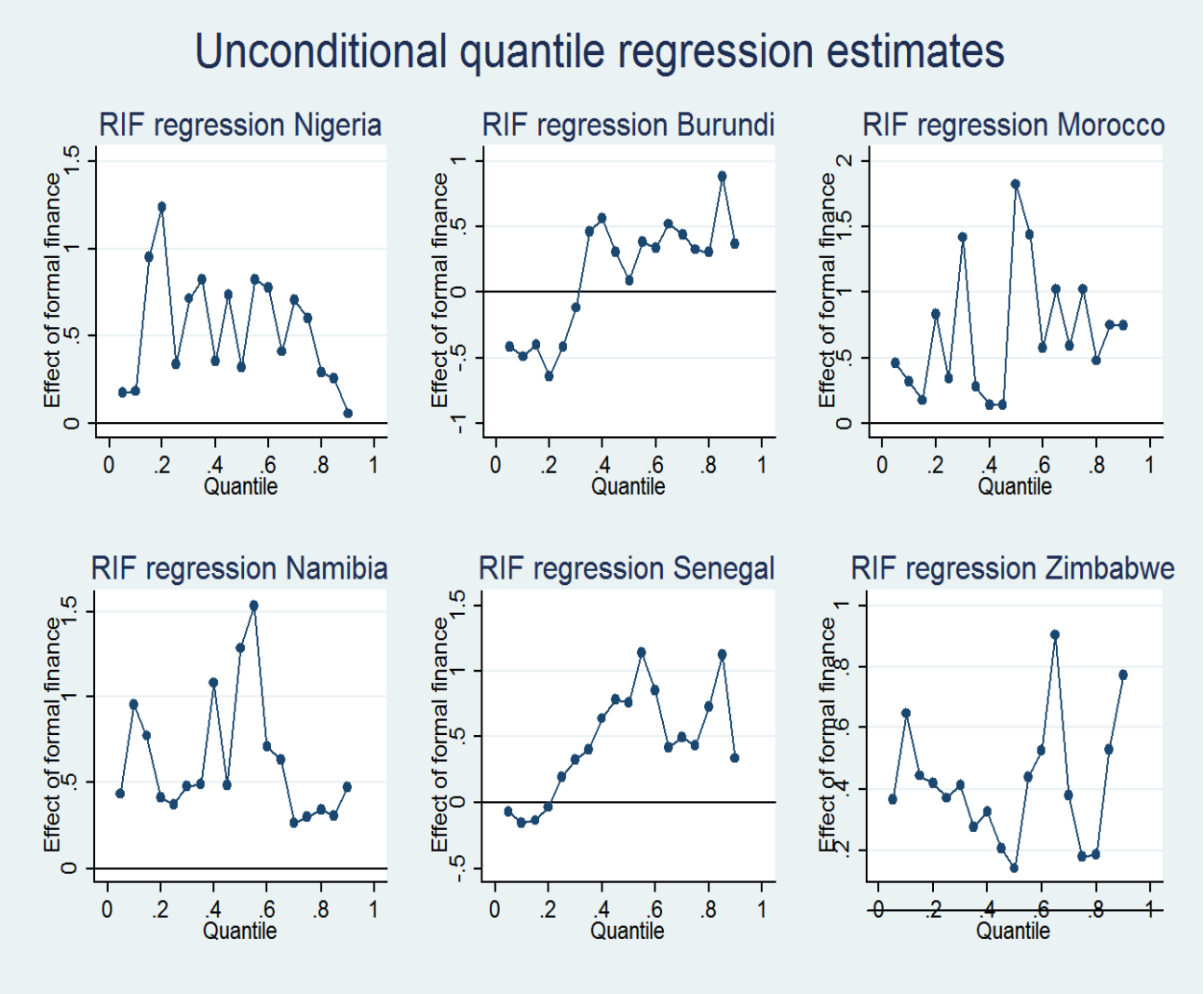
Bootstrapped standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

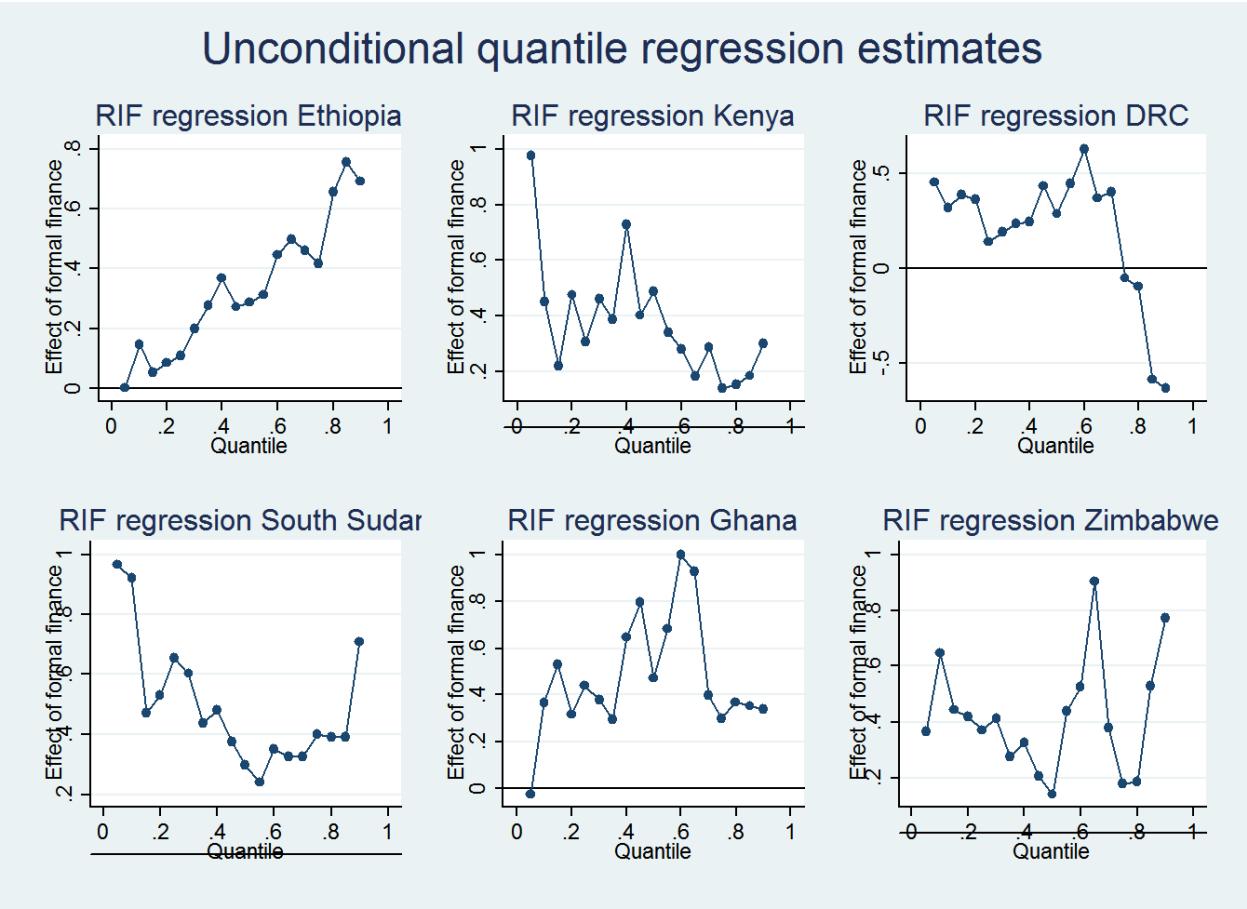
The *bank dummy* measure takes the value of 1 if financing of working capital and investment is through bank and non-bank financial institutions, 0 if financing is through any other sources other than bank and non-bank financial institutions.

The effect can be seen more clearly by demonstrating this on graphical displays. Figure 3.8.1 demonstrates how Formal finance impacts on firm growth across many quantiles. Even though the growth is seen to be fluctuating across the quantiles, the growth oscillates along the positive

quadrant. It is only in the Democratic Republic of Congo, where the growth declines till negative at the upper tails of the distribution (Figure 3.8.1). For instance, in Ghana, Senegal and Burundi, the growth increases from negative at the lower quantile, then gets to a high positive at the upper quantile. This could imply that formal finance benefits more those firms at the lower level of the distribution than those at higher levels of the distribution. In Ethiopia, the estimates display a monotonically increasing effect across the quantiles. The figures, clearly confirm the point that the use of formal/informal finance affects firm growth differently, at different points of the distribution. So policy makers should recommend different policies for different firms depending on their level of sales/labor productivity distribution.

Figure 3.8.1: Graphical display of the Unconditional Quantile partial effects





The model also incorporated other covariates other than the financing variable. Table 3.8.4 shows the association of firm characteristics with performance and growth. Size is positively associated with firm growth. The bigger the firm size, the more likely that the firm will perform better as compared to smaller firms, holding all other factors constant. And this effect increases monotonically across the quantiles. Age is also positively associated with firm performance and growth. The older the firm is, the more it is likely to perform better. This supports the evidence in the literature that large and older firms perform better than young and small firms[24]. Though we

[24] See for example Berger and Udell (1998); Gregory et al. (2005) and Tang (1995).

cannot rule out the fact that the bigger firms could be benefiting from economies of scale, as a result of their increased size. And since in our model firms using formal financing perform better than those using informal financing, then we can also infer that old and larger firms perform better because they can easily access formal finance due to their reputational advantage, as compared to young and smaller firms, holding all other factors constant.

Those firms that directly or indirectly export their products perform better than those that do not export. This is however not the case with Namibia, Morocco, South Sudan and Kenya whose coefficient is negative. The effect throughout is higher at the fiftieth and ninetieth quantiles than at the tenth quantile (Table 3.8.4).

The number of years that the manager has been in a firm does not seem to impact on firm performance in most countries. In Nigeria where the variable is highly significant at 1% significance level, the growth of the firm declines as the manager's experience increases. It could be that the manager gets used into routine as he/she keeps the position in a firm to an extent firm performance stagnates. The coefficient is however positive in Ethiopia and Kenya.

Firms listed in the stock exchange perform better than those not listed. Its only in Ethiopia where the coefficients are significantly negative. This could be due to the fact that the Ethiopian stock exchange market was young and not well established at the time of the survey. In addition, foreign owned firms perform better than domestically owned firms (see Tables 3.8.4, A3.1 and A3.2). This could be in line with the existing literature which argues that foreign owned firms have access to many sources of formal finance, since they can easily access funds even from foreign banks as well as their mother companies abroad[25].

[25] See for example Beck and Demirguc-kunt (2006); Blalock, Gertler and Levine (2008).

Table 3.8.4: Estimates of the effect of other firm characteristics on firm performance (using formal1 measure of formal/informal financing source)

	Sales Growth			Labor Productivity			Sales Growth			Labor Productivity		
VARIABLES	Q10	Q50	Q90	Q10	Q50	Q90	Q10	Q50	Q90	Q10	Q50	Q90
	Senegal						**Zimbabwe**					
size	0.235	1.036***	0.364	0.190**	0.309***	0.444**	0.381	1.574***	0.439	-0.0394	0.267**	-0.112
	(0.152)	(0.282)	(0.241)	(0.0870)	(0.111)	(0.175)	(0.261)	(0.370)	(0.461)	(0.117)	(0.110)	(0.159)
exporting	0.683**	3.472***	0.874	0.594***	0.690	1.357	0.264	-0.794	-0.345	0.531***	-0.130	0.145
	(0.321)	(0.885)	(1.811)	(0.214)	(0.590)	(1.314)	(0.752)	(2.679)	(1.731)	(0.148)	(0.484)	(0.964)
industry	0.0201	0.00271	-0.00406	0.0121*	0.00896	0.00832	-0.204	-0.0967	-0.128	0.0293	0.0119	-0.0266
	(0.0138)	(0.0126)	(0.0172)	(0.00682)	(0.00565)	(0.00802)	(0.169)	(0.152)	(0.263)	(0.0540)	(0.0465)	(0.0672)
age	-0.0125	0.0152	0.0839*	0.00286	0.0222***	0.0270	0.0104	0.0154	0.0249*	0.00544	0.00572*	0.00189
	(0.0144)	(0.0266)	(0.0428)	(0.00718)	(0.00725)	(0.0166)	(0.00732)	(0.0110)	(0.0140)	(0.00338)	(0.00335)	(0.00440)
ownership	0.645*	1.045	3.794*	0.504***	0.253	1.224	0.554	1.477*	-1.419	0.0314	0.506**	0.989*
	(0.353)	(1.026)	(1.930)	(0.121)	(0.398)	(0.861)	(0.371)	(0.865)	(1.433)	(0.237)	(0.242)	(0.540)
Legal status	0.408	2.733***	5.643**	0.430**	1.215***	1.196	-0.122	1.157*	3.111*	0.358*	0.995***	1.527***
	(0.287)	(0.742)	(2.445)	(0.177)	(0.420)	(0.972)	(0.423)	(0.596)	(1.802)	(0.190)	(0.201)	(0.576)
Manager_ exp	0.0133	0.0549*	-0.0140	0.0131	0.0104	-0.000449	0.0300	0.00251	0.0136	-0.00160	-0.00363	-0.00377
	(0.0172)	(0.0312)	(0.0329)	(0.0111)	(0.0120)	(0.0210)	(0.0189)	(0.0242)	(0.0302)	(0.00870)	(0.00745)	(0.0106)
	Cameroon						**Namibia**					
size	0.251*	0.560**	1.477*	0.0971	0.131	0.0445	-0.0516	1.319**	1.342	0.00121	0.334	0.785**
	(0.151)	(0.223)	(0.789)	(0.185)	(0.136)	(0.203)	(0.300)	(0.567)	(1.548)	(0.273)	(0.234)	(0.319)
exporting	0.555*	0.119	-3.830	-0.735	-0.318	-0.972	0.797	-2.332	-2.061	1.078	-0.172	-1.410*
	(0.328)	(0.804)	(3.134)	(0.844)	(0.470)	(1.153)	(0.586)	(2.883)	(2.888)	(1.086)	(1.654)	(0.820)
industry	-0.231	0.216	0.122	-0.117	-0.0314	-0.142	0.0381	-0.330	-0.0834	0.313	0.212	-0.197
	(0.152)	(0.178)	(0.693)	(0.147)	(0.126)	(0.203)	(0.314)	(0.454)	(0.608)	(0.260)	(0.184)	(0.227)
age	-0.00231	0.0251*	0.0673	0.0267**	0.0125	0.0373	0.0208	0.0228	0.0649	-0.00563	0.0453***	0.0529**
	(0.0113)	(0.0137)	(0.0759)	(0.0129)	(0.00849)	(0.0262)	(0.0192)	(0.0342)	(0.0669)	(0.0178)	(0.0142)	(0.0250)
ownership	0.279	0.113	5.351	0.392	0.571	2.058	1.045**	2.059	1.838	0.435	0.180	-0.0812
	(0.226)	(0.565)	(3.805)	(0.422)	(0.441)	(1.550)	(0.422)	(1.561)	(3.284)	(0.451)	(0.528)	(0.717)
Legal status	-0.119	0.260	0.941	-0.0108	0.325	1.575**	-1.677*	-1.557	-6.190	0.218	-0.668	0.264
	(0.429)	(0.378)	(1.670)	(0.400)	(0.285)	(0.758)	(0.975)	(1.731)	(3.942)	(0.616)	(1.240)	(2.530)
Manager_exp	0.0201	0.0157	-0.0194	-0.0160	-0.00886	-0.0311	0.0266	0.0436	-0.00941	0.0586***	0.0502***	0.0281
	(0.0151)	(0.0178)	(0.0602)	(0.0175)	(0.0106)	(0.0221)	(0.0255)	(0.0479)	(0.0818)	(0.0165)	(0.0167)	(0.0209)
	Ethiopia						**Kenya**					
size	0.263	0.621***	0.506***	0.483***	0.162**	0.000204	0.737***	1.244***	1.667***	0.0257	0.216**	0.247
	(0.180)	(0.176)	(0.158)	(0.0927)	(0.0755)	(0.113)	(0.216)	(0.337)	(0.617)	(0.170)	(0.0985)	(0.157)
exporting	0.237	1.343**	3.205**	0.550***	0.485	0.955	-0.336	0.642	1.078	-1.101*	-0.252	-0.166
	(0.396)	(0.600)	(1.271)	(0.196)	(0.300)	(0.727)	(0.504)	(0.576)	(1.344)	(0.605)	(0.226)	(0.299)
industry	0.00262	-0.00444	-0.00397	0.00618	0.0119***	0.0319***	-0.0106	-0.0137	-0.0159	-0.00385	0.00641	0.00596
	(0.00829)	(0.0100)	(0.0106)	(0.00557)	(0.00440)	(0.00766)	(0.0109)	(0.0142)	(0.0258)	(0.00899)	(0.00537)	(0.00782)
age	0.0111	0.0373***	0.0607***	0.0131**	0.0136**	0.00757	0.0140**	0.00560	-0.00293	0.00280	0.00335	0.00183
	(0.00904)	(0.0131)	(0.0195)	(0.00593)	(0.00585)	(0.0103)	(0.00660)	(0.0141)	(0.0299)	(0.00932)	(0.00470)	(0.00838)

ownership	0.632**	2.053***	1.080	0.386**	0.307	0.857	-0.194	1.552**	4.402*	0.276	0.403	1.252*
	(0.281)	(0.436)	(0.877)	(0.184)	(0.276)	(0.601)	(0.474)	(0.734)	(2.405)	(0.524)	(0.294)	(0.698)
Legal status	0.483	0.628	-3.637**	0.521***	-0.433	-1.154***	0.0926	2.107	-0.630	-0.286	1.010*	0.634
	(0.357)	(1.370)	(1.626)	(0.193)	(0.653)	(0.438)	(0.618)	(1.284)	(5.400)	(1.160)	(0.556)	(1.450)
Manager _exp	0.00879	0.0238	-0.0111	0.0328***	0.0108*	-0.00896	0.0387**	0.0359	-0.0275	0.0298*	0.0112	-0.0122
	(0.0121)	(0.0164)	(0.0196)	(0.00778)	(0.00651)	(0.0141)	(0.0191)	(0.0220)	(0.0377)	(0.0165)	(0.00711)	(0.0108)
	DRC						**Malawi**					
size	0.420	1.467***	5.536***	-0.0599	0.433*	2.846***	-0.467**	-0.124	0.422*	-0.0867	0.211*	0.0315
	(0.341)	(0.369)	(1.318)	(0.223)	(0.241)	(0.756)	(0.232)	(0.216)	(0.219)	(0.187)	(0.109)	(0.160)
exporting	0.960*	2.262**	8.347	0.432	1.155	7.120*	0.595	0.885	3.453	-3.076	-0.462	-0.0464
	(0.516)	(0.969)	(5.334)	(0.910)	(0.756)	(4.136)	(0.507)	(0.860)	(5.364)	(1.902)	(0.677)	(1.215)
industry	0.0275**	0.00978	-0.0244	0.0162*	0.0167**	0.0147						
	(0.0125)	(0.0132)	(0.0286)	(0.00847)	(0.00817)	(0.0181)						
age	0.000939	0.0262	0.0451	0.0206**	0.0144	-0.0269	0.00881	0.0319*	0.0494	0.0147	0.0160	0.00979
	(0.0143)	(0.0212)	(0.0772)	(0.0103)	(0.0129)	(0.0474)	(0.0156)	(0.0176)	(0.0336)	(0.0135)	(0.0101)	(0.0154)
ownership	1.190***	1.848***	2.374	0.898***	1.588***	1.254	0.0528	1.530***	2.148**	0.161	0.474	0.189
	(0.230)	(0.540)	(1.521)	(0.273)	(0.372)	(0.973)	(0.488)	(0.574)	(1.081)	(0.467)	(0.299)	(0.532)
Legal status							-1.553	0.335	6.339	-2.574	-1.607***	-1.205**
							(2.729)	(1.775)	(3.906)	(2.811)	(0.489)	(0.468)
Manager _exp	0.0225	-0.00108	0.0207	0.0310**	0.0142	0.0934*	0.0269	0.00962	-0.0344	0.00756	-0.0125	-0.00837
	(0.0164)	(0.0230)	(0.0735)	(0.0122)	(0.0159)	(0.0490)	(0.0164)	(0.0258)	(0.0368)	(0.0178)	(0.0118)	(0.0230)
	Burundi						**Sudan**					
size	0.302	0.460*	0.534	0.255*	0.571***	0.299	0.0229	-0.0905	1.496	-0.124	0.251	1.451***
	(0.434)	(0.275)	(0.492)	(0.149)	(0.159)	(0.245)	(0.442)	(1.049)	(2.500)	(0.271)	(0.171)	(0.540)
exporting	1.155	-0.331	1.764	-0.944	-0.675	-0.945	0.113	0.784	-3.391	-0.671	0.461	-1.255***
	(0.734)	(1.324)	(3.734)	(1.032)	(0.751)	(0.829)	(0.470)	(2.050)	(2.623)	(1.196)	(0.586)	(0.382)
industry	-0.00892	-0.0308*	0.00316	-0.0128	-0.0252***	-0.0174	0.0169	-0.00786	-1.80e-05	0.00710	0.00815	0.0181
	(0.0249)	(0.0184)	(0.0288)	(0.00941)	(0.00919)	(0.0154)	(0.0433)	(0.0504)	(0.0622)	(0.0109)	(0.00541)	(0.0134)
age	0.0330	0.00537	0.0903	-0.00707	0.00839	0.0253	0.208	0.143	-0.0228	-0.0387	-0.0121	0.0224
	(0.0276)	(0.0324)	(0.0676)	(0.00896)	(0.0118)	(0.0278)	(0.135)	(0.172)	(0.214)	(0.0322)	(0.0162)	(0.0459)
ownership	-0.820	-0.139	1.636	-0.0712	0.705*	-0.285	1.235	2.224	2.600	0.360	0.148	0.468*
	(0.957)	(0.824)	(1.691)	(0.406)	(0.401)	(0.856)	(0.795)	(1.509)	(1.877)	(0.230)	(0.128)	(0.269)
Legal status	0.648	-0.115	1.054	0.163	-0.436	-0.0805	-0.392	-0.518	4.775	-1.384	-0.779**	-0.325
	(0.457)	(0.803)	(1.480)	(0.281)	(0.363)	(0.698)	(1.087)	(2.370)	(6.596)	(1.040)	(0.376)	(0.747)
Manager _exp	0.0358	0.0371	-0.0381	0.0119	-0.00950	-0.0239	0.0293	-0.0171	-0.0543	0.0109	0.0102	0.0201
	(0.0379)	(0.0312)	(0.0886)	(0.0130)	(0.0179)	(0.0322)	(0.0461)	(0.0808)	(0.107)	(0.0195)	(0.00937)	(0.0268)
	Ghana						**Morocco**					
size	0.0280	0.386**	0.500**	-0.0699	0.0470	0.0713	-0.303	1.045***	0.923**	-0.283	-0.272**	-0.159
	(0.166)	(0.164)	(0.230)	(0.108)	(0.0825)	(0.102)	(0.340)	(0.266)	(0.380)	(0.204)	(0.135)	(0.240)
exporting	0.418	1.433*	2.518*	-0.441	0.125	0.350	0.195	0.0539	-0.674	-0.105	-0.891***	-0.502
	(0.614)	(0.744)	(1.412)	(0.702)	(0.495)	(0.751)	(0.762)	(0.604)	(1.040)	(0.375)	(0.290)	(0.423)
industry	-0.00668	0.0294**	0.00906	0.0139	0.0235***	0.0238***	0.0553	-0.0543	-0.0365	-0.00132	-0.0557	0.000105
	(0.0130)	(0.0117)	(0.0164)	(0.00936)	(0.00735)	(0.00852)	(0.185)	(0.140)	(0.200)	(0.0872)	(0.0741)	(0.140)

age	-0.000397	-0.00914	0.114**	0.000158	0.0147	0.0145	0.0319**	0.0137	0.00678	0.0111**	0.00745	0.0133
	(0.0134)	(0.0213)	(0.0500)	(0.00972)	(0.0112)	(0.0171)	(0.0131)	(0.0122)	(0.0295)	(0.00515)	(0.00692)	(0.0121)
ownership	0.898**	2.482***	3.528***	0.583**	1.751***	1.671***	1.281***	1.068*	2.070	0.396	0.592*	0.223
	(0.357)	(0.474)	(1.223)	(0.297)	(0.289)	(0.578)	(0.294)	(0.568)	(1.721)	(0.368)	(0.314)	(0.682)
Legal status	1.686**	4.803***	4.926	1.390**	3.008***	4.031	1.232***	0.164	0.131	0.682***	0.404*	0.583
	(0.725)	(1.768)	(5.135)	(0.569)	(1.076)	(3.655)	(0.357)	(0.502)	(0.908)	(0.225)	(0.240)	(0.522)
Manager _exp	0.0288	0.0218	-0.0613	0.00840	0.00452	-0.00817	0.000458	0.00499	0.0262	0.00915	0.000215	0.00164
	(0.0180)	(0.0227)	(0.0424)	(0.0129)	(0.0135)	(0.0179)	(0.0241)	(0.0176)	(0.0358)	(0.0113)	(0.00893)	(0.0162)
	Nigeria											
size	0.293***	0.756***	3.390***	-0.189*	-0.139*	0.255						
	(0.112)	(0.173)	(0.929)	(0.109)	(0.0832)	(0.212)						
exporting	0.0221	-0.532	-1.418	-0.0642	-0.328	-0.511						
	(0.318)	(0.437)	(1.426)	(0.288)	(0.251)	(0.456)						
industry	-0.0251	0.0467*	-0.0217	-0.0245	0.00885	0.0380						
	(0.0218)	(0.0251)	(0.0705)	(0.0176)	(0.0125)	(0.0276)						
age	0.0106	0.0304**	0.123**	-0.00841	0.0149*	0.0298*						
	(0.00932)	(0.0152)	(0.0552)	(0.00961)	(0.00800)	(0.0178)						
ownership	-0.596	-0.00189	1.521	-1.177**	-0.667**	0.541						
	(0.462)	(0.525)	(1.889)	(0.477)	(0.272)	(0.707)						
Legal status	0.641***	0.687	-1.343	0.0633	-0.0146	0.0258						
	(0.205)	(0.968)	(2.975)	(0.883)	(0.482)	(1.444)						
Manager _exp	-0.00395	-0.0499***	-0.0648	-0.0199*	-0.0284***	-0.0532***						
	(0.0125)	(0.0175)	(0.0677)	(0.0112)	(0.00783)	(0.0198)						

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Formal1 takes the value of 1 if financing of working capital and investment through bank, non-bank financial institutions and retained earnings is greater or equal to 50%, and the firm has a loan or overdraft. It takes a value of zero if financing of working capital and investment through trade credit, other money lenders, friend and relatives is greater or equal to 50%.

3.9 Robustness checks

For purposes of verifying our results, we carry out a propensity score matching, where we match firms using formal financing with those using informal financing. Matching involves pairing firms using formal financing and those using informal sources that are similar in terms of their characteristics, and then comparing their outcomes. We do this using the three categorizations of financing source that we used while carrying out the recentered influence function regressions. In this particular case, we seek to estimate the impact of formal financing, on firm performance and growth, relative to informal finance. The general model we are estimating here can be expressed as:

$$Firmgrowth = \beta_0 + \beta_1 Finance + \beta_2 X + \varepsilon \qquad (3.10)$$

Where *Finance* is the financial access dummy variable (which takes a value of 1 if the firm uses formal financing and 0 if the firm is using informal financing in their working capital and new investment), X represents a set of firm characteristics (firm size, age, sector/industry, ownership, listing status, exporting status and manager experience) and ε is a well behaved error term. Our coefficient of interest is β_1.

Table 3.9.1 shows the propensity score matching results across the 13 African countries, with all the three finance categorization variables *(Formal1, Formal2 and bank dummy)*[26], and firm characteristics (firm size, age, sector/industry, ownership, listing status, exporting status and manager experience). The results portray a positive significant effect of formal financing on firm performance and growth. Across all the 13 countries, the effect is positive and significant when using the first two categorization variables. The bank dummy however is not significant, and in some countries we could not get results due to lack of enough firms in the comparison group.

[26] Bank dummy takes the value of 1 if financing of working capital and investment is through bank and non-bank financial institutions, 0 if financing is through any other sources other than bank and non-bank financial institutions. Formal1 takes the value of 1 if financing of working capital and investment through bank, non-bank financial institutions and retained earnings is greater or equal to 50%, and the firm has a loan or overdraft. It takes a value of zero if financing of working capital and investment through trade credit, other money lenders, friend and relatives is greater or equal to 50%. Formal2 takes the value 1 if a firm has a loan or overdraft, 0 if a firm does not have either loan or overdraft. Sales growth is the log of the difference between sales 3 years ago and current sales, while labor productivity is the log of the ratio of sales to the number of employees

According to this categorization variable, almost all firms use self-financing unlike bank and non-bank financial institutions (see Table 3.5).

Table 3.9.1: Propensity score matching results (Sales and labor productivity outcome)

	Sales			Labor Productivity		
	Formal1	**Formal2**	**Bank dummy**	**Formal1**	**Formal2**	**Bank dummy**
Ghana	1.437***	0.750*	-0.813	0.751***	0.278	-1.097
	(0.353)	(0.384)	(1.471)	(0.191)	(0.243)	(1.053)
Nigeria	0.921***	0.696	1.589	-0.115	0.292	0.694
	(0.351)	(0.782)	(1.843)	(0.183)	(0.259)	(1.839)
Sudan	0.420	-0.216		0.667***	0.394*	
	(1.402)	(1.300)		(0.197)	(0.235)	
Cameroon	-0.263	1.294***		-0.463	0.690**	
	(0.508)	(0.378)		(0.285)	(0.296)	
Burundi	0.377	1.618***	1.525	-0.223	0.523**	-1.015
	(0.542)	(0.587)	(1.198)	(0.348)	(0.264)	(0.789)
Morocco	0.992**	1.293***	0.256	0.139	1.014***	0.855
	(0.407)	(0.475)	(0.739)	(0.201)	(0.205)	(0.685)
Senegal	1.577***	1.769***		0.0999	0.605***	
	(0.443)	(0.298)		(0.276)	(0.210)	
Kenya	1.180***	0.981**	0.989	0.326	0.551***	0.318
	(0.368)	(0.385)	(1.451)	(0.206)	(0.168)	(0.505)
Ethiopia	1.027***	1.144***	-0.0294	0.437***	0.555***	0.385
	(0.334)	(0.251)	(0.726)	(0.163)	(0.129)	(0.795)
DRC	-0.122	2.128***		0.245	0.747*	
	(0.414)	(0.554)		(0.315)	(0.443)	
Zimbabwe	0.791*	0.404		0.438***	0.232	
	(0.412)	(0.521)		(0.160)	(0.169)	
Namibia	1.331***	1.291	-0.0888	0.566***	1.077***	-0.341
	(0.491)	(0.813)	(0.675)	(0.207)	(0.298)	(0.282)
Malawi	0.887*	1.849***	0.805	0.566**	0.676**	-0.909
	(0.473)	(0.433)	(1.320)	(0.272)	(0.316)	(1.033)

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1; Bank dummy takes the value of 1 if financing of working capital and investment is through bank and non-bank financial institutions, 0 if financing is through any other sources other than bank and non-bank financial institutions. Formal1 takes the value of 1 if financing of working capital and investment through bank, non-bank financial institutions and retained earnings is greater or equal to 50%, and the firm has a loan or overdraft. It takes a value of zero if financing of working capital and investment through trade credit, other money lenders, friend and relatives is greater or equal to 50%. Formal2 takes the value 1 if a firm has a loan or overdraft, 0 if a firm does not have either loan or overdraft. Sales growth is the log of the difference between sales 3 years ago and current sales, while labor productivity is the log of the ratio of sales to the number of employees.

3.10 Conclusion and Policy Recommendations

Using a sample of 8,932 firms from the World Bank Enterprise survey data set, we investigated the extent to which firms in 13 African countries use formal versus informal financing sources to fund their investment and working capital. We used the Relative Distribution methods by Handcock and Morris (1998) and Recentered Influence Function techniques by Firpo, Fortin and Lemieux (2009), to evaluate the growth differential that exists among firms that finance their working capital and investment through formal finance relative to those that use informal sources.

We developed three categorization measures of whether a firm uses formal or informal finance to fund its investment and working capital. Two of the categorization measures are those that were used by previous studies done in China by Allen et al. (2005) and Ayyagari et al. (2010). The use of these measures was to purposely ensure consistency in our comparative conclusions, especially when we compare the results in Chinese firms and those in Africa.

The study found that approximately 68% of the firms in the sample rely on informal finance when using the first formal/informal finance categorization variable, 57% and 97% rely on informal finance when using the Allen et al. (2005) and Ayyagari et al. (2010) categorization measures respectively. This heavy reliance on informal finance may be associated with information asymmetry, lack of collateral and even poor lending terms by banks and non-bank financial institutions in Africa.

The study found a positive effect of formal finance on sales growth and labor productivity, implying that formal finance is more growth enhancing than informal finance. This result was evident regardless of the measure of financial categorization used, implying that our results are robust. The study also found that formal finance impacts differently on firm performance and growth, depending on whether a firm is at the lower, middle or upper level of sales and labor productivity distribution.

Since formal finance is more growth enhancing, it is necessary for firms to be sensitized to rely more on formal finance than informal sources. Countries should put measures in place that address any obstacles to the access of formal finance, in order to make it accessible to all firms regardless of size. In addition, while designing policy interventions, policy makers need to design policies

that fit each segment of firms. This is due to the fact that formal finance impacts on firms differently. Therefore, even banks and other financial institutions should have products that are designed to benefit all groups of firms.

We however note that the study was limited to cross sectional data which implies that we could not take into considerations some dynamics of firms changing from using one form of financing into another form of financing over time. We therefore recommend the use of panel data in future studies in order to capture such dynamics. In addition, we recognize that firms prone to growth can access more formal finance under some circumstances, which can result into endogeneity problems. In further research, we recommend this issue to be taken into account.

Appendix

Table A3.1: RIF regression estimates for other firm characteristics using *formal2* categorization model

	Sales Growth			Labor Productivity			Sales Growth			Labor Productivity		
VARIABLES	Q10	Q50	Q90	Q10	Q50	Q90	Q10	Q50	Q90	Q10	Q50	Q90
	Senegal						**Zimbabwe**					
size	0.226	0.966***	0.274	0.189**	0.339***	0.442**	0.724***	1.576***	0.941*	0.0380	0.252**	-0.0569
	(0.176)	(0.266)	(0.251)	(0.0906)	(0.129)	(0.180)	(0.265)	(0.391)	(0.480)	(0.109)	(0.105)	(0.169)
exporting	0.711**	3.537***	0.757	0.461***	0.797	1.531	-0.165	-1.952	-1.002	0.532***	0.0402	0.330
	(0.325)	(0.831)	(1.950)	(0.178)	(0.613)	(1.307)	(0.736)	(2.888)	(2.202)	(0.133)	(0.513)	(0.898)
industry	0.0218	-0.00292	-0.00556	0.0114*	0.00956	0.00476	-0.136	-0.0808	-0.116	0.0213	-0.00336	-0.0328
	(0.0154)	(0.0142)	(0.0153)	(0.00675)	(0.00644)	(0.00889)	(0.179)	(0.145)	(0.205)	(0.0518)	(0.0472)	(0.0695)
age	-0.0131	0.0105	0.0792*	0.00101	0.0182**	0.0169	0.0125	0.0122	0.0149	0.00491*	0.00614*	0.000641
	(0.0145)	(0.0261)	(0.0466)	(0.00715)	(0.00794)	(0.0158)	(0.00797)	(0.0114)	(0.0118)	(0.00296)	(0.00322)	(0.00441)
ownership	0.653*	0.956	3.686**	0.509***	0.296	1.108	0.667	1.303	-2.199	0.00474	0.514**	0.772*
	(0.343)	(1.060)	(1.761)	(0.136)	(0.416)	(0.733)	(0.424)	(1.112)	(1.505)	(0.268)	(0.234)	(0.463)
Legal status	0.340	2.298***	5.256**	0.298	1.023*	0.779	-0.522	0.938*	2.557	0.426***	0.881***	1.310**
	(0.309)	(0.714)	(2.214)	(0.191)	(0.544)	(0.960)	(0.432)	(0.551)	(2.020)	(0.156)	(0.218)	(0.525)
Manager _exp	0.0176	0.0708**	-0.00623	0.0114	0.0121	-0.0114	0.0130	0.00292	0.0235	-0.00114	-0.00663	-0.00275
	(0.0168)	(0.0345)	(0.0322)	(0.0108)	(0.0125)	(0.0196)	(0.0193)	(0.0221)	(0.0276)	(0.00846)	(0.00753)	(0.0103)
	Cameroon						**Namibia**					
size	0.124	0.481*	1.207*	-0.0776	0.0825	0.0626	-0.00985	1.447**	1.020	-0.447	0.633**	0.992**
	(0.139)	(0.248)	(0.707)	(0.194)	(0.133)	(0.251)	(0.501)	(0.667)	(1.185)	(0.408)	(0.299)	(0.446)
exporting	0.554*	0.00177	-4.244	-0.756	-0.388	-1.285	0.731	-2.330	-1.507	1.393	-0.137	-1.489**
	(0.324)	(1.039)	(2.961)	(0.876)	(0.496)	(1.299)	(0.679)	(2.396)	(3.026)	(1.704)	(1.574)	(0.750)
industry	-0.159	0.185	0.00413	-0.0427	0.00748	-0.0951	0.154	-0.314	-0.281	0.227	0.133	-0.174
	(0.119)	(0.228)	(0.701)	(0.159)	(0.120)	(0.229)	(0.430)	(0.485)	(0.751)	(0.276)	(0.283)	(0.259)
age	-0.00354	0.0181	0.0476	0.0220*	0.00741	0.0426	0.0283	0.0339	0.0591	-0.00500	0.0406**	0.0168
	(0.0116)	(0.0131)	(0.0842)	(0.0126)	(0.00778)	(0.0307)	(0.0231)	(0.0402)	(0.0668)	(0.0173)	(0.0184)	(0.0287)
ownership	0.237	0.0928	4.678	0.222	0.468	2.085	0.931	0.834	0.710	0.290	-0.00860	0.362
	(0.192)	(0.664)	(4.166)	(0.424)	(0.389)	(1.800)	(0.677)	(1.875)	(2.737)	(0.779)	(0.677)	(1.043)
Legal status	0.387**	0.646	0.962	0.221	0.443	1.827**	-1.422	-0.0543	-4.911	0.333	-0.628	0.478
	(0.191)	(0.504)	(1.732)	(0.350)	(0.353)	(0.850)	(1.217)	(1.638)	(3.609)	(0.738)	(1.101)	(2.121)
Manager _exp	0.0124	0.00952	-0.0217	-0.0126	-0.00754	-0.0337	0.0311	0.0254	0.00569	0.0877***	0.0517**	0.0116
	(0.0139)	(0.0183)	(0.0646)	(0.0171)	(0.0106)	(0.0254)	(0.0400)	(0.0577)	(0.0999)	(0.0263)	(0.0244)	(0.0270)
	Ethiopia						**Kenya**					
size	0.225	0.501***	0.396***	0.477***	0.126	-0.0398	0.766***	1.200***	1.815***	0.00942	0.237**	0.256
	(0.175)	(0.158)	(0.150)	(0.0956)	(0.0773)	(0.107)	(0.246)	(0.397)	(0.635)	(0.214)	(0.106)	(0.172)

exporting	0.215	1.122**	3.070***	0.524***	0.334	0.824	-0.321	0.638	0.955	-1.092*	-0.322	-0.201
	(0.372)	(0.569)	(1.184)	(0.198)	(0.259)	(0.702)	(0.520)	(0.685)	(1.456)	(0.597)	(0.212)	(0.360)
industry	0.00198	-0.00538	-0.00535	0.00593	0.0116***	0.0314***	-0.00972	-0.0105	-0.0215	-0.00386	0.00986*	0.00896
	(0.00876)	(0.00794)	(0.0103)	(0.00654)	(0.00416)	(0.00747)	(0.0121)	(0.0154)	(0.0283)	(0.00930)	(0.00534)	(0.00838)
age	0.0130	0.0395***	0.0647***	0.0132**	0.0129**	0.00776	0.0116	0.00213	0.000947	0.00213	0.00345	0.00206
	(0.00930)	(0.0125)	(0.0195)	(0.00558)	(0.00650)	(0.00930)	(0.00801)	(0.0141)	(0.0310)	(0.00928)	(0.00474)	(0.00830)
ownership	0.635**	2.069***	1.092	0.394**	0.349	0.899	-0.139	1.633**	4.876*	0.388	0.586**	1.239*
	(0.305)	(0.468)	(0.854)	(0.164)	(0.258)	(0.589)	(0.545)	(0.743)	(2.530)	(0.514)	(0.296)	(0.716)
Legal status	0.510	0.599	-3.610**	0.499**	-0.531	-1.256***	-0.0127	1.816*	-1.003	-0.408	0.893*	0.583
	(0.357)	(1.122)	(1.583)	(0.201)	(0.608)	(0.307)	(0.457)	(0.966)	(4.456)	(1.242)	(0.536)	(1.591)
Manager _exp	0.00667	0.0160	-0.0179	0.0320***	0.00648	-0.0140	0.0394*	0.0345	-0.0348	0.0315*	0.00848	-0.0128
	(0.0143)	(0.0171)	(0.0199)	(0.00718)	(0.00730)	(0.0114)	(0.0213)	(0.0242)	(0.0416)	(0.0170)	(0.00796)	(0.0123)
	DRC						**Malawi**					
size	0.313	1.278***	6.185***	-0.181	0.333	2.757***	-0.451*	-0.0143	0.479*	-0.149	0.211*	0.0655
	(0.342)	(0.365)	(1.545)	(0.276)	(0.220)	(0.807)	(0.259)	(0.214)	(0.262)	(0.181)	(0.110)	(0.174)
exporting	0.747	1.978*	8.793	0.257	1.067	6.959*	0.157	0.608	3.313	-2.930	-0.614	-0.338
	(0.584)	(1.097)	(5.703)	(0.955)	(0.795)	(4.081)	(0.416)	(0.733)	(5.776)	(1.987)	(0.711)	(1.418)
industry	0.0304**	0.0136	-0.0131	0.0178**	0.0177**	0.0229						
	(0.0139)	(0.0145)	(0.0295)	(0.00899)	(0.00824)	(0.0185)						
age	-0.000663	0.0184	0.0293	0.0208*	0.0140	-0.0467	0.00851	0.0356*	0.0607*	0.0137	0.0135	0.00219
	(0.0156)	(0.0195)	(0.0740)	(0.0120)	(0.0133)	(0.0509)	(0.0137)	(0.0182)	(0.0341)	(0.0132)	(0.0108)	(0.0162)
ownership	1.076***	1.793***	2.847*	0.824**	1.492***	1.510	-0.0807	1.305**	2.008*	-0.0562	0.424	0.145
	(0.270)	(0.485)	(1.577)	(0.330)	(0.364)	(1.031)	(0.491)	(0.537)	(1.117)	(0.442)	(0.291)	(0.487)
Legal status							-1.935	-0.687	5.237	-2.732	-1.945***	-1.741***
							(2.581)	(1.486)	(4.127)	(2.525)	(0.542)	(0.455)
Manager _exp	0.0252	0.00616	0.0410	0.0345**	0.0147	0.100*	0.0300	0.0214	-0.0231	0.0106	-0.00556	0.00390
	(0.0172)	(0.0206)	(0.0725)	(0.0134)	(0.0145)	(0.0554)	(0.0183)	(0.0244)	(0.0414)	(0.0161)	(0.0125)	(0.0230)
	Burundi						**Sudan**					
size	0.399	0.594**	0.622	0.267*	0.589***	0.302	0.104	0.0800	1.862	-0.0174	0.292*	1.407***
	(0.440)	(0.283)	(0.515)	(0.155)	(0.162)	(0.244)	(0.518)	(1.291)	(3.133)	(0.322)	(0.162)	(0.514)
exporting	1.604**	0.173	2.020	-0.950	-0.322	-0.860	0.584	1.265	-2.892	-0.306	0.637	-0.902**
	(0.803)	(0.754)	(2.717)	(1.056)	(0.746)	(0.912)	(0.556)	(1.881)	(2.828)	(1.372)	(0.704)	(0.374)
industry	-0.0146	-0.0361*	0.00130	-0.0139	-0.0245**	-0.0171	0.0198	-0.00628	0.0118	0.00426	0.00863	0.0137
	(0.0279)	(0.0186)	(0.0357)	(0.0103)	(0.0104)	(0.0149)	(0.0399)	(0.0481)	(0.0670)	(0.0111)	(0.00530)	(0.0122)
age	0.0306	0.000897	0.0867	-0.00743	0.00839	0.0246	0.165	0.0564	-0.0809	-0.0372	-0.0127	0.0249
	(0.0272)	(0.0288)	(0.0653)	(0.00962)	(0.0126)	(0.0302)	(0.116)	(0.170)	(0.263)	(0.0342)	(0.0174)	(0.0437)
ownership	-1.166	-0.729	1.180	-0.161	0.761*	-0.291	1.236*	2.129	2.926	0.341	0.181	0.486**
	(1.160)	(0.743)	(2.238)	(0.472)	(0.439)	(1.027)	(0.714)	(1.573)	(2.076)	(0.231)	(0.118)	(0.240)
Legal status	0.758	0.197	1.357	0.170	-0.454	-0.0676	-0.322	0.652	5.048	-1.417	-0.869**	-0.436

	(0.489)	(0.636)	(1.496)	(0.293)	(0.411)	(0.706)	(1.431)	(2.419)	(6.553)	(1.021)	(0.378)	(0.774)
Manager _exp	0.0205	0.0221	-0.0442	0.0128	-0.0164	-0.0247	0.0406	-0.0547	-0.0285	0.0154	0.0129	0.0257
	(0.0337)	(0.0274)	(0.0836)	(0.0135)	(0.0167)	(0.0289)	(0.0610)	(0.0990)	(0.129)	(0.0190)	(0.00982)	(0.0228)
	Ghana						**Morocco**					
size	-0.0141	0.388**	0.487**	-0.0949	0.0344	0.0653	-0.541	0.904***	0.860**	-0.309*	-0.320**	-0.168
	(0.166)	(0.158)	(0.221)	(0.103)	(0.0820)	(0.0983)	(0.370)	(0.278)	(0.384)	(0.174)	(0.132)	(0.192)
exporting	0.383	1.352*	2.013	-0.450	0.0906	0.330	0.466	0.0128	-0.750	-0.0387	-0.823***	-0.446
	(0.632)	(0.769)	(1.353)	(0.789)	(0.548)	(0.733)	(0.808)	(0.676)	(0.943)	(0.325)	(0.285)	(0.420)
industry	-0.00514	0.0286**	0.00991	0.0147*	0.0237***	0.0239***	-0.0466	-0.112	-0.0736	0.00843	-0.0593	-0.0291
	(0.0140)	(0.0120)	(0.0163)	(0.00860)	(0.00789)	(0.00812)	(0.167)	(0.148)	(0.203)	(0.0937)	(0.0820)	(0.135)
age	0.00532	-0.00208	0.123**	-0.00209	0.0165	0.0161	0.0286**	0.0116	0.00527	0.00906**	0.00458	0.0113
	(0.0134)	(0.0185)	(0.0487)	(0.00887)	(0.0102)	(0.0182)	(0.0124)	(0.0122)	(0.0293)	(0.00433)	(0.00701)	(0.0110)
ownership	0.912**	2.525***	3.359***	0.591*	1.839***	1.679***	1.569***	0.962	1.928	0.430	0.630*	0.284
	(0.376)	(0.449)	(1.160)	(0.301)	(0.293)	(0.565)	(0.394)	(0.582)	(1.402)	(0.317)	(0.332)	(0.609)
Legal status	0.414	4.074***	3.465	0.970**	2.593***	3.668	1.150***	0.123	0.242	0.604**	0.373*	0.400
	(0.387)	(1.351)	(4.869)	(0.399)	(0.974)	(3.345)	(0.347)	(0.484)	(0.903)	(0.245)	(0.221)	(0.451)
Manager _exp	0.0245	0.0107	-0.0681	0.00693	0.00121	-0.0100	0.0106	0.0135	0.0307	0.00789	0.00414	0.00203
	(0.0182)	(0.0205)	(0.0441)	(0.0158)	(0.0137)	(0.0178)	(0.0251)	(0.0159)	(0.0354)	(0.0109)	(0.00922)	(0.0167)
	Nigeria											
size	0.397**	0.777***	1.981**	-0.329	-0.384***	0.223						
	(0.188)	(0.264)	(0.989)	(0.200)	(0.146)	(0.242)						
exporting	0.0948	-0.590	-1.269	0.321	-0.482	-0.543						
	(0.520)	(0.621)	(1.384)	(0.487)	(0.367)	(0.584)						
industry	-0.0500	0.0576	0.283**	-0.0211	0.00163	0.0804**						
	(0.0322)	(0.0444)	(0.129)	(0.0299)	(0.0194)	(0.0402)						
age	0.0246	0.0352	0.0757	-0.0249	0.0135	-0.00746						
	(0.0173)	(0.0316)	(0.0832)	(0.0230)	(0.0135)	(0.0278)						
ownership	-2.038*	-0.672	-0.229	-2.082**	-1.421***	0.141						
	(1.046)	(0.937)	(2.251)	(0.931)	(0.367)	(0.785)						
Legal status	0.346	-0.0784	4.499	-0.683	0.139	1.001						
	(0.454)	(1.799)	(8.424)	(2.022)	(1.204)	(2.350)						
Manager _exp	-0.00895	-0.0717**	-0.109	-0.0171	-0.0367**	-0.0214						
	(0.0183)	(0.0309)	(0.0929)	(0.0249)	(0.0154)	(0.0321)						

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1 *Formal2is the Ayyagari et al. (2010) measure of formal finance, which* takes the value 1 if a firm has a loan or overdraft, 0 if a firm does not have either loan or overdraft

Table A3.2: RIF regression estimates for other firm characteristics using *the Bank dummy* categorization model

	Sales Growth			Labor Productivity			Sales Growth			Labor Productivity		
VARIABLES	Q10	Q50	Q90	Q10	Q50	Q90	Q10	Q50	Q90	Q10	Q50	Q90
	Senegal						**Zimbabwe**					
size	0.247	1.135***	0.406*	0.189*	0.328***	0.455***	0.513*	1.659***	0.652	0.00899	0.279**	-0.0430
	(0.172)	(0.290)	(0.228)	(0.0962)	(0.116)	(0.156)	(0.284)	(0.379)	(0.472)	(0.114)	(0.113)	(0.154)
exporting	0.721**	3.781***	1.006	0.568***	0.863	1.445	0.145	-0.873	-0.518	0.579***	-0.0978	0.207
	(0.319)	(0.878)	(1.968)	(0.217)	(0.669)	(1.420)	(0.442)	(2.448)	(1.714)	(0.158)	(0.500)	(0.940)
industry	0.0198	0.000384	-0.00506	0.0124**	0.00750	0.00760	-0.200	-0.0946	-0.118	0.0304	0.0130	-0.0253
	(0.0161)	(0.0137)	(0.0165)	(0.00604)	(0.00645)	(0.00769)	(0.190)	(0.158)	(0.245)	(0.0559)	(0.0528)	(0.0730)
age	-0.0125	0.0153	0.0839**	0.00309	0.0209***	0.0264	0.00862	0.0142	0.0222	0.00552*	0.00587*	0.00196
	(0.0131)	(0.0253)	(0.0423)	(0.00646)	(0.00776)	(0.0169)	(0.00692)	(0.0114)	(0.0135)	(0.00286)	(0.00325)	(0.00436)
ownership	0.627*	0.903	3.733**	0.504***	0.266	1.232	0.680*	1.553*	-1.162	0.0223	0.494**	0.980*
	(0.327)	(0.914)	(1.841)	(0.115)	(0.391)	(0.864)	(0.368)	(0.925)	(1.728)	(0.246)	(0.235)	(0.506)
Legal status	0.366	2.394***	5.498**	0.444**	1.132***	1.155	-0.167	1.125*	3.075	0.335*	0.997***	1.490**
	(0.304)	(0.701)	(2.253)	(0.174)	(0.427)	(0.975)	(0.385)	(0.641)	(1.877)	(0.192)	(0.198)	(0.582)
Manager _exp	0.0153	0.0707**	-0.00725	0.0125	0.0142	0.00144	0.0358*	0.00620	0.0230	-0.00112	-0.00382	-0.00299
	(0.0163)	(0.0327)	(0.0323)	(0.0116)	(0.0125)	(0.0211)	(0.0196)	(0.0238)	(0.0308)	(0.00790)	(0.00681)	(0.0103)
	Cameroon						**Namibia**					
size	0.248*	0.554***	1.483**	0.0941	0.131	0.0458	-0.00868	1.518**	1.325	0.0807	0.395*	0.883***
	(0.138)	(0.196)	(0.707)	(0.188)	(0.116)	(0.212)	(0.320)	(0.609)	(1.314)	(0.290)	(0.222)	(0.310)
exporting	0.566	0.140	-3.851	-0.706	-0.315	-0.971	0.720	-2.764	-2.002	0.921	-0.290	-1.602**
	(0.349)	(0.762)	(2.880)	(0.879)	(0.530)	(1.147)	(0.465)	(2.450)	(2.746)	(1.061)	(1.617)	(0.755)
industry	-0.245	0.189	0.148	-0.127	-0.0335	-0.148	0.0697	-0.0519	-0.148	0.328	0.288	-0.134
	(0.158)	(0.207)	(0.639)	(0.158)	(0.127)	(0.204)	(0.329)	(0.478)	(0.597)	(0.246)	(0.183)	(0.239)
age	-0.00277	0.0242**	0.0682	0.0260**	0.0124	0.0370	0.0256	0.0268	0.0703	-0.00431	0.0457***	0.0541*
	(0.0127)	(0.0122)	(0.0759)	(0.0127)	(0.00802)	(0.0275)	(0.0193)	(0.0333)	(0.0658)	(0.0152)	(0.0152)	(0.0280)
ownership	0.295	0.143	5.321	0.399	0.569	2.042	0.887**	1.429	1.858	0.380	0.0180	-0.232
	(0.204)	(0.565)	(4.642)	(0.416)	(0.403)	(1.521)	(0.346)	(1.466)	(2.793)	(0.462)	(0.509)	(0.743)
Legal _status	-0.106	0.285	0.916	-0.0221	0.329	1.605**	-1.231	-0.474	-5.969	0.283	-0.767	0.241
	(0.383)	(0.393)	(2.009)	(0.429)	(0.316)	(0.723)	(0.814)	(1.270)	(3.992)	(0.539)	(1.239)	(2.964)
Manager _exp	0.0198	0.0152	-0.0189	-0.0160	-0.00879	-0.0307	0.0288	0.0350	-0.00281	0.0595***	0.0458**	0.0256
	(0.0162)	(0.0154)	(0.0593)	(0.0178)	(0.0110)	(0.0220)	(0.0282)	(0.0483)	(0.0747)	(0.0165)	(0.0180)	(0.0195)
	Ethiopia						**Kenya**					
size	0.257	0.608***	0.491***	0.483***	0.161**	-0.00952	0.745***	1.260***	1.689***	0.0437	0.230**	0.279*
	(0.181)	(0.180)	(0.171)	(0.0928)	(0.0786)	(0.111)	(0.212)	(0.381)	(0.645)	(0.195)	(0.104)	(0.167)
exporting	0.238	1.402**	3.310***	0.555***	0.494*	0.860	-0.297	0.633	1.141	-1.143**	-0.305	-0.196
	(0.412)	(0.648)	(1.173)	(0.199)	(0.264)	(0.606)	(0.520)	(0.710)	(1.268)	(0.543)	(0.215)	(0.372)
industry	0.00248	-0.00515	-0.00509	0.00603	0.0116***	0.0323***	-0.0127	-0.0164	-0.0208	-0.00313	0.00757	0.00585

	(0.00827)	(0.00942)	(0.0102)	(0.00607)	(0.00392)	(0.00712)	(0.0121)	(0.0164)	(0.0255)	(0.00892)	(0.00498)	(0.00866)
age	0.0140	0.0432***	0.0679***	0.0136**	0.0150**	0.0105	0.0157**	0.00933	0.00178	0.00301	0.00329	0.00271
	(0.00896)	(0.0120)	(0.0202)	(0.00540)	(0.00685)	(0.00949)	(0.00660)	(0.0133)	(0.0286)	(0.00896)	(0.00501)	(0.00925)
ownership	0.642**	2.063***	1.088	0.388**	0.312	0.897	-0.165	1.627**	4.490*	0.277	0.389	1.288*
	(0.308)	(0.424)	(0.813)	(0.171)	(0.256)	(0.572)	(0.448)	(0.682)	(2.335)	(0.496)	(0.314)	(0.731)
Legal status	0.624**	0.871	-3.364**	0.521***	-0.431	-1.096***	-0.0100	1.973*	-0.875	-0.270	1.058*	0.582
	(0.293)	(1.213)	(1.353)	(0.197)	(0.638)	(0.316)	(0.478)	(1.162)	(5.131)	(1.074)	(0.573)	(1.566)
Manager _exp	0.0103	0.0261	-0.00884	0.0327***	0.0104	-0.0101	0.0384**	0.0348	-0.0286	0.0312*	0.0131	-0.0120
	(0.0125)	(0.0169)	(0.0190)	(0.00723)	(0.00661)	(0.0121)	(0.0189)	(0.0241)	(0.0378)	(0.0159)	(0.00856)	(0.0104)
	Burundi						**Malawi**					
size	0.288	0.387	0.519	0.260*	0.567***	0.322	-0.463*	-0.0992	0.460*	-0.0880	0.209*	0.0347
	(0.490)	(0.240)	(0.510)	(0.149)	(0.151)	(0.254)	(0.238)	(0.227)	(0.251)	(0.179)	(0.110)	(0.168)
exporting	1.208*	-0.551	1.588	-0.926	-0.696	-0.904	0.293	0.144	4.182	-3.013	-0.394	0.183
	(0.666)	(1.045)	(3.337)	(0.986)	(0.783)	(0.797)	(0.475)	(0.676)	(6.273)	(2.260)	(0.817)	(1.379)
industry	-0.00980	-0.0272	0.00605	-0.0131	-0.0248***	-0.0183						
	(0.0313)	(0.0173)	(0.0310)	(0.0100)	(0.00946)	(0.0163)						
age	0.0336	0.00635	0.0900	-0.00713	0.00824	0.0242	0.00943	0.0380*	0.0593	0.0155	0.0170*	0.0112
	(0.0378)	(0.0271)	(0.0683)	(0.00910)	(0.0125)	(0.0282)	(0.0146)	(0.0209)	(0.0362)	(0.0145)	(0.0102)	(0.0154)
ownership	-0.771	-0.0101	1.631	-0.0762	0.709	-0.304	0.0680	1.616***	2.235**	0.151	0.466*	0.141
	(1.168)	(0.782)	(1.821)	(0.449)	(0.453)	(0.838)	(0.480)	(0.559)	(1.133)	(0.476)	(0.281)	(0.510)
Legal status	0.487	-0.321	1.172	0.177	-0.441	0.000509	-1.585	-0.0113	5.744	-2.624	-1.670***	-1.315***
	(0.472)	(0.734)	(1.554)	(0.329)	(0.405)	(0.817)	(3.016)	(1.773)	(4.398)	(2.395)	(0.519)	(0.358)
Manager _exp	0.0352	0.0495*	-0.0314	0.0110	-0.00848	-0.0261	0.0276	0.0158	-0.0248	0.0121	-0.00661	-4.21e-05
	(0.0401)	(0.0280)	(0.0790)	(0.0130)	(0.0170)	(0.0299)	(0.0190)	(0.0262)	(0.0383)	(0.0173)	(0.0121)	(0.0208)
	Ghana						**Morocco**					
size	0.0491	0.407**	0.522**	-0.0682	0.0544	0.0751	-0.367	0.985***	0.900**	-0.288	-0.273**	-0.149
	(0.166)	(0.165)	(0.207)	(0.106)	(0.0781)	(0.107)	(0.338)	(0.281)	(0.437)	(0.200)	(0.128)	(0.199)
exporting	0.334	1.377*	2.423*	-0.447	0.0680	0.321	0.239	-0.146	-0.786	-0.0842	-0.924***	-0.519
	(0.666)	(0.780)	(1.437)	(0.709)	(0.503)	(0.738)	(0.789)	(0.672)	(0.948)	(0.368)	(0.284)	(0.436)
industry	-0.00749	0.0286**	0.00821	0.0145	0.0239***	0.0240***	-0.00175	-0.0804	-0.0605	-0.00330	-0.0652	-0.00270
	(0.0137)	(0.0122)	(0.0162)	(0.00914)	(0.00662)	(0.00801)	(0.190)	(0.145)	(0.209)	(0.0891)	(0.0741)	(0.153)
age	0.0120	0.00131	0.128***	0.00283	0.0202*	0.0175	0.0317***	0.0115	0.00753	0.0106**	0.00663	0.0133
	(0.0139)	(0.0186)	(0.0465)	(0.00951)	(0.0111)	(0.0180)	(0.0116)	(0.0112)	(0.0298)	(0.00479)	(0.00601)	(0.0102)
ownership	1.004***	2.557***	3.647***	0.626**	1.818***	1.707***	1.362***	0.863	1.817	0.444	0.570*	0.192
	(0.337)	(0.450)	(1.200)	(0.296)	(0.310)	(0.560)	(0.307)	(0.649)	(1.444)	(0.371)	(0.338)	(0.682)
Legal status	0.936*	4.170***	4.109	1.168**	2.554***	3.788	1.371***	0.303	0.287	0.661***	0.454*	0.610
	(0.547)	(1.513)	(4.942)	(0.474)	(0.941)	(3.237)	(0.325)	(0.466)	(0.841)	(0.236)	(0.231)	(0.478)
Manager _exp	0.0152	0.0109	-0.0763*	0.00532	-0.00123	-0.0113	0.00442	0.00984	0.0286	0.00918	0.00238	0.00230
	(0.0201)	(0.0229)	(0.0424)	(0.0144)	(0.0128)	(0.0171)	(0.0230)	(0.0172)	(0.0351)	(0.0125)	(0.00806)	(0.0161)
	Nigeria											
size	0.314***	0.780***	3.369***	-0.190*	-0.141*	0.236						

	(0.110)	(0.161)	(0.934)	(0.114)	(0.0804)	(0.211)
exporting	0.0767	-0.464	-1.494	-0.0722	-0.325	-0.555
	(0.327)	(0.380)	(1.337)	(0.292)	(0.203)	(0.399)
industry	-0.0210	0.0521**	-0.0293	-0.0252	0.00918	0.0341
	(0.0197)	(0.0239)	(0.0692)	(0.0155)	(0.0131)	(0.0229)
age	0.0112	0.0307**	0.124**	-0.00833	0.0147**	0.0290*
	(0.00908)	(0.0138)	(0.0542)	(0.0109)	(0.00676)	(0.0158)
ownership	-0.607	-0.0202	1.560	-1.174**	-0.669**	0.557
	(0.496)	(0.571)	(1.916)	(0.488)	(0.287)	(0.648)
Legal status	0.691***	0.723	-1.297	0.0651	-0.0206	0.00916
	(0.192)	(0.943)	(2.835)	(0.754)	(0.521)	(1.266)
Manager _exp	-0.00438	-0.0502***	-0.0658	-0.0199*	-0.0282***	-0.0524***
	(0.0134)	(0.0176)	(0.0556)	(0.0109)	(0.00827)	(0.0183)

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1 The *bank dummy* measure takes the value of 1 if financing of working capital and investment is through bank and non-bank financial institutions, 0 if financing is through any other sources other than bank and non-bank financial institutions

CHAPTER FOUR

CHOICE BETWEEN DEBT AND EQUITY FINANCING: DOES IT MATTER FOR GROWTH?

4.0 Introduction

The role of business enterprises as an engine for aggregate economic growth is well acknowledged in the extent literature (see for example Berger & Udell, 1998). Firms as major employers and job creators in the world account for much of the tax contributions for public investment, thus promoting growth and development (Haltiwanger et al., 2013). Understanding the challenges that firms face in their growth circle is important especially in Africa where they are regarded as the solution to the blooming unemployment especially among the youth. For firms to be major players in the growth of the economy, they however need to be seen growing into thresholds that can sustain employment creation through adopting labor intensive production, and increased earnings. A major factor in this growth process of a firm is the availability of financing for their investment opportunities (Berger & Udell, 1998; Quartey, Turkson, Abor, & Iddrisu, 2017).

Firms finance their investment through various sources. Broadly, the sources can either be from debt or equity financing sources. The choice between debt and equity is one of the most important corporate financing decisions that a firm needs to take. Debt financing is obtained from lenders like banks, other financial and non-financial institutions, credit from suppliers/trade credit, and private lenders. Equity sources include retained earnings, capital from owners, net worth, new/existing partners, bonds, common stock and share capital. In Africa, most firms are not listed in stock exchanges and cannot issue bonds in the securities exchange markets. This reduces financing options at their disposal (Gwatidzo & Ojah, 2013).

All firms both in developed and developing countries have the same objective: to minimize the cost of capital given the available financing options (Glen & Pinto, 1994). When firms choose a financing source, they therefore have cost and risk in mind. They choose that which has minimal cost and maximizes investment returns. Cost of capital may be different across countries due to the diversity of financial markets, tax laws and macroeconomic environment (Glen & Pinto, 1994). For instance debt has a tax advantage in countries with favorable tax laws, sometimes making it

preferable to traders. For firms to get debt contracts from financial institutions, they however need to put aside deposit reserves which they use to create loans. This in itself is a cost, making debt finance expensive in this case, considering that there are other interest payments on the issued loans. Equity financing is best suited in randomly arriving and short lived investment opportunities, as well as growth options (Li & Mauer, 2016). However, equity financing has a moral hazard cost due to excess control rights by the controlling shareholder(s) (Luo, Li, & Zhang, 2015).

Firm characteristics also play a major role in capital structure. For instance, the debt equity mix is sometimes different for small and younger firms than for large and older firms. Most African owned firms are small and medium sized and do not have track records that are required to receive debt financing (Beck & Demirguc-kunt, 2006). This forces most of them to rely on internal finance, trade credit and leases for survival. In addition, debt financing requires adequate levels of institutional infrastructure. Unfortunately this lacks in most African countries, in the presence of poor contract enforcement, information asymmetry, policy uncertainties and reversals (Gwatidzo & Ojah, 2013). Financing choices may also depend on managerial characteristics. Those managers who possess optimist personality perceive equity to be costly and resort to debt financing, while those not optimists stick to retained earnings (Wang, Chen, & Yu, 2013). Other factors that may influence the choice of capital structure include: the specific country where the firm is based, country's financial system as well as institutional and legal environment (Fan et al., 2010).

The major sources of debt finance in Africa are the banks. Banks are believed to be quite efficient in monitoring borrowers, which forces the young and older non-profitable firms to rely on banks since they benefit more from monitoring (Diamond, 1991; 1984; James & Smith, 2000). Young and older less successful firms have no reputation to loose in case of inefficiency, so they require a lot of monitoring to ensure they invest in profitable projects (Hoshi, Kashyap, & Scharfstein, 1993). Banks are however believed to inhibit growth of firms especially when they impose restrictions on firms or even decline to lend to high risk business firms. On the other hand, successful firms will prefer to use equity financing or issue public debt which does not have much monitoring, since they fear losing their reputational capital if they become inefficient. Each financing source therefore plays a unique role depending on the segment of firms that it serves.

Most of the previous studies done in this area have been more focused on bank debt versus other forms of debt, without considering equity financing (Gwatidzo & Ojah, 2013; Hooks, 2003; Denis & Mihov, 2003). Other researchers have only concentrated on bank debt alone (Ghosh, 2007). Limited work has been done on the impact of debt equity choice on firm performance, especially in developing African countries. This study fills this gap by looking at the capital structure for African firms, specifically debt and equity financing. Africa is a unique case since most firms are not listed in the stock exchange. They therefore face unique financial access challenges, and those who rely on equity finance majorly use retained earnings and owner contributions, since they are not able to issue shares to the public. We therefore seek to bring new evidence into this literature by analyzing the extent to which African firms rely on these financing sources, and investigate the financing source that is more growth enhancing. In achieving this objective, we use the World Bank enterprise survey data to examine the debt/equity mix decision in the context of the African firms.

4.1 Research Questions

The specific research questions that the study aims to answer include:

i. What is the extent of debt and equity usage among African firms?
ii. Is there a growth differential between firms whose capital structure is dominated by debt compare to those whose capital structure is dominated by equity?
iii. If the differential exists, which of the two sources is more growth enhancing?

4.2 Objectives of the study

The main aim of this study is to analyze the use of debt and equity financing among African firms. To this end, the following specific objectives have been set:

i. To analyze the extent of debt and equity financing among African firms.
ii. To assess the source of financing that is more growth enhancing, between debt and equity financing.

4.3 Scope of the Study

This study uses World Bank Enterprise Survey data. it covers 13 African countries which have data in more recent years (2013-2016), those with same globally comparable variables and uniform methodology of implementation in the core questionnaires. We also take note of regional representation in the Sub-Saharan region by assuming that we have firms in each of the following regions: Northern Africa(Morocco); East and horn of Africa(Kenya, South Sudan, Ethiopia); Central Africa(Burundi, Cameroon, DRC Congo); Southern Africa(Malawi, Namibia, Zimbabwe); West Africa(Nigeria, Ghana, Senegal).

4.4 Justification of the study

Literature on corporate financing choices is vast, but much has been done on listed firms especially in the developed and emerging economies (see for example Arena, 2011; Denis & Mihov, 2003; Hoshi, Kashyap, & Scharfstein, 1993; Johnson, 1997; Keasey & Watson, 1994). There is a lot of literature on the choice between debt and equity (see for example Buehlmaier, 2014; Jackson, Keune, & Salzsieder, 2013; Lewis & Tan, 2016; Namarayan, 1988). Most of the literature looks at the firm characteristics that drive financing decisions. Other studies have focused on the choice between banks versus non-bank debt (Gwatidzo & Ojah, 2013; Hooks, 2003; Denis & Mihov, 2003). What is lacking in the literature is the impact of such choices on firm performance, especially in the African dimension. Other previous studies have been more focused on bank debt versus other forms of debt, without considering equity financing. Others have only concentrated on bank debt alone (Ghosh, 2007). There is limited work on the impact of choosing more debt or more equity on firm performance, especially in developing African countries.

Africa is a unique case considering the existing data limitations and most firms not listed on stock exchanges. They therefore face unique financial access challenges, and those who rely on equity finance majorly use retained earnings and owner contributions. Most African firms are not able to issue shares to the public, since they cannot issue corporate bonds due to illiquid and underdeveloped debt markets and information asymmetries. This makes African firms' corporate structure unique, especially in getting data based on their financial statements. It would be crucial therefore to examine how these firms in Africa finance their operations, based on survey data. Most of the African firms are small and informal, and may not be in a position to prepare annual

financial reports that can provide useful data for study. This study contributes into this literature by using the firm level survey data to examine the financing preferences among African firms by critically analyzing the usage of debt and/or equity financing. We shall also investigate that financing source that is more growth enhancing among the two financing sources.

4.5 Literature review

This section reviews the literature on the use of debt and equity finance. It starts by looking at the theoretical basis of capital structure and firm ownership decisions, thereafter detailing the empirical evidence on the choice between the use of debt and equity financing and how these decisions affect firm growth.

4.5.1 Theoretical literature

In this subsection, we look at the theories that explain the existence of the wedge between debt and equity financing that influence the choice between the two financing sources. We also illustrate the theoretical basis of optimal balance between the debt-equity mix among firms.

A firm's investment decision is independent of its financing decision. This is according to Modigliani and Miller (1958), who said that financial structure should not affect firm value in a frictionless market. Whether a firm chooses to finance its working capital using debt or equity should be irrelevant in the firm's growth prospects. Assuming perfect markets, debt and equity finance are perfect substitutes. *Ceteris paribus*, a decrease in equity finance should not lead to decline in investment, since the firm will substitute it with debt finance. But in imperfect markets of credit rationing and demand for collateral by credit suppliers, this may not hold. In addition, equity and debt finance sometimes are interdependent. Retained earnings signal strength of the firm to obtain debt finance (Berger & Udell, 1998).

Imperfections in the capital market create a wedge between debt and equity finance. This is due to asymmetry of information between firms and suppliers of credit. These information problems give rise to moral hazard and adverse selection in the debt markets (Carpenter & Petersen, 2002). Debt issue may also not be appropriate to firms with little collateral due to asset specificity. And this

problem may be more pronounced in young and small firms (Carpenter & Petersen, 2002). Other factors and theories that create a wedge between debt and equity include:

Tax advantage of debt: Interest income is not taxed. Thus debt has a tax advantage over equity, which may imply more value when a firm is more leveraged. Even so, corporate tax distorts financing decisions in favor of debt use. Firms are believed to increase their leverage to the level where marginal tax advantage of debt finance equals marginal expected bankruptcy costs (Cordes & Sheffrin, 1981). But under some circumstances, the tax advantage to debt can be overturned by the personal tax advantage to equity finance. This is because the increased interest deductions on debt finance may interfere with other tax shields (Cordes & Sheffrin, 1981). On the other hand, interest rates are sometimes increased to eliminate the debt finance tax advantage. This makes firms to be indifferent between the use of debt or equity in funding their investments (Cordes & Sheffrin, 1981).

Static trade off theory: Depending on the cost of a particular source of capital, firms will choose those sources which are cheaper. Firms are rational, since they minimize the cost of capital subject to the constraints that they face. Kaplan and Zingales (1997), argue that external funds are more costly than internal funds. Considering the fact that firms' objective is to minimize the cost of capital given the available financing options, then managers will always prefer the source of capital that is cheaper and more fulfilling. In this case, the optimal capital structure is the balance between debt and equity that minimizes total agency costs (Jensen & Meckling, 1976).

Financial structure and riskiness of a firm: Most of the funds acquired by firms are meant for investment in assets whose yields are uncertain. The firm needs to invest in an asset that has positive profits to the firm or one that increases firm value. There is always a risk premium associated with any form of financing, which is usually in form of interest rates (Modigliani & Miller, 1958). Firms should therefore take into consideration this risk premium or certainty equivalent when they are making a decision on the form of financing to use. A firm needs to adjust its financial structure in order to maintain manageable risk levels. Too much debt for instance, increases interest payments thus increasing chances of bankruptcy. So adjustment is needed to ensure risks and costs are minimized.

Control of the firm: The choice of capital structure is sometimes based on the projected gains between the various parties (Israel, 1991). Debt has a value decreasing effect for the shareholders. This is because higher levels of risky debt reduces gains for the shareholders, leading to lower profits for the firm (Israel, 1991). On the other hand, use of equity is considered as value increasing since shareholders will gain control over the firm and make key decisions. Equity finance also gives shareholders voting rights which enables them to have control over the firm (Israel, 1991).

Financial decisions determine who has control over the firm. For instance in developing countries where most firms are family owned, financial decisions determine who makes key decisions especially when deciding on investing in growth opportunities (Glen & Pinto, 1994). In addition, managers value firm control benefits. They therefore choose their financial and ownership structure depending on the benefits of control especially in future takeover battles (Israel, 1992). When determining the financial structure of the firm, entrepreneurs consider the expected appreciation in firm value and benefits of control over the firm accruing to the rival management (Israel, 1992).

Macroeconomic environment: Monetary policy shocks may have huge effects on corporate financing. For instance, changes in government policy on interest rates may affect firm financing decisions. When interest rates are controlled at a manageable level, firms will prefer to use more debt than equity. Banking crisis due to failures, regulatory changes, and capital shortfalls may lead to reduction in credit leading to a reliance on equity financing (Berger & Udell, 1998). In addition, monetary tightening result into reduction in bank reserves which may result into some banks reducing credit supply. Monetary tightening is associated with higher interest rates impairing collateral values which reduces the creditworthiness of some borrowers, making it difficult for some firms to obtain funds (Berger & Udell, 1998).

Pricing of private equity is majorly dependent on public equity markets. When stock market values fall, it affects the smooth flow of equity finance which may result in firms shifting to debt financing. High inflation can also cause uncertainty prompting a preference for equity financing (Glen & Pinto, 1994). In addition, credit crunches, change in business conditions and market failure as a result of changes in public policies affect firm financing decisions.

Pecking order theory: Optimality of capital structure requires firms to choose a financing source that has the least average cost. This makes firms to rely on cheaper options and go to costly

financing after exhausting cheaper ones. In this case firms will prefer retained earnings before going for debt and issuing new equity. This is as a result of informational differences between insiders and outsiders which brings about cost differences (Glen & Pinto, 1994). But due to changing times, and with more financial liberalization in emerging and developing markets, capital structure is subject to many changes. For instance debt has become accessible by small and medium size firms in most developing countries, unlike in the past when it used to be difficult. So firms have a wide range of instruments to choose from, including international financial markets.

Financial Growth cycle theory: Different capital structures are optimal at different points of the firm's growth cycle (Berger & Udell, 1998). The equity debt mix is sometimes different for small and younger firms than for large and older firms. This is because small businesses are informationally opaque than large firms. They are also owner managed and the managers want to maintain ownership and control of the firm. So smaller and younger firms use equity from the principal owner, family and friends while large and older firms use public and private debt (Berger & Udell, 1998). As firms grow, they become less informationally opaque and gain financing from both public equity and debts from financial intermediaries. Banks will not be ready to finance firms until they achieve a level of production where their asset base is enough to be pledged as collateral (Berger & Udell, 1998).

However, these forms of financing can substitute as well as complement each other. Sometimes financial intermediaries offer credit to firms that have sufficient equity especially retained earnings, thus acting as complements for each other. Retained earnings demonstrate that the firm is stable and thus facilitate access to other external finance (Berger & Udell, 1998). At the same time, dependency on retained earnings or credit from friends and family may be negatively associated with bank debt, thus substituting each other. Applying this theory in firm financing choices may mean that the choice between debt and equity financing is likely to vary by firm size and age. This is because size and age demonstrates built up relationships between firms and financial institutions, and reflects reputation in firm financing (Berger & Udell, 1995).

Managerial discretion and ability: Firms have different access potential to key scarce resources/factors of production. Firms with access to this scarce resource can produce any level of

output at lower costs compared with those without access to the key resource. Lucas (1978) proposed a model in which firm costs are dependent on managerial ability. He presented the costs as a function of managerial ability as: $C(q)/\theta$ where θ is the managerial ability and $C(q)$ are costs which exhibit decreasing returns to scale. Better managers have lower costs and produce more output *ceteris paribus* (Wang, Chen, & Yu, 2013).

Managerial characteristics also influence capital structure. Those managers who possess optimist personality perceive equity to be costly and resort to debt financing (Wang et al., 2013). Optimistic managers therefore follow the pecking order theory. Overconfident managers are more likely to underestimate riskiness of future earnings, leading to long-term underperformance (Wang et al., 2013).

4.5.2 Empirical Literature

Capital structure is dependent on the mix between debt and equity. How firms choose between these sources and why they choose, still remains an empirical and theoretical debate especially in Africa (Glen & Pinto, 1994). In Africa, most firms use debt financing since most of them are not listed in the security exchange markets. And for those who use equity, they rely on retained earnings and owner contributions. This reduces the financing options that the firms have since they can either use debt financing or equity in the form of retained earnings (Gwatidzo & Ojah, 2013). Even the existing capital structure theories may not hold in African countries due to government controls and institutional constraints (Glen & Pinto, 1994). In addition, African countries' banks and other financial institutions are concentrated in the urban areas. So firms that easily access debt are those located in urban areas. This implies that those firms in non-urban areas rely on retained earnings (Gwatidzo & Ojah, 2013).

At the aggregate level, capital structure is dependent on the capital suppliers, like financial and non-financial institutions, pension funds and insurance companies (Fan, Titman, & Twite, 2012). For instance firms in countries with deposit insurance will receive more lending and the banks will offer more long term debt than those without the deposit insurance. This is because banks do not need to hedge a lot of income (Fan et al., 2012). Capital structure can also be dependent on firm characteristics or specific country institutional environment. For instance firms from countries

with higher tax gain from leverage and weaker laws, will use more debt than equity (Shirasu & Xu, 2007).

Variation in the debt-equity mix across different countries also depends on the macro-economic environment, and government control and intervention in the domestic markets (Glen & Pinto, 1994). The cost of debt may be cheaper in countries with controlled interest rates. High inflation on the other hand can create uncertainty and create a reliance on equity finance (Glen & Pinto, 1994). The macroeconomic environment also changes over time. Therefore, one expects the debt-equity mix to change over time as well. Business cycles may also affect the choice between debt and equity financing. Debts increase during recession and fall during expansionary period (Shirasu & Xu, 2007).

Capital structure choices affect the firm value through the cost and riskiness of each source. When firms choose a financing source, they have cost and riskiness in mind. They choose the debt-equity mix that minimizes cost. They can however be influenced by control and disclosure as well (Glen & Pinto, 1994). The fear of losing control over the firm make firms not to list publicly. Also the fear of disclosing firm's information that is likely to give competitors an advantage. Capital structure may seem different across countries demonstrating the diversity of financial markets, investor preferences, tax laws and monetary policy across different countries (Glen & Pinto, 1994).

Past literature on corporate financing choices have emphasized the costs and benefits of debt (Bolton & Freixas, 2000; Easterwood & Kadapakkam, 1991; Gilson & Warner, 1997). They suggest that market imperfections, caused by information asymmetry and agency costs make it difficult for firms to acquire finances for their projects. This is as a result of the conflict of interest between the lenders and the entrepreneurs who in this case are the borrowers. The magnitude of these imperfections also depends on the legal system and rules of the country where the firm resides. This implies that there are cross country differences in firm's ability to obtain any type of external financing (Demirgüç-Kunt & Maksimovic, 1998). Firms are therefore forced to take up any financing which has less cost and more benefits.

Corporate governance affects the cost of capital and thus influencing capital structure decisions (Luo et al., 2015). In this case, corporate governance includes internal controls, incentive

compensation plans, and even legal protection for minority shareholders. Excess control rights for the controlling shareholder increases the cost of equity due to moral hazard (Luo et al., 2015). The moral hazard of controlling shareholder also increases credit risk, thus increasing cost of debt financing. This is due to the fact that banks increase monitoring costs of such a firm and incorporate these costs in the debt contracts (Luo et al., 2015).

Family control and management of firms also limit the firm to specific investment motives though it reduces agency costs (Wu, Chua, & Chrisman, 2007). Equity financing can give control rights to controlling shareholders (be it family or investors) to exercise control over the company and even serve their own interests for their own benefit. The excess control rights cause moral hazard problems, discouraging other potential investors and generating financial constraints in the firm. This moral hazard of the controlling shareholder can also affect the firm's access of debt financing (Luo et al., 2015). Corporate financing choices among firms may also be determined by a number of factors, among which credit quality of the issuer is very major. Research has shown that firms with the highest credit quality are more likely to prefer borrowing from public sources, while those with lower credit quality seem to depend on retained earnings or borrow from private non-bank lenders (Denis & Mihov, 2003).

The equity-debt mix is sometimes different for small and younger firms than for large and older firms. This is because small businesses are informationally opaque than large firms, they are also owner-managed and the managers want to maintain control of the firm (Berger & Udell, 1998). Also due to their poor solvency and lack of track records and less real assets for collateral, debt finance may be costly for such firms (Guariglia, 2008). Other researchers have however found mature and older firms to be more likely to use retained earnings to finance their investment opportunities due to higher profitability (Bulan & Yan, 2009). Older firms also have long credit history and have built a reputation which helps them obtain bank loans easily, compared to the younger firms (Bulan & Yan, 2009). Chavis, Klapper and Love (2011) found that the younger firms as they mature switch to bank debt, thus creating a substitution effect.

In this respect, different capital structures are optimal at different points of firm growth cycle. Firms use different financing sources at different growth cycles (Berger & Udell, 1998). For

instance smaller and younger firms use equity from principal owner, family and friends, while large and older firms use public and private debt. Banks won't be ready to finance firms until they achieve a level of production where their asset base is enough to be pledged as collateral (Berger & Udell, 1998). At this moment they rely on insider finance from the principal owner or family and friends.

Firms' financing decisions has also been found to impact on the firms' growth prospects. For instance, external debt finance has a positive impact on growth and the impact on firm growth increases as firm size falls (Moore, Craigwell, & Maxwell, 2005). Literature has also examined the importance of legal rules and their enforcement on firm financing and growth (La porta, Lopez-de-Silanes, Andrei, & Vishny, 1998; Levine, 1999). They all conclude that countries with poor law enforcement rules use less public debts, and that well established legal system facilitates financial intermediation and thus impacting on firm growth (Ross Levine, Loayza, & Beck, 2000).

In addition, some researchers have found debt finance to be more growth enhancing than equity financing (Ayyagari et al., 2010), while others have found equity financing to be contributing positively on growth despite the belief that equity financing may lead to dilution of family control (Moore et al., 2005). Previous studies have documented bank debt as the most important financing source for firms, especially in the developing countries where stock markets are not well developed (Diamond, 1991; Subramanian & Umakrishnan, 2004). According to these studies, banks reduce agency costs by screening prospective clients. This provides the firm with incentive to invest in profitable projects due to threats to cut off credit if the firm does not comply. In this context, borrowing from banks can signal to potential investors that the firm is stable and credible (Stiglitz & Weiss, 1980). This reduces moral hazard and adverse selection.

Despite these benefits from banks, firms in practice diversify away from bank financing and resort into other non-bank sources, thus lowering project returns (Rajan, 1992). This could be as a result of firms trying to avoid payment of monopoly rents which result from long term relationship with only one bank (Rajan, 1992). Also due to the norm of firms establishing relationships with one bank, the firms may face difficulties if the bank they rely on encounters financial difficulties (Gwatidzo & Ojah, 2013).

Prior research has also revealed that financing patterns are likely to change over time. This is evidenced by the contrasting findings of Arena (2011) and Denis and Mihov (2003). Using 1995-1996 dataset, Denis and Mihov (2003) found that low credit quality firms prefer nonbank private debt. Contrary to this, Arena (2011) used a more recent sample between 1995-2003 and found different results. Arena found that good credit quality firms which are not large enough to afford the flotation costs and overcome informational asymmetry costs are more likely to raise capital from nonbank private sources. In this case moderate credit quality firms choose bank loans while high risky and poor credit firms issue public debt (Arena, 2011).

Most previous studies on financing preference and choice have been done in the developed countries, mostly on listed firms, and have not addressed how financing decisions affect firm performance and growth. See for example, Arena (2011), Denis and Mihov (2003), Hoshi and Kashyap (1993), Keasey et al. (1994). In addition, most of the empirical literature in this area have employed time series techniques and have been macro in nature (Denis & Mihov, 2003a; Ghosh, 2007; Ross Levine & Davidson, 2002; Keasey & Watson, 1994). Most of them have been more focused on bank debt versus other forms of debt, without considering equity financing (Denis & Mihov, 2003; Gwatidzo & Ojah, 2013; Hooks, 2003). Other researchers have only concentrated on bank debt alone (Ghosh, 2007). There's limited research if any, on debt versus equity financing, especially in developing African countries. This paper uses firm level World Bank enterprise data by employing unconditional quantile regression techniques to establish the form of financing that is more growth enhancing between debt and equity financing.

4.6 Data and Methodology

This study looks at African firms, both listed and unlisted, from the following countries: Kenya, Cameroon, Zimbabwe, Ethiopia, Ghana, Malawi, Namibia, Nigeria, South Sudan, Burundi, Morocco, Senegal and the Democratic Republic of Congo. The choice of the countries was based on those with most current survey data, and also a regional representation was considered: Northern Africa(Morocco); East and horn of Africa(Kenya, South Sudan, Ethiopia); Central Africa(Burundi, Cameroon, DRC Congo); Southern Africa (Malawi, Namibia, Zimbabwe); West Africa(Nigeria, Ghana, Senegal). The available data on these countries is between 2013 and 2016.

We make use of the unconditional quantile regression/Recentred Influence Function (RIF) technique proposed by Firpo, Fortin and Lemieux (2009).

4.6.1 Data sources and definition of variables

The study uses the enterprise survey dataset, which comprises of surveys conducted by the World Bank and its partners across all countries. This is cross sectional data and it covers firms of all sizes from small, medium to large firms. It also covers all sectors (manufacturing, services, transport and construction sectors). The data is comparable across countries and time due to the global standard methodology used in the data collection. It covers major regions in each country which are largest centers of business enterprises.

The data is advantageous for our study since it has information on firms' characteristics and how firms finance their investment and working capital through various sources. This will help us identify those firms that use each form of financing both in their working capital and investment. The data however has shortcomings since it does not contain information on public debt issue, and variables describing dividend payments. This could be because stock markets are not well established in the African countries. We shall therefore use retained earnings to proxy equity financing.

4.6.2 Definition of variables

Dependent variables

The dependent variables are the firm performance or growth measures. In this paper, we use two growth/performance measures as dependent variables for robustness purposes. We chose sales growth and labor productivity as measures of firm performance since we are able to measure them from the available data set. Growth in sales is measured as the change in sales for a three year period, while labor productivity is the ratio of sales to the total number of employees in the firm.

Explanatory Variables

Financing source

This is the main independent variable of interest. Equity comprises of retained earnings and issues of new equity, while debt comprises of loans from banks, non-bank financial institutions, supplier credit and loans from informal sources like family and friends. The financing source variable takes the value of 1 if financing of assets through debt is greater or equal to 50%, and a value of zero if

financing of assets through equity and retained earnings is greater or equal to 50%. Other key variables used as covariates are summarized in table 4.6.1

Table 4.6.1 Description of key variables

Variable	Description
Age	Age of the firm based on the year in which the firm began operations
Ownership	Dummy variables for firm ownership; whether foreign or domestically owned
Listed	Dummy variable=1 if listed in stock markets 0 otherwise
Exporting status	Dummy variable=1 for exporter firm and 0 otherwise
Firm size	Total number of permanent and temporary employees in the firm
Education	Dummy variable =1 if manager has a degree, 0 otherwise
Location	Dummy variable=1 if located in capital city, 0 otherwise
Industry	Dummy variable for sector
Bank finance	Dummy variable=1 if working capital is financed by bank sources zero otherwise

Source: Author's compilation based on the enterprise survey data

4.6.3 Methodology

Whether a firm prefers to use debt or equity financing source, is a function of both observable and unobservable characteristics. It can be due to both supply and demand factors which sometimes may be difficult to measure. For us to establish the effect of financing source on firm growth, we use the Unconditional Quantile regression (UQR) method proposed by Firpo, Fortin and Lemieux (2009). It is based on the Re-centered Influence Function. This method involves running of a regression of the Recentered Influence Function (RIF) of the unconditional quantiles of the outcome variable (Sales and labor productivity), on the explanatory variables (firm characteristics). It enables us to analyze the impact of financing sources on the conditional quantiles of the marginal distribution of sales and labor productivity outcome (Ndoye, 2015).

To compute the RIF for quantiles, we let q_n and $f_Y(\alpha)$ denote the change in quantiles and marginal distributions respectively. Our interest is to calculate the direct effect $dq_n(p)/dp$ of using debt, on the nth quantile of the distribution of sales and labor productivity; where p is the proportion of firms using debt vis-avis those using equity. In this case p =Pr[X=1], and X=1 if the firm is using debt and zero otherwise. We can as well calculate the unconditional mean $d_{\mu}(p)/dp$. This is the change in firm growth if the firm changes its decision from using debt, to equity financing. This approach uses the concept of influence function (IF). We let the influence function be equal to:

$$IF(Y, q_n, f_Y) = \frac{(n - \mathbb{I}\{Y \leq q_n\})}{f_Y(q_n)} \qquad (4.1)$$

Where $\mathbb{I}\{.\}$ is an indicator function, q_n is the population nth quantile of the unconditional distribution of the outcome measure Y, and $f_Y(.)$ is the density of the marginal distribution of the outcome variable Y, which in our case is the firm performance measures. If we add the influence function into the population nth quantile of the unconditional distribution of Y, it yields the Recentered Influence Function (RIF) as:

$$q_n + IF(Y, q_n, f_Y) \qquad (4.2)$$

If we model this as a function of the explanatory variables and take a conditional expectation, then we get our RIF regression model as:

$$E[RIF(Y, \alpha)|X] = m_\alpha(X) \qquad (4.3).$$

In our case of quantiles, the Unconditional Quantile Regression (UQR) model becomes:

$$E[RIF(Y, q_n)|X] = m_n(X) \qquad (4.4)$$

Unconditional Partial Effects

We assume that X and Y have a joint distribution. And that there is a small location shift in the distribution of X in terms of the counterfactual distribution $G_X(x)$ (Firpo et al., 2009). In this case, the unconditional distribution function can be expressed as:

$$F_Y(y) = \int F_{Y|X}(y \mid X = x).dF_X(x) \qquad (4.5)$$

The counterfactual distribution of Y, G_Y^*, can be expressed as:

$$G_Y^*(y) = \int F_{Y|X}(y \mid X = x).dG_X(x) \qquad (4.6)$$

For this, we can have a mixing distribution which is t away from F_Y, such that $F_Y, t.G_Y \in F_v$. Where $0 \leq t \leq 1$. Differentiating v with respect to G_Y gives:

$$\lim_{t\downarrow 0}\frac{v(F_Y, t.G_Y)-v(F_Y)}{t}=\frac{\partial v(F_Y, t.G_Y)}{\partial t}\Big|_{t=0}$$

$$=\int IF(y;v,F_Y).d(G_Y-F_Y)(y) \qquad (4.7)$$

Where $IF(y;v,F_Y)=\frac{\partial v(F_Y;t,\Delta y)}{\partial t}\Big|_{t=0}$

In a case where t=1, and since the Influence Function integrates to zero i.e. $\int IF(y;v,F_Y).dF_Y(y)=0$. Then our re-centered influence function can be represented as:

$$RIF(y;v,F_Y)=v(F_Y)+IF(y;v,F_Y) \qquad (4.8)$$

Since our interest is on the impact of X on the distributional statistic $v(F_Y)$, then we can use the law of iterated expectations to show that this only requires us to integrate over $E[RIF(Y;v,F_Y)|X]$ i.e. $v(F_Y)=\int RIF(y;v,F_Y).dF_Y(y)$

$$\iint RIF(y;v,F_Y).dF_{Y|X}(y\mid X=x).dF_X(x) \qquad (4.9)$$

$$\int E[RIF(Y;vF_Y)|X=x].dF_X(x) \qquad (4.10)$$

In a discrete/dummy X variable the Re-centered Influence Function can be presented as:

$$\alpha(v)\equiv\lim_{t\downarrow 0}\frac{v(F_{Y,}t)-v(F_Y)}{t} \qquad (4.11)$$

$$=E[RIF(Y;v,F)|X=1]-E[RIF(Y;v,F)|X=0] \qquad (4.12)$$

This integration can be done by regression methods like OLS, Logit and non-parametric regression. This method has been widely used in the literature (see for example (Alejo, Gabrielli, & Sosa-Escudero, 2014; Chi & Li, 2007; Essama-Nssah & Lambert, 2011; Firpo, Fortin, & Lemeiux, 2011).

For purposes of robustness, we shall use propensity score matching, whereby we will match those firms using debt versus those using equity financing (Rosenbaum & Rubin, 1984). This method helps us to construct counterfactuals using the survey data being used. The propensity score matching technique helps in reducing the bias that may be caused by lack of distributional overlap. In this paper, those firms that use over 50% debt to finance new investment and working capital form the treated sample while the treated sample are those with less than 50% debt on new investment and working capital. The outcomes of interest are the changes in annual sales and labor productivity. We are interested in the individual causal treatment effect of debt finance on firm performance and growth.

4.6.4 Summary Statistics

Table 4.6.2 provides a summary of the financing sources by firms in their working capital and investment, across 13 African Countries. The sample has a total of 9,521 firms, with Nigeria having the highest number of firms and Burundi the lowest. The table shows that most firms prefer using equity sources like retained earnings to finance their working capital, and use debt more when financing new investment. At least 75% of the firms finance their investment using debt; while only 32% of the sample uses debt in working capital (see Table 4.6.2). In Cameroon, all firms in the sample reported to be using debt finance in their investment projects.

Table 4.6.2: Financing sources across 13 African countries

		Working Capital		Investment	
Country	**Total number of firms**	**Equity % of firms**	**Debt % of firms**	**Equity % of firms**	**Debt % of firms**
Nigeria	2,676	55.57	44.43	21.82	78.18
Namibia	580	52.07	47.93	18.79	81.21
South Sudan	738	90.24	9.76	31.57	68.43
Ghana	720	70.42	29.58	38.61	61.39
Cameroon	361	67.31	32.69	0.00	100.00
Burundi	157	66.88	33.12	30.57	69.43
Malawi	523	53.73	46.27	27.15	72.85

Morocco	407	69.32	30.68	28.89	71.11
Senegal	601	81.03	18.97	15.14	84.86
Kenya	781	56.72	43.28	27.14	72.86
Ethiopia	848	79.25	20.75	31.96	68.04
DRC	529	92.06	7.94	41.21	58.79
Zimbabwe	600	84.33	15.67	19.50	80.50
Total	**9,521**	**67.93**	**32.07**	**25.41**	**74.59**

Source: Own calculation from the World Bank enterprise survey data. Equity comprises of retained earnings and issues of new equity, while debt comprises of loans from banks, non-bank financial institutions, supplier credit and loans from informal sources like family and friends.

In terms of firm size, firms portray the same trend where they finance most part of their working capital with equity finance, and fund their investment projects using debt (see Table 4.6.3). The sample has more small and medium size firms than large firms. 68% of the micro firms fund their investment using debt, as compared to 14% of the firms who rely on equity to finance their investment. In general, firms seem to rely more on debt in investment than using debt in their day-to-day running of their enterprises (see Table 4.6.2).

Table 4.6.3: Financing source by firm size

Size	Total Number of firms	Working Capital Equity % of firms	Working Capital Debt % of firms	Investment Equity % of firms	Investment Debt % of firms
Micro	393	57.25	42.75	14.25	85.75
Small	5,089	70.68	29.32	23.51	76.49
Medium	2,425	65.77	34.23	27.32	72.68
Large	1,546	64.94	35.06	31.46	68.54
Total	**9,453**	**67.93**	**32.07**	**25.41**	**74.59**

Firm size was measured in terms of the number of employees in the firm. Micro firms are those with less than 5 employees, small firms are those with 5-19 workers, medium have 20-99 workers and large are those with more than 100 employees.

From Table 4.6.4, the average age of firms in the sample is approximately 19 years, with the oldest firms being as old as 170 years, while the youngest in the sample is less than a year old. Since total

number of employees reflects on firm size, the average firm size in our sample is medium with 70 employees, and there are other firms in the sample that have no employees at all.

The highest average log of sales growth was 18.53 in Burundi, with the least sales growth being 11.52 in Ghana. The same trend prevails in labor productivity, since Burundi still reports the highest labor productivity in the sample and Ghana the lowest. With the manager's experience, some of the managers are less than a year old in the firm, while others have been in a firm for up to 72 years.

Table 4.6.4: Descriptive statistics by country

Country	Statistic	Sales Growth	Labour Productivity	Total Employment	Age	Manager's Experience
Nigeria	Mean	15.01	12.10	42.98	19.01	12.72
	Std.Dev	2.96	2.32	219.12	12.54	9.08
	Min	9.21	5.16	0.00	2.00	0.00
	Max	27.24	24.84	5000.00	170.00	72.00
Namibia	Mean	13.98	11.33	38.70	13.64	13.99
	Std.Dev	2.24	1.73	155.54	11.10	9.57
	Min	9.90	6.32	1.00	2.00	1.00
	Max	20.18	17.15	2114.00	122.00	54.00
South Sudan	Mean	13.05	10.30	16.50	6.53	7.44
	Std.Dev	2.25	1.43	30.64	4.11	6.38
	Min	8.99	5.14	5.00	2.00	1.00
	Max	19.75	16.24	567.00	43.00	42.00
Ghana	Mean	11.52	9.53	39.86	18.12	16.24
	Std.Dev	2.51	1.82	87.56	11.71	9.32
	Min	5.30	4.92	5.00	4.00	2.00
	Max	19.74	16.23	800.00	107.00	64.00
Ethiopia	Mean	14.52	12.08	141.51	15.50	15.78
	Std.Dev	2.37	1.53	755.96	12.85	10.68
	Min	9.35	7.49	1.00	2.00	1.00
	Max	22.57	18.14	18452.00	91.00	60.00
Burundi	Mean	18.53	16.48	63.28	17.08	12.78
	Std.Dev	1.90	1.44	161.04	13.73	9.46
	Min	13.87	12.83	5.00	3.00	1.00
	Max	23.72	21.90	1592.00	89.00	46.00
Cameroon	Mean	15.83	14.66	36.93	19.55	18.63
	Std.Dev	2.15	1.44	101.83	13.81	10.49
	Min	10.82	11.18	1.00	0.00	1.00
	Max	23.25	20.09	1500.00	86.00	68.00
DRC	Mean	16.74	14.86	37.75	14.37	13.85
	Std.Dev	3.13	2.32	189.69	10.76	10.32
	Min	10.04	9.77	1.00	4.00	1.00
	Max	28.84	22.69	3900.00	88.00	66.00
Malawi	Mean	16.82	14.42	69.24	20.66	15.67
	Std.Dev	2.52	1.81	249.25	13.75	9.83
	Min	11.51	8.13	2.00	2.00	1.00
	Max	24.82	20.68	4030.00	109.00	60.00
Morocco	Mean	15.25	12.55	158.80	25.91	23.09
	Std.Dev	2.14	1.56	507.91	17.15	10.89
	Min	10.82	7.96	2.00	4.00	3.00
	Max	22.51	19.62	6300.00	92.00	64.00
Senegal	Mean	17.16	15.60	53.61	18.79	19.44
	Std.Dev	2.71	1.68	220.92	13.61	10.55
	Min	11.70	11.51	2.00	3.00	1.00
	Max	25.35	23.96	3500.00	168.00	60.00
Kenya	Mean	17.01	14.09	122.18	25.93	18.36
	Std.Dev	2.74	1.71	445.26	18.07	10.86
	Min	10.31	7.64	2.00	4.00	1.00
	Max	25.15	20.36	8000.00	110.00	57.00
Zimbabwe	Mean	12.04	10.11	149.24	29.39	16.18

	Std.Dev	2.12	1.31	1863.87	25.92	11.02
	Min	7.17	6.35	3.00	1.00	1.00
	Max	17.69	15.26	45000.00	125.00	59.00
Total	Mean	15.00	12.43	70.13	18.62	14.93
	Std.Dev	3.17	2.62	580.90	15.11	10.33
	Min	5.30	4.92	0.00	0.00	0.00
	Max	28.84	24.84	45000.00	170.00	72.00

Sales growth is the log of the difference between sales 3 years ago and current sales, while labor productivity is the log of the ratio of sales to the number of employees. Total employment includes both temporary and permanent employees, while manager's experience is the number of years the manager has been in a firm.

4.7 Regression Results

In this section, we discuss regression results obtained from the unconditional quantile regression (UQR)/recentered Influence function (RIF) technique. This regression method yields the impact of each covariate on the outcome variable. In this case, we shall be able to get the individual contribution of financing choice, towards firm performance and growth. The regressions are presented for 13 African countries, (Kenya, Senegal, Namibia, South Sudan, Nigeria, Burundi, Malawi, Morocco, Cameroon, Ghana, Zimbabwe, Ethiopia and the Democratic Republic of Congo), using the World Bank Enterprise Survey data between 2013 and 2016. We compare firms using debt financing versus those using equity financing sources, to fund their working capital and new investment opportunities.

From equation (3), we compute the $IF(Y, q_n, f_Y)$ for each observation using the sample estimates of q_n. Tables 4.7.1 and 4.7.2 show the unconditional quantile regression results for the marginal influence on firm performance and growth, as a result of the use of debt vis-a-vis equity finance in investment projects. On the other hand, Tables 4.7.3 and 4.7.4 show regression results on the use of debt vis-a-vis equity finance on working capital, and its effect on firm performance and growth. The RIF regression results for the 10th, 50th and 90th quantiles are presented along with their standard errors in parenthesis.

When considering the use of debt and equity in financing new investment, the results portray a negative association between debt finance and firm performance. For instance in Malawi, firms that use debt to finance investment perform less by 1.6 and 0.8 units of sales growth and labor productivity respectively, in relation to those firms that finance their investment using equity

finance, *ceteris paribus* (see Tables 4.7.1 and 4.7.2). The same is portrayed in other countries except in Kenya, Morocco, Burundi and the Democratic Republic of Congo, where the effect is not significant. This affirms the theoretical assertion that higher levels of risky debt has a value decreasing effect for the shareholders, leading to lower profits for the firm (Israel, 1991). When taking new investment, yields are uncertain. So choosing to finance new investment with debt is more likely to increase the risk premium, as a result of the interest payments which may reduce the operational capital. Cameroon was however dropped for lack of comparison group since all firms in the sample reported to be financing their new investment using debt.

The effect is different in financing of their working capital. Firms that finance their working capital with debt in Kenya, Malawi, Ethiopia, Burundi, Morocco and the Democratic Republic of Congo experience positive growth in sales and labor productivity. This could be because of the liquidity nature of working capital expenditure. Unlike asset expenditures which can fund dormant and static assets, most of this expenditure has certainty in terms of returns, so even interest payments are easy to make. However those in Nigeria and Namibia portray a negative growth as compared to those using equity financing. This is due institutional diversity at the country level. In Cameroon, Zimbabwe, Ghana, Senegal and South Sudan, there is no significant difference in growth between those firms that finance their working capital using debt and those that use equity financing.

Our regression results portray that the effect is different across the different African countries. This could be as a result of the diversity of financial markets, tax laws, government controls, monetary policy and macroeconomic environment differences in various countries. It can also be associated with the different institutional environments at the country level. For instance the banks, pension funds, insurance companies and non-financial institutions and level. This makes the cost of debt higher in some countries than others.

On the distributional analysis, the effect increases as we move towards the upper tails of the distribution. The effect of the choice of financing is more pronounced in highly productive firms and those with higher sales growth outcomes than those at the lower quartiles of the distribution. This can be clearly seen in Malawi, Senegal Ghana, Ethiopia and Nigeria (see Tables 4.7.1 and 4.7.4).

Table4.7.1 RIF regression estimates (Use of debt versus equity in financing new investment with sales growth as the outcome variable)

	Kenya			Malawi			Sudan			Senegal		
VARIABLES	**10Q**	**50Q**	**90Q**	**10Q**	**50Q**	**90Q**	**10Q**	**50Q**	**90Q**	**10Q**	**50Q**	**90Q**
Financing	-0.530	-0.443	0.0256	0.119	-0.739	-1.617**	-0.844	-1.338	-1.486	-0.166	-1.490**	-0.899
	(0.346)	(0.598)	(0.807)	(0.528)	(0.447)	(0.768)	(0.978)	(1.209)	(1.871)	(0.394)	(0.738)	(0.932)
Size	0.766***	1.280***	1.686***	-0.382	0.133	0.701**	-0.0468	0.953	1.219	0.657***	2.438***	1.201
	(0.213)	(0.381)	(0.637)	(0.277)	(0.274)	(0.319)	(0.389)	(1.278)	(2.300)	(0.250)	(0.437)	(0.738)
Exporting	-0.329	0.660	1.099	0.705	1.463	4.197	0.0577	1.674	-3.294	0.216	1.855**	-0.0121
	(0.481)	(0.754)	(1.378)	(0.542)	(1.252)	(5.206)	(0.621)	(1.976)	(2.710)	(0.302)	(0.880)	(1.914)
Sector	-0.0106	-0.0160	-0.0198				0.0177	-0.0201	0.00187	0.0281*	0.0364***	0.00976
	(0.0113)	(0.0159)	(0.0261)				(0.0347)	(0.0505)	(0.0662)	(0.0153)	(0.0116)	(0.0112)
Age	0.0142**	0.00855	0.00151	0.0131	0.0381*	0.0519	0.210	0.123	-0.0159	-0.0170	0.00123	0.0771*
	(0.00692)	(0.0139)	(0.0333)	(0.0152)	(0.0199)	(0.0338)	(0.130)	(0.168)	(0.181)	(0.0151)	(0.0234)	(0.0427)
Ownership	-0.232	1.573**	4.490**	0.0584	1.454**	1.991*	1.276	1.571	2.504	0.346	-0.0518	3.237*
	(0.518)	(0.771)	(2.264)	(0.513)	(0.569)	(1.180)	(0.767)	(1.720)	(2.065)	(0.292)	(0.854)	(1.755)
Listed	0.0304	1.937*	-0.819	-1.685	0.0444	6.225	-0.405	-0.414	4.209	-0.0756	0.957	4.677*
	(0.641)	(1.050)	(4.314)	(2.546)	(1.593)	(4.198)	(1.175)	(2.090)	(6.510)	(0.286)	(0.779)	(2.460)
Manager	0.0393**	0.0357	-0.0287	0.0279	0.0136	-0.0311	0.0303	-0.0319	-0.0493	0.0151	0.0681**	-0.00997
	(0.0189)	(0.0240)	(0.0410)	(0.0201)	(0.0260)	(0.0399)	(0.0407)	(0.0819)	(0.117)	(0.0173)	(0.0327)	(0.0369)
	DRC			**Ghana**			**Morocco**			**Ethiopia**		
Financing	-0.264	0.0341	0.976	-0.802**	-0.735**	-0.956*	0.00199	-0.697	-0.769	-0.301	-0.961***	-1.078***
	(0.456)	(0.443)	(0.865)	(0.336)	(0.336)	(0.507)	(0.546)	(0.463)	(0.775)	(0.314)	(0.331)	(0.379)
Size	0.422	1.468***	5.516***	0.273	0.945***	1.098***	-0.119	1.011***	1.184**	0.498***	0.981***	0.827***
	(0.340)	(0.386)	(1.396)	(0.237)	(0.262)	(0.372)	(0.376)	(0.344)	(0.541)	(0.177)	(0.212)	(0.209)
Exporting	0.955*	2.268***	8.340	0.377	1.354*	2.447*	0.907	0.240	-1.920*	0.289	1.469**	3.372***
	(0.497)	(0.857)	(5.643)	(0.727)	(0.741)	(1.467)	(0.754)	(0.694)	(1.053)	(0.413)	(0.595)	(1.234)
Sector	0.0275*	0.00976	-0.0239	-0.00798	0.0256**	0.00504	0.148	0.0563	0.176	0.00294	-0.00396	-0.00391
	(0.0150)	(0.0144)	(0.0298)	(0.0139)	(0.0109)	(0.0160)	(0.189)	(0.134)	(0.241)	(0.00938)	(0.00835)	(0.0107)
Age	0.00121	0.0261	0.0446	0.00201	-0.0113	0.114**	0.0176	0.0173	0.0444	0.0111	0.0366***	0.0615***
	(0.0146)	(0.0235)	(0.0764)	(0.0137)	(0.0201)	(0.0479)	(0.0107)	(0.0133)	(0.0350)	(0.00910)	(0.0128)	(0.0209)
Ownership	1.194***	1.848***	2.352	0.773**	2.194***	3.251***	0.769**	0.954*	3.011*	0.591**	1.978***	0.982
	(0.252)	(0.525)	(1.506)	(0.362)	(0.443)	(1.144)	(0.296)	(0.549)	(1.695)	(0.288)	(0.482)	(0.838)
Listed				1.296**	4.300***	4.265	0.832***	0.306	0.457	0.306	0.242	-3.977**
				(0.626)	(1.614)	(4.554)	(0.312)	(0.583)	(1.177)	(0.409)	(1.135)	(1.589)
Manager	0.0224	-0.00114	0.0214	0.0256	0.0202	-0.0649	0.00204	-0.00584	-0.00449	0.0101	0.0245	-0.0102
	(0.0139)	(0.0241)	(0.0699)	(0.0202)	(0.0223)	(0.0419)	(0.0258)	(0.0182)	(0.0387)	(0.0143)	(0.0168)	(0.0207)

	Namibia			Nigeria			Zimbabwe			Burundi		
Financing Source	-0.315	-1.111	0.268	-0.678***	-0.671**	-0.797	-0.609***	-0.384	-1.011	1.232	0.539	-1.002
	(0.522)	(0.887)	(1.197)	(0.156)	(0.328)	(1.098)	(0.232)	(0.520)	(1.068)	(0.953)	(0.490)	(1.115)
Size	0.0515	1.492**	1.417	0.299***	0.760***	3.373***	0.407	1.588***	0.521	1.241***	1.614**	1.619
	(0.279)	(0.618)	(1.455)	(0.111)	(0.166)	(0.891)	(0.260)	(0.398)	(0.522)	(0.446)	(0.621)	(1.005)
Exporting	0.579	-2.698	-2.218	0.110	-0.451	-1.383	0.214	-0.824	-0.464	0.915	-0.568	1.846
	(0.424)	(2.717)	(2.642)	(0.348)	(0.468)	(1.278)	(0.776)	(2.546)	(1.799)	(0.700)	(1.118)	(2.547)
Sector	0.177	-0.0850	0.00662	-0.0234	0.0479*	-0.0251	-0.203	-0.0963	-0.126	0.0130	-0.00292	0.0269
	(0.316)	(0.455)	(0.616)	(0.0196)	(0.0252)	(0.0667)	(0.187)	(0.151)	(0.213)	(0.0162)	(0.0165)	(0.0342)
Age	0.0232	0.0240	0.0689	0.00890	0.0287**	0.121**	0.0101	0.0152	0.0238*	0.0223	-0.0107	0.0714
	(0.0184)	(0.0329)	(0.0700)	(0.00898)	(0.0128)	(0.0513)	(0.00760)	(0.0110)	(0.0133)	(0.0282)	(0.0261)	(0.0626)
Ownership	0.719**	1.532	1.585	-0.573	0.0221	1.565	0.576	1.489	-1.350	-0.566	0.0893	1.703
	(0.309)	(1.441)	(2.965)	(0.510)	(0.561)	(1.734)	(0.410)	(0.982)	(1.548)	(1.048)	(0.741)	(1.847)
Listed	-0.866	0.0974	-5.851	0.759***	0.799	-1.248	-0.206	1.104*	2.955	0.189	-0.494	0.905
	(0.782)	(1.540)	(3.579)	(0.211)	(0.896)	(2.760)	(0.436)	(0.625)	(1.867)	(0.451)	(0.714)	(1.518)
Manager Experience	0.0205	0.0269	-0.00843	-0.00284	-0.0488***	-0.0632	0.0315	0.00336	0.0178	0.0469	0.0512*	-0.0332
				(0.0131)	(0.0189)	(0.0646)	(0.0199)	(0.0240)	(0.0311)	(0.0384)	(0.0279)	(0.0794)

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1. The financing variable takes the value of 1 if financing of assets through debt is greater or equal to 50%, and a value of zero if financing of assets through equity and retained earnings is greater or equal to 50%.

Table 4.7.2 RIF regression estimates (Use of debt versus equity in investment with labor productivity as the outcome variable)

VARIABLES	Kenya 10Q	Kenya 50Q	Kenya 90Q	Malawi 10Q	Malawi 50Q	Malawi 90Q	Sudan 10Q	Sudan 50Q	Sudan 90Q	Senegal 10Q	Senegal 50Q	Senegal 90Q
Financing	-0.347	-0.276	-0.278	0.0734	-0.355	-0.778*	-0.656**	-0.311**	-0.710**	0.174	-0.680**	-0.226
	(0.313)	(0.190)	(0.295)	(0.393)	(0.249)	(0.433)	(0.258)	(0.136)	(0.316)	(0.359)	(0.323)	(0.523)
Size	0.0413	0.240**	0.263*	-0.0725	0.361**	0.126	0.173	0.243	0.611	0.362**	1.014***	0.471
	(0.175)	(0.102)	(0.158)	(0.233)	(0.149)	(0.227)	(0.274)	(0.149)	(0.424)	(0.163)	(0.201)	(0.323)
Exporting	-1.120**	-0.279	-0.185	-3.034	-0.311	0.0969	-0.554	0.551	-1.077***	0.337	-0.0765	1.178
	(0.446)	(0.232)	(0.309)	(2.012)	(0.764)	(1.276)	(1.116)	(0.519)	(0.353)	(0.244)	(0.564)	(1.606)
Sector	-0.00421	0.00612	0.00567				0.00848	0.00875	0.0168	0.0168***	0.0171***	0.0184**
	(0.00856)	(0.00515)	(0.00840)				(0.0103)	(0.00575)	(0.0119)	(0.00603)	(0.00519)	(0.00821)
Age	0.00339	0.00413	0.00239	0.0159	0.0163*	0.0107	-0.0397	-0.0111	0.0294	0.00172	0.0182**	0.0273*
	(0.00827)	(0.00471)	(0.00824)	(0.0147)	(0.00975)	(0.0145)	(0.0367)	(0.0174)	(0.0475)	(0.00617)	(0.00773)	(0.0160)
Ownership	0.289	0.425	1.265*	0.160	0.402	0.0953	0.322	0.148	0.565**	0.344**	-0.181	1.023
	(0.501)	(0.294)	(0.737)	(0.440)	(0.290)	(0.513)	(0.239)	(0.121)	(0.272)	(0.133)	(0.357)	(0.870)
Listed	-0.326	0.962	0.597	-2.658	-1.615***	-1.052***	-1.392	-0.739**	-0.0125	0.266	0.590	1.070
	(1.225)	(0.618)	(1.649)	(2.535)	(0.481)	(0.354)	(0.930)	(0.347)	(0.673)	(0.164)	(0.445)	(1.059)
Manager	0.0297*	0.0113	-0.0122	0.0126	-0.00865	-0.00583	0.00720	0.00959	0.0261	0.0135	0.0128	0.00441
	(0.0159)	(0.00803)	(0.0109)	(0.0183)	(0.0126)	(0.0214)	(0.0210)	(0.0108)	(0.0246)	(0.0116)	(0.0118)	(0.0222)
	DRC			**Ghana**			**Morocco**			**Ethiopia**		
Financing	-0.417	-0.377	0.711	-0.348	-0.648***	-0.0939	0.0878	-0.251	-0.191	-0.0911	-0.267**	-0.559*
	(0.260)	(0.251)	(0.582)	(0.233)	(0.232)	(0.244)	(0.293)	(0.227)	(0.451)	(0.162)	(0.135)	(0.302)
Size	-0.0556	0.431*	2.833***	-0.00556	0.231*	0.146	-0.305	-0.212	0.274	0.626***	0.271***	0.129
	(0.270)	(0.234)	(0.778)	(0.157)	(0.138)	(0.173)	(0.245)	(0.151)	(0.292)	(0.112)	(0.104)	(0.148)
Exporting	0.428	1.139*	7.116*	-0.516	0.0289	0.317	0.00377	-0.780***	-0.775	0.574***	0.516*	1.004
	(0.850)	(0.672)	(4.173)	(0.791)	(0.549)	(0.746)	(0.430)	(0.298)	(0.612)	(0.222)	(0.298)	(0.703)
Sector	0.0161*	0.0166*	0.0148	0.0134	0.0224***	0.0236***	-0.0167	-0.0861	0.00604	0.00661	0.0120***	0.0320***
	(0.00926)	(0.00848)	(0.0186)	(0.00987)	(0.00742)	(0.00798)	(0.0984)	(0.0774)	(0.157)	(0.00558)	(0.00400)	(0.00809)
Age	0.0210*	0.0150	-0.0273	-0.000508	0.0140	0.0166	0.0101	0.00372	-0.00165	0.0115**	0.0132*	0.00765
	(0.0108)	(0.0125)	(0.0498)	(0.00919)	(0.0111)	(0.0186)	(0.00640)	(0.00684)	(0.0127)	(0.00564)	(0.00677)	(0.00844)
Ownership	0.906***	1.587***	1.234	0.532*	1.646***	1.667***	0.426	0.567*	0.0504	0.424**	0.280	0.769
	(0.296)	(0.333)	(1.145)	(0.311)	(0.286)	(0.603)	(0.373)	(0.327)	(0.622)	(0.194)	(0.220)	(0.578)
Listed	0	0	0	1.319**	2.808***	3.780	0.678***	0.453*	0.733	0.345*	-0.582	-1.355***
	(0)	(0)	(0)	(0.518)	(0.973)	(3.312)	(0.240)	(0.273)	(0.606)	(0.201)	(0.639)	(0.394)
Manager	0.0307**	0.0142	0.0940*	0.00838	0.00423	-0.0107	0.00875	0.00269	0.00339	0.0313***	0.0107	-0.00789
	(0.0121)	(0.0143)	(0.0537)	(0.0156)	(0.0130)	(0.0200)	(0.0131)	(0.0106)	(0.0169)	(0.00723)	(0.00677)	(0.0125)

	Namibia			Nigeria			Zimbabwe			Burundi		
Financing	-0.619*	-0.546*	-0.642	0.0475	0.0971	0.459	-0.591***	-0.156	-0.586*	0.0282	0.128	-0.444
	(0.325)	(0.329)	(0.445)	(0.171)	(0.142)	(0.315)	(0.122)	(0.188)	(0.299)	(0.275)	(0.341)	(0.666)
Size	0.0845	0.302	0.827**	-0.187*	-0.140*	0.251	-0.0351	0.276**	-0.0868	0.106	0.365	0.0450
	(0.278)	(0.231)	(0.323)	(0.101)	(0.0845)	(0.198)	(0.112)	(0.108)	(0.168)	(0.247)	(0.282)	(0.477)
Exporting	0.907	-0.114	-1.500**	-0.0664	-0.338	-0.559	0.553***	-0.119	0.181	-0.914	-0.655	-0.853
	(1.058)	(1.794)	(0.747)	(0.317)	(0.223)	(0.444)	(0.147)	(0.483)	(0.962)	(0.934)	(0.727)	(0.784)
Sector	0.398*	0.246	-0.126	-0.0243	0.00867	0.0371	0.0269	0.0113	-0.0287	-0.00393	-0.00382	-0.00924
	(0.235)	(0.186)	(0.205)	(0.0171)	(0.0115)	(0.0273)	(0.0541)	(0.0508)	(0.0701)	(0.00778)	(0.00920)	(0.0165)
Age	-0.00353	0.0456***	0.0545**	-0.00826	0.0150**	0.0301	0.00509*	0.00563*	0.00154	-0.00401	0.0137	0.0297
	(0.0166)	(0.0146)	(0.0269)	(0.0108)	(0.00686)	(0.0189)	(0.00291)	(0.00308)	(0.00457)	(0.00842)	(0.0141)	(0.0278)
Ownership	0.312	0.185	-0.162	-1.180**	-0.671***	0.524	0.0605	0.514**	1.017*	0.0325	0.935*	-0.161
	(0.459)	(0.512)	(0.757)	(0.485)	(0.246)	(0.679)	(0.253)	(0.222)	(0.562)	(0.382)	(0.504)	(0.916)
Listed	0.229	-0.694	0.260	0.0634	-0.0190	0.00458	0.336*	0.984***	1.491***	0.273	-0.202	0.0646
	(0.556)	(1.129)	(2.563)	(0.743)	(0.517)	(1.405)	(0.200)	(0.196)	(0.573)	(0.240)	(0.430)	(0.814)
Manager	0.0547***	0.0474**	0.0243	-0.0200*	-0.0285***	-0.0536**	-0.00138	-0.00346	-0.00326	0.0151	-0.00193	-0.0216
	(0.0157)	(0.0184)	(0.0213)	(0.0113)	(0.00828)	(0.0213)	(0.00811)	(0.00721)	(0.0116)	(0.0117)	(0.0181)	(0.0317)

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 4.7.3 RIF regression estimates (Use of debt versus equity in working capital, with sales growth as the outcome variable)

VARIABLES	Kenya 10Q	Kenya 50Q	Kenya 90Q	Malawi 10Q	Malawi 50Q	Malawi 90Q	Sudan 10Q	Sudan 50Q	Sudan 90Q	Senegal 10Q	Senegal 50Q	Senegal 90Q
Financing	0.138	0.689	0.455	-0.435	1.043*	1.219	0.177	-0.451	-2.655	0.0319	-0.520	0.736
	(0.414)	(0.507)	(0.773)	(0.601)	(0.591)	(0.871)	(0.570)	(1.845)	(2.417)	(0.461)	(0.613)	(0.796)
Size	0.748***	1.286***	1.703***	-0.378	0.159	0.788**	0.114	1.237	1.622	0.668***	2.593***	1.217
	(0.234)	(0.389)	(0.606)	(0.258)	(0.271)	(0.315)	(0.413)	(1.351)	(1.952)	(0.212)	(0.422)	(0.814)
Exporting	-0.336	0.625	1.075	0.904	0.958	3.559	0.504	2.194	-3.268	0.231	1.900**	0.129
	(0.493)	(0.719)	(1.272)	(0.655)	(1.097)	(5.748)	(0.639)	(2.104)	(2.769)	(0.285)	(0.841)	(2.181)
Sector	-0.0116	-0.0160	-0.0190				0.0201	-0.0187	-0.00364	0.0280**	0.0351***	0.0101
	(0.0111)	(0.0156)	(0.0254)				(0.0357)	(0.0485)	(0.0649)	(0.0137)	(0.0117)	(0.0121)
Age	0.0153**	0.00866	0.000873	0.0117	0.0433**	0.0610	0.166	0.0717	-0.0205	-0.0175	-0.00329	0.0742*
	(0.00667)	(0.0134)	(0.0336)	(0.0145)	(0.0196)	(0.0403)	(0.116)	(0.132)	(0.197)	(0.0167)	(0.0250)	(0.0446)
Ownership	-0.166	1.630**	4.488*	0.151	1.267**	1.832*	1.196	1.574	2.889	0.334	-0.219	3.214*
	(0.451)	(0.680)	(2.534)	(0.493)	(0.537)	(1.088)	(0.739)	(1.470)	(2.095)	(0.394)	(0.776)	(1.904)
Listed	0.00545	1.807*	-0.906	-1.532	-0.546	5.167	-0.122	0.103	4.986	-0.0921	0.755	4.624**
	(0.494)	(0.953)	(4.799)	(2.811)	(1.843)	(4.870)	(1.046)	(1.883)	(5.708)	(0.252)	(0.775)	(2.215)
Manager	0.0382**	0.0340	-0.0292	0.0292	0.0121	-0.0301	0.0286	-0.0439	-0.0904	0.0157	0.0723**	-0.00576
	(0.0183)	(0.0246)	(0.0372)	(0.0193)	(0.0284)	(0.0422)	(0.0464)	(0.0804)	(0.118)	(0.0167)	(0.0314)	(0.0329)
	DRC			**Ghana**			**Morocco**			**Ethiopia**		
Financing	0.708**	1.577**	-0.270	0.243	0.251	0.0863	-0.292	0.165	-0.145	0.296	0.650*	0.390
	(0.305)	(0.735)	(1.441)	(0.416)	(0.384)	(0.530)	(0.556)	(0.451)	(0.985)	(0.343)	(0.388)	(0.470)
Size	0.365	1.405***	5.626***	0.258	0.929***	1.097***	-0.135	1.083***	1.119**	0.501***	0.987***	0.830***
	(0.336)	(0.339)	(1.322)	(0.232)	(0.260)	(0.374)	(0.394)	(0.325)	(0.538)	(0.193)	(0.216)	(0.216)
Exporting	0.834	2.127*	8.565*	0.351	1.337*	2.377*	0.639	0.522	-1.871	0.227	1.335**	3.296**
	(0.620)	(1.193)	(4.952)	(0.698)	(0.760)	(1.358)	(0.768)	(0.795)	(1.179)	(0.353)	(0.620)	(1.309)
Sector	0.0276*	0.00891	-0.0256	-0.00904	0.0246**	0.00328	0.0950	0.183	0.312	0.00377	-0.00235	-0.00331
	(0.0144)	(0.0123)	(0.0256)	(0.0127)	(0.0113)	(0.0170)	(0.187)	(0.150)	(0.237)	(0.00882)	(0.00916)	(0.0107)
Age	0.00214	0.0267	0.0421	0.00976	-0.00416	0.123**	0.00776	0.00473	0.0431	0.0125	0.0405***	0.0654***
	(0.0140)	(0.0213)	(0.0677)	(0.0140)	(0.0214)	(0.0510)	(0.0124)	(0.0134)	(0.0444)	(0.00948)	(0.0130)	(0.0198)
Ownership	1.109***	1.705***	2.447*	0.860**	2.276***	3.340***	0.746***	0.997*	2.797	0.612**	2.052***	1.070
	(0.243)	(0.524)	(1.414)	(0.365)	(0.450)	(1.206)	(0.269)	(0.562)	(1.750)	(0.268)	(0.454)	(0.835)
Listed	0	0	0	0.765	3.808**	3.667	0.654*	0.622	0.945	0.397	0.513	-3.697**
	(0)	(0)	(0)	(0.550)	(1.615)	(4.525)	(0.379)	(0.566)	(1.456)	(0.328)	(1.208)	(1.525)
Manager	0.0227	-0.00272	0.0184	0.0158	0.0112	-0.0759*	0.0274	0.00429	-0.00476	0.0102	0.0249	-0.00958
	(0.0167)	(0.0225)	(0.0722)	(0.0212)	(0.0222)	(0.0456)	(0.0249)	(0.0182)	(0.0456)	(0.0130)	(0.0177)	(0.0192)

	Namibia			Nigeria			Zimbabwe			Burundi		
Financing	-0.110	-1.684**	0.963	-0.525**	-0.753**	-2.819***	0.586	0.506	1.673	-0.200	0.900*	1.361
	(0.486)	(0.803)	(1.012)	(0.210)	(0.293)	(0.869)	(0.558)	(0.592)	(1.108)	(0.932)	(0.499)	(0.851)
Size	0.0518	1.586***	1.354	0.335***	0.802***	3.486***	0.510*	1.651***	0.679	1.279**	1.521***	1.456
	(0.311)	(0.597)	(1.428)	(0.113)	(0.166)	(0.983)	(0.278)	(0.380)	(0.432)	(0.501)	(0.541)	(1.092)
Exporting	0.564	-3.124	-1.955	0.204	-0.307	-0.795	-0.186	-1.150	-1.508	1.220*	-0.200	1.882
	(0.444)	(2.694)	(2.970)	(0.312)	(0.418)	(1.441)	(0.647)	(2.506)	(1.959)	(0.718)	(0.967)	(2.953)
Sector	0.175	0.0843	-0.110	-0.0137	0.0602**	0.0118	-0.200	-0.0943	-0.120	0.00633	-0.00567	0.0325
	(0.324)	(0.506)	(0.646)	(0.0193)	(0.0250)	(0.0685)	(0.180)	(0.153)	(0.230)	(0.0178)	(0.0148)	(0.0289)
Age	0.0235	0.0162	0.0747	0.00875	0.0275*	0.111**	0.00659	0.0126	0.0159	0.0180	-0.00626	0.0825
	(0.0227)	(0.0312)	(0.0648)	(0.00900)	(0.0146)	(0.0509)	(0.00782)	(0.00974)	(0.0138)	(0.0359)	(0.0238)	(0.0550)
Ownership	0.732**	1.557	1.588	-0.394	0.296	2.692	0.702*	1.574*	-1.110	-0.773	0.198	2.113
	(0.296)	(1.466)	(2.921)	(0.501)	(0.545)	(1.720)	(0.383)	(0.877)	(1.241)	(1.079)	(0.683)	(1.521)
Listed	-0.983	0.741	-6.461	0.910***	1.048	-0.129	-0.256	1.055*	2.778	0.345	-0.579	0.592
	(0.813)	(1.418)	(4.157)	(0.280)	(0.898)	(2.320)	(0.419)	(0.636)	(1.778)	(0.651)	(0.577)	(1.566)
Manager	0.0237	0.0320	-0.00710	-0.00341	-0.0490**	-0.0604	0.0356**	0.00584	0.0240	0.0348	0.0454*	-0.0238
	(0.0237)	(0.0463)	(0.0734)	(0.0131)	(0.0194)	(0.0650)	(0.0160)	(0.0246)	(0.0276)	(0.0335)	(0.0256)	(0.0666)
	Cameroon											
Financing	-0.183	0.288	1.188									
	(0.377)	(0.315)	(1.297)									
Size	0.262	0.710***	1.948**									
	(0.175)	(0.224)	(0.872)									
Exporting	0.581	-0.0249	-4.396									
	(0.381)	(0.845)	(3.821)									
Sector	-0.256*	0.201	0.197									
	(0.143)	(0.198)	(0.599)									
Age	-0.00257	0.0224*	0.0624									
	(0.0124)	(0.0121)	(0.0706)									
Ownership	0.304	0.0781	5.101									
	(0.228)	(0.615)	(5.116)									
Listed	-0.109	0.219	0.722									
	(0.382)	(0.430)	(1.714)									
Manager	0.0190	0.0138	-0.0221									
	(0.0152)	(0.0155)	(0.0564)									

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 4.7.4 RIF regression estimates (Use of debt versus equity in working capital, with labor productivity as the outcome variable)

VARIABLES	Kenya 10Q	Kenya 50Q	Kenya 90Q	Malawi 10Q	Malawi 50Q	Malawi 90Q	Sudan 10Q	Sudan 50Q	Sudan 90Q	Senegal 10Q	Senegal 50Q	Senegal 90Q
Financing	0.246	0.390**	0.0576	-0.212	0.383*	0.730	-0.455	-0.265	-0.205	-0.167	0.0945	0.591
	(0.278)	(0.173)	(0.272)	(0.443)	(0.228)	(0.510)	(0.546)	(0.225)	(0.527)	(0.317)	(0.308)	(0.480)
Size	0.0677	0.268***	0.279*	-0.0742	0.368***	0.142	0.365	0.337**	0.801*	0.370**	1.031***	0.429
	(0.191)	(0.101)	(0.167)	(0.222)	(0.123)	(0.228)	(0.275)	(0.165)	(0.458)	(0.148)	(0.208)	(0.317)
Exporting	-1.165**	-0.340	-0.204	-2.917	-0.529	-0.322	-0.322	0.657	-0.800***	0.309	0.0171	1.224
	(0.508)	(0.216)	(0.375)	(2.022)	(0.803)	(1.459)	(1.285)	(0.583)	(0.302)	(0.201)	(0.651)	(1.396)
Sector	-0.00302	0.00773	0.00615				0.00695	0.00797	0.0155	0.0171***	0.0164***	0.0180**
	(0.00954)	(0.00560)	(0.00811)				(0.0101)	(0.00563)	(0.0129)	(0.00622)	(0.00543)	(0.00726)
Age	0.00378	0.00453	0.00263	0.0155	0.0172*	0.0126	-0.0376	-0.0101	0.0317	0.00203	0.0166**	0.0271
	(0.00892)	(0.00522)	(0.00930)	(0.0148)	(0.00968)	(0.0157)	(0.0329)	(0.0175)	(0.0502)	(0.00695)	(0.00691)	(0.0178)
Ownership	0.317	0.453	1.285*	0.193	0.361	0.0252	0.323	0.148	0.566**	0.339**	-0.182	1.043
	(0.494)	(0.315)	(0.711)	(0.473)	(0.283)	(0.547)	(0.226)	(0.128)	(0.222)	(0.132)	(0.362)	(0.862)
Listed	-0.375	0.889	0.582	-2.516	-1.953***	-1.732***	-1.393	-0.732**	-0.0576	0.270*	0.542	1.085
	(1.024)	(0.544)	(1.583)	(2.641)	(0.671)	(0.493)	(0.984)	(0.356)	(0.782)	(0.161)	(0.472)	(1.091)
Manager	0.0292*	0.0100	-0.0121	0.0131	-0.00827	-0.00451	0.00921	0.0103	0.0294	0.0134	0.0137	0.00419
	(0.0165)	(0.00785)	(0.0115)	(0.0180)	(0.0117)	(0.0222)	(0.0192)	(0.0108)	(0.0260)	(0.0106)	(0.0115)	(0.0198)
	DRC			**Ghana**			**Morocco**			**Ethiopia**		
Financing	0.708**	1.577**	-0.270	0.0914	0.0736	0.266	0.521*	0.382	0.303	0.231	0.295*	0.483
	(0.305)	(0.735)	(1.441)	(0.230)	(0.212)	(0.273)	(0.291)	(0.252)	(0.537)	(0.200)	(0.166)	(0.342)
Size	0.365	1.405***	5.626***	-0.0111	0.229	0.123	-0.350	-0.262*	-0.0514	0.625***	0.269***	0.123
	(0.336)	(0.339)	(1.322)	(0.168)	(0.147)	(0.171)	(0.236)	(0.153)	(0.235)	(0.109)	(0.0932)	(0.163)
Exporting	0.834	2.127*	8.565*	-0.513	0.0127	0.370	0.263	-0.731**	-0.334	0.521***	0.443	0.882
	(0.620)	(1.193)	(4.952)	(0.776)	(0.528)	(0.704)	(0.445)	(0.310)	(0.532)	(0.187)	(0.308)	(0.731)
Sector	0.0276*	0.00891	-0.0256	0.0138	0.0228***	0.0242***	0.00400	-0.0844	0.0640	0.00703	0.0125***	0.0327***
	(0.0144)	(0.0123)	(0.0256)	(0.00906)	(0.00717)	(0.00761)	(0.101)	(0.0738)	(0.156)	(0.00503)	(0.00450)	(0.00744)
Age	0.00214	0.0267	0.0421	0.00151	0.0175	0.0177	0.0100	0.00300	0.00611	0.0120**	0.0142**	0.00955
	(0.0140)	(0.0213)	(0.0677)	(0.00926)	(0.0117)	(0.0172)	(0.00633)	(0.00710)	(0.0143)	(0.00540)	(0.00722)	(0.00889)
Ownership	1.109***	1.705***	2.447*	0.568*	1.711***	1.681***	0.363	0.476	0.265	0.431**	0.305	0.823
	(0.243)	(0.524)	(1.414)	(0.311)	(0.298)	(0.560)	(0.360)	(0.308)	(0.834)	(0.193)	(0.260)	(0.598)
Listed	0	0	0	1.133***	2.479***	3.688	0.697**	0.308	0.317	0.315*	-0.589	-1.342***
	(0)	(0)	(0)	(0.433)	(0.801)	(3.199)	(0.270)	(0.262)	(0.543)	(0.180)	(0.680)	(0.385)
Manager	0.0227	-0.00272	0.0184	0.00524	-0.00126	-0.0124	0.0116	0.00528	0.0161	0.0305***	0.00956	-0.00999
	(0.0167)	(0.0225)	(0.0722)	(0.0148)	(0.0131)	(0.0167)	(0.0120)	(0.0107)	(0.0213)	(0.00791)	(0.00731)	(0.0133)

	Namibia			Nigeria			Zimbabwe			Burundi		
Financing	-0.431	-1.142***	-0.599*	-0.299*	-0.366***	-0.579*	-0.433	0.154	0.0970	-0.292	0.164	0.603
	(0.358)	(0.318)	(0.344)	(0.177)	(0.133)	(0.329)	(0.268)	(0.202)	(0.312)	(0.287)	(0.328)	(0.526)
Size	0.137	0.405*	0.893**	-0.186	-0.139*	0.245	0.0343	0.283***	-0.0398	0.149	0.335	-0.0258
	(0.302)	(0.216)	(0.358)	(0.117)	(0.0832)	(0.215)	(0.105)	(0.104)	(0.176)	(0.246)	(0.273)	(0.401)
Exporting	0.776	-0.404	-1.671**	-0.00174	-0.257	-0.415	0.711***	-0.166	0.163	-0.917	-0.634	-0.899
	(1.018)	(1.434)	(0.658)	(0.326)	(0.230)	(0.454)	(0.188)	(0.456)	(0.863)	(1.001)	(0.814)	(0.796)
Sector	0.383	0.286	-0.130	-0.0202	0.0137	0.0441	0.0259	0.0135	-0.0250	-0.00459	-0.00406	-0.00624
	(0.279)	(0.179)	(0.225)	(0.0167)	(0.0125)	(0.0275)	(0.0556)	(0.0518)	(0.0664)	(0.00700)	(0.00926)	(0.0167)
Age	-0.00311	0.0477***	0.0552**	-0.00899	0.0140*	0.0277*	0.00567*	0.00562	0.00181	-0.00424	0.0142	0.0294
	(0.0140)	(0.0139)	(0.0267)	(0.00966)	(0.00716)	(0.0167)	(0.00329)	(0.00347)	(0.00461)	(0.00874)	(0.0143)	(0.0320)
Ownership	0.217	-0.0907	-0.299	-1.064**	-0.526*	0.770	0.0469	0.500**	0.983*	-0.0162	0.963**	-0.0612
	(0.465)	(0.489)	(0.721)	(0.454)	(0.276)	(0.719)	(0.241)	(0.241)	(0.504)	(0.419)	(0.447)	(0.995)
Listed	0.377	-0.345	0.457	0.0822	0.00411	0.0416	0.342	0.974***	1.475**	0.284	-0.214	0.0572
	(0.546)	(1.031)	(2.653)	(0.789)	(0.536)	(1.353)	(0.214)	(0.240)	(0.573)	(0.302)	(0.416)	(0.822)
Manager	0.0536***	0.0385**	0.0215	-0.0197*	-0.0280***	-0.0519***	-0.000557	-0.00338	-0.00271	0.0163	-0.00338	-0.0223
	(0.0170)	(0.0175)	(0.0196)	(0.0111)	(0.00724)	(0.0173)	(0.00813)	(0.00698)	(0.0104)	(0.0122)	(0.0183)	(0.0298)
	Cameroon											
Financing	-0.0914	0.241	0.367									
	(0.274)	(0.190)	(0.439)									
Size	0.164	0.195	0.113									
	(0.205)	(0.129)	(0.243)									
Exporting	-0.709	-0.397	-1.082									
	(0.860)	(0.528)	(1.195)									
Sector	-0.130	-0.0165	-0.121									
	(0.151)	(0.123)	(0.200)									
Age	0.0252**	0.0114	0.0357									
	(0.0118)	(0.00855)	(0.0274)									
Ownership	0.382	0.523	2.001									
	(0.425)	(0.399)	(1.618)									
Listed	-0.0337	0.310	1.557**									
	(0.424)	(0.307)	(0.772)									
Manager	-0.0166	-0.00924	-0.0314									
	(0.0184)	(0.0107)	(0.0238)									

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

4.8 Robustness checks

For robustness check, we carried out a propensity score matching for firms that use at least 50% debt on working capital and new investment, with those that use less than 50% debt on both working capital and new investment. In this case, those firms that use over 50% debt to finance new investment and working capital form the treated sample while the untreated sample are those with less than 50% debt on new investment and working capital. The outcomes of interest are the firm performance and growth measures (sales and labor productivity). We are interested in the individual causal treatment effect of debt finance on firm performance and growth. This method helps us to construct counterfactuals using the survey data, thus reducing the bias that may be caused by lack of distributional overlap.

The matching regression results for 10 African countries are presented in Table 4.8.1. The other countries were dropped due to data deficiency. The number of firms in the comparison group were few thus hindering us from getting the regression results. The results are in tandem with the RIF regression results on the directional effect. For instance, in the matching results, firms using over 50% debt on new investment financing, are more likely to experience a decline in performance. This is portrayed both when using sales outcome and labor productivity as well. As was portrayed in our RIF regressions, use of debt financing to finance working capital had a positive impact in Malawi Kenya, Burundi, Morocco and the Democratic Republic of Congo. The same effect is portrayed in the propensity score matching regression results. The same trend has been portrayed in Nigeria and Namibia results.

Like the RIF regression results, the matching results also portray a cross country difference on the way debt financing impacts on growth and performance. The matching regression results are therefore in line with the RIF regression results, showing that our results are robust, holding all factors constant.

Table 4.8.1: Propensity Score Matching results (Sales and labor productivity outcome)

	Sales Outcome		Labor Productivity Outcome	
Country	Working Capital	Investment	Working Capital	Investment
Nigeria	-0.538*	-0.254	-0.715***	0.0739
	(0.307)	(0.270)	(0.221)	(0.203)
Namibia	-0.832**	-0.339	-1.036**	-1.055***
	(0.357)	(0.509)	(0.421)	(0.304)
Ghana	0.159	-0.624*	-0.0811	-0.342
	(0.379)	(0.341)	(0.315)	(0.238)
Burundi	1.592***	0.325	0.198	0.371
	(0.573)	(0.577)	(0.377)	(0.374)
Malawi	1.588***	0.532	0.0661	-0.572
	(0.509)	(0.551)	(0.423)	(0.378)
Morocco	0.431	-1.339**	0.475**	-0.313
	(0.520)	(0.529)	(0.234)	(0.270)
Senegal	-0.418	-1.693**	-0.327	-0.0567
	(0.789)	(0.668)	(0.405)	(0.438)
Kenya	0.569	-0.261	0.381	-0.688***
	(0.553)	(0.419)	(0.282)	(0.194)
DRC	2.178***	0.731*	1.203**	0.331
	(0.776)	(0.382)	(0.493)	(0.321)
Zimbabwe	1.820***		-0.272	
	(0.570)		(0.247)	

*Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1*

4.8 Conclusion

Using a sample of 9,521 firms from the World Enterprise survey data set, we investigated the extent to which firms in 13 African countries use debt versus equity financing sources to fund their investment opportunities and working capital. We used the unconditional quantile regression technique/Recentered Influence Function techniques by Firpo, Fortin and Lemieux (2009), to evaluate the growth differential that exists among firms that finance new investment and working capital through equity finance relative to those that use debt financing sources.

The study found that most firms (approximately 68%) rely on equity financing to source their working capital, but rely heavily on debt (approximately 75% of firms) to finance new investment projects. This heavy reliance on debt to finance investment could be associated with asset financing as a collateral requirement by financial institutions. The study also found that the use of debt to finance new investment lowers firm performance and growth, while the use of debt in working capital raises firm growth and performance. This could be because the yields for new investment

are uncertain, and choosing to finance new investment with debt is more likely to increase the risk premium, as a result of the interest payments which may reduce the operational capital. If the investment returns are not realized as expected, then firm performance is likely to be derailed.

This effect was found to be greater as we move to the upper tails of sales and labor productivity distribution, and was evident in all countries except Nigeria and Namibia, whose results portrayed a decline in growth for firms using debt financing in both working capital and investment financing. This affirms the assertions in the literature on country differences in the use of financing sources depending on the level of development and legal environment. The study also found that debt/equity finance impacts on firm performance and growth differently, depending on whether a firm is at the lower, middle or upper level of sales and labor productivity distribution. In view of this, policy makers should design financial policies that suit each segment of firms. No one policy can fit all firms.

We however note that the study was limited to cross sectional data which implies that we could not take into considerations some dynamics of firms changing from using one form of financing into another form of financing over time. We therefore recommend the use of panel data in future studies in order to capture such dynamics. The data is also limited since it does not report on dividend payments and the use of only retained earnings as equity measure. Further studies can be done on different dataset to verify these results.

CHAPTER FIVE

CONCLUSION AND POLICY RECOMMENDATIONS

5.0 Introduction

Economic theory suggests that credit constraints hinder liquidity strapped entrepreneurs from undertaking profitable investment. This implies that the level of investment and profitability of the firm can be attributed to credit constraints (S. R. Boucher et al., 2009). In view of this, informal lenders are portrayed as recipients of the spillover demand from the formal sector (S. Boucher & Guirkinger, 2007). This explains the informal sector as a lender of last resort for firms that are quantity-rationed in the formal sector (Stiglitz & Weiss, 1981). The quantity rationing can be as a result of limited information by formal sectors which make them demand collateral to overcome moral hazard. Those firms that do not have collateral will be involuntarily excluded from formal credit and eventually turn to informal lenders, who will finance them on grounds of informational advantage which in this case substitutes for collateral (Stiglitz, 1990).

According to Modigliani and Miller (1958), financial structure should not affect firm value in a frictionless market. Whether a firm chooses to finance its working capital using debt or equity should be irrelevant in the firm's growth prospects. Assuming perfect markets, debt and equity finance are perfect substitutes. *Ceteris paribus*, a decrease in equity finance should not lead to decline in investment, since the firm will substitute it with debt finance. But in imperfect markets of credit rationing and demand for collateral by credit suppliers, this may not hold. In addition, equity and debt finance sometimes are interdependent. Retained earnings signal strength of the firm to obtain debt finance (Berger & Udell, 1998).

This thesis looked at the extent to which African firms are financially constrained and how they make their financing decisions. We looked at three related essays which are important in raising finances for new investment and working capital. The first essay looked at financial constraints and growth. A closer look at the extent of financial constraints among African firms together with its impact on firm performance, helps us understand how severe finance as an obstacle is, across different African countries and how this affects growth of firms.

The second essay looks at the choice between formal and informal finance among firms, when financing their working capital and new investment. This essay used the relative distribution and recentered influence function methodologies to examine the extent to which firms choose formal financing relative to informal financing sources, analyze the factors that influence their choices, and whether there are specific factors unique to those using informal/formal financing sources. An analysis of the use of these two financing sources helps policy makers to understand which financing source to recommend for various kinds of firms.

The third essay looks at the use of equity versus debt in financing both new investment and working capital. The choice between debt and equity is one of the most important corporate financing decisions that a firm needs to take. African firms in particular face unique financial access challenges since most firms are not listed in the stock exchange. Those who rely on equity finance majorly use retained earnings and principal owner contributions, since they are not able to issue shares to the public. This essay therefore investigates the financing source between equity and debt that is more growth enhancing. This will be helpful and give more insight on which form of financing firms should aim at, if they are targeting faster and sustained growth.

The aim of this section is to highlight the key issues in the three essays in this thesis, explain the major findings in each essay, and give our policy recommendations based on the major findings and conclusions.

5.1 Financial constraints

Firms of all sizes are very instrumental in any economy since they stimulate economic growth through employment creation and generation of public revenue. Despite this fact, firms especially in Africa face a number of obstacles, among which financial constraints form one of the major obstacles. Financial constraints are frictions that hinder firms from financing desired investment projects (Lamont et al., 2001). They can be as a result of credit constraints, inability to issue equity, illiquidity of assets or dependence on bank loans (Lamont et al., 2001).

Financing as an obstacle is one of the major factors that hinder firm growth. This is because financially constrained firms may be forced to forgo positive net present value projects, thus reducing firm value in terms of investment. Most of the studies that have been previously done

on financial constraints have been mostly based on data from financial statements, which can pose data challenges when it comes to African firms. In addition, most of the available measures of financial constraints are applicable to traded firms which can easily issue equity and debt. Most African firms however are not listed in the stock exchange markets due to their illiquidity nature and the underdeveloped Stock Markets. It is therefore crucial to understand the extent to which African firms' growth is affected by financial constraints, considering that previous studies have concentrated in developed countries due to data availability.

Using the World Bank Enterprise Survey data set, we investigated the extent of financial constraints in 11 African countries (Kenya, Ethiopia, Ghana, Malawi, Namibia, Nigeria, the Democratic Republic of Congo, South Sudan, Burundi, Morocco and Senegal), and assessed the impact of these constraints on performance and growth. We found that more firms reported to be financially constrained than those that reported otherwise. This problem of financial constraints may be associated with information asymmetry, lack of collateral, inadequate credit history to ascertain credit worthiness by banks, and even high risk premiums. Financial constraints therefore continue to prevail despite various interventions made in Africa, by both national and international organizations.

We employed different matching techniques and found a significant and strong positive effect of firm financing on labor productivity and sales growth. The study also found that firm financing impacts on firm growth and labor productivity differently, depending on whether the firm is in the lower, middle or higher levels of labor productivity and sales growth distributions. Despite the fact that all firms benefit from financing, the effect was more significant and felt on the highly productive firms.

5.2 Financing choice decisions

All firms both in developed and developing countries have the same objective: to minimize the cost of capital given the available financing options (Glen & Pinto, 1994). When firms choose a financing source, they therefore have cost and riskiness in mind. They choose that which has minimal cost and maximizes investment and returns. Cost of capital may be different across countries due to the diversity of financial markets, tax laws and macroeconomic environment (Glen & Pinto, 1994). A firm makes a choice whether to borrow from formal or informal lenders;

debt or equity, and chooses a contract (whether formal/informal or debt/equityr) that maximizes its expected utility.

The theoretical literature portray informal lenders as recipients of the spillover demand from the formal sector (S. Boucher & Guirkinger, 2007). This explains the informal sector as a lender of last resort for firms that are quantity-rationed in the formal sector (Stiglitz & Weiss, 1981). The quantity rationing can be as a result of limited information by formal sectors which make them demand collateral to overcome moral hazard. Those firms that do not have collateral will be involuntarily excluded from formal credit and eventually turn to informal lenders, who will finance them on grounds of informational advantage which in this case substitutes for collateral (Stiglitz, 1990).

The informal sector can however be a sector of choice other than being viewed as a sector of last resort. This is because informal loans especially those from family, friends and relatives may be cheaper to borrowers. In addition, high transaction costs on formal loans like application fees results in some entrepreneurs preferring informal credit. Due to informational advantage by informal lenders, application procedures are easier and less costly. As a result the effective cost of informal loans is below the effective cost of formal loans, and thus making the informal loans a preference for some entrepreneurs, despite the high interest rates (Guirkinger, 2008).

African firms make unique financing decisions due to the unique challenges that they face. Using the World Bank Enterprise Survey dataset for 13 African countries, this study employed the Relative Distribution methods by Handcock and Morris (1998) and Recentered Influence Function techniques by Firpo et al. (2009), to investigate the form of financing most preferred by firms, the determinants of their financing choices and assess the financing sources that are more growth enhancing.

This study found formal financing sources to be more growth enhancing than informal financing, but the effect is different at different levels of sales and labor productivity distribution. Firm characteristics like size, age and firm ownership were found to be key determinants of financing source chosen by the firm. The study also found that most African firms rely on internal/retained earnings and informal sources like money from friends and family to finance their businesses.

Formal sources like non-bank financial institutions are not well utilized, maybe due to information asymmetry.

5.3 Corporate financing decisions in Africa

The choice between debt and equity is one of the most important corporate financing decisions that a firm needs to take. Debt financing is obtained from lenders like banks, other financial and non-financial institutions, credit from suppliers/trade credit, and private lenders. Equity sources include retained earnings, capital from owners, net worth, new/existing partners, bonds, common stock and share capital. Imperfections in the capital market create a wedge between debt and equity finance. This is due to asymmetry of information between firms and suppliers of credit. These information problems give rise to moral hazard and adverse selection in the debt markets (Carpenter & Petersen, 2002). Debt issue may also not be appropriate to firms with little collateral due to asset specificity.

According to the Pecking order theory, optimality of capital structure requires firms to choose a financing source that has the least average cost. This makes firms to rely on cheaper options and go to costly financing after exhausting cheaper ones. In this case firms will prefer retained earnings before going for debt and issuing new equity. This is as a result of informational differences between insiders and outsiders which brings about cost differences (Glen & Pinto, 1994). But due to changing times, and with more financial liberalization in emerging and developing markets, capital structure is subject to many changes. For instance debt has become accessible by small and medium size firms in most developing countries, unlike in the past when it used to be difficult. So firms have a wide range of instruments to choose from, including international financial markets, for foreign owned enterprises.

Africa is a unique case since most firms are not listed in the stock exchange. They therefore face unique financial access challenges, and those who rely on equity finance majorly use retained earnings and principal owner contributions, since they are not able to issue shares to the public. Using the World Bank Enterprise Survey dataset for 13 African countries (Morocco, Kenya, South Sudan, Ethiopia, Burundi, Cameroon, DRC Congo, Malawi, Namibia, Zimbabwe, Nigeria, Ghana and Senegal), this study employed the Recentered Influence Function techniques by Firpo et al.

(2009), to evaluate whether there exists a growth differential among firms that source their working capital and investment through debt finance relative to those using equity financing sources, and investigate which financing source is more growth enhancing.

The study found that most African firms rely on equity financing to finance their working capital, but use debt financing on their new investment decisions. The study also found that the use of debt to finance investment lowers firm performance and growth, while the use of debt in working capital raises firm growth and performance. This result was evident in all countries except Nigeria and Namibia whose results portrayed a decline in growth for firms using debt financing in both working capital and investment financing. The growth differential was however different at different levels of labor productivity and sales growth outcome distributions.

5.4 Policy Recommendations

As a result of the findings from this study on the three essays, the following policy advice emanates:

Most financing sources that are more growth enhancing like non-bank financial institutions are not well utilized by most African firms. This is majorly due to information asymmetry. Most entrepreneurs do not have information about the existence of these institutions. So there is need to fill this information gap. Entrepreneurs need to be sensitized on the available financing options that are at their disposal, so that they can make informed decisions.

Since formal financing has been found by this study to be superior to informal finance, it will be prudent if policy makers aim at creating a more conducive environment for firms to obtain these finances easily and conveniently. For instance, the issue of interest rates, delocalization of financial banks, civic education to disseminate information, among other policy decisions.

According to the findings of this study, equity financing if used to fund new investment; it is more likely to enhance firm growth and performance, than when debt is used to finance new investment. This implies that Africa needs to develop their stock markets for sustained firm growth to be realized. Policy makers should therefore design ways to create conducive environment that favor the growth of stock markets in developing countries. Further to this, entrepreneurs need to be given

information on the importance of using equity financing in capturing new investment opportunities.

This study found that financing sources affect firms differently depending on their level of outcome distribution. Policy makers should therefore design policies that are not blanket for all firms. Design policies that are specific to specific segments of firms. Each form of financing to be targeted to the right segment of firms to ensure growth in the economy is sustained.

Firms from specific countries experience specific financing challenges. That is why in this study the effect of financial constraints on firm growth is not uniform across all countries. Policy makers should therefore design policies taking into consideration these country specific challenges. Some countries need specific policy interventions to unlock the financing potential in them.

5.5 Further Research Areas

The literature in firm financing is vast. However much still needs to be done especially in areas with data challenges like in Africa. Most research in this area has been concentrating on micro data. So much is required to provide more evidence using firm level survey data. We highlight the following areas for further research:

The study was limited to cross sectional data which implies that we could not take care of the effect of unobservable factors and other growth dynamics of firms changing from using one form of financing into another form of financing over time.. We therefore recommend the use of experimental or panel data in future studies in order to better infer a causal link between finance and growth.

There is need to test whether the capital structure theories hold in the context of African firms. Firm level micro data can be used to test these theories since most of the theories are based on macro data and case studies from developed countries. There is need to test these theories in Africa using survey data.

With the current upsurge of new and improved technology, there is need to assess its impact on firm financing and growth. For instance the emergency of internet banking, mobile money, digital cash among others, how do these emerging digitalization improve firm performance in Africa?

More so how does it affect the uptake of credit by entrepreneurs both from banks and other non-bank financial institutions?

Bibliography

Aga, F., Francis, D. C., & Meza, J. R. (2015). SMEs , Age , and Jobs A Review of the Literature , Metrics , and Evidence. *World Bank Group*, (November).

Al-matari, E. M., Al-Swidi, A. K., & Bt Fadzil, F. H. (2014). The Measurements of Firm Performance ' s Dimensions. *Asian Journal of Finance and Accounting*, *6*(1).

Alejo, J., Gabrielli, F. M., & Sosa-Escudero, W. (2014). THE DISTRIBUTIVE EFFECTS OF EDUCATION : AN UNCONDITIONAL QUANTILE REGRESSION APPROACH. *Revista De Analisis Economico*, *29*(Abril), 53–76.

Allen, F., Carletti, E., Cull, R., Qian, J., & Senbet, L. (2010). *The African Financial Development Gap*. *European University Institute Working paper* (Vol. ECO2010/24).

Allen, F., Carletti, E., Cull, R., Qian, J., Senbet, L., & Valenzuela, P. (2012). EUI Working Papers. *EUI Working Papers*.

Allen, F., Chakrabarti, R., De, S., & Qian, Q. J. (2012). Financing firms in India. *Journal of Financial Intermediation*, *21*(3), 409–445.

Allen, F., Qian, J., & Qian, M. (2005). Law , finance , and economic growth in China. *Journal of Financial Economics*, *77*(1), 57–116.

Almeida, H., Campello, M., & Weisbach, M. S. (2004). The Cash Flow Sensitivity of Cash. *The Journal of Finance*, *59*(4), 1777–1804.

Amissah, E., & Gyeke-Dako, A. (2016). Formal and informal finance; Firm growth in Ghana. *International Growth Centre*, (September).

Angelini, P, Salvo, R. Di, & Ferri, G. (1998). Availability and cost of credit for small businesses : Customer relationships and credit cooperatives. *Journal of Banking and Finance*, *22*, 925–954.

Angelini, Paolo, & Generale, A. (2005). Firm size distribution : do financial constraints explain it all? Evidence from Survey data. *Bank of Italy, Economic Research Department*, (549).

Arellano, C., Bai, Y., & Zhand, J. (2007). Contract Enforcement and Firms ' Financing Contract Enforcement and Firms ' Financing. *Research Seminar in International Economics: Discussion Paper*, (573).

Arena, M. P. (2011). The Corporate Choice Between public Debt, bank loans,traditional private debt placements , and 144A debt issues. *Review of Quantitative Accounts*, *36*, 391–416.

Aterido, R., Beck, T., & Iacovone, L. (2013). Access to Finance in Sub-Saharan Africa: Is There a Gender Gap? *World Development*, *47*(July), 102–120.

Atieno, R. (2001). Formal and informal institutions ' lending policies and access to credit by small-scale enterprises in Kenya : An empirical assessment. *AERC Research Paper*, (111).

Audretsch, D. B., & Elston, J. A. (2002). Does firm size matter ? Evidence on the impact of liquidity constraints on firm investment behavior in Germany. *International Journal of Industrial Organization*, *20*, 1–17.

Ayyagari, M., Beck, T., & Demirguc-Kunt, A. (2007). Small and medium enterprises across the globe. *Small Business Economics*, *29*(4), 415–434.

Ayyagari, M., Demirguc-Kunt, A., & Maksimovic, V. (2011). Small vs. young firms across the world: contribution to employment, job creation, and growth. *Policy Research Working Paper Series*, (5631).

Ayyagari, M., Demirgüç-kunt, A., & Maksimovic, V. (2011). Firm Innovation in Emerging Markets : The Role of Finance , Governance , and Competition. *The Journal of Financial and Quantitative Analysis*, *46*(6), 1545–1580.

Ayyagari, M., Demirgüç-Kunt, A., & Maksimovic, V. (2008). How important are financing constraints? The role of finance in the business environment. *World Bank Economic Review*, *22*(3), 483–516.

Ayyagari, M., Demirgüç-Kunt, A., & Maksimovic, V. (2010). Formal versus informal finance: Evidence from China. *Review of Financial Studies*, *23*(8), 3048–3097.

Bannerjee, A. V, & Duflo, E. (2004). Do firms want to borrow more? Testing credit constraints using a Directed lending program. *BREAD Working Paper*, (005).

Basu, P., & Guariglia, A. (2002). Liquidity Constraints and Firms ' Investment Return Behaviour. *Economica*, *69*(276), 563–581.

Baum, C. F., Schäfer, D., & Talavera, O. (2009). The Impact of Financial Structure on Firms' Financial Constraints: A Cross-Country Analysis. *DIW Berlin*.

Beck, T., Demirgu, A., & Honohan, P. (2009). Access to Financial Services : Measurement , Impact , and Policies. *Oxford University Press*, 119–145.

Beck, T., & Demirguc-kunt, A. (2006). Small and medium-size enterprises : Access to finance as a growth constraint. *Journal of Banking and Finance*, *30*, 2931–2943.

Beck, T., & Demirguc-Kunt, A. (2006). The determinants of financing obstacles. *Journal of International Money and Finance*, *25*, 932–952.

Beck, T., Demirguc-kunt, A., Laeven, L., & Levine, R. (2008). Finance , Firm Size , and Growth. *Journal of Money*, *40*(7), 1379–1405.

Beck, T., Demirguc-Kunt, A., & Maksimovic, V. (2005). Financial and Legal Constraints to Growth: Does Firm Size Matter? *The Journal of Finance*, *45*(2), 643–654.

Beck, T., Demirguc-Kunt, A., & Maksimovic, V. (2008). Financing patterns around the world : Are small firms different ? *Journal of Financial Economics*, *88*(1), 467–487.

Beck, T., Demirgüç-kunt, A., & Maksimovic, V. (2006). The Influence of Financial and Legal Institutions on Firm Size. *World Bank Group*.

Beck, T., Demirgüç-Kunt, A., & Maksimovic, V. (2008). Financing patterns around the world: Are small firms different? *Journal of Financial Economics*, *89*(3), 467–487.

Berger, A. N., & Udell, G. F. (1995). Relationship Lending and Lines of Credit in Small Firm Finance. *The Journal of Business*, *68*(3), 351–381.

Berger, A. N., & Udell, G. F. (1998). The economics of small business finance: The roles of private equity and debt markets in the financial growth cycle. *Journal of Banking & Finance*, *22*(6–8), 613–673.

Blalock, G., Gertler, P. J., & Levine, D. I. (2008). Financial constraints on investment in an emerging market crisis. *Journal of Monetary Economics*, *55*, 568–591.

Bolton, P., & Freixas, X. (2000). Equity , Bonds , and Bank Debt : Capital Structure and Financial Market Equilibrium under Asymmetric Information. *Journal of Political Economy*, *108*(2), 324–351.

Bond, S., Elston, J. A., Mairesse, J., & Mulkay, B. (2003). Financial Factors and Investment in Belgium , France , Germany , and the United Kingdom : A Comparison Using Company Panel Data. *The Review of Economics and Statistics*, *85*(1), 153–165.

Boucher, S., & Guirkinger, C. (2007). Risk, wealth, and sectoral choice in rural credit markets. *American Journal of Agricultural Economics*, *89*(4), 991–1004.

Boucher, S. R., Guirkinger, C., & Trivelli, C. (2009). Direct Elicitation of Credit Constraints : Conceptual and Practical Issues with an Application to Peruvian Agriculture. *Economic Development and Cultural Change*, *57*(4), 609–640.

Brown, J. D., & Earle, J. S. (2015). Finance and Growth at the Firm Level : Evidence from SBA Loans. *IZA Discussion Paper*, (9267).

Buehlmaier, M. M. M. (2014). Debt , equity , and information. *Journal of Mathematical Economics*, *50*, 54–62.

Bulan, L., & Yan, Z. (2009). The Pecking Order Theory and the Firm's Life Cycle. *Banking and Finance Letters*, *1*(3), 129–140.

Calderón, C., & Liu, L. (2003). The direction of causality between financial development and economic growth. *Journal of Development Economics*, *72*(1), 321–334.

Carbo-Valverde, S., Rodriguez-Fernandez, F., & Udell, G. F. (2012). Trade credit, the financial crisis, and firm access to finance. *Central Bank of Ireland …*, *693*, 1–40.

Carpenter, R. E., & Petersen, B. C. (2002). Is the Growth of Small Firms Constrained by Internal Finance? *Review of Economics and Statistics*, *84*(2), 298–309.

Casey, E., & O'Toole, C. M. (2014). Bank lending constraints, trade credit and alternative financing during the financial crisis: Evidence from European SMEs. *Journal of Corporate Finance*, *27*, 173–193.

Cattaneo, M. D. (2010). Efficient semiparametric estimation of multi-valued treatment effects. *Journal of Econometrics*, *155*(2), 138–154.

Chandavarkar, A. (1992). Of finance and development: Neglected and unsettled questions. *World Development*, *20*(1), 133–142.

Chavis, L., Klapper, L., & Love, I. (2010). International Differences In Entrepreneurial Finance. *Enterprise Note Series*, (11).

Chavis, L. W., Klapper, L. F., & Love, I. (2011). The impact of the business environment on young firm

financing. *World Bank Economic Review*, *25*(3), 486–507.

Chi, W., & Li, B. (2007). Glass Ceiling or Sticky Floor? Examining the Gender Pay Gap across the Wage Distribution in Urban China, 1987-2004. *Munich Personal RePEc Archive MPRA*, (11543), 1987–2004.

Christensen, G. (1993). The limits to informal financial intermediation. *World Development*, *21*(5), 721–731.

Cleary, S. (1999). The Relationship between Firm Investment and Financial Status. *The Journal of Finance*, *54*(2), 673–692.

Coad, A. (2007). Neoclassical vs Evolutionary Theories of Financial Constraints : Critique and Prospectus. *Documents de Travail Du Centre d'Economie de La Sorbonne*, *1955-611X*(February), 106–112.

Cordes, J. J. ., & Sheffrin, S. M. . (1981). The Tax Advantage of Debt Finance. *National Tax Association*, *74*(1981), 44–49.

Degryse, H., Lu, L., & Ongena, S. (2016a). Informal or formal financing ? Evidence on the co-funding of Chinese firms. *Journal of Financial Intermediation*, *0*, 1–20.

Degryse, H., Lu, L., & Ongena, S. (2016b). Informal or formal financing? Evidence on the co-funding of Chinese firms. *Journal of Financial Intermediation*, *27*, 31–50.

Demİrgüç-kunt, A., & Klapper, L. (2013). Measuring Financial Inclusion : Explaining Variation in Use of Financial Services across and within Countries. *Brookings Papers of Economic Activity*, (Spring 2013), 279–321.

Demirguc-Kunt, A., & Maksimovic, V. (1998). Law , Finance , and Firm Growth. *The Journal of Finance*, *53*(6), 2107–2137.

Demirgüç-Kunt, A., & Maksimovic, V. (1998). Law , Finance , and Firm Growth. *The Journal of Finance*, *53*(6), 2107–2137.

Demirgüç-Kunt, A., & Maksimovic, V. (1999). Institutions, financial markets, and firm debt maturity. *Journal of Financial Economics*, *54*(3), 295–336.

Denis, D. J., & Mihov, V. T. (2003). The choice among bank debt , non-bank private debt , and public debt : evidence from new corporate borrowings. *Journal of Financial Economics*, *70*, 3–28.

Diamond, D. W. (1991). Monitoring and Reputation : The Choice between Bank Loans and Directly Placed Debt. *Journal of Political Economy*, *99*(4), 689–721.

Donati, C., & Sarno, D. (2014). Are firms in " backward " areas of developed regions more financially constrained ? The case of Italian SMEs. *Industrial and Corporate Change*, 1–23.

Easterwood, J. C., & Kadapakkam, P. (1991). The Role of Private and Public Debt in Corporate Capital Structures. *Financial Management*, *20*(3), 49–57.

Essama-Nssah, B., & Lambert, P. J. (2011a). Influence functions for distributional statistics. *Society for the Study of Economic Inequality*, (236).

Essama-Nssah, B., & Lambert, P. J. (2011b). Influence functions for distributional statistics, (2011 ◆ 236).

Fabbri, D. (2010). Law Enforcement and Firm Financing: Theory and Evidence. *Journal of the European Economic Association*, *8*(4), 776–816.

Fan, J. P. H., Titman, S., & Twite, G. (2010). An International Comparison of Capital Structure and Debt Maturity Choices. *NBER Working Paper Series*, (16445).

Fan, J. P. H., Titman, S., & Twite, G. (2012). An International Comparison of Capital Structure and Debt Maturity Choices. *Journal of Financial and Quantitative Analysis*, *47*(1), 23–56.

Farre-mensa, J., & Ljuungqvist, A. (2015). Do Measures of Financial Constraints Measure Financial Constraints ? *Oxford University Press*, (1997).

Fazzari, S. M., Hubbard, R. G., Petersen, B. C., Blinder, A. S., & Poterba, J. M. (1988). Financing Constraints and Corporate Investment. *Brookings Papers of Economic Activity*, *1988*(1), 141–206.

Firpo, S., Fortin, N. M., & Lemeiux, T. (2011). Occupational Tasks and Changes in the Wage Structure. *IZA Discussion Papers*.

Firpo, S., Fortin, N. M., & Lemieux, T. (2007). Unconditional quantile regressions. *Econometrica*, *77*(3), 953–973.

Firpo, S., Fortin, N. M., & Lemieux, T. (2009). Unconditional Quantile Regressions. *Econometrica*, *77*(3), 953–973.

Ghate, P. B. (1992). Interaction Between the Formal and Informal Financial Sectors : The Asian Experience. *World Development*, *20*(6), 859–872.

Ghosh, S. (2007). Bank Debt Use and Firm Size : Indian Evidence. *Small Business Economics*, *29*(1), 15–23.

Gilson, S. C., & Warner, J. B. (1997). Junk Bonds, Bank Dept, and Financing Corporate Growth. *Harvard Business School*.

Glen, J., & Pinto, B. (1994). Debt or equity?: How firms in developing countries choose. *International Finance Corporation*, *22*.

Gregory, B. T., Rutherford, M. W., Oswald, S., & Gardiner, L. (2005). An empirical investigation of the growth cycle theory of small firm financing. *Journal of Small Business Management*, *43*(4), 382–392.

Guariglia, A. (2008). Internal financial constraints, external financial constraints, and investment choice: Evidence from a panel of UK firms. *Journal of Banking and Finance*, *32*(9), 1795–1809.

Guirkinger, C. (2008). Understanding the Coexistence of Formal and Informal Credit Markets in Piura , Peru. *World Development*, *36*(8), 1436–1452.

Gwatidzo, T., & Ojah, K. (2013). Firms' debt choice in Africa: Are institutional infrastructure and non-traditional determinants important? *International Review of Financial Analysis*, *31*(January), 152–166.

Hadlock, C. J. (1998). Ownership , Liquidity , and Investment. *The RAND Journal of Economics*, *29*(3), 487–508.

Hadlock, C. J., & Pierce, J. R. (2010). New evidence on measuring financial constraints: Moving beyond the KZ index. *Review of Financial Studies*, *23*(5), 1909–1940.

Haltiwanger, J., Jarmin, R., & Miranda, J. (2013). Who Creates Jobs? Small Versus Large Versus Young. *The Review of Economics and Statistics*, *69*(4), 567–574.

Haltiwanger, J., Scarpetta, S., & Schweiger, H. (2014). Cross country differences in job reallocation: The role of industry, firm size and regulations. *Labour Economics*, *26*, 11–25.

Han, S., & Qiu, J. (2007). Corporate precautionary cash holdings. *Journal of Corporate Finance*, *13*, 43–57.

Handcock, M. S., & Morris, M. (1998). Relative Distribution Methods. *Sociological Methodology*, *28*, 53–97.

Hirano, K., Imbens, G. W., & Ridder, G. (2003). Efficient Estimation of Average Treatment Effects Using the Estimated Propensity Score. *Econometrica*, *71*(4), 1161–1189.

Hoberg, G., & Maksimovic, V. (2014). Redefining financial constraints: A text-based analysis. *The Society for Financial Studies*, *28*(5), 1312–1352.

Hooks, L. M. (2003). The impact of firm size on bank debt use. *Review of Financial Economics*, *12*(January 2002), 173–189.

Hoshi, T., Kashyap, A., & Scharfstein, D. (1993). The Choice between public and private debt. An analysis of Post-Deregulation Corporate Financing in Japan. *NBER Working Paper Series*, (4421).

Hovakimian, G. (2009). Determinants of Investment Cash Flow Sensitivity. *Financial Management Association International*, *38*(1), 161–183.

Huang, H., Shi, X., & Zhang, S. (2010). Counter-cyclical substitution between trade credit and bank credit. *Journal of Banking and Finance*, *35*(8), 1859–1878.

Huang, X., Zhang, Y., Liu, Y., & Hu, Z. (1997). Effect of small amount of nitrogen on carbide characteristics in unidirectional Ni-base superalloy. *Metallurgical and Materials Transactions A: Physical Metallurgy and Materials Science*, *28*(10), 2143–2147.

Israel, R. (1991). Capital Structure and the Market for Corporate Control : The Defensive Role of Debt Financing. *Journal of Finance*, *46*(4), 1391–1409.

Israel, R. (1992). Capital and Ownership Structures , and the Market for Corporate Control. *The Review of Financial Studies*, *5*(2), 181–198.

Jackson, S. B., Keune, T. M., & Salzsieder, L. (2013). Debt , equity , and capital investment. *Journal of Accounting and Economics*, *56*(2–3), 291–310.

Jain, S. (1999). Symbiosis vs . crowding-out : the interaction of formal and informal credit markets in developing countries. *Journal of Development Economics*, *59*, 419–444.

James, C., & Smith, D. C. (2000). Are Banks Still Special? New Evidence on Their Role in the Corporate

Capital-Raising Process. *Journal of Applied Corporate Finance*, *13*(1).

Jensen, M. C., & Meckling, W. (1976). Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure. *Journal of Financial Economics*, *3*, 305–360.

Johnson, S. A. (1997). An Empirical Analysis of the Determinants of Corporate Debt Ownership Structure. *The Journal of Financial and Quantitative Analysis*, *32*(1), 47–69.

Kadapakkam, P., Kumar, P. C., & Riddick, L. A. (1998). The impact of cash flows and firm size on investment : The international evidence. *Journal of Banking and Finance*, *22*.

Kaplan, S. N., & Zingales, L. (1997). Do Investment-Cash Flow Sensitivities Provide Useful Measures of Financing Constraints ? *The Quarterly Journal of Economics*, *112*(1), 169–215.

Kaplan, S. N., & Zingales, L. (2000). Investment Cash Flow Sensitivities are Not Valid Measures of Financing Constraints. *The Quarterly Journal of Economics*, *53*(May), 1689–1699.

Kar, M., Nazlioğlu, Ş., & Ağir, H. (2011). Financial development and economic growth nexus in the MENA countries: Bootstrap panel granger causality analysis. *Economic Modelling*, *28*(1–2), 685–693.

Keasey, K., & Watson, R. (1994). The Bank Financing of Small Firms in UK : Issues and Evidence Stable. *Small Business Economics*, *6*(5), 349–362.

Kensuke, T., & Molnar, M. (2008). What Is Different about Informal Finance ? Financing of Private Firms in China. *Revenue Economique*, *59*(6), 1131–1143.

King, R. G., & Levine, R. (1993a). Finance , entrepreneurship and growth : Theory and evidence. *Journal of Monetary Economics*, (January 1993).

King, R. G., & Levine, R. (1993b). Finance and Growth : Schumpeter Might be Right. *The Quarterly Journal of Economics*, *108*(3), 717–737.

Klapper, L., Laeven, L., & Rajan, R. (2006). Entry regulation as a barrier to entrepreneurship. *Journal of Financial Economics*, *82*(3), 591–629.

Klapper, L., & Singer, D. (2015). The role of informal financial services in Africa. *Journal of African Economies*, *24*(1), i12–i31.

Kuntchev, V., Ramalho, R., Rodriguez-Meza, J., & Yang, J. S. (2014). What have we learned from the Enterprise Surveys regarding access to finance by SMEs? *Enterprise Analysis Unit …*, (May), 1–33.

La porta, R., Lopez-de-Silanes, F., Andrei, S., & Vishny, R. W. (1998). Law and Finance. *Journal of Political Economy*, *106*(6), 1113–1155.

Lamont, O., Polk, C., & Saa-Requejo, J. (2001). Financial Constraints and Stock Returns. *The Review of Financial Studies*, *14*(2), 529–554.

Levine, R. (1997). Financial development and economic growth: views and agenda. *Journal of Economic Literature*, *XXXV*(June), 688–726.

Levine, Ross. (1997). Law, finance, and economic growth. *Journal of Financial Intermediation*, *35*, 8–35.

Levine, Ross. (2005). Finance and Growth: Theory and Evidence. *Handbook of Economic Growth*, *1*, 865–934.

Levine, Ross, & Davidson, W. (2002). Bank-Based or Market-Based Financial Systems : Which is Better ? *Working Paper Series*, (442).

Levine, Ross, Loayza, N., & Beck, T. (2000). Theory in DBA Financial intermediation and growth causality and causes. *Journal of Monetary Economics*, *46*, 31–77.

Levine, Ross, & Zervos, S. (1998). Stock Markets , Banks , and Economic Growth. *The American Economic Review*, *88*(3), 537–558.

Lewis, C. M., & Tan, Y. (2016). Debt-equity choices , R & D investment and market timing R. *Journal of Financial Economics*, *119*(3), 599–610.

Li, J. Y., & Mauer, D. C. (2016). Financing uncertain growth. *Journal of Corporate Finance*, *41*, 241–261.

Lin, Y.-C. (2007). The cash flow sensitivity of cash: evidence from Taiwan. *Applied Financial Economics*, *17*(12), 1013–1024.

Linton, K. C. (2006). Access to Capital in China : Competitive Conditions for Foreign and Domestic Firms. *Journal of International Commerce and Economics*, 1–23.

Love, I. (2003). Financial Development and Financing Constraints: International Evidence from the Structural Investment Model. *Review of Financial Studies*, *16*(3), 765–791.

Lucas, R. E. (1988). On the mechanics of economic development. *Journal of Monetary Economics*, *22*(February), 3–42.

Luo, Q., Li, H., & Zhang, B. (2015). Financing constraints and the cost of equity : Evidence on the moral hazard of the controlling shareholder. *International Review of Economics and Finance*, *36*, 99–106.

Majid, M. S. A., & Mahrizal. (2007). Does Financial Development Cause Economic Growth in the Asean-4 Countries? *Savings and Development*, *31*(4), 369–398.

Mateut, S., Bougheas, S., & Mizen, P. (2006). Trade credit , bank lending and monetary policy transmission. *European Economic Review*, *50*, 603–629.

Modigliani, F., & Miller, M. H. (1958). The Cost of Capital, Corporation Finance and the Theory of Investment. *The American Economic Review*, *48*(3), 261–297.

Moore, W., Craigwell, R., & Maxwell, C. (2005). Financing Preferences and Firm Growth. *Savings and Development*, *29*(1), 5–20.

Moshoeshoe, R. (2016). Educational Achievement and Educational Inequality in Lesotho : Changes and Determinants. *UCT*.

Mundt, P., Alfarano, S., & Milakovic, M. (2015). Gibrat ' s Law Redux : think profitability instead of growth. *Industrial and Corporate Change*, 1–23.

Myers, S. C. (1977). Determinants of corporate borrowing. *Journal of Financial Economics*, *5*(2), 147–175.

Namarayan, M. . (1988). Debt Versus Equity under Asymmetric Information. *Journal of Financial and Quantitative Analysis*, *23*(1), 39–51.

Ndoye, A. A. J. (2015). Unconditional quantile regression-based decomposition method : evidence from rural-urban inequality in Senegal. *University of Orleans, France*, 1–28.

Oliveira, B., & Fortunato, A. (2006). Firm growth and liquidity constraints: A dynamic analysis. *Small Business Economics*, *27*(2–3), 139–156.

Pál, R., & Ferrando, A. (2005). Financial Constraints and Firm ' s Cash Policy in the Euro Area. *The European Journal of Finance*, *16*(2), 139–156.

Patrick, H. T. (1966). Financial Development and Economic Growth in Underdeveloped Countries. *Economic Development and Cultural Change*, *14*(2), 174–189.

Penrose, E. (1956). *The Theory of The Growth of the Firm*. *Oxford University Press* (Fourth Edi, Vol. 1).

Petersen, M. A., & Rajan, R. G. (1993). The Benefits of Firm-Creditor Relationships : Evidence from small business data .

Petersen, M. A., & Rajan, R. G. (1997). Trade Credit : Theories and Evidence. *The Review of Financial Studies*, *10*(3), 661–691.

Quartey, P., Turkson, E., Abor, J. Y., & Iddrisu, A. M. (2017). Financing the growth of SMEs in Africa: What are the contraints to SME financing within ECOWAS? *Review of Development Finance*, *7*(1), 18–28.

Rajan, R. G. (1992). Insiders and Outsiders : The Choice between Informed and Arm's Length Debt. *The Journal of Finance*, *47*(4), 1367–1400.

Rajan, R. G., & Zingales, L. (1995). What Do We Know about Capital Structure ? Some Evidence from International Data. *The Journal of Finance*, *50*(5), 1421–1460.

Rajan, R. G., & Zingales, L. (1998). Financial Dependence and Growth. *Journal of American Economic Review*, *88*(3), 559–586.

Rien, W. (2003). Are Finance Constraints Hindering the Growth of SMEs in Europe? *European Investment Bank (EIB), Luxembourg*, *8*(2), 23–50.

Rosenbaum, P. R. (2005). Observational study. *Encyclopedia of Statistics in Behavioral Science*, *3*, 1451–1462.

Rosenbaum, P. R., & Rubin, D. B. (1984). Reducing Bias in Observational Studies Using Subclassification on the Propensity Score. *Journal of the American Statistical Association*, *79*(387), 516–524.

Ruiz-vargas, Y. (2000). Small business financing sources between immigrants and natives in Puerto Rico. *The Quarterly Review of Economics and Finance*, *40*, 387–399.

Safavian, M., & Wimpey, J. (2007). When Do Enterprises Prefer Informal Credit? *Policy Research Working Papers*, (4435), 34.

Shirasu, Y., & Xu, P. (2007). The choice of financing with public debt versus private debt : New evidence

from Japan after critical binding regulations were removed. *Japan and the World Economy*, *19*, 393–424.

Silva, F., & Carreira, C. (2009). No Deep Pockets: Some stylized results on firms' financial constraints. *GEMF, University of Coimbra*.

Silva, F., & Carreira, C. (2012). Measuring firms ' financial constraints : A rough guide. *GEMF, University of Coimbra*, (14).

Singh, A., & Weisse, B. A. (1998). Emerging Stock Markets , Portfolio Capital Flows and Economic Growth : Micro and Perspectives Macroeconomic Perspectives. *World Development*, 607–622.

Stern, N. (1989). The Economics of Development. *The Economic Journal*, *6*(2), 312–334.

Stiglitz, J. E. (1993). The role of the state in financial markets. *World Bank Research Observer, Annual Conference on Development Economics Supplement*, 19–61.

Stiglitz, J. E. . (1990). Peer Monitoring and Credit Markets. *The World Bank Economic Review*, *4*(3), 351–366.

Stiglitz, J. E., & Weiss, A. (1980). Credit Rationing in Markets with Imperfect Information, Part II: Constraints as Incentive Devices. *Research Memorandum*.

Stiglitz, J. E., & Weiss, A. (1981). Credit Rationing in Markets with Imperfect Information. *The American Economic Review*, *71*(3), 393–410.

Subramanian, V., & Umakrishnan, K. U. (2004). Is Bank Debt Special ? An Empirical Analysis of Indian Corporates. *Economic and Political Weekly*, *39*(12), 1247–1252.

Tang, S. (1995). Informal Credit Markets and Economic Development in Taiwan. *World Development*, *23*(5), 845–855.

Tirole, J. (2006). The theory of corporate finance. *The Theory of Corporate Finance*, *8*, 657.

Ullah, B. (2019). Firm innovation in transition economies: The role of formal versus informal finance. *Journal of Multinational Financial Management*, *50*, 58–75.

UNCTAD. (2014). *Economic Development in Africa - Catalysing Investment for Transformative Growth in Africa*.

Wang, C., Chen, Y., & Yu, C. (2013). Managerial optimism and post-financing stock performance in Taiwan : A comparison of debt and equity financing. *Economics Letters*, *119*(3), 332–335.

Whited, T. M., & Wu, G. (2006). Financial Constraints Risk. *The Review of Financial Studies*, *19*(2), 531–559.

Winker, P. (1999). Causes and Effects of Financing Constraints at the Firm Level. *Small Business Economics*, *12*(2), 169–181.

World, B. (2014). Obtaining Finance in Latin America and the Caribbean. *World Bank Group*, (5), 1–6.

World, B. (2017). Financial sector development in Africa – an overview. *Review of Development Finance*, *7*, 1–5.

Yang, X. (2011). Trade credit versus bank credit : Evidence from corporate inventory financing. *Quarterly Review of Economics and Finance*, *51*(4), 419–434.

Zeller, M. (1994). Determinants of Credit Rationing : A Study of Informal Lenders and Formal Credit Groups in Madagascar. *World Development*, *22*(12), 1895–1907.

Zhang, G. (2008). The choice of formal or informal finance : Evidence from Chengdu , China. *China Economic Review*, *19*(4), 659–678.