CREDIT ACCESS AND FIRM EMPLOYMENT GROWTH: AN ENDOGENOUS TREATMENT EFFECT ANALYSIS OF CONSTRAINED AND UNCONSTRAINED ENTERPRISES IN LIBERIA

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X50/8425/2017

A RESEARCH PAPER SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF MASTER OF ARTS IN ECONOMICS OF THE UNIVERSITY OF NAIROBI

AUGUST 2019

DECLARATION

I confirm that this research paper was solely undertaken by myself and that it has never been presented to any other institution or examination body for the award of a degree.

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APPROVAL

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ACKNOWLEDGEMENTS

I am thankful to God for guidance, especially during the time of my studies. To my parents, Mr Worpoe W. Mahn and Mrs Angeline Ivy-Mahn, I am grateful for your unconditional moral and financial support from my childhood up to now. You have always believed and encouraged me in my academic, professional and personal development, and I admit that life would not have been the same without you.

The successful completion and outcome of this research project relied hugely on the regular supervision and assistance from numerous individuals, and I am incredibly fortunate to have gotten the chance to work with all of you. To Professor Anthony Wambugu, Director of the School of Economics, Dr Michael Ndwiga, my research supervisor and Dr Owen Nyangoro, I want to express my most profound admiration and gratitude to you for your patient guidance, encouragement and useful critiques. Also, to Dr Edna G. Johnny of the University of Liberia, I am grateful for your support throughout this program.

To the African Economic Research Consortium (AERC) who financed my studies, I would like to acknowledge you. To Dr Tom Kimani, Mrs Elizabeth Mboi, Dr Innocent Matshe, and the rest of the AERC family, I remain forever indebted to you for believing in me and for your consistent efforts towards the advancement of this continent. My deepest gratitude also to the Lux in Tenebris Scholar Program (LITSP) of the University of Liberia, Associate Professor Mamawa Moore-Freeman, Mrs Kula Thompson-William and the rest of the LITSP family for believing in me and for planting in me the seeds of excellence, good character, and service. My deep and sincere appreciations also go to the technicians and staff of the School of Economics and the graduate library for their regular support and constant willingness to assist me regardless of the situation.

DEDICATION

This project is dedicated to my mother Angeline, who has always encouraged and supported me in all my endeavours.

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ABBREVIATIONS

ATE	Average Treatment Effect
ATET	Average Treatment Effect on the Treated
CBL	Central Bank of Liberia
ES	Enterprise Survey
ETM/R	Endogenous Treatment Model/ Regression
FIML	Full Information Maximum Likelihood
GOL	Government of Liberia
IMF	International Monetary Fund
LD	Liberian Dollar
LES	Liberia Enterprise Survey
MFDP	Ministry Of Finance and Development Planning
MFI	Micro-Finance Institution
MSME	Micro, Small and Medium-Sized Enterprises
RBP	Resource-Based Perspective
RCFI	Rural Community Financial Institutions
SME	Small and Medium Enterprises
SSA	Sub-Saharan Africa
WB	World Bank
WBDBR	World Bank Doing Business Report
WBES	World Bank Enterprise Survey

ABSTRACT

Access to credit has long been recognised as a major hindrance to the performance and survival of small enterprises, mainly in developing countries. Nevertheless, country-specific evidence on the difference between the performance of firms that are considered credit-constrained and unconstrained remain narrow. In this light, the current study provides empirical evidence using an endogenous treatment effect analysis to first investigate the determinants of firms credit access status (i.e. constrained or unconstrained) and how it affects firms employment growth in Liberia. The study used unique enterprise-level data from the 2017 edition of the World Bank Enterprise Survey, covering 151 firms in the non-agricultural private economy of Liberia. Findings suggest that being constrained to accessing credit negatively affects firm employment growth, leading to reduced annual employment growth rates for constrained firms. It was also revealed that indicators of credit market participation and firm financial history were negatively correlated with being credit constrained. The study recommends that improvements in the availability of information between firms and financial institutions are crucial to reducing credit constraints. By promoting small businesses participation in the credit market and reducing prevailing information asymmetries whether by creating formal business associations or startup incubator programs, firms can improve their credit-worthiness and fully exploit their full employment potential.

Keywords: *annual employment growth, constrained credit access, endogeneity, Liberia, endogenous treatment effect, enterprise survey, small and medium enterprises*

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

On average, small and medium-sized enterprises (SMEs) represent roughly 90 percent of domestic enterprises in sub-Saharan Africa and accounts for about 60 percent of employment in most African economies (Ahiawodzi & Adade, 2012; Muriithi, 2017; World Bank, 2017). These statistics reinforce the growing attention on this subject, primarily focusing on the crucial roles SMEs play in the development process, whether through job creation or their contribution to household income, etcetera. (World Bank, 2017; Asiedu et al., 2013; Fowowe, 2017). Although these rather small enterprises are being recognised globally as significant players in the economy, SMEs, particularly those in low-income countries, still face numerous challenges to their performance and survival (Haider, 2018). High on this list of constraints is access to finance or credit[1], which arises mainly because of information asymmetries that exist in the credit market (Asiedu et al., 2013; Stiglitz & Weiss, 1981). As a result, small firms are perceived as high-risk borrowers, coupled with their inability to meet certain lending conditions and banking practices (Alhassan & Sakara, 2014). However, it is evident that when firms are credit constrained, their performance is adversely affected, thus limiting their overall contribution to society (Malhotra et al., 2007).

In Liberia, SMEs operate in a complex and challenging business environment, dampening the pace of growth. Suboptimal SME performance ultimately impacts overall economic performance and poverty reduction efforts, as formal and informal SMEs account for a significant share of Liberia's economic activities (GoL, 2013; World Bank, 2018; Building Markets, 2016). This reality partly

[1] Access to financial capital or credit in this context refers to external financing obtained through debt from formal institutions.

stems from the fact that Liberia has experienced prolonged spells of political and economic instabilities since independence (Gorlorwulu, 2011; World Bank, 2017). The local economy relies heavily on imports, importing more than twice of what it exports (GoL, 2013; Building Market, 2016; Gorlorwulu, 2011). The domestic business environment lacks most of the necessary institutional and infrastructural requirements needed to propel growth in the private sector which presents a considerable challenge to Liberia's development efforts (Building Market, 2016; Gorlorwulu, 2011).

Access to credit, especially for firms within the SME category in Liberia is shallow, and this impedes the performance of these firms and hence their potential contributions to the economy. (World Bank, 2017; Gorlorwulu, 2011; GoL, 2013). In the absence of a well-developed SME sector, achieving economic growth remains a challenge, rendering socio-economic paradigm shifts unattainable and poverty reduction efforts impossible (Sanders, 2016). Seeing that when compared to larger firms, SMEs are exposed to more constraints when it comes to accessing credit, it is crucial that adequate empirical investigations be made to identify the root cause of such obstacles (Schiffer & Weder, 2001; Beck et al., 2002). Nevertheless, country-specific evidence on the differences between the employment growth of constrained and unconstrained firms remains limited. This paper evaluates the nexus between constrained credit access and the employment growth of SMEs in Liberia following the works of Dinh et al. (2012), Delmar, Wiklund & Davidsson (2006) and Fowowe (2017).

1.1.1 SMEs Performance in Liberia

In Liberia, a firm employing between 5 to 50 employees falls within the Small and Medium-Size Enterprises[2] category abbreviated as SME (Building Market, 2016; GoL, 2011). SMEs constitute a massive 89% of domestic enterprises, and 93% are Liberian owned (Building Markets, 2016). Montserrado County where the capital city is located currently hosts over 72% of formal domestic enterprises in Liberia thus accommodating approximately four out of every five registered SMEs (Bruins, 2013; Building Markets, 2016). Annual turnover is quite low, with over 80% of firms reporting less than 20,000 USD[3] per annum (Building Market, 2016). The domestic business climate ranks poorly in overall ease of doing business[4], at 174 out of 190 places to do business, and ranks 43.51 in ease of starting a business which is a decline in rank from previous Doing Business Reports (Bikel, 2017; World Bank, 2018). Applying for and getting credit for business-related purposes stands among some of the main constraints facing SMEs in Liberia with less than one-third of domestic firms being qualified to take a loan and over 80% agreeing to take a loan provided the opportunity (Building Market, 2016; World Bank, 2017).

With assistance from development partners, the Liberian government have initiated several business environment reforms aimed at improving SMEs performance (Building Markets, 2016). With initiatives like the Liberian Enterprise Development Finance Corporation (LEDFC), the Commercial Court of Liberia, the Revised Commercial Code, the Automated Collateral Registry (LCR), the National MSME Policy, etc. the government aims at supporting domestic enterprises through the provision of credit, educational, technical assistance and development of the legal and

[2] MSMEs and SMEs are used interchangeably within this study. World Bank Enterprise Survey dataset does not contain information on Micro enterprises (0-4 employees), hence, our analysis does not include them.
[3] United States Dollars
[4] The Doing Business Report by the World Bank regularly investigates and provide conducive measures of the regulatory environment of local firms for over 190 economies globally (World Bank, 2018).

regulatory framework of the domestic business environment (Gorlorwulu, 2011; GoL, 2013). Despite all actions taken to enhance SMEs performance, firms are still performing poorly according to recent reports (World Bank, 2018).

Most of the initiatives mentioned above either failed or is struggling to address the case of SMEs and a concrete solution for resolving micro-finance and access to finance-related issues is yet to be found (Building Market, 2016; Gorlorwulu, 2011). The infrastructure gap also constrains the countrywide implementation of such programs making these constraints a daily challenge for businesses operating in many rural communities across the country (GoL, 2013). This explains why the bulk of SMEs are in and around Montserrado county, where physical infrastructure is much better as compared to other parts of the country (Building Markets, 2016). As acknowledged within the National SME development framework[5] of 2011, micro-enterprises constitute an essential source of income for low-income households (GoL, 2013). With successful and growing small businesses, many low-income households can afford better health services, housing and education for their families (Building Market, 2016). However, due to the poor performance of SMEs; not only are these prospects blurred, but also economic advancement and innovativeness are constrained (Sanders, 2016).

1.1.2 Credit Market in Liberia

A few numbers of undercapitalised formal financial institutions characterise the credit market in Liberia, consisting of about sixteen registered microfinance providers and twelve Rural Community Financial Institutions[6] (GoL, 2009). The Central Bank's Micro-Finance and Financial

[5] The National MSME Development Framework of Liberia developed in 2011 is the chief policy document that promotes and governs all MSMES in the country, with the aim to reduce poverty through unconstrained finance access and reduced income inequality (GoL, 2013).

[6] Rural Community Financial Institutions (RCFI) were created by the Central Bank of Liberia to support the governments' financial inclusion plans for the people of Liberia.

Inclusion unit is the chief entity responsible for the promotion and regulation of financial inclusion policies in the country. The National Strategy for Financial Inclusion (2009-2013) provides the appropriate framework which governs all efforts in this area to deliver financial services and enhance access to finance for all Liberians. As indicated within the national framework for financial inclusion, when policies are adequately informed and implemented, they should contribute significantly to poverty reduction (GoL, 2009).

The provision of microfinance in Liberia is the sole responsibility of the commercial banks, domestic credit unions and credit-only institutions. There are also a host of recognised informal village savings and loan associations such as Susu clubs and money lenders that operate mainly in rural communities. These informal institutions in the credit market play a significant part in enhancing accessibility to credit for SMEs owners and small scale farmers in most developing countries. For instance, owners of SMEs including small-scale farmers usually lack the required assets for collateral, which is a requirement for borrowing from formal financial institutions and access to equity financing and advanced methods of financing are very scarce. These rather informal entities currently stand at about 2,300 establishments operating under the control of the Network of Microfinance Institutions in Liberia.

There are nine commercial banks currently operational with about thirty sub-branches in seven of the fifteen counties. This ratio increases the costs of financial services for the remaining parts of the country with limited bank presence. Before 2008, none of these banks provided micro-finance services due to the high risks involved (GoL, 2009). Due to rigorous efforts by the government and development partners, including the African Development Bank (AfDB) and the International Finance Corporation (IFC), numerous commercial banks are now engaging in the provision of microfinance services. For instance, Access Bank Liberia in 2009 started operation with a paid-in

capital of US$6 million with intentions to serve over sixty thousand clients (primarily SMEs) before 2015 (GoL, 2009). Credit Unions have also long provided financial services to low-income households in Liberia. There are 260 functioning credit unions, with nearly 26 thousand clients all over the country (GoL, 2017). They work under the authority of the Liberia Credit Union National Association (LCUNA) which offers training and monitoring support for members.

In addition to the above micro-finance providers in Liberia, there are local and international organisations, including NGOs that provide credit only services to low-income earners (GoL, 2009). These include the recently created BRAC Microfinance Company which is a subsidiary of the Bangladeshi Micro-finance Institution, Liberty Finance and LEAP which are much smaller organisations in terms of capitalisation and outreach. These organisations have operated for over seven years in Liberia and currently jointly have over US$2.4 million in outstanding loans with over thirty-two thousand clients all over the country.

1.1.3 Constraints to Enterprise Performance in Liberia

Countries recovering from the effects of political crisis and economic instability are prone to a highly constrained and unfavourable business climate (Spark, 2013). As such, eliminating barriers that hinder the growth of entrepreneurship, trade, income and the creation of jobs are crucial to regaining economic independence (World Bank, 2017; Muriithi, 2017; Haider, 2018). According to the World Bank Enterprise Survey (WBES) and Doing Business Reports, there are numerous challenges faced by SMEs in Liberia, thus making it an unfavourable place for investment (World Bank, 2017, 2018). The list of constraints include but not limited to the following; lack of infrastructure (especially roads and electricity), lack of tax incentives, difficulty in accessing finance, difficulty in accessing markets, feeble and unclear property rights, low levels of literacy,

limited managerial and entrepreneurial skills, continued risks regarding security and stability, high administrative and regulatory costs among several others.

Moreover, the smooth functioning of the credit market in Liberia is also highly constrained by several factors. These include; the low levels of literacy which affects the effectiveness and efficiency in providing financial services to underprivileged groups, poor credit culture which can be attributed to over-dependency on aid, poor infrastructure, limited credit reference services, limited microfinance expertise, weak microfinance network, and poor linkages between financial service providers. These challenges play a central role, affecting critical decisions relating to human, physical and financial capital accumulation and work-related choices (Demirgüç-Kunt et al., 2008).

Due to the prevalence of these challenges, growth in the private sector is yet to be explicitly realised specifically regarding domestic industries (GoL, 2013; World Bank, 2017, 2018). The government has implemented numerous policies in which these challenges are prioritised (World Bank, 2017, 2018). For instance, under the Poverty Reduction Strategy (PRS), the National MSME Policy and the Agenda for Transformation (AfT), the government prioritises revamping damaged infrastructure, upgrading the traditional resource sectors and establishing a competitive and conducive business climate as critical areas that need urgent attention (GoL, 2013, 2011). So far, these efforts have yielded some visible results in improving the business environment especially in the case of the financial market, but regarding access to credit for SMEs, there is still a lot to be done.

1.2 Statement of the Problem

Achieving industry-led growth and economic integration are two identified channels African governments could explore to create quality jobs, alleviate poverty and build resilient economies

(World Bank, 2017, 2018, and 2019). To actualise this, the need for robust private sector reform and improved macroeconomic performance in each African state is a must. On average, SMEs represent about 90% of firms in Africa and account for roughly 60% of employment, making them major macroeconomic stakeholders. However, due to the unfavourable business climate in most African countries, SMEs performance remains constrained, threatening their survival and adversely affecting Africa's overall economic performance.

When firms are constrained from accessing credit for further investments, operations expansion and innovation, it becomes a hindrance to their growth and overall performance (Malhotra et al., 2007). Businesses that want to expand for some reason often face serious challenges obtaining financing from banks and are therefore constrained which results to poor performance and stagnant or deteriorating growth (World Bank, 2018; Fowowe, 2017). This current situation poses a severe problem for the Liberian economy where private-sector development plays a vital role in employment and most of the government's development plans. Despite all efforts to improve SMEs access to credit, many local SMEs are still marking it as a significant constraint and the main factor protracting their poor performance (GoL, 2013; World Bank, 2018).

Descriptive findings from the WBES show that SMEs made up approximately 86.1% of the 151 firms surveyed with 72.1% of their investment, and operational costs being financed through internal means, which usually are through informal channels with unfavourable and exploitative terms (World Bank, 2017). Additionally, 38.8% of firms surveyed listed credit access as the biggest obstacle to their performance while the proportion of small business investments financed by banks and other formal credit institutions stands at a meagre 11% (World Bank, 2017). The challenge for the Liberian government is how to structure programs to best address the challenges

of SMEs in all industries, and this requires rigorous empirical research, especially considering the limited information and the complexities of the SMEs sector.

1.3 Study Objectives

The general objective is to study the effect of constrained credit access on employment growth among SMEs in Liberia. This objective is operationalised by first looking at the following three specific objectives:

i. To examine the determinants of SMEs' credit access status in Liberia

ii. To analyse the effect of constrained credit access on SMEs employment growth

iii. To suggest appropriate policy measures

1.4 Significance of the Study

Recent editions of the African Economic Outlook highlights the significance of industry-led growth and integration to Africa's development agenda. However, expected contributions and gains from integration remain uneven as a result of country-specific circumstances. In Liberia, like most African economies, the private sector is mostly dominated by SMEs with low productivity and limited ability to create quality jobs. This reality contributes to poor macroeconomic performance and deindustrialisation, two critical requirements in achieving effective economic integration. To advance and improve the chances of becoming an integral member of regional integration efforts, Liberia needs to industrialise and add value to it's abundant agricultural, mineral, and other natural resources. Developing a robust doing business environment – underpinned by creating and implementing sound industrial and pro-growth tax policies – could unlock Liberia's industrial potential, contributing to healthy job growth and stable macroeconomic performance.

When credit is easily accessible, SMEs can expand their operations, create more and better jobs and enable entrepreneurs to invest in better and efficient technologies (Quartey, Turkson, Abor, & Iddrisu, 2017; Nguimkeu, 2013; Fowowe, 2017). Improving SMEs performance also improve domestic macroeconomic performance. As such, the issue of constrained access to credit requires keen attention to exploring means by which SMEs can improve their performances and contributions to the economy (Fowowe, 2017; Clark & Rosales, 2013; World Bank, 2017). Before a sustainable solution is identified, it is vital first to examine the factors affecting firm credit access and secondly, examine the degree at which it is impeding firm performance.

Considering the limited and ambiguous evidence on how SMEs employment growth is affected by their credit status, the study bridges this gap by examining the difference between the employment growth rates of credit constrained and unconstrained SMEs using an Endogenous Treatment Effect regression model. By exploring the impact of constrained credit access on SMEs growth, the study provides academicians and policymakers with a comprehensive understanding of the extent to which constrained credit access hinders SMEs employment growth in Liberia. Adopting this approach enables the author to investigate the main variables (Annual Employment Growth) comprehensively while controlling for numerous aspects of the business environment and firm-specific characteristics. This method also allows the researcher to address some of the recognised statistical errors in most firm growth studies, such as endogeneity, sample selection biases and multicollinearity.

1.5 Organisation of the Study

The succeeding chapters of this paper are organised as follows. Chapter two reviews relevant theories and empirical literature and provides a brief assessment of the two. The third chapter covers the research methodology, including the data and empirical methods used. The fourth

chapter covers the descriptive data analysis, econometric estimation procedures and results from the various diagnostic tests. Chapter five concludes the paper and provides relevant policy recommendations and suggestions for further studies.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

In understanding the various issues mentioned in the previous chapter, chapter two provides an in-depth review of relevant literature related to this subject, which together has formed the basis of this study. The chapter is separated into three sections. Sections one and two covers the theoretical and empirical literature respectively, and the last section provides an overview of the chapter.

2.2 Theoretical Literature Review

The theoretical development for empirical studies of firm growth and the determinants of credit access have differentially drawn from various disciplines in the social sciences. However, the available literature provides a host of economic theories that have attempted to explain this phenomenon. The theories reviewed for this study include the following: Theory of the Growth of the firm, the Pecking Order Theory and the Theory of Credit Rationing.

2.2.1 Theory of the Growth of the Firm

In 1959, British economist Edith Tilton Penrose theorised the growth of the firm in her book, "The Theory of the Growth of the Firm" in which she relates enterprise growth to the internal activities and capabilities of the firm. Penrose (1959) considered growth maximisation as the primary goal of the manager, unlike earlier theories that assume profit. This is because the firm increases the employment of managerial staff at a rate that maximises growth and with growth, the complexities of the organisation increase, thus demanding higher managerial services. Penrose defined a firm as the organisation of resources operating with authority and management, producing goods and services in the market to maximise growth. According to Penrose, the profitability of the firm is

independent of its size and depends only on its growth rate, which is determined by the effective use of its resources. The theory postulates that the firm's managerial capabilities dictate its dominance over rival firms and the market.

The main confusion with most economic theories of the firm, according to Penrose, was that they could not identify the drivers and constraints to firm's growth (Penrose, 1959). Penrose clarifies that unless markets are restricted in regards to product kinds and output quantities, the possibilities for expansion are driven by the flexibility and versatility of the firm's resources. She argued that the firm's growth could be studied as a dynamic process of management, interacting with internal and external resources (Penrose, 1959).

2.2.2 Credit Rationing Theory

Stiglitz and Weiss (1981) formulated a theory under the assumption of asymmetric information to explain credit rationing in a credit market in equilibrium. Credit rationing, according to the literature, is the limiting of available loanable funds to demanding borrowers as a result of information asymmetry that exists within the credit market. The theory is based on the assumptions that creditors cannot differentiate between the risk levels of borrowers, therefore, contracts for loans are restricted to limited liability on the side of the borrower (i.e., borrowers bears has no incentive to pay if the returns from the investment project is less than the debt obligation), and borrowers will repay their debt when they have the means (involuntary default). According to the theory, banks providing loans are usually concerned with the interest received on loan (i.e. banks' profit) and how risky the loan is. The interest rate also affects the riskiness of the loan through the sorting process (adverse selection effect) and the actions of the borrowers (incentive effect). These effects are somehow a direct result of prevailing underdevelopment and information asymmetry within the credit market.

In the basic model, when there are loan contracts among parties that are risk-neutral (lender and borrowers) with the borrowing party having limited liability, the probability of risk increases among borrowing parties and lending parties become more risk-averse. This happens because a one-sided limited liability loan contract of the above nature would not be in favour of a lending party. Lenders stand to lose more in the case of a failed investment while the borrower tends to benefit alone when profits are realised on the project. Given that lenders have no way of differentiating high risk from low-risk borrowers, they result to using the interest rate as a screening device. When interest rates are high, returns on low-risk projects are unduly reduced, which discourages low-risk borrowers from taking up loans.

On the other hand, given the high returns generally associated with risky projects, risk-loving borrowers are still willing to take the loan regardless of high-interest rates. Such a situation results in an adverse selection effect (i.e. higher interest rates attracting risky borrowers). Considering lenders perceive risky projects differently as compared to debtors, the interest rates are usually kept at levels below market-clearing levels, and borrowers are rationed to obtained lower risk borrowers in their selection pool (Mookherjee & Ray, 1999).

There are numerous approaches to this model, some focusing on credit rationing issues resulting from specific information asymmetry problems like adverse selection and moral hazard. However, these strands of the theory are all similar to some degree in terms of policy implications and significance. The study uses this model to clarify that credit constraints sometimes arises as a result of credit market efforts to reduce defaults and mitigate problems associated with high risk-borrowers and not necessarily the result of the unfavourable business environment or creditworthiness of firms.

2.2.3 Pecking Order Theory

Developed by Myers and Majluf (1984), the Pecking Order Theory posits that the costs associated with a particular financing channel dictate the capital structure or the financing preference of firms. A firms capital structure refers to the method of financing it prefers to use in financing its operations; these include internal finance, debt, and equity. Myers and Majluf (1984) argued that in the presence of asymmetric information, the cost of financing increases and firms make their funding decisions bearing in mind the costs and risks involved with each financing source.

According to the theory, firms prioritised the different sources of financing based on their associated costs and risk levels. Financing decisions are ranked as follow: internal/ retained earnings, debt and equity financing. Internal financing is considered the first source that firms use because it is less risky and the easiest to obtain. It is assumed that if firms avoid equity financing and debt and use only internal financing (i.e. retained earnings), it can minimise losses from information asymmetry. However, this source has proven unreliable and often insufficient to sustain the firm for an extended period, and this ultimately constrains the growth prospects of the firm. When private financing becomes unreliable, the next source of financing is debt. Availability of loanable funds from the credit market allows firms to borrow funds prioritising short-term over long-term debt. The model prefers debt financing to equity financing because of the lower costs associated with formal debt issues.

Finally, the last resort is equity financing, which, according to the model, is more costly than the original two sources. Equity reduces the owners' profit and has far more significant risks involved. As compared to debt where the costs are interest payment or loss of collateral, with equity financing, the owner could lose the whole company in some instances.

2.3 Empirical Literature Review

This segment provides a comprehensive review of empirical studies on the subject. It offers empirical arguments and findings on the determinants of SME access to credit and the effect of constrained credit access on SME growth. It covers the different methods and data that have been used to measure and analyse firm growth in this context.

2.3.1 Determinants of SME Access to Credit

Determinants of SMEs credit access can be categorised into three groups. These groups includes; firm characteristics, owner's characteristics and location characteristics (Beck & Demirguc-Kunt, 2006; Akoten, Sawada, & Otsuka, 2006; Beck, 2007; Coleman, 2004). Other factors, including the quality of the entrepreneur's network, is also an influencing factor (Malesky & Taussig, 2009).

Using data collected from 225 garment MSMEs in Nairobi, Akoten, Sawada, & Otsuka (2006) sought out to identify the determinants of credit access for SMEs from both formal and informal sources and their impact on firm performance and employment growth. The result from the analysis concluded that factors determining credit access were somehow different from those affecting firm performance and growth, indicating that credit access had minimal impact on the performance of SMEs in that region.

A review by Beck and Demirguc-Kunt (2006) established that factors such as the firm location, specifically financial markets and legal systems within which a firm operates had a significant correlation with SMEs credit access. Results from the study found that in the absence of a well-developed financial system and an inclusive legal framework, smaller firms find it challenging to grow to their optimal size. Findings from the study suggest that improving legal and financial institutions and the overall business environment were two of the essential approaches towards reducing growth constraints faced by small businesses.

Alhassan and Sakara (2014) conducted a study on the socio-economic factors underlying SMEs access to credit in Ghana. Their investigation was restricted to the Tamale region of Ghana and exclusively focused on loans provided by Barclay bank to SMEs in the region. The study collected primary data from small and medium-sized firms in Tamale and obtained the following results; the number of employees, firm previous credit record, fixed assets possessed, and manager's experience, firm attitude toward risk, legal status, business sector and firm size were all significant factors determining the firm access to credit. Manager expertise, default rate and monitoring were some of the significant challenges faced by banks in giving out credit to SMEs.

Demirguc-Kunt and Maksimovic (1998) examined the impact of underdeveloped legal and financial systems on the firm's ability to access and use external financing using a sample of 30 countries, including both developed and developing countries. Results from the empirical analysis, which employed a financial planning model show that an active stock market and an adequate legal framework are positively associated with firm growth financed by external credit. Finding also showed that in countries with developed financial and legal systems, firms tend to rely less on internal financing sources and use more credit and other streams of external financing.

2.3.2 Constrained Credit Access and SME Growth

Firm growth studies have employed numerous approaches which usually concerns the type of data, the period under consideration, the specific measure of growth, among others. Some empirical studies focus on factors such as average size, firm's inherent characteristics and others focus on a host of other explanatory variables explaining firm growth. Ardishvili et al. (1998) and Delmar (1996), in their studies, established that growth indicators were mostly similar among the theoretical and empirical literature. These indicators included; the financial or stock market value of the firm, growth in an employee, the sales and revenue, profits, assets, the value of output and

the value-added. However, sales, employment and assets growth were identified as the most used measures of firm growth. Also, earlier empirical studies, including Demirguc-Kunt and Maksimovic (1998), Beck et al. (2008, 2006), Demirguc-Kunt et al. (2006), conducted firm growth analysis using a combination of firm-level data and indicators of financial development for a cross-section of countries. Most empirical studies used surveys and cross-sectional datasets, which are not the most appropriate for firm growth analysis (Ahiawodzi & Adade, 2012; Delmar, 1996).

Acs and Audretsch (1990) study on the determinants of SME growth in the US manufacturing sector and measured growth as an average change in sales of the firm. This measurement brought severe disagreement. According to Ahiawodzi & Adade (2012), growth and profitability could not relate to sales growth because some of the companies studied were able to maintain high profits despite deteriorating growth rates. The most suitable measure for firm growth would be the growth of employment if the goal were to remain as objective and neutral as possible (Ahiawodzi & Adade, 2012).

Using similar measurement for growth as the previous, Zhou and De Wit (2009) studied the determinants and dimensions of enterprise growth using firm-level data from 523 Dutch SMEs and a multivariate linear regression model. Employment and sales growth, according to them, were the most broadly used indicators of firm growth and both reflected changes within the firm, either short-term or long-term and were much easier obtained. According to Liedholm and Mead (1999) and Liedholm (2001), this measurement is applied in two ways. First, by using the annual compound growth rates of employees or the normal annual employment growth and secondly by using the change in the number of workers since startup. The latter is the measure employed in this study in line with Zhou and De Wit (2009), Aterido et al. (2011), Dinh et al. (2012), Ahiawodzi & Adade (2012) and Fowowe (2017).

Muriithi (2017) and Fowowe (2017) investigated the effects of constrained credit access on the productivity of firms in sub-Saharan Africa using enterprise firm-level cross-sectional data. They found that access to credit had a significant positive relationship with SMEs growth, which also had a positive correlation with overall economic performance proxied by GDP. For instance, with increased growth, firms could increase its demand towards other sectors, thus producing an increase in the economic activity of a region.

Fowowe (2017), used data on 10,888 firms in over 38 African countries estimating two models with two distinct measures of firm credit access, unlike previous studies that followed straight subjective measures. The investigation discovered that inadequate financing severely constrained the productivity of firms, which was proxied by the employment growth rate. Constrained credit access was negatively correlated with firm employment growth in both models. The study also acknowledged that a significant drawback was the use of survey data which was acknowledged to have restricted the study in several ways, for instance, the study was unable to investigate the growth process over time.

Ahiawodzi & Adade (2012) also obtained similar results in his study of 78 SMEs in the Ho Municipality of the Volta Region in Ghana. Although his approach was significantly different from the latter, his results were quite similar. Access to credit had a positive and significant correlation with firm growth. He used both primary and secondary data and multiple regression for analysis and laid focus on a much smaller sample, unlike the former.

Ayyagari et al. (2011) also studied the determinants of firm growth across 80 countries. The outcome of their study concluded that factors such as access to credit, political stability and the rate of crime all have a significant impact on the rate at which a firm could grow. However, access to credit was revealed as one of the most significant factors within the model.

Regasa et al. (2017) used firm-level data of Ethiopian SMEs to investigate how the different forms of available financing methods affected the rate of firm growth. Unlike findings from other studies in developing countries, the study established an empirical indication of a negative correlation between the use of external financing methods and growth. This outcome suggests the existence of considerable cross-country and industry-specific effects on the study of firm growth. His findings accord with that of Beck et al., (2015) who studied the link between credit and firm growth in rural China using household-level dataset. The study discovered that the relationship between the growth of micro-enterprises and formal external finance was insignificant, which he also attributed to cross-country differences.

2.4 Overview of Literature

SMEs growth is influenced by both internal and external factors (Ardishvili et al., 1998; Delmar, 1996; Penrose, 1959). However, the literature unveils several complexities associated with studying the factors associated with firm growth. Earlier theories place a cap on firm growth to its optimum size while other theories place no limits on the growth potential of firms. Other studies attribute firm growth to internal factors exclusively, while others distinguish the influences of both internal and external factors on the growth of firms (Penrose, 1959). Also, the location and periods under consideration varied considerably among the literature (i.e. single and cross country analysis). Specific measure for growth has also been another area of serious contention with each study providing its justification for the measurement used. However, regardless of the measure employed, findings remain somewhat comparable, indicating that particular measures for credit-constraint and firm growth do not significantly affect the findings.

Among the literature, the most common measurements/ indicators of firm performance used includes growth in employment, assets and sales in either absolute or relative terms depending on

the justification made. The specific measure used was found to have limited influence on the empirical outcomes as well as intended policy recommendations. Majority of the empirical literature confirms the following regardless of the specific measures and methodology used: i) access to credit positively influences firm growth, ii) constrained access to credit negatively affects firm growth and iii) access to credit remains a significant constraint to smaller firms, especially in low-income countries. However, a few studies have argued contrary and suggest that there exist country and industry-specific effect to the study of firm growth which will be considered within this study and adequately controlled for (Beck et al., 2015; Regasa et al., 2017; Carrizosa, 2007).

There are limited country-specific studies on the firm access to credit-growth nexus in Liberia, and as such, we rely solely on studies from other countries for insights. The current study intends to address this gap in the literature by providing country-specific evidence from the complex and highly unexplored business environment in Liberia.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

To analyse the effect of SME's credit access status on its annual employment growth in Liberia, the study adopts an endogenous treatment analysis approach. The following sections clearly explain the theoretical and empirical frameworks underlying this method, including the model specification and the estimation techniques for analysis. The last section presents the summary of relevant variables and the data source.

3.2 Theoretical Framework

The author anchors this study on the Resource-based Theory of the Growth of the firm and the Credit Rationing Theory as the underpinning theoretical frameworks.

Empirical studies of firm growth can be classified into two categories: factors of growth studies and studies of the growth process (Ardishvili et al., 1998). The first category of firm growth studies mentioned above falls under the Resource-Based Perspective[7] (hereafter "RBP") to firm growth analysis. According to this framework, the economy consists of a range of heterogeneous firms operating in an oligopolistic market situation where every firm can set up its own goal. The decision to maximise profit, revenue or growth depends on the real interests of the managers and is also subjected to the corporate and institutional structures of the location in which the firm operates. In the basic model, the goal of the firm is to maximise growth subject to a financial constraint (Baumol, 1962). From the perspective of a long-run growth maximising firm, profits no

[7] The Resource-Based Perspective to firm growth analysis is a collection of theories of the firm that prioritizes the firm's unique experience in mobilising resources and managerial capabilities through which performance is enhanced. It reasserts the significance of economic principles, and human motivations in explaining and examining the firm growth concept. (Penrose, 1959; Lockett, 2005).

longer serve as a constraint but rather as a means whereby financial capital can be acquired (i.e. retention of profits or retained earnings and internal investments to boost the firm's creditworthiness) to facilitate the primary growth objective (Baumol, 1962).

The productive opportunity set of the firm includes all resources (i.e. internal and external resources) that influences its growth. The firm's managerial capabilities and available resources determine this effective set of productive opportunity. The financial resources of the firm exist both as an internal and an external resource and are one of the significant determinants of firm growth. Together with effective strategic management and technical capabilities, the financial resource enables firms to reduce liabilities, acquire new technologies and assets paving the way to achieve targeted growth projections (Stacey, 2011).

According to Shephard & Wiklund (2006), financial capital is the source of all other resources available to the firm because it can easily be used to acquire other types of resources including credit from external sources. Access to credit makes it possible to acquire new employees, new equipment and invest in new innovative technologies. It is safe to assume that the availability of financial capital can, to some extent lessen resource constraints in other areas. Considering the RBP links firm growth to its financial resources, firm and manager's characteristics, and the business environment, a theoretical framework for firm growth can be accurately specified as follow:

$$g = f(\text{financial resources},\ \text{managerial characteristics},\ \text{firm specific factors},\ \text{external environment factors}) \quad (3.1)$$

Where firm growth is a function of the available money-capital which stems from both internal and external sources, firm's managerial characteristics, firm-specific factors, and factors of the external business environment. The firm's managerial characteristics include the manager's

experience and gender, education and technical knowledge of the management. The firm-specific factors, according to the literature, include the business type, firm age and size of the firm, credit access status, firm industry and location. The external business environment includes indicators of the effectiveness of the legal, political, financial institutions and policies governing the environment in which the firm operates.

When we account for existing imperfections of the credit market, firm access to credit access cannot be modelled simply as the number of firms with credit and those without credit. In reality, it can be seen that some firm may not demand credit at all while others might be denied credit due to other irrepressible factors (i.e. profit-maximising behaviour of banks, domestic credit market policies, information asymmetries, availability of internal finance, etc.). As such, the study builds on the frameworks of Stiglitz and Weiss (1981) and Bigsten et al. (2003) to satisfactorily model firm credit access status.

Given the above framework with some modifications, we model the firm's credit access status as a function of both demand and supply factors using direct evidence on the firm's credit market participation and constraints. A firm is considered "unconstrained" to accessing credit under the following conditions; i) if a firm states that they are self-sufficient and do not require external financing and, ii) if a firm states that they demanded and were able to access credit. Firms that were denied credit after applying and those refusing to apply because of expected rejection are captured as constrained; this excludes size rationing factors. This approach adequately captures the issue of credit rationing as a determining factor to firm credit access status, thus allowing researchers to identify factors affecting the firm's credit access status from both the demand and supply perspectives.

Following Bigsten et al. (2003), let $y_{i1} = 1$ if a firm demand credit and $y_{i2} = 1$ if the credit demanded is satisfied; thus the credit demand and supply models can be expressed as follow;

$$Z_{i1} = \alpha_i + \beta_1 X_{i1} + e_{i1} \; ; y_{i1} = 1 \text{ if } Z_{i1} > 0, \; y_{i1} = 0 \text{ otherwise} \quad \text{..... (3.2)}$$

$$Z_{i2} = \alpha_i + \beta_2 X_{i2} + e_{i2} \; ; y_{i2} = 1 \text{ if } Z_{i2} > 0, \; y_{i2} = 0 \text{ otherwise} \quad \text{..... (3.3)}$$

Equations (3.2) and (3.3) represents the demand for credit by firm *i* represented by Z_{i1} and the supply of credit by banks and financial institutions Z_{i2}. From the above equations, it is seen that y_{i2} is only observed when $y_{i1} = 1$. In (3.2.), X_{i1} is a vector of firm credit demand factors determining Z_{i1} which includes those factors influencing the firm investment decisions taking into account the cost of other funding sources together with other factors. These factors include managers' and firm-specific characteristics, elements of the credit market and e_{i1} is a vector of unobservable factors. On the other hand, equation (3.3) reflects the possibility of credit constraints affecting this demand. In (3.3), X_{i2} is a vector of credit supply determinants including indicators of firm's profitability, survivability and debt sustainability based on firm-specific characteristics, and other credit-related factors (i.e. credit market participation, firm debt position, firm's net worth and the ability to provide collateral).

By setting up our model this way, we can investigate the heterogeneities among factors affecting the two equations, consequently determining the firm's credit access status. When the risk attitude of firms and financial institutions are controlled for, firms will demand if the expected return on investment exceeds the cost of using the credit while on the other hand, banks will also supply credit considering similar conditions seeing that both parties are inherently also profit maximisers (Stiglitz & Weiss, 1981). Considering the above, a generalised model for firm credit access status is given as follow:

$$\zeta_i = f(X_{i1}, X_{i2}, \delta) \quad (3.4)$$

In (3.4), X_{i1} and X_{i2} are credit demand and supply factors as explained in (3.2) and (3.3) and δ is a vector of other observable factors which are known to influence the firm credit access status. Given that our credit access status variable ζ_i is a latent variable that is equal to 1 if firm *i* is constrained and 0 if otherwise. Equation (3.4) can, therefore, be rewritten in its reduced form as follow;

$$\zeta_i^* = \beta_0 + \beta_1 X_{i1} + \beta_2 X_{i2} + \beta_3 \delta_i + \varepsilon_i \quad (3.5)$$

Following from equations (3.2), (3.3) and (3.5), the firm's credit access status is then decided based upon the following probabilistic conditions;

$$Pr(\zeta_i = 1 | X_{i1}, X_{i2}, \delta) = Pr(y_{i1} \leq 1, y_{i2} < 1) \quad \text{Or} \quad Pr(y_{i1} < 1, y_{i2} \leq 1) \quad (3.6)$$

$$Pr(\zeta_i = 0 | X_{i1}, X_{i2}, \delta) = Pr(y_{i1} = 1, y_{i2} = 1) \quad (3.7)$$

The probability of firm i being constrained as seen from (3.6) is given by the following conditions; i) the firm demanded credit but was unsuccessful, ii) no demand was made by the firm due to high expectations for rejection and, iii) the firm did not demand due to unfavourable credit conditions. The probability of firm *i* being unconstrained is also given by the following conditions; i) if a firm did not demand credit because they are self-sufficient and do not require external financing and, ii) if the firm demanded credit and was successful.

3.3 Empirical Model

To examine the treatment effect of constrained and unconstrained credit access on SMEs employment growth in Liberia, the study adopts an Endogenous Treatment Regression Model (ETM) for empirical analysis after the approach developed by Maddala (1983), Greene (2012) and

Wooldridge (2010). Following from (3.1) and (3.5), the model consists of two equations in which the firm's credit access status and annual employment growth are simultaneously determined in a manner that allows for endogeneity among the outcomes. Below we construct the generalised potential-outcome equations for the ETM with separate variance and correlation parameters for both the credit-constrained and unconstrained groups.

Let EG_{i1} and EG_{i2} denote firm *i's* annual employment growth rates with constrained and unconstrained access to credit respectively, noting that for each firm, annual employment growth is only observed in one state seeing that a firm cannot exist in both states at the same time. Also, let the conditional expectations of these variables, given a vector of observable characteristics X_i, be given by $\beta_0 X_i$ and $\beta_1 X_i$, where β_0 and β_1 are unknown parameters. We can then write the outcome and selection equations as;

$$EG_{i1} = \beta_0 X_i + \epsilon_{i0} \quad \text{..... (3.8)}$$

$$EG_{i2} = \beta_1 X_i + \epsilon_{i1} \quad \text{..... (3.9)}$$

$$C_i = \begin{cases} 1, & W_i\delta + \mu_i > 0 \quad \text{constrained} \\ 0, & \text{Otherwise} \quad \text{unconstrained} \end{cases} \quad \text{..... (3.10)}$$

Where C_i is a general form of the firm's credit access status from equation (3.5), EG_{i1} is firm *i's* the outcome if $C_i = 1$, and EG_{i2} is firm *i's* outcome when $C_i = 0$. In this model, the vector of error terms (ϵ_{i0}, ϵ_{i1}, μ_i) have a zero mean tri-variate normal distribution and with a covariance matrix

$$cov(\epsilon_1, \epsilon_2, \mu_i) = \begin{bmatrix} \sigma_0^2 & \sigma_{01} & \sigma_0\rho_0 \\ \sigma_{01} & \sigma_1^2 & \sigma_1\rho_1 \\ \sigma_0\rho_0 & \sigma_1\rho_1 & 1 \end{bmatrix} \quad \text{..... (3.11)}$$

The treatment error variance is normalized to be 1 because we only observe the outcome under the constrained group. Given the above, the observed annual employment growth can be expressed as;

$$EG_i = C_i EG_{i1} + (1 - C_i) EG_{i2} \quad \text{..... (3.12)}$$

The unobserved heterogeneity component of the error terms in (3.8) and (3.9) are assumed to be correlated. Factors determining the firm credit access status in (3.10) are assumed to be nonrandom and potentially endogenous to the outcome variable in equation (3.12). The above model is thereby specified, allowing for correlated unobserved effects to correct this concern following the works of Dutoit (2007), Malikov and Kumbhakar (2014) and Maddala (1986). The likelihood function for this model as given by Maddala (1983) is expressed as;

$$\ln f_i \begin{cases} \ln\Phi\left\{\dfrac{W_i\delta + \frac{(EG_i - \beta_1 X_i)\rho_1}{\sigma_1}}{\sqrt{1-\rho_1^2}}\right\} - \frac{1}{2}\left(\frac{EG_i - \beta_1 X_i}{\sigma_1}\right)^2 - \ln\left(\sqrt{2\pi\sigma_1}\right), & C_i = 1 \\ \ln\Phi\left\{\dfrac{-W_i\delta - \frac{(EG_i - \beta_0 X_i)\rho_0}{\sigma_0}}{\sqrt{1-\rho_0^2}}\right\} - \frac{1}{2}\left(\frac{EG_i - \beta_0 X_i}{\sigma_0}\right)^2 - \ln\left(\sqrt{2\pi\sigma_0}\right), & C_i = 0 \end{cases} \quad \text{..... (3.13)}$$

$$\ln L \sum_{i=1}^{n} w_i \ln f_i \quad \text{..... (3.14)}$$

From (3.13), $\ln\Phi(\cdot)$ represents the cumulative distribution function of the normal distribution, in (3.3.7), w_i is an optimal weight. The covariance between ϵ_{i0}, ϵ_{i1} and σ_{01} cannot be estimated because the potential outcomes (EG_{i1} and EG_{i2}) are never observed simultaneously. σ_0, and σ_1 are not directly estimated in the maximum likelihood function, in its place the model estimates $\ln\sigma_0$, and $\ln\sigma_1$. The parameters ρ_0 and ρ_1 are also not estimated directly instead, the inverse hyperbolic tangent of ρ (atanh ρ_0 and atanh ρ_1) are estimated.

$$\text{atanh}\ \rho = \frac{1}{2}\ln\left(\frac{1+\rho}{1-\rho}\right) \quad \text{..... (3.15)}$$

Thus, the vector of parameters estimated by the ETM is given below;

$$\psi = (\beta_0, \beta_1, \delta, \ln\sigma_0, \ln\sigma_1, \text{atanh}\rho_0, \text{atanh}\rho_1) \quad (3.16)$$

Estimation of the ETM follows a unique two-step procedure. The first step estimates the determinants of SMEs credit access status, which is specified by a Probit function, as shown in equation (3.10). Secondly, the employment growth equations for the two regimes given by (3.8) and (3.9) are estimated. The model is estimated using a Full information Maximum Likelihood estimator. This method jointly estimates the coefficients of the credit access probit equation and the employment growth equations for both regimes. The unobserved characteristics affecting SMEs employment growth is captured by rho (ρ), which is computed from values obtained from the first step estimation and introduced as an explanatory variable in the employment growth equations. The FIML procedure obtains consistent parameter estimates by finding the parameter values that maximise the likelihood function. This process is conducted in two steps: 1) The ML first computes initial values of the parameters and, (2) Maximizes the log-likelihood function using the initial computed values, consequently producing robust estimates for ψ (Dutoit, 2007).

The model also estimates the average treatment effect (ATE) and the average treatment effect on the treated group (ATET). This process requires first interacting the treatment variable (credit access status) with one or more of the exogenous variables in the outcome equation and then separately estimating the ATE and the ATET afterwards. In the case the treatment variable is not interacted with any of the exogenous variables, the ATE and ATET are the same and is reported as the coefficient on the treatment variable in the outcome model. The ATE and ATET are explained and derived in appendices III and IV.

3.3.1 Diagnostic Tests

The study employs diagnostic tests to ensure the robustness and reliability of the results. The following are used in this study. The Breush-Pagan/ Cook-Weisberg test for linear forms of heteroskedasticity developed by Breush and Pagan (1979) and was further augmented Cook and Weisberg (1983). This test comes in handy when the variance of the error term vary across observations (i.e.$V(\varepsilon_i) \neq \sigma^2$). The procedure includes testing the null hypothesis that the variances of the errors are equal against the alternative that the error variances is constant (Breusch & Pagan, 1979). In this case, a large chi-square would imply that there is the presence of heteroskedasticity within the model. With this approach, one can test for heteroskedasticity in one, several or all the variables in the model. If there is heteroskedasticity within the model is not precisely due to misspecification, the alternative solution will be to use robust standard errors to solve the problem.

To test for the presence of multicollinearity within the model, we use the Variance Inflation Factors (VIF). This approach identifies both the correlation between explanatory variables as well as the strength of that correlation. It starts at 1 and does not include an upper limit; thus, a value of 1 will suggest no correlation between selected explanatory variables. However, a VIF value in the range of 1 and five would suggest the presence of weak or moderate correlation while a value >5 represents significant levels of multicollinearity and would require attention.

The presence of endogeneity is tested for by the use of the rho value generated by the ETM. In the case that the estimated value of rho is significant within the model, we accept the null hypothesis that there is a presence of endogeneity within the model. The ETM also uses this estimate to correct this concern (Maddala, 1983; Greene 2012).

3.4 Definition and Construction of Variables

Table 3.1 below provides the names, descriptions, specific measurements and expected signs for the various variables used in the empirical analysis.

Table 3.1: Variables Definition and Measurement

Variable Name	Description	Measurement	Expected Sign	Variable Reference
Dependent variables				
Annual Employment Growth[8]	Growth in the employment of permanent workers of the firm	Measured as the difference between the numbers of permanent full-time employees for the last three fiscal years, divided by the number of permanent full-time employees for the last fiscal years.		Delmar, 1997; Delmar et al., 2006; Fowowe, 2017; Dinh et. 2012
Credit Access Status[9]	Credit Access status is a subjective measure of a firm's access to credit indicating whether or not it is an obstacle	(Dummy) 1 = Constrained 0 = Unconstrained		Kuntchev et al., 2014; Fowowe, 2017
Independent Variables				
Firm Size				Fowowe, 2017; Beck

[8] $g_i = \frac{size_{(i,t1)} - size_{(i,t0)}}{size_{(i,t0)}}$

[9] Credit access status was generated from a subjective categorical variable from the World Bank Enterprise Survey defined by Kuntchev et al. (2014) which covers the extent to which firms are constrained on a scale from 0 – 4 (i.e. no constraint, minor constraint, moderate constraint, major constraint, and very severe constraint). Observations with 0 are captured as unconstrained firms and 1- 4 are captured as constrained.

	Initial size represents the number of full-time permanent employees of the firm	It is measured as the number of the full-time permanent employee of the firm during the survey period	Negative/ Positive	& Demirguc-Kunt, 2006; Coleman, 2004
Size Category	Size captures the size category of a firm in the number of full-time permanent employees	Small = 1 if the number of employees is ≥ 5 & ≤ 19, and 0 if otherwise Medium = 1 if number of employees are ≥ 20 & ≤ 99, and 0 if otherwise Large = 1 if the number of employees is ≥ 100, and 0 if otherwise (benchmark category)	Positive/ Negative	Fowowe, 2017; Beck & Demirguc-Kunt, 2006; Dinh et. 2012
Firm Age	Firm age is the length of time/ years a particular firm has been operational	Number of years in existence	Positive	Akoten, Sawada, & Otsuka, 2006; Beck, 2007
Manager's experience	Captures the experience level of the firm's top manager	Measured by the number of years working in the industry/ sector	positive	
Manager Gender	Captures the gender of the top manager of the firm	(Dummy) 1 = male, 0 = female	Positive/ Negative	
Sector	Sector describes the business sector within which a firm operates	(Dummy) 0 = Manufacturing, 1 = Service	Positive/ Negative	
Legal Status	Captures the legal status of the firm in three categories	1 = Shareholding & 0 = Otherwise 1 = Sole proprietorship or limited Liability firms & 0 = Otherwise 3 = Partnership Company & 0 = Otherwise	Positive/ Negative	
Region	Captures the location in which the firm operates (Montserrado, Nimba and Margibi counties)	Nimba = 1 if the firm is located in Nimba county and 0 if otherwise, Margibi = 1 if the firm is located in Margibi County and 0 if otherwise	Positive/ Negative	

		Montserrado = 1 if the firm is located in Montserrado County and 0 if otherwise	
Log of Annual Labor Cost	Firms yearly expenditure on labour for the firm, including wages, salaries, bonuses, etc.	Taken as the log of the annual amount spent on labour services in United States dollars (USD)	Negative
Financial History	Captures whether or not the firm's financial statements were checked & certified by an external auditor in the last FY	(Dummy) 0 = No, 1 = Yes	Positive
Firm Network	This indicates whether or not the firm is a member of a formal business association	(Dummy) 0 = No, 1 = Yes	Positive
Employees HS Education	Captures the percentage of the employee with completed high school education	Measured as the percentage of employees with completed high school education at the time of the survey	Positive/ Negative
Firm Link	Captures whether the firm is part of a larger firm or parent company	(Dummy) 0 = No, 1 = Yes	Positive/ Negative
Savings Account	Captures whether the firm has a savings or checking account with a bank	(Dummy) 0 = No, 1 = Yes	Positive/ Negative
Line of Credit	Captures whether the firm has an active line of credit with a bank or microfinance institutional	(Dummy) 0 = No, 1 = Yes	Positive/ Negative
External Support	This indicates whether or not a firm had external advice for business management purposes in the last FY	(Dummy) 0 = No, 1 = Yes	Positive/ Negative
	Captures the business environment regulatory		

Regulation 1	conditions that constraints SMEs performance	Percentage of business time spent handling government regulations and bureaucratic procedures	Negative	Fowowe, 2017
Regulation 2	Captures the business environment regulatory conditions for tax compliance	Measured as the frequency of visits (number of annual visits) by task officials to the business	Negative/ Positive	Fowowe, 2017
Corruption	Represents corruption constraints faced by firms	Percentage of annual sales used in making informal payments	Negative	Fowowe, 2017

3.5 Data Source

For analysis, we use cross-sectional firm-level data collected by the World Bank Enterprise Survey for the year 2017. The Enterprise Survey (ES) is part of the World Bank's effort to reduce poverty and promote sustainable economic growth globally through private sector development. The survey collects firm-level data every 3 to 4 years from over 155,000 business establishments in about 139 countries. The survey covers numerous aspects of the business environment, including infrastructure, crime, competition, access to finance, sales, employment, corruption, and other obstacles to firms performance and growth.

The ES was conducted in Liberia between July 2017 and September 2017, successfully covering a total of 151 registered enterprises. A stratified random sampling method with replacement was used to generate a sample representative of the whole non-agricultural private economy. The survey consisted of three stratifications criteria: firm industry, firm size and geographical location. The industry stratification covered the manufacturing and service industries. The stratification for firm size was defined as, small (5-19 employees), medium (20-99 employees), and large (100 or more employees). Geographical location stratification was chosen based on the locations with the highest levels of economic activity, and it covers three unique locations; Montserrado, Margibi, and Nimba counties. Some limitations of the ES is that it samples only firms from the formal sector in Liberia and excludes the informal sector. Also, considering that the sample frame only captures firms with five or more employees, microenterprises are not represented. A breakdown of the sample by each stratification is provided in the Appendices.

CHAPTER FOUR

EMPIRICAL ANALYSIS AND RESULTS

4.1 Introduction

Chapter four report the study findings through descriptive statistics and an endogenous treatment regression analysis. The chapter is subdivided into five sections. The subsequent sections report non-parametric analysis of descriptive statistics, diagnostic tests results and findings from the endogenous treatment regression analysis.

4.2 Descriptive Statistics

To assess the statistical properties of the main variables, the study conducts a descriptive statistics analysis which provides insights into the business environment in Liberia. Essential elements of the analysis are presented in Table 4.1.

Table 4.1: Descriptive/ Summary Statistics

Variables	Number of Observations	Mean	Standard Deviation	Minimum	Maximum
Dependent Variables					
Annual Employment Growth Rate	151	0.2336	0.2769	-0.1026	2.2857
Credit Access Status (Constrained = 1, Otherwise = 0)	151	0.8079	0.3952	0	1
Independent Variables (Firm & Manager Characteristics)					
Firm Size	151	31.298	51.3621	4	300
Firm Age	151	14.1722	9.4175	2	57
Manager Gender (Male = 0, Female = 1)	151	0.1722	0.3788	0	1
Firm Network	151	0.7020	0.4589	0	1
Manager Experience	151	14.9735	9.5882	2	50
Financial History	151	0.3775	0.4864	0	1
Savings Account (No = 0, Yes = 1)	151	0.7285	0.4462	0	1
Employees Education	151	35.9669	38.3147	0	100
Log of Total Annual Labor Cost (USD)	151	8.8495	1.3589	5.4027	12.3013
Firm Link (No = 0, Yes = 1)	151	0.3444	0.4767	0	1
External Support (No = 0, Yes = 1)	151	0.4172	0.4947	0	1
Line of Credit (No = 0, Yes = 1)	151	0.2119	0.4100	0	1

(Firm Location)					
Montserrado	151	0.6954	0.4618	0	1
Margibi	151	0.2185	0.4146	0	1
Nimba	151	0.0861	0.2814	0	1
(Firm Industry)					
Manufacturing	151	0.5033	0.5017	0	1
Service	151	0.4967	0.5017	0	1
(Firm Size Category)					
Small	151	0.6887	0.4645	0	1
Medium	151	0.2185	0.4146	0	1
Large	151	0.0927	0.2910	0	1
(Firm Legal Status)					
Shareholding Company	151	0.0795	0.2714	0	1
Sole Proprietorship/ Limited Liability	151	0.6225	0.4864	0	1
Partnership	151	0.2980	0.4589	0	1
(External environment Factors)					
Regulation1	151	7.1325	12.7821	0	90
Regulation2	151	4.2848	3.3294	1	24
Corruption	151	3.3444	6.7063	0	40

Source: Author's computation based on the 2017 Liberia Enterprise Survey data

The mean annual employment growth rate[10] of enterprise in the sample is 23 per cent. The standard deviation remains small at 28 per cent, which indicates that variations in the annual employment growth rate of enterprises in the private sector are very close to the average. In general, over 98.67 of firm reported positive annual employment growth which indicates that even in the presence of high operational constraints and unfavourable business environment as pointed out by the World Bank, and other development partners, enterprises in Liberia are still able to create jobs.

With regards to the credit-access status of enterprises, our measure shows that about 80.79 per cent of the sample population reported being constrained to some extent to accessing credit as compared to unconstrained firms which represent about 19 per cent. This finding supports assertions that majority of the firms in sub-Saharan African countries are constrained to accessing credit which usually is attributed to poorly functioning and underdeveloped financial markets (Fowowe, 2017; Hategа, 2007; Kauffmann, 2005; IFC, 2006). Also, it is observed that among the top managers of the firms, 82.8 per cent were male with the remaining 17.2 per cent being managed by a female. Also, of the constrained firms, 18 per cent are managed by females, with 81 per cent being managed by males. The result indicates that of the 151 firms surveyed, male-owned or managed firms dominates the sample implying a male-dominated private sector in the country.

The average firm age recorded is approximately 14 years, with a standard deviation of 9.42. This shows a wide variation among the ages of the firms in the data with the minimum and maximum ages recorded being 2 and 57 years, respectively. The majority of the firms surveyed are relatively matured firms, which can be supported by the fact that the average year of establishment for the sample is 2002. The firm age reflects the firms' level of experience, competitiveness and reputation

[10] Note that employment in the context of this study does not include the employee income or quality of the job, it basically captures the annual growth in the number of permanent fulltime employment made available by the firm.

which are all factors that are associated with the firm's knowledge of a particular industry, its ability to easily manoeuvre the market as well as influence its growth.

With over 85 percent of enterprises reporting their financial source as either internal (i.e. retained earnings) or informal (i.e. money lenders, friends and relatives). Moreover, less than 11 percent using credit from formal financial institutions (i.e. microfinance institution and banks), it appears admissible that most of the firm are attesting to being constrained to accessing credit. Findings also show that about 72 per cent of the sample relies on internal financing sources for investment purposes. Bank finance is about 11 per cent while the remaining firms seek financing sources from supplier credit, equity financing and other sources which are usually informal. This realisation reflects not only country-specific realities but also a regional reality as established by Quartey et al. (2017) who established that bank and domestic credit to the private sector as per cent of GDP among fifteen member countries of ECOWAS were significantly low on average. The study found that Liberia's bank credit to the private sector as per cent of GDP in 2010 and 2015 were 14 and 19 per cent respectively.

With over 99 per cent of large firms actively involved in the financial sector by their ownership of bank accounts (savings and checking accounts) and about 61 per cent reporting having a bank loan in the last fiscal year, it is somehow admissible that larger firms are less credit constrained. SMEs on the other end despite being arguably present in the financial market with over 60 and 80 per cent of small and medium firms respectively having a savings or checking account, these figures are not even close to that of their larger counterparts. This finding shows that regardless of their involvement in the banking sector, acquiring bank loans remains a challenge for SMEs. This makes it difficult to conclude on the relationship between the use of financial services and employment

growth as reported by studies such as Alhassan and Sakara (2014) and others. The firm financing sources and use of financial services are summarised and presented in appendices V and VI.

4.3 Diagnostic Test Results

Econometric estimation began with diagnostic checks for potential endogeneity, multicollinearity and heteroscedasticity. A significant rho value of 0.79 from the ETM shows that unobserved factors between the outcome and treatment models are positive and highly correlated, thus indicating the presence of endogeneity and validates the use of the ETM. This positive relationship indicates that unobserved factors that increase firm observed annual employment growth tend to occur with those that increase their likelihood of being constrained to accessing credit. The Wald test of independent equations showed a significant chi-squared value of 6.63, implying that both models are suitable for simultaneous estimation.

The VIF test condition number was 6.35, which is an acceptable level for concerns of multicollinearity. Almost all variables were uncorrelated except some dummy variables measuring the firm's legal status, size categories and the three firm locations (i.e. the dummies for Small and Medium firms, Partnership and Sole Proprietorship, and Margibi and Montserrado counties were highly correlated). The correlated regressors were dropped due to multicollinearity, which hindered the convergence of the maximum-likelihood function. Results from the VIF test and the correlation matrix for the variables are presented in Appendices II and VII.

The Breusch-Pagan/ Cook-Weisberg test for heteroskedasticity could not be performed due to the nature of the ETM; however, heteroscedasticity was tested for by comparing the residuals from both a model with the conventional standard errors and another with robust standard errors. Due to the high variance in the errors observed in the first model, the study used robust standard errors instead to control for possible heteroscedasticity.

4.4 Endogenous Treatment Regression Results

To realise the main objectives of the study, the model first estimates determinants of the firms credit-constrained status and then estimates the average treatment effect (ATE) on the firm's annual employment growth.

The results in Table 4.2 reports a Wald chi-square test value of 47.00 significant at the 1 per cent level. These values suggest that the model as a whole is statistically significant and that it fits significantly better than a model with no regressors. The value also implies that jointly, all the regressors influences the dependents variables within the model. The estimated correlation between the selection-assignment errors and the outcome errors is reported by a positive and significant rho value of 0.79, which is very high. This positive relationship indicates that unobserved factors that increase firm observed annual employment growth tend to occur with those that increase the likelihood of being constrained. Considering that the treatment variable has been interacted with some of the explanatory variables in the outcome model as seen for the regressors (savings account, corruption and firm age), the coefficient for constrained credit access cannot be reported as the average treatment effect. The ATE and ATET, therefore, had to be separately estimated as reported in Table 4.3.

In line with the first objective of this study, the results show that the firm legal status and size dummies capturing shareholding companies and large firms respectively were both significant and negatively associated with being constrained. For instance, being a larger firm or a shareholding company reduces the likelihood of being credit constrained by 1.27 per cent as compared to being a medium-firm, a sole-proprietorships or limited liability company. This phenomenon corroborates the findings of Alhassan and Sakara (2014) and Demirguc-Kunt and Maksimovic (1998) who argued that the firm legal status and size were significant determinants of its ability to assess credit.

Findings from Beck et al. (2005, 2006) that small and medium-sized firms face more significant financing hurdles than larger firms also supports this result. However, the number of full-time employees of the firm is positive and significant at 5 per cent, signifying that an increase in the number of employees increases the likelihood of being constrained to accessing credit.

The firm network (proxied by being part of a formal business association), firm financial history (proxied by having an audited financial statement for the most recent fiscal year) and Regulation (proxied by the number of annual visits by a tax official) were all significant and negatively correlated with the firms credit access status. These finding could imply that formal business associations in Liberia are indeed helping to increase access to credit for member firms. They could also be working toward improving access to information and internal management aspects of member firms, which are also crucial to the firm's productivity. The analysis shows that being part of a formal business association reduces the chances of being credit constrained by 45 per cent. A study by Malesky and Taussig (2009) and Chavez (2017) corroborates these findings suggesting that firms' financial transparency is crucial to credit access.

The negative correlation with having financial history accessible to lenders could also mean that lenders perceives firms that have audited their financial records as more financially responsible and knowledgeable than others and thus reduces their chances of being constrained. Also, the negative correlation between regulation2 and credit access could be justified by the fact that firms that pay higher taxes to the government are more likely to be visited more or summoned by tax officials during the year. This could improve lender knowledge of the business and thus reduce their chances of being constrained.

Also, the results show that firm-specific characteristics including manager experience, manager gender, employees level of education, firm online presence and external support (as proxied by

firm access to external management advice), were not statistically significant in determining their credit access status in Liberia. The saving account dummy, which is a proxy for firm use of the financial sector services was also negative but not statistically significant.

Table 4.2: Endogenous Treatment Regression Results

	Probit/ Treatment Model Coefficients	**Outcome Model Coefficients**
Independent Variables		
	Credit Access Status	**Annual Employment Growth**
Credit Access Status		- 0.3906 **
		(0.1778)
Small	- 0.6003	-0.0018
	(0.3749)	(-0.0580)
Large	- 1.2691 ***	- 0.1289
	(0.4687)	(0.0908)
Shareholding Company	- 0.8558 **	- 0.2086 **
	(0.4081)	(0.0970)
Partnership	0.1265	- 0.0012
	(0.2595)	(0.0630)
Montserrado ct.	0.0077	- 0.0325
	(0.3479)	(0.0474)
Nimba ct.	0.7624	0.10510
	(0.5450)	(0.0736)
Service	- 0.1337	- 0.0687
	(0.2556)	(0.0497)
Manager Experience	- 0.0075	- 0.0020
	(0.0129)	(0.0031)
Manager Gender	0.1036	- 0.0389
	(0.3436)	(0.0730)
Firm Size	0.3025 **	0.0925 *
	(0.1446)	(0.0536)
Savings Account	-0.2944	
	(0.2886)	
Regulation1		0.0034 **
		(0.0015)
Regulation2	- 0.0914 **	- 0.0101
	(0.0372)	(0.0097)
Log of Annual Labor Cost		-0.02926 **
		(0.01576)
Firm Link		- 0.0661
		(0.0499)
Line of Credit		- 0.0747
		(0.0466)
Savings Account (Constrained Firms)		0.0816 *

		(0.0421)
Savings Account (Unconstrained Firms)		0.0744
		(0.1098)
Firm Age (Constrained Firms)		- 0.0042 *
		(0.0022)
Firm Age (Unconstrained Firms)		- 0.0073
		(0.0046)
Corruption (Constrained Firms)		- 0.0048 *
		(0.0022)
Corruption (Unconstrained Firms)		- 0.0044
		(0.0215)
Financial History	- 0.6218 **	
	(0.2924)	
External Support	0.2897	
	(0.2637)	
Employee Level of Education	-0.0033	
	(0.0026)	
Firm Network	- 0.4496 *	
	(0.2569)	
Firm Online	0.4952	
	(0.3333)	
Constant	1.8186 **	
	(0.8421)	
/athrho		1.0632 ***
		(0.4131)
/lnsigma		-1.2510 ***
		(0.22010)
rho		0.7869
		(0.1573)
sigma		0.2837
		(0.0627)
lambda		0.2233
		(0.0905)

Linear regression with endogenous treatment, Estimator: maximum likelihood. Notes: ***, **, and * denote the significance of estimated coefficient at 1, 5, & 10 per cent levels respectively. Log pseudo likelihood = - 60.5710; Obs = 151; Wald chi2 (22) = 47.00; Prob > chi2 = 0.0015 ; Wald test of indep. eqns. (rho = 0): chi2 (1) = 6.63 Prob > chi2 = 0.0101; Robust Standard errors are reported in parenthesis

The firm size category dummies for large and small enterprises both reported negative and insignificant coefficients implying the size category of the firms does not significantly impact their ability to hire or fire employees. The number of employees and the second proxy for government regulation were both significant and positively correlated with employment growth. The

coefficients suggest that increases in the number of permanent full-time employees increase their annual employment growth, which is quite apparent. On the other hand, it is shown by our regulation variable that as the time spent dealing with government business-related regulatory procedures increases so does the level of employment growth of the firm. It is assumed that adhering to proper channels and regulatory proceedings of the state increase the firm's performance in general.

Firm-specific characteristic such as manager gender and experience, business sector and firm location are insignificantly associated with the annual employment growth rate in Liberia. The log of the annual cost of labour, the firm age and corruption (as proxied by the annual per cent of sales revenue given as informal payments) were all statistically significant and negatively associated with the firm annual employment growth. As expected, an increase in the annual cost of labour would discourage managers from taking on more employees, also as the amount of annual informal payments increases; firms are less likely to employ more considering that it adversely affects their annual revenue and profitability. The negative correlation between the firm age and annual employment growth, on the other hand, signifies that as firms grow older, they are less likely to employ more people specifically considering the measure in the study.

By interacting with the treatment variable with the firm age, savings account and corruption in the outcome model, we obtain different coefficients for constrained and unconstrained firms as seen in table 4.2. The coefficients appear to be significant in the case of constrained firms and insignificant for unconstrained firms, but the negative association remains the same in both cases. This finding implies that increases in both the firm age and the level of corruption reduce the chances of employment growth. Having a savings account is also significant and positively

associated with the annual employment growth of constrained firms but insignificant in the case of unconstrained firms.

Table 4.3: Results for the ATE and ATET Estimation

	Contrast	Unconditional Std. Err.	[95% Conf. Interval]
Average Treatment effect (ATE)	-0.3418***	0.1266	- 0.5900 - 0.0936
Average Treatment effect on the Treated (ATET)	-0.3427***	0.1285	- 0.5946 - 0.0908

The average treatment effect of being credit constrained is negative 0.3418, as reported in the above table. This figure reports the counterfactual case for unconstrained firms assuming they were constrained to accessing credit also. The above ATE for the whole population implies that being constrained to accessing credit in Liberia regardless of the current credit access status reduces the likelihood of increasing annual employment growth by 34 per cent. For the sub-sample of constrained firms, it is seen that the ATE and ATET estimates are mostly the same. The average treatment effect for constrained firms is somewhat higher at -0.3427 than the entire population, which stands at -0.3418 — indicating that being constrained to accessing credit in Liberia reduces a firm's annual employment growth rate a bit higher magnitude than when we assume that the entire population is constrained.

CHAPTER FIVE

SUMMARY, CONCLUSION AND POLICY RECOMMENDATIONS

5.1 Introduction

This chapter provides an overall summary and conclusion of the paper, the main results, policy recommendations, and limitations and suggests to the general public additional areas for further studies on this subject.

5.2 Summary

The study empirically investigated the determinants of credit constraints and its effect on the annual employment growth of enterprises in Liberia. Findings established that being credit constrained negatively affects the annual employment growth of firms. It was also established that factors like owning a savings or checking account, being a member of a formal business association, being a large firm or a shareholding company and abiding by government regulations were all likely to reduce the chances of being credit constrained. On the other hand, firms with audited financial records were less likely to be constrained to accessing credit.

The study also found compelling new evidence that the ATE for the whole sample and the sub-population of constrained firms is essentially the same. The average treatment effect of being credit constrained on employment growth is higher but not significantly different from that of the sample population. The ATET supports the counterfactual or an unobserved outcome for unconstrained firms assuming they were constrained to accessing credit. It shows that if an unconstrained firm in the sample population were to be constrained, their employment growth is likely to reduce by 34.18 percent annually.

Specifically, being constrained to assessing credit reduces firm annual employment growth by 34.27 percent annually. Other factors negatively affecting the annual employment growth of firm were firm's age, the annual cost of labour (i.e. annual expenditure on labour) and corruption (proxied by the annual per cent of total sales revenue given as informal payments). All three factors were significant and negatively associated with enterprise employment growth in Liberia.

However, factors such as the firm participation in the banking sector (i.e. having a saving or checking account, etc.) and its ability to follow government regulations were positively associated with the annual employment growth. It is shown that having a savings account and spending more time handling government regulations increases the chances of growth in annual employment by 8 and 0.34 percent, respectively.

It was established that joining a formal business association in Liberia which was a proxy for the firm network, owning a bank account (i.e. savings or checking) and having a proper financial record (i.e. audited financial statement) significantly reduces the chances of being credit constrained as both factors jointly improve the availability of information of the firm. Larger firms and shareholding companies were also among the category of firms with limited chances of being credit constrained. Also, firms that were visited by tax official more often during the year were also found less-likely to be constrained to accessing credit.

Surprisingly, firm-specific characteristic including the manager experience, manager gender, employees level of education, firm online presence and external support (as a proxy by firm access to external management advice), were all insignificant to determining their credit access status in Liberia.

5.3 Conclusion

In conclusion, being credit constrained is a significant impediment to the annual employment growth of firms in Liberia which indicates that firm's expansion in employment is less likely in the presence of constrained credit access. Firms that were more present in the financial market whether through the use of financial products and services were less likely to be constrained to accessing credit thus giving these firms an upper hand to expand in their growth and activities. Firms that operate as a network or as a member of a business association were also found to be less likely constrained to accessing credit.

5.4 Policy Recommendations

To improve and fully exploit the employment potential of small businesses, it is prudent that their access and use of financial credit is improved. From the above findings, the study suggest several essential recommendations regarding policies, practices, and practical approaches towards reducing credit and other constraints faced by SMEs. The proposed recommendations are summarised below.

- The study recommends that enterprises should consider improving their participation in the credit market by saving with banks and regularly auditing financial statement to ensure the accuracy of their financial records. Through this, the chances of acquiring financial credit can be improved. Enhancing the efficiency of SMEs requires that constraints such as credit access be reduced both on the side of the financial institutions and the enterprises involved.
- Policymakers should also consider enhancing the availability of low-cost financing mechanisms as well as research & development and innovation support to SMEs owners.
- Gaining membership into a formal business association also reduces the financing constraints of SMEs. Thus, it is recommended that the government and its development

partners facilitate the establishment of formal business associations and small business incubator programs to support SMEs and the financial sector. Considering the high presence of information asymmetry within the credit market, these formal business association should aids in the collection of regular and accurate performance data on both the internal and external operations of member firms thereby making much-needed information available to lenders and potential investors.

- Considering the size of domestic enterprises, it is recommended that firms mainly SMEs operate as a network. By operating as a network or as an association, the risks of adverse selection, moral hazard and credit defaults are significantly reduced. Such policies if adequately planned and implemented could also encourage the use of data-informed decision making in the daily operations of firms and the financial institutions, thus enhancing their efficiency and contribution to employment, innovation and economic growth.

By adopting the above recommendations as suggested, policy-makers could significantly contribute to the improvement of access to information for enterprises and financial institutions, thus enabling the smooth and effective operation of both institutions in the economy.

5.5 Limitations

The findings presented in the previous chapter are subjected to several limitations. The following restrictions were observed during the study. The unavailability of firm-level longitudinal data was a significant limitation of this study. The growth process is an economic phenomenon that should be studied over time, which allow the researcher to investigate in real-time.

Several other limitations also restricted the study. For instance, the limited country-specific studies on firm access to credit and employment growth in Liberia restricted the researcher to rely solely

on studies from other countries for insights. The secondary dataset used for the analysis also presented some restrictions. From the sample size to the exclusion of micro firms and the exclusion of critical sectors including the informal and the agriculture sectors, these restrictions limit the inferences of the analysis to only formal enterprises excluding all firm from the agriculture and the informal sectors which are two of the most significant sectors in Liberia. Despite these limitations, findings from this study remain relevant to private sector advancement and the policy concerns for sustainable SMEs performance and growth.

5.6 Areas for further research

This study looked primarily at the demand side of the finance and small enterprise growth debate, and this limits its ability to provide a well-rounded policy recommendation that incorporates both the demand and supply perspective of the subject. This gap provides the opportunity for more research on issues like factors affecting the supply of credit by financial institutions and credit provider to the private sector. Also, the primary outcome variable for this study only investigates the employment aspect of enterprises which does not provide insights into other performance indicators of the firm. With the unavailability of many of such studies on Liberia, researchers can make use of this opportunity by investigating further into factor affecting enterprise growth and development using a host of different performance indicators (i.e. sales growth, value-added, profits, innovation, etc.), and constraint measures (i.e. electricity, crime, transportation, etc.) to provide extensive insights into the domestic business environment beyond what is currently available. A lengthy panel study on this topic and other closely related topics would also offer compelling new empirical insights on the performance of the private sector over time. Open and available firm-level and business environment microdata can be acquired on the websites of institutions like the World Bank, IMF and others.

The limitation of the dataset to two sectors and three categories of firms also limits our understanding to the two industries and business types covered under the survey leaving a massive gap in available knowledge. These excluded factors present an avenue for studies of similar nature incorporating the agriculture sector and firms that falls within the micro-enterprise category. Also, the informal sector represents another untapped area with limited evidence, but this is usually as a result of limited data. However, conducting a study of this nature on firms within the informal sector would greatly enrich the available literature providing both private and public institutions with the knowledge needed to implement smart policies and stimulate growth.

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APPENDICES

APPENDIX I: Summary of the Sample by Strata (Region, Size and Industry)

	Size	Manufacturing	Service	Total	Grand Total
Montserrado	Small	27	40	67	
	Medium	18	7	25	
	Large	4	10	14	
	Total	49	57		106
Margibi	Small	0	7	7	
	Small & Medium	21	0	21	
	Medium & Large	0	3	3	
	Total	21	10		31
Nimba	Small	5	4	9	
	Medium	1	0	1	
	Medium & Large	0	4	4	
	Total	6	8		14
Industry Total		76	75		n = 151

Source: World Bank and Liberia Business Registry

APPENDIX II: VIF Collinearity Diagnostic Test Results

Variable	VIF	SQRT-VIF	Tolerance	R-Squared	Eigenvalue	Cond. Index
Credit Access Status	1.22	1.1	0.82	0.18	3.4571	1.0
SME Category	6.28	2.51	0.1592	0.8408	1.8739	1.3583
Legal_Status	1.25	1.12	0.801	0.199	1.7086	1.4225
Firm Region	1.54	1.24	0.6514	0.3486	1.5074	1.5144
Firm Industry	1.14	1.07	0.8752	0.1248	1.481	1.5279
Firm Size	6.0	2.45	0.1666	0.8334	1.2531	1.661
Firm Age	2.05	1.43	0.4881	0.5119	1.1329	1.7469
Manager Gender	1.14	1.07	0.8773	0.1227	0.9676	1.8902
Manager Experience	2.25	1.5	0.4436	0.5564	0.9588	1.8988
Firm Network	1.37	1.17	0.7323	0.2677	0.767	2.1231
Financial History	1.69	1.3	0.5911	0.4089	0.7378	2.1647
Savings Account	1.3	1.14	0.7669	0.2331	0.6919	2.2353
Employees Education	1.52	1.23	0.6563	0.3437	0.6517	2.3032
Firm Link	1.36	1.16	0.7375	0.2625	0.6296	2.3433
External Support	1.4	1.18	0.7136	0.2864	0.5651	2.4735
Line of Credit	1.27	1.12	0.7905	0.2095	0.481	2.6808
Regulation1	1.48	1.22	0.6752	0.3248	0.4325	2.8271
Regulation2	1.25	1.12	0.7976	0.2024	0.3557	3.1175
Corruption	1.39	1.18	0.7204	0.2796	0.2615	3.6363
Total Annual Labor Cost	1.27	1.13	0.7875	0.2125	0.0859	6.345
Eigenvalues & Cond Index computed from deviation sscp (no intercept) Det (correlation matrix) 0.0049						
Mean VIF	1.91					
Condition Number	6.345					

APPENDIX III: Average treatment effect

By estimating the average treatment effect (ATE) from an endogenous treatment regression, researchers are able to obtain the mean-variance of the constrained and unconstrained potential outcomes. That is, the ATE provides the average effect on the whole population assuming all firms are constrained. The ATE is expressed as;

$$E(EG_{i1} - EG_{i2}) = E\{E(EG_{i1} - EG_{i2}|X_i, \epsilon_{i0}, \epsilon_{i1})\} \quad \text{(3.16)}$$

$$E(EG_{i1} - EG_{i2}) = E(X_i\beta_1 + \epsilon_{i1} - X_i\beta_0 + \epsilon_{i0}) \quad \text{(3.17)}$$

$$E(EG_{i1} - EG_{i2}) = E\{X_i(\beta_1 - \beta_0)\} \quad \text{(3.18)}$$

The above expectation equation is only estimable as a predictive margin when $X_i(\beta_1 - \beta_0)$ varies in X_i . If not, the average effect is predictable as the coefficient of C_i in the growth model.

APPENDIX IV: Average treatment effect on the treated

The ATET is the same as the ATE, but it applies only to the treated group and not the entire population. It measures the mean-variance for the subpopulation of constrained firms and the potential control outcomes on the constrained population. The conditional mean of the potential outcomes EG_{i1}, EG_{i2} when $C \in (0.1)$ for independent variables X_i and treatment variable W_i at treatment $C_i = 1$ are

$$E(EG_i|X_i, W_i, C_i = 1) = X_i\beta_i + \sigma_i\rho_i\emptyset(W_i\delta)/\Phi(W_i\delta) \quad \text{(3.19)}$$

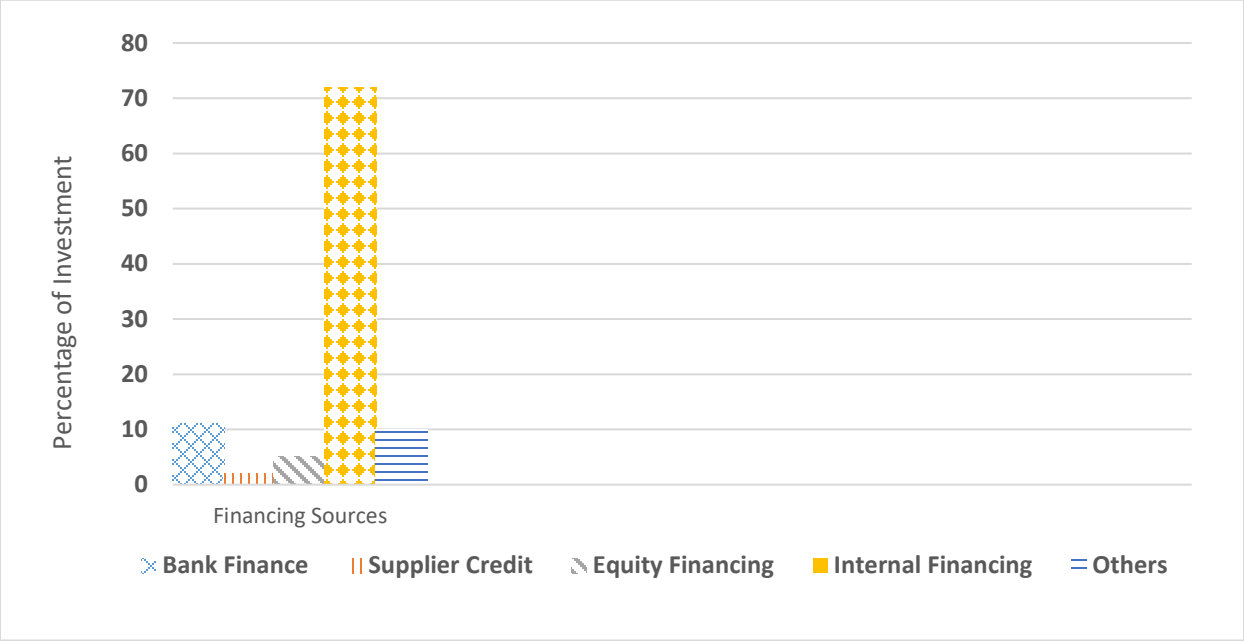
The ATET is then given as,

$$E(EG_{i1} - EG_{i0}|\ C_i = 1) = E\{E(EG_{i1} - EG_{i0}|X_i, W_i, C_i = 1)\} \quad \text{(3.20)}$$

$$E(EG_{i1} - EG_{i0}|\ C_i = 1) = E\{X_i(\beta_1 - \beta_0) + (\sigma_1\rho_1 - \sigma_0\rho_0)\emptyset(W_i\delta)/\Phi(W_i\delta)|C_i = 1\} \quad \text{(3.21)}$$

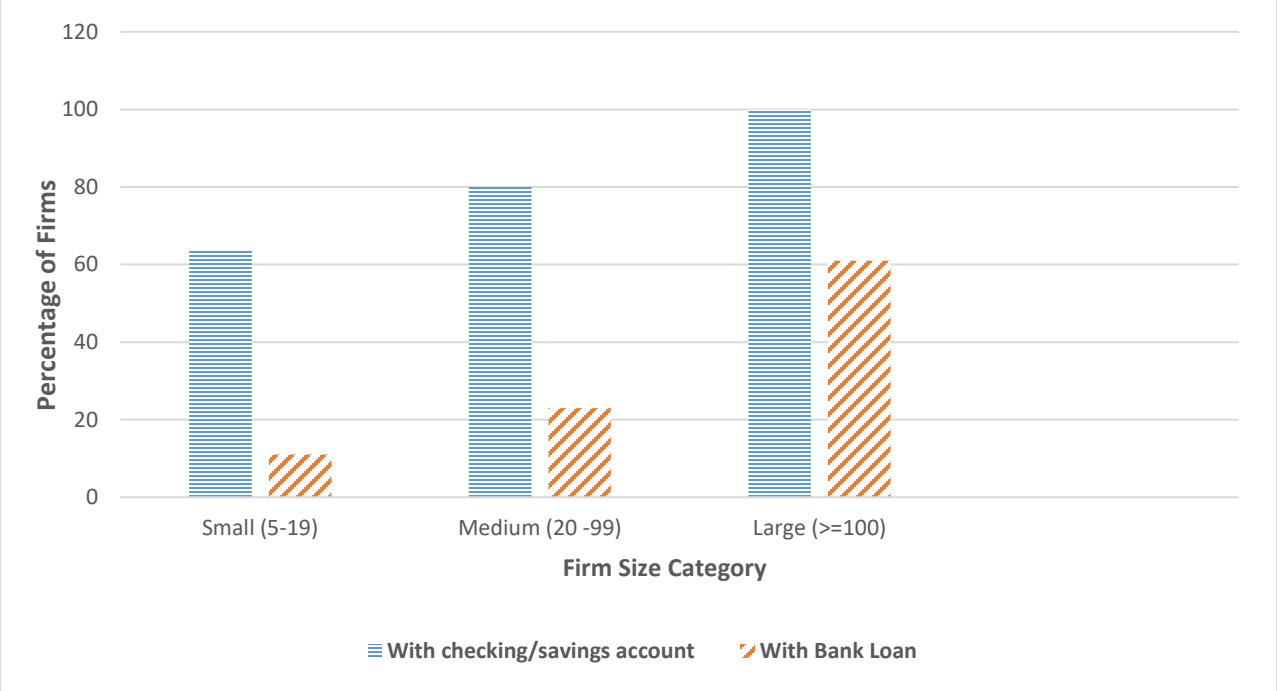
Equation (3.20) can be estimated as an analytical margin on the constrained group when $X_i(\beta_1 - \beta_0)$ varies in X_i or when the variance and coefficients are different for each treatment group. Otherwise, the ATET is calculated as the parameter of C_i in the potential outcome model.

APPENDIX V: Sources of Credit for Investment



Source: Author's computation based on the 2017 LES data and Liberia 2017 Country Profile report

APPENDIX VI: Firms use of financial services



Source: Author's computation based on the 2017 LES manufacturing sector data

APPENDIX VII: Pairwise Correlation Matrix

0	Credit Ac	Small	Medium	Large	Sharehol	Sole Proj	Partnersl	Montserr	Margibi	Nimba	Manufac	Service Ir	Firm Size	Firm Age	Manager	Manager	Firm Netv	Financial	Savings /	Employe	Firm Link	External S	Line of Cr	Regulatic	Regulatic	Corruptio	Total Annu
Credit Access Sta	1.0000																										
Small	-0.0010	1.0000																									
Medium	0.0951	-0.7867	1.0000																								
Large	-0.1340	-0.4755	-0.1691	1.0000																							
Shareholding Firm	-0.1675	-0.0669	0.0816	-0.0095	1.0000																						
Sole Proprietorshi	0.0712	0.1847	-0.1171	-0.1279	-0.3773	1.0000																					
Partnership	0.0236	-0.1562	0.0759	0.1412	-0.1914	-0.8367	1.0000																				
Montserrado	-0.1401	-0.1653	0.0367	0.2116	0.0349	-0.2186	0.2110	1.0000																			
Margibi	0.0951	0.2171	-0.1246	-0.1691	-0.0369	0.1143	-0.0993	-0.7990	1.0000																		
Nimba	0.0897	-0.0486	0.1233	-0.0981	-0.0029	0.1903	-0.2000	-0.4637	-0.1623	1.0000																	
Manufacturing Inc	0.0537	0.0188	0.0766	-0.1391	-0.0999	-0.0632	0.1260	-0.1395	0.2048	-0.0729	1.0000																
Service Industry	-0.0537	-0.0188	-0.0766	0.1391	0.0999	0.0632	-0.1260	0.1395	-0.2048	0.0729	-1.0000	1.0000															
Firm Size	-0.0898	-0.3042	0.0958	0.3491	0.1836	-0.2733	0.1810	0.3287	-0.2582	-0.1588	0.0055	-0.0055	1.0000														
Firm Age	-0.0291	-0.0118	0.0154	-0.0031	0.2082	-0.0975	-0.0197	0.0478	-0.0241	-0.0429	-0.0229	0.0229	0.2337	1.0000													
Manager Gender	0.0888	-0.0344	0.0559	-0.0248	-0.1340	0.0657	0.0097	0.0732	-0.0714	-0.0149	-0.0030	0.0030	-0.0023	-0.0957	1.0000												
Manager Experier	0.0131	0.0606	-0.0859	0.0257	0.0605	-0.1301	0.1021	0.0430	-0.0122	-0.0526	0.0998	-0.0998	0.2390	0.6350	-0.1369	1.0000											
Firm Network	-0.1706	-0.0315	-0.0058	0.0585	0.0308	-0.1191	0.1080	0.1979	-0.0058	-0.3162	0.1057	-0.1057	0.2542	0.0973	0.0287	0.1600	1.0000										
Financial History	-0.2099	-0.3912	0.3816	0.0808	0.2763	-0.2954	0.1497	0.0999	-0.1143	0.0045	-0.0735	0.0735	0.2913	0.1912	-0.0657	0.0143	0.1788	1.0000									
Savings Account	-0.1086	-0.2496	0.1787	0.1438	0.1794	-0.1990	0.1048	0.1136	-0.1095	-0.0250	-0.0704	0.0704	0.2590	0.0726	0.0812	-0.1093	0.0580	0.3218	1.0000								
Employees Educa	-0.1114	-0.0830	0.0848	0.0116	0.1612	-0.0665	-0.0248	-0.0036	-0.2232	0.3347	-0.1601	0.1601	0.2698	-0.0064	-0.0984	0.0758	-0.1458	0.1792	0.1753	1.0000							
Firm Link	-0.0712	-0.2051	0.1563	0.1047	0.1478	-0.3557	0.2896	-0.0654	0.0552	0.0260	-0.0327	0.0327	0.1469	-0.0431	-0.1090	-0.1491	0.1066	0.3557	0.1918	0.0320	1.0000						
External Support	0.0034	-0.0113	0.0400	-0.0389	0.0493	-0.2277	0.2122	0.2099	-0.1225	-0.1639	0.1153	-0.1153	0.2791	0.1076	0.0410	0.1522	0.3164	0.2831	0.1844	0.0535	0.0651	1.0000					
Line of Credit	0.0060	-0.1414	0.1571	0.0019	0.1472	-0.0642	-0.0190	-0.0089	-0.1174	0.1875	0.0614	-0.0614	0.2284	0.1202	-0.0219	0.0961	0.0544	0.2982	0.2073	0.0959	0.1357	0.1856	1.0000				
Regulation1	0.0922	-0.2535	0.3253	-0.0589	0.2660	-0.2010	0.0557	0.1402	-0.1036	-0.0773	-0.0780	0.0780	0.1020	0.1801	0.0434	0.0954	0.0420	0.2343	0.0449	0.0806	0.0548	0.2337	0.2439	1.0000			
Regulation2	-0.2419	-0.0802	0.1188	-0.0412	0.0486	-0.0402	0.0139	0.2779	-0.2772	-0.0477	-0.0465	0.0465	0.1241	0.1417	-0.1607	0.0374	0.0777	0.2419	0.0344	0.1313	0.0218	0.1824	0.0043	0.0497	1.0000		
Corroption	0.1710	-0.1280	0.0854	0.0826	-0.1140	-0.0539	0.1246	0.1439	-0.0752	-0.1253	0.0789	-0.0789	0.0527	-0.0878	-0.0209	-0.0525	0.1592	-0.1198	-0.0688	-0.1403	0.0231	0.1192	0.0630	0.3379	-0.0629	1.0000	
Total Annual Labc	-0.0528	-0.0548	-0.1474	0.2974	0.0909	-0.0498	-0.0009	0.1563	-0.1081	-0.0971	-0.1275	0.1275	0.3840	0.0262	-0.0699	0.0420	0.0306	0.0790	0.1493	0.2553	0.0153	0.0299	0.0460	0.0042	0.0279	0.0130	1.0000