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IMPACT OF VENTURE CAPITAL FINANCING ON SMEs'
GROWTH AND DEVELOPMENT IN GHANA

A thesis submitted in partial fulfillment of the
requirements for the degree of Doctor
of Philosophy in Finance

at

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by

Christian Opoku Biney

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Abstract

Abstract of a thesis submitted in partial fulfillment of the requirement for the degree of
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By

Christian Opoku Biney

SMEs' contributions to economic development both in developing and developed countries have been well documented in the economic literature. SMEs have been acknowledged as a catalyst for economic development. Furthermore, SMEs are the main engine for employment creation, economic growth, innovation, poverty alleviation and income distribution in both developed and developing countries.

Most economic and management literature has documented empirical studies on the impact and drivers of venture capital financing in developed countries such as the US and Europe, but few empirical studies exist on developing countries, especially Ghana. This is because the industry is new and also due to the lack of data. Thus, this study investigates the impact of venture capital financing on SMEs' growth and development in Ghana. The study also examines the factors that drive venture capital investments activity in Ghana, and identifies the factors which influence SME owners' accessibility to venture capital financing in Ghana.

The study applied both propensity score matching (PSM) and difference-in-difference (DiD) estimation techniques to determine the effects of venture capital financing on SMEs' growth

and development in Ghana. The, result shows a positive and significant correlation between venture capital financing and SMEs' growth in the context of employment and sales in Ghana. The study used panel data analysis to examine the factors, which drive venture capital investments activity in Ghana. The results suggest that GDP growth rate, labour market rigidities, capital gains taxes and institutional quality are the key drivers of the venture capital industry in Ghana. Next, we also applied a logit regression model to identify and analyse the factors which influence SME owners' accessibility to venture capital financing in Ghana. Our findings show that SME owner/managers' socio-demographic factors and macroeconomic variables such as gender, education, geographical location, business plan, social networks and interest rate charges influence SME owner/managers' ability to obtain venture capital financing.

Key Words: Small and Medium-Sized Enterprises, Venture Capital Financing, Accessibility, Entrepreneurs, Financing.

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Abbreviations

ABS	Australia Bureau of Statistics
AGI	Association of Ghana Industries
AMA	Accra Metropolitan Area
ATT	Average Treatment Effect on Treated
BOG	Bank of Ghana
BVCA	British Venture Capital Association
CDC	Commonwealth Development Corporation
CEE	Central and Eastern Europe
CIA	Conditional Independence Assumptions
DAC	Development Assistance Commission
DCF	Discount Cashflow
DD	Double Difference
DiD	Difference-in-Differences
DIFD	UK Development of International Development
EC	European Commission
EDAIF	Export Development and Agricultural Investment Fund
EES	European Evaluation Society
EIU	Economic Intelligence Unit
EU	European Union
EVC	European Venture Capital Association
FEM	Fixed Effect Model
FINSAP	Structural Adjustment Programme on Financial Institutions
FTSE	Financial Times-Stock Exchange
GAO	General Accounting Office
GCF	Gross Capital Formation
GDP	Gross Domestic Product
GSS	Ghana Statistical Service

Abbreviations

GMM	Generalised Method of Moment
IPO(s)	Initial Public Offering(s)
IV	Instrumental Variable
KM	Kernel Matching
LRM	Logit Regression Model
MFP	Multi-factor Productivity
MMDAs	Metropolitan and Municipal Assemblies
MOSLOC	Micro-finance and Loan Centre
NBSSI	National Board for Small Scale Industries
NNM	Nearest Neighbour Matching
NPV	Net Present Value
NVCA	National Venture Capital Association
OECD	Organization for Economic Cooperation and Development
OLS	Ordinary Least Square
PE	Private Equity
POLS	Pooled Ordinary Least Square
PSM	Propensity Score Matching
REM	Random Effects Model
RDD	Regression Discontinuity Design
R&D	Research and Development Expenditure

Abbreviations

SBA	Small Business Administration
SME(s)	Small and Medium Sized Enterprise(s)
SSA	Sub-Sahara Africa
TMA	Tema Metropolitan Area
TOR	Tema Oil Refinery
UNCTAD	United Nations Commission on Trade and Development
UNECA	United Nations Economic Commission on Africa
UNIDO	United Nations Industrial Development Organization
USAID	United States Agency for International Development
USITC	United States International Trade Commission
UK	United Kingdom
US	United States
VALCO	Volta Aluminium Company Limited
VAT	Value-Added Tax
VC	Venture Capital
VCs	Venture Capitalists
VCF	Venture Capital Financing
VCTF	Venture Capital Trust Fund
VIF	Variance Inflation Factor
YES	Youth Enterprise Scheme

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Chapter 1

Introduction

1.1 Research background

Most governments have acknowledged the significant effect of small-sized enterprises on economic development. It has been well documented in the economic literature that SMEs are a catalyst for economic development (Sanusi, 2003). SMEs' growth has attracted considerable interest among policymakers, development experts, entrepreneurs, financial institutions, venture capital firms, and NGOs (Baker, 1992). Tambunan (2008) states that SMEs perform a vital role in national development in the area of employment generation and GDP growth, in both developed and developing countries. Similarly, Qureshi (2011) states that SMEs make considerable contributions toward GDP, income generation, tax contributions, fostering innovations, job creation, increasing revenue, enhancing human capital, alleviating poverty, and improving the living standards and quality of life in a nation.

Tucker and Lean (2003) have documented that small businesses often have difficulties in obtaining funding from financial institutions to expand on their fixed assets and working capital. As pointed out by Blanton and Dorman (1994), SMEs are often undercapitalized. In other words, requirements for loans approval for SMEs are not met, and even when SMEs do receive loans, usually they are short-term. Hence, SMEs have no alternative but to depend on credit from friends as well as family members to finance their long-term requirements, for example, the procurement of new equipment (Riding and Short, 1987). Using data from ten thousand firms in eighty countries, Beck et al., (2006) show that the likelihood that a business has financial constraints is 39 percent for small enterprises, 38 percent for medium-scale enterprises and 29 percent for large enterprises. Also, small enterprises spend on average less

than 13 percent of their investments using external finance compared to large enterprises. Beck et al. (2005) show that small enterprises' inability to obtain external finance is a significant obstacle to their growth.

Aryeetey (2008) argues that in Ghana, notwithstanding the significant role SMEs perform in the social development of the country, the sector continues to be afflicted with countless challenges. These include harsh government policies, inadequate financial support, high operational costs, lack of explicit government assistance, and the problem of obtaining credit from banks and formal financial institutions. The primary challenge which SMEs face that impedes many entrepreneurs from success is the issue of finance (UNCTAD, 1995, 2001; SBA, 2000).

The existing literature recognizes a gap in financial support for SMEs in Ghana. For instance, Abor and Biekpe (2006) assert that obtaining finance is a significant obstacle facing Ghanaian SMEs. Furthermore, according to a study conducted by Aryeetey et al. (1994) 38% of Ghanaian SMEs listed credit as a critical impediment to their development. Aryeetey (1998) claims that in Ghana over half of the micro-enterprises which apply for loans are likely to be rejected and only half of the small enterprises which apply for formal finance such as loans from banks are likely to be considered. In Ghana, it has often been acknowledged that high risk linked with lending to SMEs, high-interest rates, guarantee requirements and burdensome procedures are impediments to SMEs obtaining loans from banks (Aryeetey et al. 1994, Bigsten et al. 2000, Buatsi 2000 Sowa et al. 1992).

1.1.1 SME Definitions

There is no single universally accepted definition of a small firm (Storey1994). There are differences in the levels of firms' capitalization, sales, and employment. Consequently, establishing classification gauges on size, i.e., the number of employees, profit, revenue or

the net value that may be pertinent to a sector, may result in every firm being categorized as small, whereas the similar size description once used for a different sector might not result in the same outcome. The Bolton Committee (1971) made an effort to propose a working definition based on an “economic” and a “statistical” classification. A firm is considered to be small under the “economic condition” provided it meets the following three conditions:

- The market place share is relatively small.
- The owners or partial owners must manage it informally, and not through a formal management structure.
- It should not be part of a larger enterprise, managed independently.

The following guidelines were delineated by the Bolton Committee (1971) under the “statistical” definition:

- The small firms’ size and their impact on export, employment, and economic growth.
- The level at which small firms’ economic contributions has altered over a period.
- The statistical definition is adopted cross-country in contrast to the economic contribution of the small firms.

There were shortcomings in the Bolton Committee’s (1971) report over the definitions given to small firms. Various meanings were used by the Bolton Committee to differentiate small firms in different sectors and while the staff number is used as a yardstick to describe manufacturing firms and the construction and mining sector, businesses such as the road transport sector are characterized as small provided they consist of five or fewer vehicles. However, there were objections to the Bolton Committee definitions because of the discrepancies in defining small firm characteristics.

An SME is defined as a firm with an upper limit of 300 staff, \$15 million annual revenue and an assets value of \$15 million. On the other hand, SMEs, as defined by the Inter-American Development Bank, are firms which have a maximum of 100 workers and revenue of less than \$3 million (World Bank, 2009). SMEs in Japan are described as manufacturing firms with ¥100 million paid-up capital and a labour force of 300, along with retail firms and those in the services sector with ¥10 million paid-up capital and a labour force of 50 (Grey et al., 2006). Natarajan & Wyrick (2011) state SMEs in Canada and the US are defined as enterprises with employees numbering fewer than 500. The US Small Business Administration (SBA, 2004) states that an SME employs fewer than 500 persons. According to the European Commission definition, SMEs are firms with 250 employees or fewer, yearly revenue not higher than €50 million and a yearly overall balance sheet not more significant than €43 million (EC, 2009). Tables 1.1, 1.2 and 1.3 illustrate the different definitions of SMEs by various institutions.

Table 1.1: Small firm definitions by the Bolton Committee (1971)

Sector	Definition
Manufacturing	200 personnel/ less
Construction	25 personnel/ less
Mining & Quarrying	25 personnel/ less
Retailing	Turnover of £50,000 or less
Miscellaneous	Turnover of £50,000 or less
Services	Turnover of £50,000 or less
Motor Trade	Turnover of £100,000 or less
Wholesale Trade	£200,000 or less
Road Transport	Five vehicles or fewer
Catering	All excluding multiples and brewery-managed houses

Source: The Bolton Committee (1971, p.3)

Table 1.2: SME definition by the European Commission.

Enterprise Classification	Staff Headcount	Turnover	Balance Sheet Total
Medium-Sized	< 250	≤ €50 million	≤ €43 million
Small	< 50	≤ €10 million	≤ €10 million
Micro	< 10	≤ €2million	≤ €2 million

(Source: European Commission, 2009)

Table 1.3: SME definitions by Multilateral Institutions.

Institution	Maximum number of employees	Maximum Revenue or Turnover (\$)	Maximum Assets (\$)
World Bank	300	\$15,000	\$15,000
IMF-IADB	100	\$3,000,000	None
African Development Bank	50	None	None
Asian Development Bank	No Official definition. Uses only individual definitions by national governments.		
UNDP	200	None	None

Source: Gibson, & van der Vaart (2008, p.5)

1.1.2 Contribution of SMEs to Developed and Developing Countries

SMEs are regarded as the foundation of the growth of large companies and vital for commerce and industry (Storey and Westhead, 1994). Also, small businesses are acknowledged as central hubs for large-scale industries (Fabayo, 2009). The promotion of the SME sector is a fundamental element to promote employment, economic growth, and poverty alleviation (Ayyagari et al., 2007). SMEs are vital in most developed and developing countries' economies. It is acknowledged that they significantly account for the development of the Ghanaian economy through GDP growth, and employment generation, efficiency, and innovation (Mahmoud, 2011; Abor & Quartey, 2010; Kayanula & Quartey 2000; Aryeetey et al. 1994). SMEs contribute to 95% of all enterprises in the world and constitute 66% of overall employment as well as 55% of aggregate production (OECD, 2004). OECD statistics show that in advanced countries SMEs are the primary job providers in the private sector. Previous studies indicate that SMEs make a 55% contribution to GDP and more than 65% of aggregate jobs to high-income countries. SMEs, which are unorganized firms, contribute 60% of economic growth and more than 70% of the aggregate workforce to low-income countries, and an approximately 70% of the economic growth and 75% of the aggregate workforce of middle income countries (Fida, 2008).

In the developed economies, Japan has the highest share of SMEs, accounting for 99% of all total enterprises (EIU, 2010). According to the US International Trade Commission (2012), the US economy is based on the presence of SMEs, which contribute 50-70% to the country's GDP through employment creation and self-dependency. The Annual Report on EU SMEs (2012/2013) shows that in 2012 European SMEs accounted for 66.5% of employment and over €3.4 trillion value added to the current price, compared to the €5.9 trillion that is the total value added generated by the private non-financial sector.

Mead and Liedholm (1998) show that SMEs in the US contributed 80 percent to the creation of all new jobs. In Northern Ireland and the UK, the private sector constitutes 56% of SMEs and 48% of jobs, respectively (Buckland and Greer, 1997). SMEs constitute 98% of all private sector businesses in the Netherlands, accounting for 31.6 % of GDP and employing 55% of the total workforce (Indarti & Langenberg, 2004; EIM Business & Policy Research, 1999). Small businesses create almost 97% of all businesses in the private sector and 51% of private sector jobs in Australia (ABS, 1996; Wijewardena & Tibbits, 1999). SMEs in Italy contribute \$35 million to exports and employ 2.2 million of the country's labour force (Indarti & Langenberg, 2004; Patrianila, 2003).

The role of SMEs has become more crucial in developing countries as they have the prospect of improving the distribution of incomes, creating jobs, alleviating poverty and promoting export growth. They have also led to entrepreneurship development as well as industry, and rural development. Beck et al., (2005) found a significant share or percentage of SMEs contributes to the creation of jobs, and Liedholm and Mead (1999) and the World Bank (2004) state that the contribution has been rising especially in less-developed countries. Stein et al. (2010) emphasized that SMEs in less-developed countries account for 45% of employment and 33% of GDP. Theoretically, the labour force engaged in small businesses (excluding medium-sized enterprises) is 25% in less-developed countries (Elkam, 1998).

Ayyagari et al. (2011) showed that, across developing countries, the most significant contributors to the total workforce are SMEs and they account for 71% of the workforce in the region which represents the most significant share of the labour force. Not only do SMEs contribute to the employment of a dominant number of people, but they also create most new jobs. China's increasing economic growth is attributed to SMEs (Liu, 2008). The author claims that SMEs account for over 99% of all enterprises in China. At least 60% of the country's GDP

is from SMEs, which create more than 82% of jobs in China. The backbone of the Indian economy has been SMEs which hire nearly 40% of the Indian labour force and contribute 45% to the Indian manufacturing output (Raju and Gopal, 2006). SMEs contribute significantly to the creation of millions of jobs, mainly those requiring low-level skills. Almost 1.3 million small businesses in India account for 40% of total exports and contribute 17% to the GDP (The Economic Times, 2013). In Malaysia SMEs contribute 56.4% to job opportunities, 32% to GDP, and 19% to exports (Omar, Arokiasamy & Ismail, 2009). An OECD report (2004-2005) indicates that in Bangladesh, 99% of firms are enterprises with fewer than 100 employees and create 58% of jobs. Furthermore, 99% of wholly private businesses in Ecuador have no more than 50 employees and contribute 55% of jobs.

In Africa, the informal and private sector which is essential for economic growth is dominated by SMEs. For example, they constitute about 90% of businesses and account for more than 60% of employment on the Continent (OECD, 2004). In the private sector, SMEs account for 90% of commerce and provide over 50% of the labour force and economic growth in several countries in Africa (UNIDO, 1999).

For instance, in Morocco, SMEs constitute about 93% of industrial firms, which contribute 38% to production, 33% to investment and 30% to exports. The contribution of SMEs in South Africa is significantly higher as they constitute approximately 91% of formal businesses, and contribute 52–57% to economic growth as well as providing 61% of jobs (Hassbroeck, 1996; Berry et al., 2002).

1.1.3 SMEs in Ghana

In rural and urban areas in Ghana, SMEs are the catalyst for economic development. The impact of the SME sector on the country's development regarding job creation, wealth creation as well as mitigation of poverty cannot be overlooked. Most businesses in Ghana are in the SME sector. According to Mensah (2004), Registrar General Department records showed that

about 90% of businesses registered in Ghana are SMEs. There are various definitions for Ghanaian SMEs, but generally, the standard used is the number of persons hired by an enterprise (Kayanula and Quartey, 2000). Misunderstanding frequently arises when these definitions are applied, based on the uncertainty and limits used by officialdom.

Small-Scale Enterprises are defined by the Statistical Service of Ghana (GSS) as businesses with fewer than ten workers and medium-scale businesses as firms with more than ten workers and large-scale enterprises are firms with hundred or more workers. Another measure to describe SMEs is the firm's fixed assets value. NBSSI (1999) describes SMEs as firms that hire between 1-5 workers and with fixed assets of not more than \$10,000, excluding land and buildings, as a micro-enterprise. Small enterprises are firms that hire about 6-29 workers and with fixed assets of not more than \$100,000, with land and buildings excluded. NBSSI categorizes SMEs as follows: firms that employ a workforce of fewer than five are described as a micro-enterprise; firms with a 6 - 29 workforce as small enterprises and firms with 30-99 workers as medium enterprises, while large enterprises are firms with a workforce of 100 and more. However, using fixed assets to define SMEs has been criticized (Kayanula and Quartey, 2000) since the continuing decline of the Cedi currency against the main foreign currencies in Ghana usually renders SME descriptions obsolete. Osei et al. (1993) and Steel and Webster (1991) used an upper-limit of 30 employees to describe SMEs. Osei et al. (1993) classified SMEs into three different groups: (a) micro-enterprises as firms employing fewer than six persons, (b) very-small enterprises as firms employing between six and nine people and (c) small enterprises as firms employing between ten and twenty-nine people (Teal, 2002).

Venture Capital Fund Law (Act 680, 2004) defined an SME as an industry, project, undertaking or economic activity, that hires not more than 100 people with a total asset base, excluding land and buildings of not more than the equivalent of \$1million in value. Boon (1989) argues that

the size of an enterprise's employment is the most significant criterion used to define SMEs in Ghana.

1.1.4 SMEs' Characteristics in Ghana

SMEs in Ghana are grouped into rural and urban enterprises. The urban enterprises are sub-grouped into formal (organized) and informal (unorganized) enterprises. The formal sector has employees who are paid and with a registered office, while the informal sector comprises craftspersons who operate in open spaces, in provisional wooden edifices, or at home (Kayanula and Quartey 2000). They hire few people, or in some circumstances, the staff do not earn salaries. SMEs depend on relatives or trainees as the staff. Rural enterprises usually comprise family groups, individual craftspersons, and women who deal with local food crop production. The principal activities they undertake in this sector are fabrics, textiles, clothing, and tailoring, the making of soaps and detergents. Others include ceramics, timber, and mining, village blacksmithing, tin-smithing, blocks and cement making, processing of food, bakeries, beverages, wood-furniture, assembling of electronics, agro-processing, chemical products and mechanics (Osei et al., 1993; Kayanula, 2000; UNECA,2010).

Several of the SMEs are feminine-oriented businesses that are home-based compared to the masculine-oriented businesses. They operate from homes and are mostly not considered in official records. This kind of business influences their chances of obtaining funding from credit schemes that are planned with minor attention to the requirements of female-owned businesses. Thus, female entrepreneurs often feel that they are not bankable with these credit arrangements, as the managerial costs connected with the arrangements always offset the benefits. Women are commonly engaged in sole-ownership trades, which are mostly micro-enterprises, and for that reason, they do not have the required collateral to be eligible for credits (Aryeetey et al., 1994; Abor and Quartey 2006).

As in any developing country, SMEs in Ghana are located in both the formal and informal sectors, and the majority are in the informal sector. SMEs in the formal sector in Ghana are registered officially with the Registrar General Division and hence pay taxes, whereas small businesses in the informal sector are unregistered and evade taxes. The informal sector comprises proprietary micro and small businesses which include producers, wholesalers, retailers, and consumers (Abor and Quartey, 2006).

SMEs in Ghana usually have fewer employees who are usually the owners' relations; hence, there is usually no distinction between ownership and control. Most of the small businesses are independent of public funds; hence, there is no accountability and no rules and compliance (Gockel and Akonea, 2002).

Another characteristic of the SME sector in Ghana is that participants have a low level of education and training and the sector is mostly made up of people who are self-employed. They are mainly family-oriented businesses, and there is no distinction between business finances and those in the personal accounts of owners. A distinctive feature of SMEs in Ghana is defined as follows:

- The majority of SMEs are managed by individuals, with the owner/manager taking all the most important decisions
- SMEs have weak managerial skills, with inadequate financial and legal systems, thereby impeding businesses because of lack of formalized structures.
- SMEs usually lack working capital and are vulnerable to all kinds of shocks (Frempong et al., 2007).

1.1.5 Contribution of SMEs to Ghana's Economic Development

SMEs are critical contributors to Ghana's economy and play a significant role in economic growth. They contribute largely to the industrial output and exports of goods and services.

Abor and Quartey (2010) and Aryeetey (2001) revealed that the SME sector makes up about 92% of businesses registered in Ghana, accounting for about 70% of GDP, and contributing 85% to manufacturing employment and 75% to general employment.

The World Bank (2006) reports show that the informal sector in Ghana, which is mostly SMEs contributes substantially to employment, approximately 70% of the total workforce (Fredua 2007). Keskin, (2006) and Abor & Quartey (2010) contended that SMEs support the creation of the more significant part of jobs and also contribute to national revenue through tax revenue, and improved national income.

Kayanula & Quartey (2000) and Aryeetey (2001) established that SMEs among others are the source of job generation, support the conservation of foreign exchange, increase exports of non-traditional commodities and contribute through innovation and creativity to economic growth and development.

Kufour (2008) argued that small businesses in Ghana constitute the most significant part of the labour force and form the basis of the private sector locally. SMEs are characterized as improving the competitiveness of the local markets and making efficient use of limited resources, and promoting long-term GDP growth in less developed countries (Aryeetey & Ahene, 2005).

Baume (2004) noted that SMEs are vital to any economy since they efficiently use resources, are the basis of creativity, the fountain of entrepreneurship, and utilize financial resources, develop family savings, and innovate. They also create at a lesser cost, have excellent geographic locations, a great existence in rural localities and a higher capacity to absorb a surplus workforce.

Brown and Medoff (1989) stated that small businesses are often perceived as having some advantages over larger firms. On the other hand, larger firms have unfavourable circumstances such as weaker autonomy, stricter legal frameworks, less flexible planning, and work settings that are personal. SMEs are seen to depend on self-made tailored service. Besides, small businesses are likely to offer faster services, superior products, reasonable prices and provide official and casual after sales services.

Vossen (1998) argued that while large firms' assets are material in nature, small firms' assets are commonly behavioral. Lack of an entrenched bureaucracy is the most critical asset of SMEs and perhaps the one which is often associated with larger firms.

Edmiston (2007) stated that an embedded bureaucracy could result in a long stretch of command and subsequently ineffective communication, rigidity, and reduced managerial coordination. Additionally, small firms, as they operate in a more competitive environment, tend to be innovative to stay ahead of their rivals. Lastly, as ownership and management in smaller firms are possibly linked, the personal rewards for prospective innovators are higher.

Notwithstanding such merits, Mensah (2004) explained that small enterprises endure several limitations particularly financial problems, as they usually do not have adequate capital. Several empirical studies have documented the lack of finance as the critical problem hampering the rapid development of small enterprises in most developing countries (Arthur, 2003; Deakins, North, Baldock and Whittam, 2008).

1.1.6 Financial Constraints Facing the SME Sector in Ghana

Zaman et al. (2011) stated that small businesses play a significant role in the economic development of various countries through the provision of job opportunities at low cost and sustain economic prosperity. However, most SMEs confront many factors that thwart their growth and development. These factors include lack of credit facilities, infrastructural

weaknesses, lack of managerial skills, low technological level/grading, weak establishment and rules, as well as the lack of access to international markets. Financial resources have been identified as the most significant challenge facing SMEs in Ghana (Abor and Quartey 2010; Lader, 1996; Cook and Nixson 2000; Parker et al. 2005). The lack of finance has limited the growth potential of many and well-documented evidence suggests that SMEs face more difficulties in raising finance than larger firms (Hutchinson and Xavier, 2006; Beck et al. 2006). Formal finance organizations have designed their products to meet the requirements of larger corporations and the cost per loan is higher in the case of SMEs than larger firms because, on average, larger firms borrow more substantial amounts than SMEs (Abor and Quartey, 2010). SMEs in Ghana also lack the adequate collateral to pledge for loans. Owing to their risk, lenders always demand a security before granting a loan request. However, because of their size, SMEs are unable to provide adequate collateral. Many lenders refuse to provide finance to SMEs due to their high probability of failure. For fear of intrusion, SME owners restrict themselves to the use of their limited financial resources rather than seek the assistance of a third party. Kotey (1999) pointed out that financing constraints can result in business failure, but several SME owners dislike using long-term debt finance. SMEs are known to follow the pecking order hypothesis whereby they prefer to use personal finance (Irwin and Scott, 2006).

1.2 Problem Statement

Access to finance is one vital managerially difficult decision facing business enterprises in most developing countries including Ghana. Several SMEs have difficulties accessing finance that prevents their growth beyond the early stage. Other SMEs go bankrupt at the initial stage. Ou & Haynes, (2006) and Cook, (2001) state that access to funding has been emphasized as crucial to SMEs' development. Various studies indicate that small businesses rely much more

on internal financing than external financing. Financing procedures adopted by SMEs range from internal sources like owners' savings and/ retained profits (Wu Song, & Zeng, 2008), to external sources which include monetary support from family members, trade credit, business angels and risk capital (Abouzeedan, 2003; Barker, 2007).

According to Lader (1996), access to funding has been recognized as the leading problem facing SMEs. Parker et al., (1995) assert that according to a World Bank survey report, 90% of the small businesses investigated stated that non-availability of credit was a pivotal hindrance to investment. Levy (1993) revealed that non-availability of financial resources to small enterprises as compared to large corporations impeded their development.

In Africa including Ghana, many SME entrepreneurs have few options to access funding other than depending on personal savings or retained earnings and on the benevolence of friends and families to fund their investments. Thus, most financial institutions including banks are reluctant to lend to SMEs due to the high risks linked with their enterprises and the lack of guarantees that are typically required by the banks as a prerequisite to credit (Berger et al., 2006, Vuvor and Ackah, 2011).

The government of Ghana, in 2004 passed a law, Venture Capital Trust Fund Act, 2004 (Act 680) to support the provision of financial resources for the promotion of SMEs and development of the venture capital market. (ibid) It has been a decade since the government established the Venture Capital Fund and there is very little empirical research on venture capital financing in developing countries including Ghana. Hence, this study aims to fill this research gap by exploring how venture capital financing influences the growth and development of SMEs in Ghana. Empirical evidence documented in this investigation will enable readers to gain an in-depth understanding of how the venture capital industry influences the growth and development of young innovative small businesses in Ghana.

Venture capital is equity investment in firms whose principal goal is to support the launch or early growth of new businesses that do not hitherto have access to the public securities markets or institutional lenders (Gupta and Sapienza, 1992).

Venture capital is defined as “as capital provided by firms who invest alongside management in young companies that are not quoted on the stock market. The objective is a high return on the investment. The young company creates value in partnership with the venture capitalist’s money and professional expertise” (OECD, 1996, p.5).

EVCA (2013) defined venture capital as professional equity that is co-invested with the entrepreneur to fund an early stage (seed and start-up) or expansion venture. Offsetting the high risk, the investor expects a higher than average return on the investment. Venture capital is a subset of private equity.

Venture capitals are equity or equity-linked investments in young, privately held companies, where the investor is a financial intermediary who is typically active as a director, an advisor, or even a manager of the firm (Kortum and Lerner 1998). Megginson (2004) described venture capital as a professionally managed pool of money raised for the sole purpose of making actively managed direct equity investments in rapidly growing private companies.

More strict definitions of venture capital exclude buyouts, mezzanine, and other financial dealings. Equity investments such as common stock, or preferred stock, convertible debentures or other financial instruments are used by venture capitalists when the small business is sold through either a merger or a public equity offering. Venture capitalists obtain their returns on their investment by way of capital gain at this liquidity event (i.e., Initial Public Offering).

Sahai (2010) explained that the distinction concerning private equity and venture capital is the phase of the lifecycle of the firm at which each form of capital is focused. VC refers to a subset

of PE, which is equity investment made to support the pre-launch, launch and early-stage development phases of business (OECD, 2013). Private equity investments are expended in companies during the expansion phase when the firms have established products, markets, and stable cash flows history. In contrast, venture capital investments are expended in the earlier stages of the life-cycle of a firm when the trustworthiness of its business model is still in the process of being acknowledged.

Venture capital financing is usually “the initial capital invested by sources outside the firm and the last to exit”. In the parlance of the market, the ‘front money’ or funds usually are subordinated to all other financial commitments of the enterprise. Aside from common stock financing, the most common forms of alternative equity instruments issued in venture capital investments are convertible debentures, warrants and letter stock options” (Rao,1997, p.11-30). Venture capital financing, means typically high risk and long-term investment in industrial projects with high reward potential, at any stage of execution of the project or its production cycle. Venture capital financing is done via the initiation of an economic activity or an industrial or commercial project or to improve a process or a product in an enterprise associated with both risk and reward (Verma, 1994).

1.3 Research Objectives

The objectives of the study are to:

- i. Investigate the effects of venture capital financing on SMEs’ growth in Ghana.
- ii. Examine the factors, which affect venture capital investment activity in Ghana.
- iii. Identify and analyze factors which influence SME entrepreneurs’ accessibility to venture capital financing in Ghana.

- iv. Suggest measures and policies that could be implemented by policymakers to address the challenges that SME entrepreneurs face in accessing venture capital funding in Ghana.

1.4 Research Questions and Related Hypotheses

a. Research Questions

- i. How does venture capital financing impact SMEs' growth and development in Ghana?
- ii. What factors drive venture capital investment activity in Ghana?
- iii. What factors influence SME entrepreneurs' accessibility to venture capital financing in Ghana?
- iv. What measures can policymakers adopt to address the challenges and obstacles SME entrepreneurs face in accessing venture capital financing in Ghana?

b. Hypotheses

1. H1= There is a positive and significant relationship between SMEs which receive venture capital funding (in the context of increased annual sales and employment growth) compared to SMEs which do not receive venture capital funding.
2. H2= GDP growth rate is positive and significantly influences venture capital investments activity.
3. H3=High interest rate is negative and significantly influences venture capital investments activity.
4. H4= High unemployment rate is negative and significantly influences venture capital investments activity.
5. H5= Market capitalization and stock traded are positive and significantly associated with venture capital investments activity.

6. H6= High inflation rate is negative and significantly influences venture capital investments activity.
7. H7= Reduction in capital gains tax is positive and significantly associated with increases in venture capital investments activity.
8. H8= Scientific and technical journal articles (a component of R&D) are positive and significantly correlated to venture capital investments activity.
9. H9= Index of economic freedom is positive and significantly affects venture capital investments activity.
10. H10= Female SME owners are negative and significantly correlated with accessing venture capital financing compared to their male counterparts.
11. H11= Age of SME owner/managers is negative and significantly associated with obtaining venture capital financing
12. H12= There is a negative and significant relationship between the marital status of SME owner/managers and access to venture capital financing.
13. H13= There is a positive and significant relationship between educational background of SME owner/managers and access to venture capital financing.
14. H14= There is a positive and significant relationship between SME owners/managers' working experience and access to venture capital financing.
15. H15= There is a positive and significant relationship between the age of the firm and access to venture capital financing.
16. H16= There is a positive and significant relationship between the size of the firm and access to venture capital financing.
17. H17= There is a positive and significant relationship between the legal status of an SME owner/manager's firm and access to venture capital financing.

18. H18= There is a positive and significant relationship between SME managers operating in the manufacturing/construction sector and venture capital financing.
19. H19= There is a positive and significant relationship between geographical location of a firm and SME managers' ability to obtain venture capital financing.
20. H20= There is a positive and significant association between SME owners' business plans and access to venture capital financing.
21. H21= There is a positive and significant relationship between SME owner/managers' social networking and venture capital financing.
22. H1= There is a negative and significant relationship between high-interest charged and SME owner/managers' access to venture capital financing.

1.5 Contributions of the Research Study

Numerous studies on venture capital have been carried out in the developed countries such as the US, Canada, the UK, and other European countries, while few empirical studies have been undertaken in developing countries. Thus, the venture capital concept is a recent development in most developing countries. This research is expected to contribute to the promotion of the SME sector and the development of the venture capital industry in Ghana. This study attempts to bridge the literature gap on the venture capital financing of SMEs in Ghana.

The results from this study will assist policymakers and the government to design policies and strategies that can support the growth of a vibrant venture capital market that will promote the development of SMEs in Ghana.

This study will enable the government, development partners and the private sector to have a better understanding of the contributions to and the challenges and prospects of the venture capital industry for SME development in Ghana.

The research study will also serve as a guide for young and upcoming entrepreneurs who have business acumen and desire to establish their businesses, but lack the financial resources to use VC financing as an alternative source of SME financing.

Finally, the knowledge gained from venture capital financing in Ghana will serve as a useful information source for potential investors and other key players who are interested in participating in the venture capital industry in Ghana.

1.6 Organization of the Research Study

The remainder of this study is structured as follows. Chapter two describes the relevant literature on venture capital financing and SMEs' development. It highlights the prominent related empirical evidence on the impacts and determinants of venture capital investments in SMEs' development as well as their accessibility to debt/equity financing. Chapter three discusses the methodology and data collection used in the study. Chapter four discusses the empirical results and findings. Chapter five presents the discussion and conclusions of the study, the policy implications and the recommendations for future research.

Chapter 2

Literature Review

2.1 Introduction

Chapter 2 is organized as follows. Section 2.2 provides empirical studies on SMEs and venture capital financing and Section 2.3 presents empirical studies on venture capital financing in Ghana. Section 2.4 discusses the impact of venture capital funding on SMEs' growth. Section 2.5 provides an overview of the determinants of venture capital investments Section 2.6 outlines the determinants of SMEs' accessibility to debt or equity finance and Section 2.7 highlights empirical studies on SMEs' accessibility to financing and its determinants in Ghana. Section 2.8 discusses the research gap in the literature.

2.2 Empirical Studies on the Venture Capital Financing of SMEs.

Venture capital is non-bank financing for small-sized and start-up businesses and is common in developed financial markets (Freear & Sohi, 1994). According to Gompers and Lerner (1998), VC is a professionally managed pool of money raised for the sole motive of active management of direct equity investments in fast-growing private businesses. This form of finance is regarded as a modern entrepreneurial financial innovation. Obtaining VC is crucial for commencing a new venture for countries that hope to connect to highly developed economies. Venture capitalists (VCs) provide financial support for doubtful business proposals by SMEs which show potential but unproven designs. If the VCs are persuaded that a business model shows potential, they would invest in the business and provide the required funds while partaking in the risk. In industrialized countries where venture capital has played an immense role in supporting SMEs, the sector is so widely developed that it has formal and informal venture capitalists referred to as business angels (Freear, 2003).

According to Memba (2014) the dominance of venture capital, in advanced countries has performed a critical role in improving SMEs' growth through the provision of equity capital. Freear, Sohl & Wetzel (1994) provided two primary methods of outside equity capital for entrepreneurs: venture capitalists and business angels. The VC market is made-up of professional funds and the informal VC market consists of a varied and widespread population of high net worth individuals. In nations where both kinds of VC take part in funding small businesses, they are professional investors who contribute their business expertise, industry experience, and links to a business project (Sohl, 2003).

VC is a method of funding planned to offer equity or quasi-equity financing to small businesses, with the primary return to investors as capital gains or share gains, rather than from dividends. VCs are vigorously involved in the tactical manoeuvres and running of small businesses to help achieve investment objectives and provide positive support by adding value. Investors are fascinated by VC investments because of the possibility of massive gains from later sales of the company's shares, and therefore are eager to receive the higher risks entailed, as compared to conventional loans. Indeed, a typical PE investor's portfolio usually comprises a variation of investee firms, of which some will fail, some will yield adequate returns and a handful will be highly advantageous (Freeman, 2015).

Venture capital funds are mostly invested in small businesses with high growth potential. On the other hand, they might take part in take-overs of more reputable firms. The participation period of a venture capitalist is usually two to five years, after which they will trade the shares of the business on a stock market through an initial public offering (IPO), trade sale, management buyout or sale of total shares in the business to a reputable competitor or other VCs.

The investment can be considered a good prospect provided the exit from the investment is successful (Freeman, 2015). Puri and Zarutskie, (2008) suggest that VCs offer a considerable share of their funds to young companies that show growth prospects. This indicates that VC could play a very vital role for small companies and not only to close a growing gap in funding. They are also for companies that may be confronted with difficulty in attracting capital due to asymmetric information, insufficient reputable historical records for saleable products, and inadequate assets which could be used as security for loans from the bank (Gompers and Lerner, 2001). They also contended that VC is not only crucial in supporting businesses dealing with credit difficulties, but also in assisting businesses to develop (Mollica and Zingales, 2008; Bottazzi and Da Rin, 2002).

Venture capital institutions can contribute to small and innovative companies through different means. VCs invest in companies with limited tangible assets which banks may find difficult to fund because VCs are more competent in supervising their investments (Lerner 1995; Gompers & Lerner 1996). Black and Gilson (1998) recommended that VCs can improve a company's reputation to obtain better agreements when seeking funding. Hellmann and Puri (2000) and Bottazzi et al (2008) showed VCs help to improve the proficiency of the business which they finance. Hellmann and Puri (2000) showed proof that venture capital institutions influence product-market tactics, and also make time to market lesser businesses that obtain VC in the biotechnology industry in the US. Chemmanur et al. (2008) provided fresh insights into the influence of VC and showed that the general effectiveness of VC-funded companies, gauged by total factor productivity, is higher compared to non-VC funded companies which they ascribed to the screening and monitoring role by VCs of small businesses.

2.3 Empirical Studies on Venture Capital Financing in Ghana

Empirical studies on the venture industry in Ghana are limited. This is not a surprise since the industry is in its infant stage. However, Mensah (2004) argues that venture capital funding is not new in Ghana because, in 1991, the US Agency for International Development (USAID) together with the Commonwealth Development Corporation (CDC) supported the development of a VC fund in Ghana. It was re-introduced into the country in 2006 as a form of financing to help in the promotion of SMEs and the development of the venture industry. Hence, only a handful of research studies have been carried out on the subject and researchers are more interested in other forms of financing such as bank loans, micro-finance and the stock market in Ghana.

Sam-Brew (2011) investigated the effect of venture capital financing on SMEs' growth in Tema Metropolis in a single case study and found that SMEs prefer self-financing, but occasionally receive support from financial institutions. SMEs that receive venture capital financing also received technical skills, managerial expertise, access to marketing and distribution support.

Owusu-Adjei (2010) examined the state of the private equity industry in Ghana and the extent to which it contributes to private sector development. Based on personal interviews and case studies on five locally based companies, the author found that, while the industry is still growing, it made a significant contribution to businesses in Ghana through the provision of capital and technical assistance.

Agyeman (2010) investigated challenges facing venture capital firms in developing countries, with emphasis on Ghana, based on a semi-structured interview, documentary evidence, and direct observation. The author found that the venture industry is beset with numerous challenges such as inadequate outlet prospects due to a stable IPO environment, inadequate

industry policies and rules and regulations, inadequate Research & Development support as well as poor record-keeping by SMEs.

Obeng et al. (2009) appraised the venture capital activities in Ghana, based on survey questionnaires and interviews of 29 SME firms. The authors concluded that venture capital is an emerging industry with high growth prospects as evidenced in the increasing trend of total capital under management and investment.

Poku and Frimpong (2009) assessed the prospects of venture capital finance in Ghana, using a survey questionnaire and a sample of 80 small businesses in the Greater Accra region of Ghana. The authors found the majority of the small businesses see venture capital support as an answer to their financial problems, but are unwilling to partner with venture capital firms to nurture their business due to fear of losing control rights. The findings also reveal that the prospect of the venture capital industry looks promising and can be maintained if the government creates the right environment for the industry to grow.

Gatsi and Nsekkyire (2010) described venture capital in Ghana as very young and heavily dependent on a Venture Capital Trust Fund with limited fund-raising activities. They also revealed that venture capital is skewed towards expansion and later stage investments.

Sarpong (2015), who used a self-administered questionnaire on 50 SMEs in Kumasi, revealed that venture capital financing is still not accessible in the region and more effort should be made to bridge the gap among critical stakeholders.

2.4 Empirical Studies on the Impacts of Venture Capital Financing on SMEs' Growth.

Over the last twenty years, both academics and policy-makers have contended that businesses funded by VC grow faster, are more innovative and generate above average employment (Alemany and Marti, 2005). Numerous studies that have analyzed the effect of VC investments

on business growth by depending on matched pair methods or cross-sectional regression by comparing sales growth, employment or the total assets of VC-funded and Non-VC-funded businesses (see. Puri and Zarutskie, 2008; Engel and Keilbach 2007; Alemany and Marti, 2005; Jain and Kini, 1995). In general, a positive correlation between VC funding and growth is observed, though the results differ (see, e.g., Bottazzi and Da Rin, 2002). The authors using hand collected data, argued that VC backed companies in Europe do not grow and create jobs faster than Non-VC backed companies because of the immaturity of European venture capital. Further, they also found that VC backed companies do not generate more sales and employment than Non-VC backed companies. However, VC backed companies which perform R&D appear to increase their sales less than Non-VC backed companies.

Engel and Keilbach (2007) studied some extensive records that contained almost all registered companies on the German trade register and used matching methods to compare VC-backed businesses with Non-VC backed businesses. The authors found that growth in employment of VC-backed businesses was about twofold larger than Non-VC funded counterparts. On the contrary, Bottazzi and Da Rin (2002) used data from the period 1996-2000 on 511 businesses listed on the European new stock market; the authors found no evidence of effects of VC on growth in employment in three years after the IPO. Audretsch and Lehmann (2004) observed significant employment growth in VC-backed companies during the year before and after the IPO compared to a control group of companies without VC backing.

Belke et al. (2004, 2005, and 2006) applied information on 20 advanced countries from 1986 to 1999. The authors identified that VC investment results in reduced unemployment and increased employment. The authors also found the positive effect of VC investment on growth in employment to be more dynamic and theorized that it might take time for VC investments

to gain their full employment potential through feedback and spin-off effects on other businesses.

Alemaný and Marti (2005) conducted a study by comparing 323 companies in Spain which received VC financing from 1993-1998 plus a control group sample. However, Non-VC funded companies' samples matched were based on the location of the company, sector or industry, size, and age in which VC funding was attained. The authors considered early and later phase funding, with the reorganization and MBOs/LBOs by computing for the average sales growth, employment and total assets after the year the investment happened to the third year after the incidence, and differentiating based on the stage of the company's life-cycle (i.e., start-up, growth, later stage) in which VC funding was received. VC-funded companies outperformed Non-VC funded companies when VC investments occurred in the start-up or growth stage.

Astrid & Bruno (2004) studied VC-funded companies from 1970-2000 and found out that sales increased twofold, they paid taxes about thrice, produced twofold exports and spent nearly thrice on R&D as against the average Non-VC funded companies.

Bürghel et al. (2000) evaluated sales growth and the staff of 500 start-ups in Germany and the UK but failed to discover any impact of VC financing. EVCA (2001) concluded that VC-funded companies recorded a high sales growth as compared to other companies. The result shows that companies that used venture capital experienced growth in sales.

Hellmann and Puri (2002) revealed that once the investor invests his or her cash in the business, he/she must dedicate enough time in assisting the business to be successful, organizing internal structures and proper management of human resources. Thus, venture capitalists assist in adding value to make the firm professional. Being professional is the most significant advantage of VC funding. Hellmann and Puri (2000) established that innovative businesses are

more likely to receive VC funding as compared to imitator start-ups and that VC is linked to a significant reduction in the period needed to convey merchandise to the market.

Jain and Kini (1995) matched 136 sampled US-listed companies that received VC funding preceding IPO with a matched sample of Non-VC funded IPO companies in the same sector that experienced IPOs of comparable size. The authors considered growth in sales from the year before and after the IPO and the subsequent three years, respectively. During the IPO time, VC-backed companies significantly surpassed the Non-VC funded matched group.

Manigart and Van Hyfte (1999) investigated 187 VC-funded companies in Belgium and found a significant effect on the control group regarding superior growth in assets and cash flow, but not turnover and employment growth. The authors discovered that the growth rate of the total assets of VC-funded companies was significantly larger than the control group every year, commencing in the year in which the company received VC funding over the ensuing five years.

Engel (2003) identified significant growth effects based on some broad German sampled companies offered by the country's top credit ranking agency. The author employed propensity score matching and found that VC-funded companies attained more than twice the yearly employment growth compared to Non-VC funded companies.

Puri and Zabrutskie (2012) analyzed VC-backed companies by comparing matched and non-matched samples. The authors found that VC has a positive effect on sales growth. However, VC-funded companies on average are less profitable compared to non-VC-funded companies, which indicates that the massive scale of the investee matters more than the profit for VCs. Puri and Zarutskie (2012) showed in their study that VC-backed companies had not only higher average employment than a peer group of Non-VC-backed companies, but also displayed higher growth rates of employment. According to the authors, the ratio of VC-backed

companies amounted to only 0.05 to 0.16 % of the total company's population, whereas the share of the employment in VC-backed companies was at least 2.7 % and reached 7.3 % during the study period.

Davila, Foster, and Gupta's (2003) study underpinned this finding by describing the employment patterns of VC backed firms. The authors pointed out that receiving VC has a signalling effect and increases employment growth after the investment. With regard to firm survival, when comparing the failure rates of firms that received VC to firms that did not receive VC, Puri, and Zarutskie (2012) found that the former showed a much lower rate of failure than the latter (34.1 % versus 66.3 % as of 2005).

Bertoni, Colombo, and Grilli (2005) analyzed whether companies with higher employment growth easily obtained VC based on a dataset of 537 Italian new technology firms. The authors found proof of significantly higher growth in employment of VC-funded companies as compared to the Non-VC funded companies, thus validating the positive impact of VC on employment growth. In contrast, only weak evidence is exhibited in companies' growth preceding the initial VC round which leads to a greater probability of receiving VC financing. This finding supports the view that the venture capital financing and the managerial support provided by VCs resulted in the company's growth more than the ability to pick the winners (best companies).

Romain and Pottelsberghe (2004) who used a longitudinal dataset of 16 OECD nations between 1990 and 2001, found that a build-up of VC investment increases the output flexibility of R&D. Improved VC intensity allows it to grasp the research information created by universities and companies. Furthermore, from extensive information in Germany, Audretsch and Keilbach (2002) demonstrated that VC investment is a significant and critical factor that fosters productivity and efficiency in Europe. Kenney et al. (2004), based on subjective proof,

showed that the growing electronic and semiconductor industries, and the software industry in Taiwan and Israel, respectively also benefited significantly from VC investment.

According to Mason and Harrison (2004), venture capital funding is connected with a high degree of uncertainty, which describes the unpredictability of the positive earnings that might take place after a period. VCs may perhaps also engage in an innovative business method that is different from the owners' strategy; the former can even remove the owner from the business.

Reynolds (2000) stressed that VCs ought to activate, maintain and accelerate the growth and performance of the small business, and this results in enhanced profitability. The critical role of VCs' investment is to remove the primary financial difficulties which take place in the development stage of a new business.

Baeyens and Manigart (2003) emphasized that venture capital has a significant additional quality: to provide integrity to attract new funding. The authors explained that by screening, witnessing and adding value, VCs lessen the asymmetries information and financial uncertainty and therefore attach genuineness to the VC-backed company and as a result impact on additional funding. This process stimulates the progress and improvement of entrepreneurship in a country's economy in general.

Bottazzi and Da Rin (2002), Amit et al. (1998) and Gompers (1995) stressed that VC investors usually concentrate on specific industries. Owing to their specialty in specific sectors, they supposedly cultivate context-specific screening competencies that enable them to assess quite precisely the marketable worth of business schemes and the innovative ability of promoters (Chan 1983, Amit et al. 1998) for a divergent opinion (Amit et al. 1990). Hence, they can efficiently manage adverse selection problems, which might otherwise thwart excessively concealed value companies from acquiring the funding they require. Thus, lessening of financial difficulties results in more substantial firm growth. Subsequently, VC firms are not

passive partners (Gorman and Sahlman 1989, Barry et al. 1990). In contrast, VCs keenly monitor and advise their portfolio companies.

Kaplan and Strömberg (2003) showed in their study that 41.4 percent of the board members' seats of the US VC-funded companies are under VCs' management. Again, 25 percent of them also control the majority of board seats. VC investors apparently carry out vital tutoring functions to the advantage of the investee companies (Gorman and Sahlman 1989; Kaplan and Strömberg 2004). Further, venture capitalists offer advisory support to portfolio companies in areas such as strategic planning, human resource management, marketing, accounting, and finance, since these companies usually lack internal capabilities.

Hellmann and Puri (2002) confirmed that VC investors favour staffing with outside managers, approval of stock selection strategies, and evaluation of human resource strategies by portfolio companies, which contribute to their managerial "professionalization."

Meggison and Weiss (1991) established that the US VC-funded IPO companies demonstrate lesser under-pricing as against Non-VC funded IPO companies that are compared according to sector and IPO size. However, it is essential to recognize that the agency connection involving the VC investor and the owner-manager of portfolio companies can provoke conflicts, resulting in a worsening of the performance of the latter companies. Owner-managers and outside investors might have different plans; differences might consume the manager's effort and commitment at the expense of the quest for business prospects. Assuming no differences occur, the desire of VC investors to monitor managerial decisions might increase administrative and validation procedures, impeding the flexibility and capability of firms to seize suitable business prospects.

Hellmann and Puri (2000) based on an examination of 149 ventures in Silicon Valley, discovered that VC-funded companies transport their goods to market more quickly than other

Non-VC funded companies in the US. Ueda and Hirukawa (2003) employed Multi-Factor Productivity (MFP) by using growth as a measure of innovation to determine whether VC investments are significantly related to labour productivity growth. The authors established that MFP growth is positively and significantly correlated with VC investments in the US. The outcome is noticed in the ICT sector. Furthermore, the level of employment growth is higher in the VC-funded sampled companies only when one considers luminary performing companies which fit the percentage range with the highest growth sufficiently for a long time (at least 3 years after funding). Manigart et al. (2002) revealed that venture capital is a significant substitute for companies that have problems getting more conventional funding sources and VC is a robust financial addition for start-up companies that do not have proof of regular profitability.

Peneder (2010) investigated the effect of VC funding on innovation and company growth by using two-stage propensity score matching on micro-data from Austria. The author disclosed that companies with VC funding grow significantly faster than other companies and perform much better regarding innovative output.

McCormick (1996) using data from advanced countries demonstrated that many countries engaged with venture capital focused on small businesses which had experienced significant growth at average cost. A well-developed venture capital market in the US established partnerships, mobilizing finance from many investors, and sought potential businesses to invest in and to team-up with these companies to grow them into publicly traded companies.

The amount of money invested by the partnerships in 1993 multiplied to more than three billion US dollars.

A report by Global Insight (2009) on the economic impact of venture capital-backed firms as reported by US NVCA revealed that companies funded by VCs in 2008 hired over 12 million

people and generated revenues of almost \$3 trillion. The numbers accounted for 11 % of private sector jobs and were equal to 21 % of the GDP of the US that year. The report further suggests that, although several VC-funded companies have the impetus to develop faster and create more jobs than their non-VC comparable group, their accomplishment cannot be underestimated.

According to a report on the private equity market in Canada (2002), the Canadian venture capital industry experienced robust growth and enhanced the high-growth-potential of SMEs' access to venture capital between 1996 and 2002. If the industry can maintain these growth developments, the Canadian venture capital sector should remain a significant part of the business and investment landscape, promote innovation and productivity, and support new job and wealth creation.

The US General Accounting Office (GAO) (1982: p.10) examined the impact of the VC market on the US economy. Assessing 72 publicly listed VC-backed companies in operation in 1979 (1332 VC-backed companies existed at the time), GAO concluded that employment rose in 1989 from 52,000 to 2.54 million based on the yearly growth assumptions. Similarly, a report by the NVCA (2001) estimated that firms' VC investments were accountable for the generation of 4.3 million jobs and \$736 billion in annual revenue in 2000.

In the UK, a study by the British Venture Capital Association (BVCA) (1999) revealed that PE funded companies nurtured yearly increased rates of 24 percent, or thrice faster than companies in the Financial Times-Stock Exchange Index (FTSE) 100 and 70% faster than the FTSE 250. The BVCA concluded that VC-backed firms hired 2 million workers or 10 percent of the current private labour force. The estimate seems somewhat high but offers some sign of how vital PE/VC has been to the growth of the British economy. Table 2.1 below shows a summary of the empirical studies on the impact of venture capital on SMEs' growth.

Table 2.1: Summary of empirical studies' on the impact of venture capital financing on SMEs' growth

Authors	Coverage	Methods	Findings/Conclusions
Alemany and Marti, (2005)	Spain 1996-1998	Panel data analysis	VC-funded companies' exhibit faster growth in sales, gross margins, total assets, intangible assets and corporate tax. Employment in VC backed companies' increased by 30.5% per year from 1997-2004.
Manigart et al., (2002)	Belgium,1987-1997	Survival analysis	VC backed companies do not exhibit higher survival rates. The question is not whether young firms are backed by VC, but by which type of VC (for example government, private).
Audretsch and Lehmann (2004)	Germany, 1997-2000	Quantile Regressions	Growth regarding employment is higher in VC backed firms.
Engel and Keilbach (2007)	Germany, 1995-1998	Propensity score matching	Employment in VC backed companies grows faster than employment in companies that are not backed by VC.

Puri and Zarutskie ,2012)	US, 1981-2005	Panel data analysis	The rate of failure by VC funded companies is only half as high as the failure rates of firms without VC backing. VC-funded companies show a faster growth in sales and payrolls than comparable firms without VC. Average employment is higher and grows faster for VC-funded companies in comparison to companies without VC support.
Bottazzi and Da Rin (2002)	European,1996-2000	Hand collection	After IPO, VC-funded companies do not generate more sales and more employment than companies that are not backed by VC.
Belke et al., (2004)	OECD countries, 1986-1999	Dynamic data panel	VC has a positive impact on employment.
Bürghel et al., (2000)	OECD Countries	Panel data analysis	VC has no impact on employment and sales growth.
Astrid and Bruno (2004)	UK & Germany,1997-2003	Questionnaire	No significant effect of VC on sales growth and employment growth.
EVCA (2013)	16 OECD,1990-2001	Panel data analysis	The build-up of VC is a significant factor which contributes directly to productivity growth. The social return of VC is significantly higher than the social return of businesses and public

			research & development. VC has an unintended impact on productivity growth in that it improves the output elasticity of R&D.
Hellmann and Puri (2002)	US	Survey and interview	VC is connected to a variety of professionalization measures, such as human resource policies and execution of stock option plans.
Engel (2003)	Germany	Propensity score matching	Results indicate that surviving VC-funded companies realize higher growth rates compared to surviving Non-VC funded companies.
Davila et al., (2003)	US, 1994-2000.	Logit model	VC has a positive and significant effect on employment at the firm level.
Bertoni et al., (2005)	Italy	Gibrat-law-type dynamic panel data model	Found strong evidence that VC investments positively impact firm growth. Most of it is received after the first round of VC finance.
Peneder (2010)	Austrian, 1996-2005	Propensity Score Matching	Sales grow faster in VC backed firms
Popov and Roosenboom (2009)	21 Countries in Europe 1998-2008	Panel data analysis	PE investment has a positive effect on the rate of business formation.
Amit et al., (1998)	Canada, 1991-1996.	Survey instrument	Found significant industry effects in the data, with VCs having uneven representation in

			industries that are thought to have high levels of informational asymmetry.
Gorman and Sahlman (1998)	US, 1984	Questionnaire via mail	Found that VCs spend about half their time monitoring nine portfolio investments of which five are companies on the boards on which they sit.
Jain and Kini (1995)	US, 1976-1988	Panel data model	Found that VC-backed companies have significantly lower operating returns on assets and operating cash flows over assets compared to non-VC backed IPOs in the year before the offering.
Samila and Sorenson (2011)	US, 1993-2002	Panel Data Analysis	Found VC has a positive impact on firm births, aggregate income, and employment.

2.5 Empirical Studies on the Determinants of Venture Capital Investments Activity

Porteba (1989) examined the relationship between capital gains taxes and venture capital investments in the US between 1969 and 1987. The author established that the supply of venture capital was not affected by capital gains taxes as most investors were excluded from taxes. Nonetheless, Porteba argued that capital gains taxes affect negatively the demand for venture capital. Poterba explained VC investment as an adjustment in supply and demand. The author contended that many of the alterations in financing could take place from an adjustment in either the supply of or demand for venture capital. Poterba also claimed that VC funds are from investors who are excluded from taxes, and they are affected by the disparity in capital gains tax rates. Poterba described this impact as not affecting those who supply the funds but instead prompting the employees to become entrepreneurs leading to a demand for more VC.

After Poterba's (1987, 1989) model, Gompers and Lerner (1998) found practical support for Poterba's claim that lesser capital gains tax rates have a strong influence on the VC investments provided by tax-exempt investors. However, Jensen (1991) and Sahlman & Stevenson (1986) contend that institutional investors are exposed to over or underinvestment in markets like venture capital. They argued that this absurd pattern of investment can explain the differences in fund raising. They also suggested that these discrepancies can impede entrepreneurship in the US economy.

Black and Gilson (1998) argued that venture capital companies will be more vibrant in nations with stock oriented capital markets than in nations with bank oriented capital markets. The authors explained that venture capital develops solely where an active stock market is present as VCs manage to efficiently exit from investee businesses through successful IPOs. Based on this, the authors argued that the US VC market is more dynamic compared to VC markets in Germany and Japan.

Black and Gilson (1998) found a correlation between the countries' financial structure and the VC market. They claimed that the vital source of the U.S. dominance in the VC market is the presence of a strong IPO market. A dynamic stock market entails a liquid stock market and is further suited to a strong VC market compared to a bank market because of the prospects for VCs to exit during an IPO. Similarly, Jeng and Wells (2000) developed a design intended to find the contributing factors to VC and examined them based on a cross-section of the data of 21 nations over ten years. The authors discovered that inflexibility of the labour market, the degree of IPOs, government strategies for entrepreneurship, and liquidation measures explained a substantial part of cross-country difference in VC investments.

Gompers and Lerner (1998) studied the economy of the US from 1969-1994. Using the IPO as a substitute for fund performance, they found no significant effect in their study. Ostensibly, the IPO was strongly related to the estimated returns on the alternative investments and GDP. The authors discovered that GDP has a significant impact on VC, but no impact on the IPO. However, Jeng and Wells' (2000) study showed a different result where GDP formed part of the impact on IPOs but was not significant in their study.

Becher and Hellmann (2003) presented fresh evidence about German involvement in developing a dynamic VC market and argued that a dynamic IPO market was relevant, but by itself not enough, particularly in a bank-based system like Germany. Variations in corporate governance and the attitude of a country towards private enterprise are also critical.

Schertler (2003) examined the dynamic VC activity with data from 14 Western European countries from 1988 -2000. The author demonstrated that stock market liquidity, availability of human capital, and labour market firmness do not affect the development phase of VC investments, but affect the early phase of VC investments. Contrary to Jeng and Wells (2000), Schertler found that stock market liquidity has a positive and significant effect on investments

at an early stage. Conflicting results could be explained by their different handling of proxies. For example, Jeng and Wells (2000) applied IPOs market value while Schertler (2003) used capitalization of the stock market as a replacement for stock market liquidity. Jeng and Wells (2000) revealed that IPOs are strong drivers of VC investments, hence high levels of IPOs in a country lead to more venture capital. On the other hand, Scherlter (2003) found that stock market liquidity has a significant and positive impact on VC investment at an early stage. However, as with Jeng and Wells (2000), he finds stock market capitalization growth rate does not have a significant impact on VC investments at an early stage.

The pension fund in an economy is an additional variable that has been studied in the VC literature since they are permitted to invest in VC. Pension funds involve so much money, therefore, their contribution influences the supply of VC (Jeng and Wells, 2000; Gompers and Lerner, 1998). Pension funds may be vital in the US, but in Europe they do not deal with large sums of money and European countries dislike investing in unquoted firms.

Achs and Audretsch (1994) determined the macroeconomic factors that might influence VC by affecting activities of start-ups. VC fund raising for limited partnerships in the US from 1972 to 1979 was examined by Gompers and Lerner (1998). They focused on the cumulative industry level to verify whether macroeconomics, rules or using the total VC obligations and the number of investees at the state level might influence VC activity. The authors recognized that a decrease in retirement fund restrictions and expenses on R&D show positive effects on VC fund raising at the state-level. The authors also realized that a decline in capital gains tax rates caused an upsurge in demand for VC as more employees are invigorated to be entrepreneurs.

Jeng and Wells (2000) studied the factors influencing VC using longitudinal data of 21 OECD nations from 1986 to 1995. The authors' dependent variable was VC in the early expansion

phase, which involved investments in the early phase and when the new fund's size rose. They found that the factors were affected differently by different kinds of investment. While investments in the growth phase were responsive to the size of IPOs, the exit method did not influence those completed in the early phases. However, other variables connected with the inflexibility of the labour market that affected funds raised, did not affect the investment at the expansion stage.

In the Jeng-Wells model, GDP and market capitalization showed an insignificant influence on venture capital. Jeng and Wells (1998) found that the IPO is a positive and significant contributing factor to a later stage of investment. The authors incorporated lawful and shareholder rights that encompass the institutional structure which influences the effectiveness of the stock markets, and issues fundamental to IPOs not linked to VC as instruments to control for endogeneity. Consequent to controlling for this possible cause of predisposition, they discovered that stock market capitalization, private pension funds, IPOs for early phase VC, GDP growth, rule-of-law, capital gains tax, rights of equity-holders, anti-director rights and labour market rigidities, which relate to investments at early and later stages are insignificant.

Kortum and Lerner (1998) examined the relationship involving VC and innovation across 20 businesses in the US for more than 30 years. The authors found from their analysis that venture capital significantly enhanced the patent rate and contributed approximately 15% of industrial innovation.

Jagwani (2000) investigated factors which influence venture capital in the US based on the application of OLS to time-series data. The author asserted that an investment decision is based on past performance and lagged one period on the interest rate variable in the investigation.

Romain and van Pottelsberghe, (2003) investigated critical determinants of VC investments in 16 main OECD nations from 1990-2001, and they found three key issues affecting VC demand

and supply. The issues comprised research and technological prospects, entrepreneurship setting and macroeconomic conditions. The authors asserted that interest rates in the short-term positively affect VC demand, while interest rates in the long-term have a robust adverse effect on VC supply. The authors indicated that the cycle of VC investments relates to economic growth as they found the flow of VC funds responds positively and significantly to economic growth, but during the high growth period the flow of VC outperforms economic growth rates and inversely. The labour market situation positively influences this sequence. The labour market rigidity points to lessening the positive effect of economic growth on the degree of VC investments and effects of the awareness of the stock market on the growth of companies' investment in R&D. Furthermore, they corroborated the positive role of the entrepreneurial culture's domination and tax inducements in venture capital market development. However, they found no significant effect for financial markets liquidity.

Romain and Potterie (2003) used a longitudinal dataset of 16 OECD countries from 1990 to 1998 and a general least squares technique, to study the determinants of venture capital. The authors initially presented each variable independently in their experimental equation and then concurrently examined whether any differences might be identified. The results remained unaffected. The authors revealed that GDP growth, interest rates, patent numbers, corporate R&D expenses and capital stock of corporate R&D are significantly correlated to VC. The authors also established that risk and corporate income tax rates are negative and significantly correlated to VC.

Romain and van Pottelsberghe (2004) also investigated the determinants of venture capital using GDP growth rates, variables related to technological opportunities (corporate R&D expenditure growth rate as a substitute, corporate R&D investment, and patents numbers). Further, variables connected with entrepreneurial settings such as the degree of corporate

income tax, the index of entrepreneurial action and labour market rigidities influence demand for and supply of VC. Using cross-section-time series data of 16 European countries from 1990 to 2000, the authors detected a positive effect of interest rate and the GDP on the VC intensity. Indicators associated with technological prospects also positively affect the VC's relative size, while the index of rigidities of the labour market lessens the positive occurrence of economic growth or R&D expenses on the VC intensity. Another determinant that positively influences the VC invested, without detecting variations between countries is the bulk of the money raised from the private pension scheme.

Bonini and Alkan (2009) employed a longitudinal dataset of 16 nations from Australia, Europe, and North America from 1995 to 2002, to study the determinants of venture capital. The authors established positive and significant connections between corruption control and a replacement for lower political risk, but the connection was not strong.

La Porta, Lopez-de Silanes, Shleifer, and Vishny (1997, 1998) used OLS to investigate laws safeguarding external stockholders and creditors from embezzlement in 49 countries. The authors identified legal origin as a vital determinant of the laws governing the security of external investors from embezzlement by corporate insiders and countries with common law were seen to provide better security than countries with civil law. The authors also showed that better investor security is robustly related to dynamic capital markets, prompt IPOs, extra diffuse possession of public companies, and other pointers of financial improvement. Later examination showed that countries with civil law demonstrate other problematic characteristics, such as heftier government involvement in economic activity (La Porte et al., 1999) and extra arduous rules of new business entry (La Porta et al., 2002).

Groh and Liechtenstein (2008) used a survey questionnaire to examine factors which influence the provision of international capital in VC and PE partnerships on potential institutional

investors globally. The information presented by the respondents on the benchmark for the provision of international assets shows security of property rights is the primary concern for the international investors, followed by the accessibility of domestic VCs and the competency of the local entrepreneurs. Contrary to previous studies, most of the respondents demonstrate that the actions of IPOs and the domestic public stock markets size are insignificant.

Schertler (2003) employed a longitudinal dataset from 14 European countries between 1988 and 2000, to determine whether VC investment for businesses in the early phase of development rely positively on the stock market capitalization, abundant human capital, and labour market inflexibility. The author explained that the abnormal positive effect of labour market inflexibility might be ascribed to a different capital-labour ratio, for example a company working in an economy with strict labour markets calls for more additional capital per employee than their counterpart working in an economy with flexible labour markets.

Félix et al. (2007) applied a longitudinal dataset to examine the factors affecting venture capital investment in 23 European nations between the period 1993 - 2003 and concluded that GDP, capitalization of the stock market and interest rate, are positive and significantly correlated to the volume of VC.

Jeng and Wells (2000) classified drivers of different investments executed based on the phases of business development. Economic growth, interest rates in the long-term, rates of unemployment, and capitalization of the stock market have a significant effect on funding in the high-tech sectors. At the initial phase, interest rates in the long-term, rates of unemployment, IPO disinvestment devices and market to book ratios of equity are recognized as the primary influence of venture capital investment activity.

Clarysse, Knockaert, and Wright (2009) applied a longitudinal data method to recognize the supply of and demand for determinants of VC activity in the UK from 1985-2006, Israel from

1999-2007 and the US from 1980-2007. The authors established that the volumes of funds raised at an early phase and overall VC invested in the three countries were influenced by three key factors, specifically overall entrepreneurial activity, capitalization of the stock market, and R&D expenses.

Groh and Liechtenstein (2009) investigated the attractiveness of risk capital investors for Central and Eastern Europe (CEE). Using questionnaires administered to institutional investors, the authors questioned the investors about the significance of some emerging markets' allotment benchmarks which are appealing to PE investors. The authors concluded that on average risk capital investors are more appealing to the EU-15 than the CEE region. Investors in the CEE region are fascinated by a lesser corporate income tax, even though investors are dejected by the little liquidity of the state capital markets.

Groh and Liechtenstein (2010) discussed the overall outcome of the merged indices built on the identical pointers employed in their 2009 paper to evaluate the attractiveness of 27 European nations on the 6-tier groups of attraction based on corporate governance, tax administration, investors' protection, social and human conditions, entrepreneurial culture and prospects, economic prosperity and the magnitude and liquidity of the nations' capital markets. The authors found that the UK is the most appealing nation for institutional investors compared to other European countries like Germany and Spain.

Jeng and Wells (2000) asserted that liquidity of the stock market is a requirement in building managerial skills. Investors who want to float their shares on the securities market turn out to be applicants of the VC firms and tend to provide management support and finances to other firms. The literature empirically confirmed these sentiments. Gompers and Lerner (2000) noted that the activity of VC firms is improved in countries where capital markets are developed.

Cherif & Gassing (2011), Clarysse et al. (2009), and Kelly (2010) recognized the positive effects of capitalization of the stock market on the venture capital investments.

Adongo (2011) applied the OLS method to semi-log design which consists of a cross-sectional dataset to investigate the influence of venture capital investments in 36 countries in Africa. The author concluded that the rule-of-law, R&D expenses as a percentage of economic growth and enhanced information involving investors and prospective investees are positive and significantly correlated to VC activity in Africa. His findings show that financial and regulatory factors are influenced by the institutional environment which impacts on VC investment activity in Africa. However, he also revealed that capital gains taxes are negative and significantly linked to VC investment activity.

Lerner and Shoar (2005) examined 210 investments by private equity firms in developing countries. The authors found a clear correlation between the legal environment and contractual use of convertible preferred stock with covenants. In a study of a sample of 1,431 VC deals across 17 European countries between 1998 and 2001, Bottazzi, Da Rin and Hellman (2009) suggest that VCs should have strong incentives to give non-convertible support to entrepreneurs and to invest in developing capacities for providing this support if the legal environment is strong. The reason is that the right legal environment ensures that providing and investing in support activities pay off for the VCs.

Cumming, Schmidt, and Walz (2010) investigated a sample of 3,848 VC investments across 39 countries between 1971 and 2003. The authors found that a better legal environment leads to faster deal screening that facilitates board representation in the entrepreneurial firm.

Empirical evidence shows that a dynamic VC market is vital for the growth of small businesses (Gompers and Lerner, 1999). For instance, over the last 50 years, the developed VC market in the US has offered early backing to many businesses like Microsoft, Apple, Intel, Lotus, Sun

Microsystems or Federal Express, which currently have a presence in most developed economies. Furthermore, this type of financing has been established as a catalyst for innovative entrepreneurial businesses.

This study seeks to identify and assess economic, political and legal factors that determine venture capital activity in Ghana. As with any industry, the VC industry in Ghana is subject to the impact of macroeconomic and institutional factors on its financial development.

A dynamic venture capital industry is a necessity for the SMEs' growth and development and thus contributes to the economy of Ghana. Since venture capital supports small businesses, they create employment, develop innovative technologies and make a significant contribution to GDP. Most of the empirical studies were undertaken in the developed countries. Hence this study uses a panel of 15 countries selected from Sub-Saharan Africa to examine the macroeconomic and institutional determinants of venture capital investment activity in Ghana. Table 2.2 shows a summary of empirical studies on determinants of venture capital investments across the world.

Table 2.2: Summary of empirical studies on the determinants of venture capital investment activity across the World.

Authors	Coverage	Methods	Findings/Conclusions
Black and Gilson (1998)	US and Germany	Comparative analysis	Shows the relationship between an active stock market and a strong venture capital market. They also find that an inactive stock market in a bank-based structure impedes the development of a venture capital industry
Jeng and Wells (2000)	Europe	Panel data model	IPOs are the robust spur of venture capital investment. Private pension fund levels, are significant determinants over time but not across countries. Economic growth and market capitalization growth are insignificant. Government policies can have a sturdy impact both by setting the regulatory stage and by spurring investments during recessions
Becher and Hellmann (2003)	Germany	OLS regression	Shows a dynamic IPO market alone although essential, is not enough particularly in a bank-based system like Germany

Porteba (1989)	US	Demand and supply model	Shows capital gains taxation affects both demand for and supply of venture capital; the reduction of tax rates leads to increase in the supply as a result of the increase in the post-tax rate return on investments and, thus encourages the demand for the increase in the number of entrepreneurs who decide to establish new business units
Schertler (2003)	14 Western European Countries, 1988-2000	Dynamic panel data model	Suggests that not only does a liquid stock market play an essential role in the development of venture capital markets, but they are not the only factor that drives venture capital activity
Kortum and Lerner (1998)	US, 1965-1992	Non-linear least square regression	Concludes that the intensity of venture capital activity in an industry significantly increases its patent rate. The ratio of venture capital to R&D has averaged less than 3% in recent years, this estimate suggests that venture capital accounts for about 15% of industrial innovations
Jagwani (2000)	US, 1978-1995	OLS	The results indicate that the regression coefficient of the capital gains tax rate is negative and statistically significant at the 1% level. This confirms the

			importance of this variable since it represents the profit carried out by venture capital companies
Romain and van Pottelsberghe, (2003)	16 European countries, 1990-2000	Panel data model	Shows economic growth and both short-term and long-term interest rates have a positive effect on venture capital intensity. The indicators of technological opportunity are positive and significantly related to the relative level of venture capital. Turning to an entrepreneurial environment, they find that labour market rigidities lessen the impact of GDP and R&D on venture capital. However, the level of entrepreneurship increases the influence of R&D on venture capital
Bonini and Alkan (2009)	16 Countries, 1995-2002	OLS regression	Found a positive and significant correlation between control of corruption, a proxy for lower political risk, but acknowledged that the relationship was not strong
La Porta et al., (1997, 1998)	49 Countries worldwide	OLS regression	Results show that common-law countries usually have the strongest and French civil law the weakest, legal protection of investors, with German and Scandinavian civil-law countries located in the middle.

Félix et al. (2007)	23 European countries, 1992-2003	Panel data model (fixed effect /Random effect)	The authors conclude that the rate of economic growth, stock market capitalization and interest rates have positive and significant relationships with the amount of venture capital
Clarysse et al. (2009)	Israel (1999-2007) US (1980-2007) UK (1985-2006),	Panel data model	Found that the amounts of early stage and total VC invested in the three countries are determined by three main factors, namely total entrepreneurial activity (as measured by the Global Entrepreneurship Monitor), stock market capitalization, and R&D expenditure
Groh and Liechtenstein (2009)	Worldwide	Questionnaire via email	Found safeguarding of property rights is the primary concern for the international investors followed by the availability of local venture capitalists and the management quality and the skills of the local entrepreneurs
Gompers and Lerner (1998)	United States, 1972-1994	Panel data model	Concluded that regulatory alterations affecting pension funds, capital gains tax rates, overall economic growth, and research and development expenditures, as well as firm-specific performance and reputation affect fundraising

Cherif and Gazdar (2011)	21 European Countries, 1997-2006	Panel data model	Found that market capitalization, GDP growth, R&D expenditures, and unemployment are the most macroeconomic determinants of European Venture Capital investments. Early stage investments, funds raised are different which are affected by institutional quality. While the index of economic freedom has a significant and a positive effect on funds raised, it does not appear to be a significant determinant in early-stage investments
Marti and Balboa (2001)	16 European Countries, 1991-1999	Panel data model	The authors determined that the amount of investments has a significant effect on fund raising. However, the divestments are negative and significantly related to fund raising activities in the group of countries analyzed
Leleux and Serlemont (2003)	15 European Countries, 1990-1996	Panel data model	Found that countries which offer relatively weak investor protections (French and German civil law countries) develop smaller venture capital industries. Their findings also demonstrate that the very nature of the legal systems regarding investors' protection, more than the quality of the enforcement of these rules, seems to influence market size

Schröder (2009)	15 European Countries, 1995-2005	Panel data model	The results illustrate that technology and innovation opportunities and the entrepreneurial environment influence the early stage risk capital. In terms of the financial system, the analysis reveals that a bank-based system has a negative impact on the relative amount of early-stage VC investments while a market-based system generates risk capital for young entrepreneurs
Cumming et al. (2010)	39 countries in North and South America, Europe and Asia,1971-2003		Found better legal institutions including better accounting standards significantly increase the benefits to venture capitalist board representation even with multivariate controls for other market factors, venture capital fund, entrepreneurial firm and transaction characteristics

2.6 Empirical Studies on Determinants of SMEs' Accessibility to External Financing

Several studies have investigated SMEs' accessibility to finance in both developed and developing countries. The empirical evidence substantiates that SMEs' requirement and access to funding is influenced by numerous factors such as growth, profitability, firm size, firm age, ownership and industry (Degryse et al. 2012; Chittenden and Hutchinson 1996). Furthermore, past studies established that the macroeconomic, legal and financial environments affect financing of SMEs (Levine 2002; La Porta et al. 1997; Rajan and Zingales 1995). It has been debated whether national markets are essential for the growth of SMEs as the volumes of their financial needs are often too small to aid transactions across borders (Guiso et al. 2004; Mullineux and Murinde 2010).

A study by Torre et al. (2008) shows that banks in Chile and Argentina have started to eye SMEs owing to the substantial competition in the corporate and retail sectors. These banks recognize the SME sector as extremely lucrative with excellent opportunities. The authors show that banks in these countries are conscious of the difficulties working with SMEs, but they deem that collaboration with SMEs is a step forward for the banks to offer financing benefits. Fraser (2004) cited in Obamuyi (2007) and Beck et al. (2006) detected that size and age influence the funding relationship between lenders and borrowers

Bigsten et al. (2003) indicated that in developing countries, high risk, asymmetric information problems, insufficient collateral, creditor-debtor distance, small and recurring credit transactions of small businesses make borrowing costs differ among different methods of credit. Access to credit by micro and small firms can also be ascribed to their features such as owners' gender, age, and education etc.

Hussien (2007) postulated the possibility that selecting commercial bank credit was positively ascribed to firm size, educational attainment, and gender. The author further elucidated that

credit information, education and extension visits have the probability of increasing the information base and the firms' decision-making capabilities, including the capacity to evaluate advantages and disadvantages of choosing proper credit and production technology.

Empirical studies on SMEs' financing have revealed that small businesses in countries with healthier institutional improvements and better safeguarding of property rights are comparatively less financially constrained as investors are willing to invest in these countries (Hernandez-Canovas & Koeter-Kant 2011; Beck et al. 2008). However, several past studies only differentiate between outside equity and external debt, and do not consider the existence of variation in outside funding methods, which can complement and replace conventional debt or equity instruments (Casey & O'Toole 2014; Cosh et al., 2009). Also, it has been established that this impact alters over the business cycle, especially during financial crises (Psillaki and Eleftheriou 2014; Casey and O'Toole 2014).

Yongqian et al., (2012) and Irwing & Scott, (2010) asserted that globally the SME sector had reported difficulties in accessing financing. Obtaining outside funding for SMEs has grown to be more expensive and difficult whereas ease of access has dramatically reduced. SMEs' financing-gap restricts their investment prospects and impedes their growth. Getting funding is commonly seen as an important factor for businesses and particularly SMEs, to sustain their daily business operation and to achieve long-term investment prospects as well as a development goal. Restrictions on access to capital markets have directed businesses to depend greatly on the banks for credit. Hence, an efficient financial system plays an important role in assigning resources to the best companies and investment ventures. Funding constraints significantly minimise a firm's growth and access to productive resources leading to the sluggishness of the SME sector, which can threaten the sector's contribution to the economy.

A study by Beck (2007) demonstrated that SMEs in developing countries are more constrained by finance problems due to flaws in the financial and legal institutions. The author investigated more than 70 developing countries and concluded that governments should play active roles in building suitable institutions, provide the legal structure and undertake market-oriented liberal programmes to reduce funding problems for SMEs. The author also warned against considerable participation of governments in SME funding because over the past decades, research has shown government failure in government SMEs' lending markets.

Fatoki and Smit (2011) claimed South African SMEs' internal factors such as professional competence, security, social connection and business information and SMEs' external factors such as macroeconomics, legal environment, ethical awareness, crime, and corruption restrain new SMEs from obtaining credits.

Olomi et al. (2008) identified three key sets of constraints that affect SMEs' accessibility to funding in Tanzania. SMEs' knowledge and skill levels are low, there is an embryonic business culture, no separation of business from household or individual matters, a lack of recorded credit history and a tendency for them not to find all the financing options. Another constraint is the low capability of the SMEs, including lack of competent staff and experience to produce products that are of good quality. In addition, there are inconsistencies in the right environment regarding rules that overprotect debtors at the expense of creditors, lack of a national identification system and credit reference bureaux.

Riding et al. (2006), using a sample of 2,800 Canadian businesses, examined gender differences among Canadian SMEs seeking external financial capital and found that women's businesses are significantly less likely to seek equity capital. However, male and female business owners that apply for financing are equally likely to obtain capital.

Brush et al. (2000) suggested that organizational barriers such as differences in social networks based on gender may result in women remaining outside the formal male-dominated VC network and gender differences in human capital such as management and track record, make it more difficult for female entrepreneurs to make acquaintances to make deals.

Amatucci and Sohl (2004) conducted a case study involving five entrepreneurs who received financing from angels' investors. The authors revealed some strong statements expressed by some respondents concerning the difficulties women encountered and attributed these difficulties to investors' assumptions or stereotyping about owners' management potential despite extensive business backgrounds.

Brooks et al. (2014) explored the relationship between entrepreneur gender, physical attractiveness, and investors' funding decisions by observing the presentation of three entrepreneurial pitch competitions in the US over three years. The authors found that gender and physical attractiveness are used to discriminate against female entrepreneurs.

The extant literature on venture capital highlights that human capital such as education, managerial experience, and skill training are important selection criteria of VCs' target choice (Muzyka et al., 1996). For example, Becker (1964) and Robinson and Sexton (1994) found that educational achievement is correlated with the benevolence of receiving financial resources in entrepreneurial ventures. Bhagavatual et al. (2010) showed in a sample of 107 entrepreneurs that human capital such as experience and skills have a direct and indirect effect on access to external financing. Baum and Silverman (2004) argued that due to high uncertainty about the quality of start-ups, investors' decisions on the financing of start-ups depends on start-up assets, i.e., technological capital, social capital and human capital. Bates and Bradford (1992) examined 14,424 sample firms using discriminant analysis and found that owners' education, age and the amount of equity investment and on-going VC firm status are positively correlated

to receipt of funding. Hsu (2007) investigated 149 early stage start-up firms and detected that an entrepreneur's prior firm-founders experience increases both the likelihood of receiving VC investments through direct and indirect ties with VCs.

Omri and Frikla (2012), Kim et al. (2006) and Davidson and Honig (2003) found that prior entrepreneurial experience is correlated with the probability of getting external financial resources. Similarly, Shepherd and Zacharakis (1999) observed that the most reliable findings across studies are that VCs prefer the ability of the founders' team, based on higher managerial skills or track record (Tyebjee & Bruno, 1984b; Hutt & Thomas, 1985).

Shane and Stuart (2002) focused on the contribution of the founder of social capital as a determinant of new venture performance. The authors found that founders having a direct or indirect relationship are likely to obtain VC funding. Fried and Hisrich (1994) suggested that since VCs receive so many business plans to fund, social networks are important in choosing which start-ups get funded. Burton et al. (2002) argued that entrepreneurs with previous career experience in more reputable firms are more likely to obtain information and position advantages with measurable effects in receiving external financing at the creation of members such as CEOs, top management, other board members, or prestigious connections to attract VC (D'Aveni, 1990; Cohen and Dean, 2005; Musteen et al., 2010).

In summary, the findings of past studies show that SME owner/managers' preferences towards debt or equity financing and their ability to access such sources of funding are influenced by firms' characteristics such as growth, profitability, firm size and firm age, ownership, and industry. Further, the socio-demographic attributes of SME owner/managers including gender, age, educational attainment, previous experience, reputations and social connections also influence their ability to access external financing (Low, 2006; Kung'u, 2011). Table 2.3

shows a summary of the empirical studies on factors which influence SME owner/managers' access to external financing.

Table 2.3: Summary of the factors which influence SMEs' access to external financing.

Authors	Coverage	Methodology	Results/Findings
Amatucci and Sohl (2004)	5 CEOs	Case studies	Found that investors' assumptions and stereotypes are used to discriminate against women with regard to women's management potential making it difficult for women to access VC.
Bhavgavathal et al. (2010)	107 Entrepreneurs in the US	Hierarchical regression	Found that human capital such as prior experience and skills have direct/indirect effects on external financing.
Bigsten et al. (2003)	200 firms in Africa,1991-1995	Panel data	Access to credit by SMEs can be attributed to characteristics of owners such as gender, age, and education.
Shepherd and Zacharak (1999)	59 students sampled	Conjoint analysis	Identified that the probability of VCs' selection criteria for investment decisions are based on

			founding team, prior experience, and educational level
Tyebee and Bruno (1984)	41 VC firms in the US	Discriminate analysis	Identified entrepreneurs' assets such as technological capital, and social capital are correlated to VC accessibility.
Baum and Silverman (2004)	204 Start-ups in Canada	Panel data analysis	Determined that founding team, managerial skills, and track records, are used as a measurement for VC investments.
Bates and Braford (1992)	14,424 sampled firms in the US	Discriminate analysis	Established that entrepreneurs' education, age, amount of funds required, and firms' reputation are positively related to receiving VC.
Muzyka et al. (1996)	73 VCs firms in the US	Cluster & Conjoint analysis	Found that human capital such as education, managerial experience, and skill training is an essential measurement for VC target selection.
Robinson and Saxton (1994)	US	Probits regression model	Found that educational achievement is correlated with the

			benevolence of receiving financial resources.
Riding et al. (2006)	2844 firms in Canada	Logistic regression model	Established that the majority of women-led businesses are less likely to seek VC.
Hsu (2007)	149 Early Stage Start-ups in the US	Probits regression model	Found entrepreneurs' experience, and founding team experience increase both the likelihood of receiving VC investment through both direct/indirect ties with VCs.
Shane and Stuart (2002)	134 firms in MIT, US	Events model/ Piecewise constant models	Found that new ventures whose founders have social capital or social network relationships with VCs are most likely to receive VC funding.
Fried and Hisrich (1994)	18 VC firms in the US	Case studies	Found that business plans and social network ties are more important in determining which firms receive start-up funds.
Burton et al. (2002)	172 young high-tech firms in the US	Logistic regression model	Found that entrepreneurs with prior career experience in

			reputable firms are likely to obtain information and position advantage with a measurable effect on receiving external funding.
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2.7 Empirical studies on SMEs' Accessibility to External Financing and Its

Determinants in Ghana.

Numerous empirical studies have acknowledged the lack of finance as the primary problem inhibiting the fast growth of SMEs in developing countries (Arthur, 2003; Mensah, 2004; Deakins, North, Baldock, & Whittam, 2008). Abor and Biekpe (2006) indicated that obtaining finance is a significant difficulty facing SMEs in Ghana. SMEs' lack of finance has also been confirmed in a study by the Association of Ghana Industries (AGI) in 2011 which showed insufficient access to credit was the key factor impeding SMEs' growth in Ghana (Nkuah et al., 2013). Other researchers such as Duah et al. (2012), Ackah and Vuvor (2011) identified risk perception of the SMEs' management, ability to obtain collateral, the importance of SME record keeping, high-interest rates and short repayment periods among others as the significant constraints of SMEs' access to credit.

Aryeetey et al. (1994) used a sample of 133 firms, and found accessibility to finance is the most critical obstacle to the businesses' future expansion and growth; about 60% viewed finance as their most pressing problem. They also found that smaller and older firms emphasize lack of finance more than larger and newer firms. According to Aryeetey et al., 38% of the SMEs investigated acknowledged credit as the primary constraint facing their businesses. SMEs have restricted access to capital markets, domestically and internationally, partly due to the perceived higher risk, asymmetric information, and the higher intermediation costs for SMEs. Hence, SMEs usually do not obtain long-term funding whether debt or equity. An investigation conducted by Aryeetey et al. (1994) and Parker et al. (1995), showed that SMEs have a significant constraint in accessing funding/credit from the formal financial institutions in Ghana.

Baah-Nuakoh (2003) found obtaining capital is the most frequently cited problem facing all firms and business sectors in Ghana because of insufficient information on the performance of SMEs and inadequate collateral securities.

HFC Bank (2004) stated that SMEs in Ghana have been relegated or have inadequate means of obtaining credit. Also, insufficient informal supports are available through business angels and personal savings; this invariably affects their capacity to use modern technology, as they do not have huge capital to purchase this modern technology (UNIDO, 2002).

Quaye, Abrokwah, Sarbah, and Osei, (2014) found that a financing gap exists in the SME sector and large corporations in Ghana. The authors concluded the presence of a funding gap in the country as the majority of SMEs are declined access to funding by official financial institutions in the country. This is due to the perceived high risk and inadequate collateral associated with small enterprises in Ghana.

Gokel and Akonea (2002) indicated that SMEs were excluded from the financial market after financial liberalization and continue to suffer from a credit shortage. This is because the banking industry has become urbanized and mainly for the educated to the disadvantage of local enterprises in the credit market.

Aguei, (2012) and Gyamfi, (2012) claimed SMEs have difficulties in accessing credit facilities and the support of financial institutions. The reason is first the lack of physical infrastructure (Aguei, 2012; Gyamfi, 2012). For example, most of the SMEs in the investigation by Ahiabor (2013) indicated insufficient physical infrastructure as a pre-requisite to obtaining substantial credit facilities. Again, the difficulty includes lack of the right collateral by SMEs to obtain credit facilities (Adjei, 2012). A fundamental problem confronting the majority of SMEs is inadequate skills or lack of proper skills (Aguei, 2012; Ahiabor, 2013). This problem reflects

severely on SMEs' financial performance in Ghana (Agyei, 2013) and accounts for lack of proper record-keeping by SMEs (Agyei, 2013; Muhammad et al., 2010).

Owing to poor record keeping, several SMEs are unable to provide essential documents and evidence to obtain financial support from financial institutions (Agyei, 2013).

Inadequate formal education among numerous SME owners is also widespread (Agyei, 2013). This problem accounts for the failure of SMEs to keep proper records and to negotiate for projects and contracts that develop their equity and liquidity.

Regarding financial support, interest rates and conditions for offering loans by financial institutions are very stringent. Because of this, few SMEs can secure funding from such institutions (Ahiabor, 2013). Government rules and inflation are also counterproductive to the development of SMEs and their creditworthiness (Agyei, 2013). Hence, high inflation and interest rates might change while the economic shocks of high inflation might make it impossible to pay off loans or obtain financial support.

Yankson (2004) researched SMEs' financing and asserted that SMEs usually do not need substantial initial capital and advanced technology, therefore they mostly fund start-ups through individual savings or credit from family members and friends. The author stated that the initial capital outlay of SMEs in developing countries is solely funded from individual savings or those of relatives and friends and the later investments are funded mainly from retained earnings. Yankson's findings are consistent with a report by the World Bank which established that small entrepreneurs start with small amounts of capital from their savings, families or friends and steadily develop their business by ploughing back profits (World Bank 1994, p.7). However, the author failed to establish why this trend of financing has not changed with the liberalization of the financial sector in Ghana.

Afenyo (2006) also discovered that self or retained earnings are the most frequently used source of funds by SMEs to finance their operations. Government-sponsored agencies appeared not to have been known by the SMEs due to inadequate information. This confirmed the finding of Mensah (2004) that SMEs failed to take advantage of government-sponsored interventions.

Mensah (2004) reviewed the SME sector and several issues relating to SMEs' development and success in Ghana. The author concluded that, even though some traditional banks fund SME businesses, they are yet to integrate it into their loan structure and develop a separate lending policy for them. Mensah's work focuses on identifying those factors that hinder SMEs' access to funding despite the financial liberalization policy in Ghana.

Nkuah, Tanyeh, and Gaeten (2013) studied the challenges of SMEs' access to credit in the Wa Municipality of Ghana. The authors quoted Antwi-Asare and Addison (2000), who asserted that the Structural Adjustment Programme on Financial Institutions (FINSAP) mostly resolved the operational and institutional shortcomings of Ghana's financial sector. The authors further suggested a robust and competitive financial sector can contribute significantly to increasing access to funding by enterprises. Antwi-Asare and Addison (2000) proposed liberalization of the financial sector to offer access to funding to SMEs. Their study, however, failed to identify the factors, which constrain SMEs' access to funding.

Ackah and Vuvor (2011) investigated the challenges confronting SMEs in getting credit in Ghana and found microfinance institutions are eager to offer funds to SMEs. However, SMEs in Ghana are unable to meet the needed requisites. They recognize security, SMEs' equity base, surging interest rates and short repayment time as critical difficulties facing SMEs. Their results are consistent with the findings of Duah et al. (2012). Even though their work established some key factors that hinder access to credit by the SMEs, it also failed to establish the interrelationships between these variables.

In a field survey of SMEs in Tamale in the Northern Region of Ghana, Alhassan and Sakara (2014) found that a firm's characteristics such as fixed assets, firm size, and form of business, as well as the sector or industry in the economy, are essential success factors in accessing bank finance. Similarly, Osei-Assibey (2014) found that a firm's age, asset structure and ownership of a bank account increase the likelihood of having access to finance among rural non-farm enterprises in Ghana.

Aryeetey et al., (1994) argued that the SME's performance is one of the criteria for assessing the creditworthiness of the firm. This is because firms that are performing well are most likely to pay back loans. Several indicators can measure a firm's performance among which are included labour productivity, increase in sales or turnover ratios, profit, and firm capacity utilization, and export growth over a given period (Baah-Nuakoh 2003; Aryeetey et al., 1994).

Evidence from empirical studies indicates superior sales and profits are linked to obtaining more credit (Bebczuk, 2004; Aryeetey et al., 1994). The reasons for lack of credit are poor business performance. Baah-Nuakoh (2003) found that credit is the most severe constraint among declining and stagnant firms.

According to Kumah (2011), the size of a firm is also one of the criteria for assessing its creditworthiness by financial institutions. Aryeetey et al. (1994) also found that medium-sized enterprises and mature firms are often offered credit three times more than younger firms. This was due to the inadequate collateral of the smaller firms.

Several studies have argued that older firms face fewer constraints in accessing credit compared to newer firms. This is because older firms tend to have a higher reputation which increases their likelihood of accessing credit (Osei-Assibey, 2014). Aryeetey et al. (1994) found only

10 % of start-up enterprises in Ghana could obtain loans from the bank because most start-up firms lack the necessary collateral to obtain loans from financial institutions. Baah-Nuakoh (2003) also discovered that access to finance is a severe constraint among new enterprises. This is because of the lack of adequate information on the financial performance of new and young firms which makes it difficult for lenders to approve their credit demand (Adomako-Ansah, 2012).

Kumah (2011) indicated that enterprises in the services sector are more likely to access credit compared to their counterparts in the agricultural sector due to the low level of risk and relatively high rising sales level and revenue associated with the former.

Osei-Assibey (2014) found that a firm's ownership of land, which is used as a proxy of asset structure, is a significant determinant of access to credit among rural non-farm enterprises in Ghana because this collateral compensates the lenders in case of default by borrowers. This finding confirms a study by Adomako-Ansah (2012), which shows that out of 15 banks and non-bank institutions in Ghana, 13 of them consider collateral as the most critical factor in approving loans.

The relationship between firms and financial institutions is often measured by the firm's ownership of a savings bank account (Osei-Assibey, 2014). For instance, Osei-Assibey (2014) found that the relationship between firms and financial institutions, as measured by ownership of a bank account is positive and statistically significant in accessing credit from formal financial institutions. This is because this relationship enables banks to assess the credit history and cash flow of a firm; hence, reducing transaction costs in generating information on the firms. Further, ownership of a bank account implies that the borrower is financially literate and may be able to repay the loan.

The characteristics of the owner are also important factors considered in SMEs' loan assessment to determine their creditworthiness and ability to repay loans (Pandula, 2011; Osei-Assibey, 2014). Kumah (2011) and Osei-Assibey (2014) showed no significant gender difference in access to credit as the financial institutions in Ghana tend to be fair and non-discriminatory in their provision of credit to SMEs.

Ahmed and Hamid (2011) found that the owner's education level is positive and significantly correlated to the probability of access to credit because firms in which the manager has a bachelor's, or a post-graduate degree exhibit a higher likelihood of access to credit compared to those firms in which the managers are not graduates. The number of years spent by the owner-manager in formal business education- such as completion of secondary education, vocational training and university education, such as graduate and postgraduate degrees is used to determine the owner's level of education. However, most SME owners in developing countries tend to have a low level of formal education. Most firm owners learn their trade through an apprenticeship with an experienced master (Aryeetey et al., 1994).

Ahmed and Hamid (2011) indicated that the experience and managerial competency of the firms' managers/owners imply human capital quality which would possibly reduce contact and assist negotiations with the providers of credit. Deakins et al. (2010) noted that young and inexperienced SME owners tend to be credit constrained as a result of factors such as inadequate security, insufficient personal resources, lack of trading records, credibility and other sources of funding. Zarook, Rahman, and Khanam (2013) found that a percentage increase in a manager's years of experience increases access to finance by 1.062 percent. The owner's managerial experience and skills are gauged by the number of years they have been managing the business.

2.8 Research Gap in the Literature

A survey of the literature on venture capital financing of SMEs shows that a significant gap exists on the impact and factors contributing to venture capital investment activity in most developing countries including Ghana. Most of the empirical studies have been focused on developed countries like the US and Western Europe. Examples include those of Hellmann & Puri 2002; Bottazzi et al. 2008, Kortum & Lerner 2000, Engel & Keilbach 2007, Alemany & Marti 2005, Gomper & Lerner 2002, Jeng & Wells 2000, Peneder 2010; Gilson and Blacks1998. This is not surprising since the venture capital concept originated in the US and has been adopted by most countries in Europe; however, the concept is very new in most developing countries. Hence, very little empirical examination has been carried out in these countries. Furthermore, the lack of data on venture capital especially in developing countries makes it difficult for researchers to investigate venture capital financing.

In Ghana, not many investigations have been performed on venture capital funding on SMEs. Only a handful of empirical studies have been conducted. Examples include Boadu (2014), Brew-Sam (2010), Owusu-Adjei (2010), Gatsi and Nsekyire (2010), Obeng et al. (2009) and Poku and Frimpong (2009) which were mostly based on questionnaires and interviews. In order to fill this gap in the literature, our study seeks to investigate the impact of venture capital funding on SMEs' growth and development. The study examines the determinants of venture capital investment activity in Ghana, as well as identifying and analyzing the factors which influence the access of SMEs' owners/managers to venture capital financing through econometric models.

Chapter 3

Data and Methodology

3.1 Introduction

This chapter discusses the data and methods used in the study. Section 3.2 describes the study area. Section 3.3 provides the sample selection and Section 3.4 provides the sources, and description of the data. Section 3.5 discusses the concept of impact evaluation and methodologies. Section 3.6 provides details of the empirical models used to investigate the impact of venture capital funding on SMEs' growth in Ghana. Section 3.7 outlines the empirical models used to examine the factors that influence venture capital investments. Section 3.8 provides the empirical model used to identify and assess the factors, which influence SME owners' accessibility to venture capital financing in Ghana.

3.2 Description of Study Area

The Greater Accra Region is situated in the South-Eastern part of Ghana laterally on the Gulf of Guinea. It has coastal savannah, a small forest zone and stretches inland towards the Eastern Region with some attractive coastline mostly in the rural part of the region. It is the smallest of the ten administrative regions of the country by land mass. It covers a total of 3,245sq.km or 1.4 percent of the entire land mass of the country. The overall populace of the region has grown from 2,905,726 to 4,010,054, the second highest after the Ashanti Region (Ghana Statistical Service) (GSS, 2011). It is the most densely populated area with 1,236 persons per square metre. Most of the inhabitants of Accra are engaged in economic activities such as wholesale and retail trade, agriculture and manufacturing (GSS, 2011).

The study was undertaken in the Accra Metropolitan Area (AMA) and the Tema Metropolitan Area (TMA) in the Greater Accra Region. These areas were chosen because they are the main commercial and industrial districts of the country where major industrial and economic activities are undertaken, and where most SMEs are located. The Greater Accra region is sub-classified into ten administrative districts namely AMA, TMA, Ga East and West District, Dangme West and East District, Dodowa, and Ada-Foah. AMA is among the 16 MMDAs in the Greater Accra Region and one of the 216 metropolises in Ghana. The 2010 population census indicated that there were approximately 1.6 million inhabitants in the region with females representing 51.9% and males 48.1 % (GSS, 2011). AMA is the commercial centre of the Greater Accra Region and other parts of the country, which can boast large financial institutions, manufacturing companies, oil companies, telecommunication, tourism, education, and health institutions. Presently the city has the most diversified economy of any area in Ghana (Grant, 2009; Yeboah et al., 2013 and Grant and Yankson, 2003).

Tema is a city on the Bay of Benin and the Atlantic coast of Ghana. It is situated 25 kilometres (16 miles) east of the capital city of Accra in the Greater Accra Region. The 2010 population census estimates indicate that the inhabitants of Tema are 292,773, which represents 7.3% of the region's population. Tema has been transformed from a small fishing community into an industrial epicentre of Ghana's economy. Major companies located in Tema include Volta Aluminium (VALCO), Tema Oil Refinery (TOR), Nestles Ghana Ltd., Wahome Steel Ltd., Tema Shipyard and a free trade enclave. About 26.3% of the residents are employed in wholesale and retail trades and repair of motor vehicles, 18.8% are in manufacturing, 8.8% in transportation and storage, 8.2% in the accommodation and food service industry, and 0.3% in real estate, mining and quarrying respectively (GSS, 2012).

3.3 Sample Selection

SME owner-managers who could provide in-depth knowledge of the effects of SMEs' financing (i.e., venture capital financing) on firm growth regarding total assets growth, annual sales growth and employment growth were selected. This study employed a non-probability sampling technique to select SMEs in different sectors of the Ghanaian economy such as Manufacturing/Construction, Wholesale and Retail Trades, Agriculture, Forestry/Fisheries, and Services.

The study used a purposive sampling technique (Miles and Huberman, 1994) as suggested by Achtenhagen et al., (2010) who argued that a purposive sampling approach should be used in studies which focus on specific types of firms. Purposive sampling ensures that information is solicited from participants who have in-depth knowledge and experience of the subject matter under study. The purposive sampling method is a deliberate selection of respondents who possess certain qualities. The researcher only chooses the subject matter and looks for people who have the ability and are prepared to share information based on their expertise or experience (Bernard, 2002).

The sample frame for this research is obtained from the Accra-Tema Metropolitan Areas in Ghana. This is because about 90% of SMEs who used venture capital financing in their businesses are in this metropolis. The sample size for the study was calculated based on Cochran's (1963, p.75) formula (see. Appendix A). The study computed sample response is 385 SMEs owners/managers from the Greater Accra Region of Ghana. In order to address sample reduction, the sample should be bigger than the computed sample response required taking into consideration non-responses. Coleman, (1999), Husain, (1998) and Brennan, (1991) suggest that generally between a 60% and 90% response rate is required based on survey questionnaires in past studies. Subsequently, 600 questionnaires were administered to the

selected SMEs owners/managers. A total of 400 questionnaires were collected, but 15 were rejected due to incompleteness. Hence, the response rate was 67% with a usable response of 385.

3.4 Data Description and Sources

Primary and secondary data were used for the study. The survey questionnaires were used to gather primary data in the Greater Accra Region of Ghana. Before administering the survey, a pre-test of the questionnaires was administered to 20 SMEs in Adenta a suburb of Accra to assess the simplicity, reliability, and validity of the survey questions. The survey questions were amended after the detection of errors and distortions from the pre-test. The survey was administered from June 2016 to September 2016.

A total of 600 questionnaires were distributed to SME owners/managers in the Accra-Tema Metropolis, and 400 were received. A total of 65 responses was received from VC backed companies and 320 responses from the non-VC backed SMEs companies. Out of the 400 responses that were received, 15 of them were rejected due to incomplete responses; hence our usable response rate was 67 percent (385 responses).

The questionnaire for the study was organized into five sections. Section one gathers information about SMEs' accessibility to finance in general. The second section focuses on participants who used venture capital to finance their businesses; section three focuses on participants who did not use venture capital to finance their businesses. The fourth section focuses on general business characteristics of the participants and the last section focuses on their socio-demographic characteristics (see Appendix B).

The survey questions include closed-ended questions to simplify the participants' answers. The questionnaires were administered through face to face interaction with participants. The

participants took an average of 45 minutes to complete the questionnaire. The questionnaires were collected by the researcher immediately after they were completed. The researcher used different approaches or strategies in administering the survey. The participants for the study were obtained from the databases of the Association of Ghana Industries and the Venture Capital Fund Secretariat and were all SME owners. In terms of the non-venture backed SMEs, the Association of Ghana Industries (AGI) Secretariat was contacted, and an introductory letter was obtained to assist the researcher to administer the questionnaires to the respondents. Similarly, contact was made with the Venture Capital Fund Secretariat for an introductory letter to enable the researcher to solicit information from VC fund managers who connected the researcher to SME owners who had received venture capital support. Meetings were arranged by the VC fund managers to enable the researcher to interact with their SME owners. These meetings took place at a prearranged location or the offices of the companies during the week.

Secondary data for the study was obtained from various sources. These include databases from the World Bank and the Heritage Foundation. The dataset consists of a panel data from 15 African countries over ten-year period from 2006-2015. The list of countries includes Botswana, Cote D'Ivoire, Ghana, Kenya, Malawi, Mauritius, Mozambique, Namibia, Nigeria, South Africa, Tanzania, Uganda, Rwanda, Zambia and Zimbabwe. These countries were selected based on the Venture Capital and Private Equity Country Attractiveness Index Report in 2013. The macro-economic variables employed for the empirical analysis such as GDP growth rate, Inflation rate, market capitalization, stock traded, interest rate, capital gains tax, and scientific and technical journal articles were obtained from the World Bank database. The institutional variables index of economic freedom was obtained from the Heritage Foundation.

3.5 Impact Evaluation of Venture Capital Financing on SMEs' Growth

3.5.1 Impact Evaluation

The definition of impact evaluation differs widely among donors and other stakeholders in the development community. Hearn and Buffardi (2016, p.7) assert “the lack of consistent definition and technical debate about methods have led to confusion among donors and implementation staff”. Omoto (2003) contends that “impact evaluation” or “impact assessment” is used interchangeably. Since the international development community cannot agree on a single definition of impact evaluation, it is no surprise that some groups advocate for quantitative methods, while others call for a mixed methods approach. However, The European Evaluation Society has taken the position that evaluation should not be defined by a particular method (EES, 2007). Professor Stern said that impact evaluation should not be confused with any one design, methodology or philosophy; “the core of what impact evaluation must be about is whether the program or policy in some way causes the effect” (DIFD, 2012, p.24).

According to the Development Assistance Committee (DAC) of the Organization for Economic Cooperation and Development (OECD), impact evaluation is a long-run effect created because of the development program, primary and secondary, directly or indirectly, positive and negative, planned or unplanned. The impact may be economic, socio-cultural, institutional, technological, and environmental (OECD/DAC, 2002 p.24). However, the World Bank defines impact evaluation as an appraisal of the transformation that occurred in the welfare of the people, household, communities, and regions because of a particular program. The emphasis is on the causality or “attribution” of the transformation and what could have occurred if the program was absent, the “counterfactual” (World Bank-IEG, 2011).

According to 3IE (2008), impact evaluation is defined as an analysis which measures the net variation of effects for a particular group that can be ascribed to a precise program using the most excellent method accessible and is viable and suitable to the assessment question that is being explored and to the precise context.

According to Baker (2000), the degree to which a program has caused a required/unrequired transformation in the intended effect is what impact evaluation assesses. It concerns the net outcome of an intervention on the institutions, individuals and households that may be ascribed wholly to the intervention. Thus, impact evaluation involves the assessment of research outcomes and continuous variations that result from the intervention. Khandker et al. (2010) described impact evaluation as the act of investigation if the changes in well-being are undoubted as a result of the intervention and not due to other factors. The impact of any program on the people cannot be accomplished without undertaking the intended direct product of research. Consequently, in any broad impact assessment, it is essential to differentiate between the intervention outcomes and the contribution of the intervention outcomes to development, and both aspects must be handled at the same time (3IE, 2008).

Impact evaluation is used to measure the effect of a program or project or to evaluate the outcome of a new product or policy. In both circumstances, the central question of the assessment remains the same. Thus, to what extent has the welfare of participants been transformed as compared to the way their situation would have been if the program or policy had not been implemented? How did the program affect the beneficiaries and how were the beneficiaries affected by the policy or project? Is the policy or project directly responsible for the improvements in the lives of the people, or would they have any way to be enhanced? Can the programming scheme be altered to enhance the effect? Is there any rationalization for the cost?

However, we cannot find answers to these questions by merely measuring the outcome of the program. There may be external attributes linked with the results that are not caused by the program. To guarantee objectivity, evaluation of the impact must measure the counterfactual, thus what would have transpired if the project did not happen or what would have been factual. For instance, assuming a fresh graduate is employed after undertaking a labour training program, can we directly attribute it to the program or would that person would have found work in any case? To estimate the counterfactual, it is essential to net out the outcome of the intervention from outside influences. This can be achieved by matching comparison or control groups with the treatment group. In this current study, to estimate the counterfactual, we construct a control group for those SMEs who did not receive venture capital financing (Non-VC backed SMEs) and compare them to those SMEs who received venture capital financing thus, the treated groups (VC-backed SMEs). To assess the effect of the venture capital financing on SMEs' growth, we estimate the effects of the intervention (outcomes) by netting out the mean difference between the treated group (VC-backed SMEs) and the control group (Non-VC backed SMEs).

Comparable groups are chosen randomly from the identical population as program participants, while non-participants of the program under analysis are more or less a "comparison group." The control and the treatment groups should have similar characteristics; program participation should be the only difference between these two groups. A counterfactual compares what happened with what could have happened assuming the program had not happened, or what otherwise would have been factual. Experimental designs evaluate the counterfactual through a random selection of the intervention within a well-defined group and compare the treatment group by intervention with the control group. Through this method, the variances of the outcomes among the groups can be ascribed exclusively to the intervention. In a situation where the program was not randomly assigned, quasi-experimental methods are applied, using

statistical methods (i.e., propensity score matching) to imitate a control group (White, 2014; Card, 2011; Ravallion, 2003).

3.5.2 Impact Evaluation Methodologies

To identify a program's effect on individual participants, we need to relate the observed effect with the outcomes, assuming the individual did not take part in the program, thus the counterfactual effect. However, the omitted data is the central problem in the evaluation of any social program (Ravallion, 2005; Bryson et al., 2002). Ezemenari et al. (1999) proposed that to evaluate the impact of a program, it is expected to differentiate the effect from intervention, which might relate to the outcomes, but not be triggered by the program. By introducing a "control group" the task of "netting out" the program outcome from external influences is improved. "Control group" refers to a matched group of households or individuals, who did not get the intervention, but nevertheless have similar attributes to those who received the intervention, known as a "treatment group." To correctly identify these groups, it is essential to establish what is likely to have happened if there were no intervention. In our study, to identify and assess the effects of venture capital financing on SMEs' growth, we created the control group (Non-VC backed SMEs) by identifying SMEs which did not receive venture capital financing, or which were rejected and compared them to SMEs which received venture capital financing. The control groups were created based on firm characteristics and SME owner-managers' characteristics and matched to the treated groups with similar characteristics.

According to Barker, (2000), the core of evaluation design is how to determine the counterfactual. Several methodologies can be used to achieve this. These methods come under two general groups, experimental models or randomized, and quasi-experimental models or non-randomized. However, to net out the program effect is slightly complicated as counterfactual situations are likely to be affected by contamination and bias selection, as well

as historical records. Qualitative and participatory procedures can evaluate the impact. These methods often give critical intuitions into recipients' viewpoints, the program's value to recipients, the procedures that might have affected outcomes, and an in-depth analysis of outcomes noted in the quantitative analysis. Theoretically, evaluators can use three main approaches to establish treatment and control groups; i.e., randomization or experimental design; non-randomization or non-experimental design, and quasi-experimental design. In practice, selecting a particular method in the social sciences hinges on, among others, cost, data availability, and ethical considerations (White, 2014; Boruch, 2016).

In our study, to determine the effects of venture capital financing on SMEs' growth, we applied non-experimental design with a matching method based on PSM-DiD estimation to measure the programme's impact, i.e., venture capital financing on SMEs' growth in the Accra-Tema Metropolis in Ghana. This approach was deemed fit since our goal was to address the issues of counterfactual and selection bias that might affect the outcome.

i. Experimental Design/ Randomization

Randomizations otherwise known as experimental designs are seen mainly as the most vigorous of the evaluation methods. Given correct sample sizes, the distribution procedure automatically creates similar treatment and control groups that statistically match each other; by random allocation of intervention among eligible beneficiaries. Theoretically, this is a useful outcome, as the control groups are produced from random allotment, which represents an ideal counterfactual, devoid of the problem of bias selection, which arises in evaluations (Gertler, 2004; Rogers, 2014; Bamberger, 2010; Khandker et al., 2010).

The critical advantage of the randomization method is that interpretation of the results is straightforward. Thus, the effect of the program on the outcome is evaluated by the sample average differences between treatment groups and control groups. Control and treatment

groups subsequently allow the researcher to assess the program's effect on the participants (Baker, 2000). Although experimental models are regarded as the best technique to evaluate program effectiveness, in practice there are numerous challenges.

Firstly, random sampling may be unethical, because to achieve the objective of the study, those who are qualified to benefit may be rejected. A classic example is to deprive some members of a population of medical treatment that may turn out to be lifesaving. Secondly, it may pose a political challenge to offer intervention by discriminating one group against the other group (Baker, 2000).

Thirdly, the latitude of the program may imply that control groups are not available such as a change in policy that is extensive in scope (Baker, 2000).

Fourthly, identified individual characteristics within control groups could undoubtedly alter during the trial, which possibly nullifies or taints the outcome. For example, assuming individuals come in and out of the area where the project is undertaken, they might come and leave from any of the two groups. On the other hand, individuals who do not benefit from the program might find it through other means, or those receiving a program may refuse it (Baker, 2000).

Fifthly to guarantee that selection is random is problematic. For instance, managers may reject high-risk applicants to accomplish better results. Lastly, experimental designs can be costly and in some circumstances, consume much time, especially in the collection of new data (Baker, 2000).

In this present study, to overcome the challenges, purposive sampling was used to select our target populace. Our selection criteria were based on firm size, age, and industry or sector in which the firm operates. Most of our target population were respondents who were willing to

participate. Regarding cost, our study was confined to only one out of ten regions in Ghana. This was deliberately done to reduce the cost and time associated with conducting the study in all the regions of Ghana.

Most of these problems can be resolved with the application of experimental design with careful planning. One method is selecting beneficiaries randomly. This presents a clear politically transparent sharing mechanism and foundation for an excellent evaluation analysis, as a financial plan or lack of data often makes it difficult to correctly find and get to the most qualified recipient (Baker, 2000).

Another method is to get the control groups into the program in a period after the planning and commencement of the assessment. With this method, random assignment is established when the qualified benefactor gets the program, and not on condition that they get it (McKay, 1978). In Colombia, during the appraisal of a program on nutrition, this method was used which gave the extra benefit of addressing questions that concerned the critical time required for the program's potential to reduce malnutrition (McKay 1978).

Lastly, randomization is used inside a subgroup of similarly qualified beneficiaries, the most qualified receive and the least qualified are denied benefits, for example, a social fund evaluation conducted in the El Chaco region of Bolivia (Pradhan et al., 1998). However, with the application of the latter, the results attained from the assessment would be significant for the randomly selected target group.

Selecting individuals randomly to treatment and control groups ensures that after the intervention any difference in outcomes between comparable and treatment groups may be ascribed to the intervention. One fundamental merit of randomization is the ability to overcome selection bias, which occurs when the participation of individuals in the program is linked to their unobservable characteristics, which is likely to influence the outcome of the program.

Evidently, randomization must take place before the program commences (Ezemenari et al., 1999). In this present study, we adopted non-randomised design due to the non-experimental nature of our study.

ii. Internal and External Validity

Internal validity means the outcomes assessed in the program which is net of possible unclear influences, or the comparison group denotes the correct counterfactuals, and estimates the precise effect of the program (Baker, 2000). Randomization gives a group that is being controlled which is statistically comparable to the group receiving the treatment, before the commencement of the program. As soon as the program commences, the control group is exposed to the identical set of outside influences over a period, excluding the program, which is in case there are changes in the outcomes between comparable groups and treatment groups, which can only be attributed to the existence of the program in the control group. Thus, it is only through randomized selection of treatment that internal validity of an impact evaluation is guaranteed (Svensson, 2008; Cook and Campbell, 1979; Gertler et al., 2016).

External validity involves the assessment of the outcome in the evaluation sample, which is generalized to the population of all qualified units (Gertler et al., 2016; Khorsan & Crawford, 2014). The evaluation sample must epitomise the population of qualified components; thus, the sample being evaluated is required to be chosen from the populace by any of numerous differences of sampling randomly. Through a randomized selection of treatment, impact evaluation can show internally valid estimates; on the contrary, assuming the evaluation is completed using non-random probability sampled population, the expected impacts are unlikely to be generalized to the population of qualified components. However, assuming the evaluation uses a random sample population of qualified individuals, treatment is not specified in a randomized manner, even though the sample will be representative, yet, the comparison

group is likely to remain invalid (Gertler et al., 2016). In this current study, to ensure the internal and external validity of our findings, we make sure that the respondents were selected from the same region using the same criteria and the same set of questions for all the respondents.

iii. Quasi-Experimental design

Quasi-experimental design or a non-randomization method is adopted to create groups when it is impossible to randomise individuals or groups of treatment and control groups. It involves the creation of a comparison group by matching comparisons (Baker, 2000). Matching is created through the identification of non-participants with key characteristics comparable to participants. Both participant and non-participant groups should be compared based on either a few observable features or a handful of known characteristics, which are well-known to affect mutual participation and outcomes of the program. Selection of matched comparison groups should be made before program implementation (White, 2014; Baker, 2000). Econometric techniques, such as matching, double in difference, instrumental variables, and reflexive comparisons methods are used to create comparable groups that are identical to the treatment groups. Before the use of these methods, the treatment and comparison groups are regularly distributed after the intervention through quasi-experimental methods. Consequently, statistical controls methods are employed to assess variances between treatment and control groups. A matching method is to create a control group that can match the treatment group. Under specific conditions, a control group is also selected before the treatment, even though assignment is not randomly done (Baker, 2000).

One key advantage of using non-randomized experimental design is that it can rely on existing data sources, is faster and inexpensive to carry out, and is usable after a program has been

executed, provided there is adequate extant information. The main drawbacks of non-randomized experimental designs are:

- Since the method is statistically slightly vigorous, trustworthiness of the outcomes is often reduced;
- Statistically, this method can be difficult
- The problem of selection bias.

According to Baker (2000) to create a control group, instead of randomly apportioning one, several factors can impact the trustworthiness of outcomes. Statistical complication demands essential knowledge of how the evaluation was designed and interpretation of the outcomes. More often, it is unimaginable, generally in a developing country's environments. The third problem is selection bias that is related to the degree to which the participation in a program differs by subclasses of a target population; hence it may affect the model and eventually the outcomes (Baker, 2000). Two types of bias can be identified: those which are a result of differences in observed characteristics and those which result from differences in unobserved characteristics, often known as bias selection or self-selection. A bias observation could involve the selection standards through which an individual is targeted, for example, participation in the labour market, school enrolled or location. Individual ability, motivation to work, family links, and a biased procedure of selecting individuals for a program are unobservable biases that may affect bias program outcomes.

As discussed, these two kinds of biases can produce inaccurate outcomes, which include underestimation and overestimation of real program effects as positive effects while real program effects are adverse and statistically insignificant effects when real program effects are significant (Baker, 2000). A statistical technique like matching and instrumental variables can be used to control bias. However, they are difficult to remove completely and that remains a

crucial obstacle for scholars in the field of impact evaluation (see Imbens and Angrist, 1994; Miguel et al., 2004). Thus, the primary shortcoming of the instrumental variable approach is that it is often difficult to find a suitable instrument to identify the treatment effect. One needs at least one regressor which determines the programme participation but is not itself established by the factors which influence the outcomes (Blundell and Costa Dias, 2000; Heckman, 1995). Matched-comparison methods are considered mainly as the second-best substitute for experimental design among all quasi-experimental design approaches. Most of the literature on evaluation methodology concentrates on how to employ the types of evaluation and echoes both the existence of usage of matched comparison and the countless difficulties in having imperfect comparison groups (Friedlander and Robins 1995; LaLonde and Maynard 1987, Fraker and Maynard 1987; LaLonde 1986).

The propensity score matching method offers substantial improvements (Jalan and Ravallion 1998; Rosenbaum and Rubin 1985). PSM is popular among researchers who do not have sufficient time and who work without baseline data, since it is possible to supplement with cross-sectional data. However, PSM depends on possessing the correct information since it depends on oversampling program beneficiaries throughout and using a more extensive data collection and comparing it to a control group chosen from the primary more significant sample, generally from a national household survey (Caliendo and Kopeinig, 2005). This evaluation method seems particularly encouraging with the advancement in the usage of extensive analyses in less developed nations, such as the Living Standards Measurement Studies. For example, Jalan and Ravallion, (1998) used single cross-section data with a matching technique to estimate the effect of the Trabajar public works program in Argentina. A non-experimental method is used in situations where program allocation is purposely located. For programs intentionally arranged, it is common to find a distinct cross-section data

survey completed after the program has been announced (Bryson et al., 2002; Jalan and Ravallion, 2003; Rosenbaum and Rubin 1983).

According to Bryson et al. (2002), there are two broad groups of non-experimental approach; cross-sectional estimator and prior and post estimators. The idea of a before and after an estimator of an impact evaluation method is to match the outcome variable for an individual group consisting of program participants against the outcome of similar non-participants or a bigger comparable group before program participation. Moreover, to assess the variance between the two groups as an estimation of Average Treatment Effect on Treated (ATT), cross-section evaluators use non-participants to measure the counterfactual for participants which turns out to be a quasi-experimental design (Bryson, 2002; Duflo, 2007; Gertler, 2004).

The quasi-experimental model comprises matching participants in a program with a similar non-participant group who are not involved in the program. This encourages randomization but should not occur before the intervention (Kerret et al., 2000). Neither a baseline survey nor randomization is a viable alternative; a quasi-experimental design is the only substitute (Jalan and Ravallion, 2003). Non-randomized methods require the creation of a (matched) control group where individuals who receive the intervention are matched with an “equivalent” group from those who did not receive the intervention (Ezemenari et al., 1999). The most frequently used quasi-experimental design available for evaluating development programs according to Asian Development Bank (ADB, 2006) are PSM, DD, RDD and IV.

Jalan and Ravallion (2003a) used PSM to estimate the impact of the Trabajar Public Works Project in Argentina on income. The Argentine government in reaction to the 1996–97 macroeconomic crisis, initiated a Trabajar workfare program on income, devoid of using any randomization method or any baseline data collection. As a result, the authors decided to use the matching method to assess the effect of the program. The usage of the matching method

in this situation also enabled it to analyze how income gains varied among households across the pre-intervention of income allocation. By matching participants to their nearest non-participant neighbours in the area of common support, and netting out the average differences in income between all of these matched groups, they assessed that the program resulted in an average income increase equal to about half of the workforce program's wage.

Galiani, Gertler, and Schargrodsky (2005) used the DiD method to deal with a significant policy question: Does the privatization of water services delivery improve health outcomes and help alleviate poverty? The Argentine in the 1990s, introduced one of the most extensive privatization campaigns ever, by reassigning domestic water companies to planned private companies. The authors' study shows that in the areas where water services were privatized, child mortality reduced by 8 percent and the impact was most substantial in the most deprived areas.

Lemieux and Milligan (2005) used regression discontinuity design to examine the incentive effect of social assistance by restricting their sample to men without children and a high school diploma by collecting data from the Canadian Census and the Labour Force Survey. Using the RDD approach, they found evidence that more social support benefit reduced employment.

Kaboski and Townsend (1998) used an IV approach to assess the effect of Thailand's Million Baht Village Fund Program on economic outputs of Thai villages. The authors used the instrumental variable of inverse number of households. The instrumental variable was used because the village fund was not randomly assigned or distributed. The authors found that the Million Bhat Village Fund increased the overall credit in the economy.

iv. Evaluation methods of ex-post impact evaluation

The fundamental question of missing counterfactuals can be addressed using different methods in impact evaluation theory. Each method has its identifiable principles on the kind of possible bias selection in the targeting program and participation, and the values are critical to developing a suitable method to assess a program's effects (Khandker et al., 2010).

- i. Randomization
- ii. Matching methods, especially propensity score matching
- iii. Difference-in-difference approach
- iv. Instrumental variable approach
- v. Regression discontinuity design approach
- vi. Distributional impacts
- vii. Structural modelling approach

The approaches differ according to their core hypothesis of how to address selection bias to assess the treatment of the program's outcome.

- i. **Randomization-** Randomization requires a randomly assigned program across a sample of subjects, i.e., local area or persons, for instance, the improvement of treatment and control groups showing identical before program characteristics pursued over a period. One benefit of randomized experiments is its ability to avoid selection bias at the level of randomization (Akobeng, 2005; Duflo 2007).
- ii. **Propensity score methods** - PSM is a mechanism used to identify a suitable comparison group that can match the treatment group. Matching is computed using the propensity score described as the predicted likelihood of participation when observable characteristics are assumed. PSM permits the discovery of a control group from a sample of non-participants nearest to the treatment group based on observable

characteristics. The propensity score is calculated as a function of individual characteristics based on a statistical model (i.e., logit or probit model). Thus, PSM compares treatment effects across participant and comparable non-participant groups in non-randomized settings, with the comparison carried out on a variety of observable features. PSM techniques thus assume that the selection bias is established solely on observed characteristics; however, they are unable to assess unobservable factors that affect participation (Dehejia and Wahba, 2002; Bryson et al., 2002; Caliendo and Kipeining, 2008).

- iii. **Difference-in-Difference Model (DiD)** - Difference-in-difference is a standard econometric approach commonly used to evaluate the impact of precise treatment on an outcome of interest. This method is used in creating an experimental design or a quasi-experimental as well as a non-experimental design. Before and after the intervention DiD compares the treated group and the comparison group. The average difference between the “before” and “after” values of the impact indicators for both the treated and comparison groups is then estimated. The variation in the value of the second difference as compared to the first difference is the program effects. This technique can be combined with the propensity score method to correct for pre-treatment differences that influence the parameter in question. DiD entails baseline and follow-up data from the same treatment and control group. DiD expresses valid assessment when the selection bias is time-invariant, which means the technique removes a selection bias which has no variation over time. On the other hand, in the condition that the selection bias changes over a period, the calculated impact will exhibit biases. As a result, the model is helpful on the condition that the two groups have parallel characteristics improvement trend before in anticipation of the introduction of the program. Thus, DiD assumes that unobserved selection does not

change over time. The effect of treatment is estimated by netting out differences in outcomes between treatment and control components pre-and post-intervention of the program (White et al.2006; Baker, 2000; Angrist and Krueger 1999).

iv. **Instrumental Variable Model (IV)** - The instrumental variable technique is used with cross-sectional or panel data analysis, and in the case of the latter it permits for self-selection on unobserved features which change with time. The instrumental variable technique relates precisely to the choice of unobservable features (Imbens and Angrist, 1994). The Average Treated Effect on Treated (ATT) instrumental variable is recognized if the researcher finds a variable that can influence the assignment into treatment but is unrelated to the outcome or the unobservable. Thus, the critical objective of the IV technique is to identify a variable or a set of variables, i.e., instruments that impact the decision to participate in a programme and at the same time do not have an impact on the outcome (Morgan and Winship, 2007; Caliendo and Kopenig, 2005). In the IV technique, the selection bias on unobservable features is corrected by looking for an instrumental variable that is linked to participation, but unrelated to unobservable characteristics which affect the outcome of interest. The instrument is employed to forecast participation (Heckman 1997; Heckman and Navarro-Lazano, 2004; Angrist and Krueger 1991; Angrist 2006; DiNardo and Lee 2010).

v. **Regression Discontinuity Design (RDD)**

Regression discontinuity design possesses many of the properties of a randomized experiment, however assigning randomly is unpractical. RDD is a well-known quasi-experimental strategy, which utilizes a clear-cut understanding of the policy, which establishes the suitability for treatment. Assignment for this strategy is exclusively dependent on pre-intervention variables, which the researcher can observe, and the

likelihood of involvement varies disjointedly as a function of these variables. RDD matches the outcomes of a group of measurement components (e.g., individuals) beyond the endpoint for qualification with a group of components below endpoint. The hypothesis that individuals almost close to the end for eligibility are comparable to selection bias must be reduced. However, other problems are likely to be dominant. RDD could be a satisfactory method if clear rules exist for the project selection as against a program that targets many different recipients. Thus, the RDD method is an expansion of IV and the experimental technique; it utilizes exogenous program regulations (such as criteria for eligibility) to assess participants and non-participants in a neighbouring locality around the eligibility cut-off (Campbell 1969; Van Der Klaauw 2002; Lee and Lemieux 2010; Khandker et al., 2010).

In assessing the effects of venture capital financing on SMEs' growth in Ghana, our study combines PSM and DiD estimation to address the problems of selection bias and to correct estimates of observable and non-observable factors which might influence the outcome. In our study, randomization could not be used because of the non-randomized nature of our study. Our study also could not use the instrumental variable method, because we do not need to find an instrument that can address endogeneity that might affect our results. The regression discontinuity design is also not appropriate for our study because we need to have cut-off eligibility criteria for our target population by using, for example, the number of employees say, 6-99 persons or fixed assets valued to determine the control group and compare it to our treated group. Table 3.1 depicts examples of impact evaluation methods used in the empirical studies.

Table 3.1 Examples of impact evaluation methods

Authors	Objective	Methods	Results/Findings
Crépon et al., 2011	To evaluate the delegation to private providers of placement services for young graduates who had spent at least six months in unemployment.	RCT	The programme had a substantial impact on the employment situation of young job-seekers eight months after the treatment.
Schultz (2004)	To identify the effects of conditional cash transfers on some outcomes, in particular, school enrolment.	RCT	The author found an average increase in enrolment of 3.4 percent for all students in grades 1-8, with the largest among girls who completed grade 6 (14.8 percent). The possible reason is that girls tend to drop out of school at higher rates as they get older than boys due to socio-cultural norms.
Angrist et al. (2002)	To determine the effects of the voucher program on educational and social outcomes.	RCT	The authors found that lottery winners were 10 percent more likely to complete the 8 th grade and scored, on average 0.2 standard deviations higher

			on standardized tests three years after the initial lottery.
Jalan and Ravallian (2003)	To assess how the interaction effects between income and education influence child health as a result of access to piped water in rural India.	PSM	The authors found an intricate pattern of interaction effects; for example, poverty attenuates the child-health gains from piped water, but less so the higher the level of maternal education.
Levy and Myers (2003)	To investigate for the first time whether an age-specific factor, older individuals' beliefs about their aging, predicts their likelihood of engaging in preventive health behaviours over time.	PSM	The authors found that individuals with more positive self-perceptions of aging tended to practise more preventive health behaviours over the next two decades after controlling for age, education, functional health, gender, self-rated health, and race.

Brand and Halaby (2005)	To identify and estimate the effects of elite college attendance on educational and career achievement.	PSM	The authors' findings suggest that attending an elite college yields an advantage concerning educational achievement and occupational status; the results for wages are mixed.
Jin and Leslie (2003)	To examine the effect of an increase in product quality information to consumers on a firm's choice of quality.	DiD	The results show that the grade card causes the restaurants' health inspection score to increase, and consumer demand became sensitive to changes in restaurants' hygiene quality. The results implied grade cards cause restaurants to make hygiene quality improvements.
Card and Krueger (1994)	To examine the effect of a minimum wage on employment.	DiD	The authors found no evidence that a rise in the minimum wage reduces employment.
Galiani et al. (2005)	To study the effect of privatization of water services on child mortality in Argentina.	DiD	The authors' results suggest that privatization of water services reduced child mortality.

Glewe and Jacoby (1995)	To examine the effect of nutrition and health on education in Ghana,	IV	This study reveals the difficulty in finding a valid instrument that satisfies the exclusion restriction, considering that it is highly unlikely that these IVs were unrelated to unobservable factors associated with education.
Ravallion and Wodon (2000)	To examine whether child labour displaces schooling and perpetuates poverty in the long-term	IV	The author used a prior program at the village level as IV. The study indicated that the subsidy increased schooling by far more than it reduced poverty.
Angrist and Krueger (1991)	To estimate the impact of compulsory schooling on earnings.	IV	The authors provide evidence that students who are compelled to attend school longer by compulsory schooling laws earn higher wages because of their extra schooling and that compulsory schooling laws are effective in compelling students to attend school.

Lemieux and Milligan (2005)	To evaluate social assistance and labour supply in Canada.	RDD	The authors found that access to significant social assistance benefits reduced employment by about 4.5 percent for men between 25-39 years without children.
Barrera-Osorio, Linden, Urquiola(2007)	To evaluate the impact of a school fee reduction program (graduated) on school enrolment rates in the city of Bogota in Colombia.	RDD	The authors found that the program had a significant and positive impact on school enrolment rates.
Levy & Ohls (2007)	To compare social safety nets based on a poverty index in Jamaica	RDD	The authors found that the program increased school attendance for children ages 6-17 by an average of 0.5 days per month, which is significant given an already reasonably high attendance rate of 85 percent. Likewise, health care visits by children ages 1 to 6 increased by roughly 38 percent.

Source:

3.6 Impact Evaluation of Venture Capital financing on SMEs' Growth

The empirical model for impact evaluation on venture capital financing on SME growth is based on PSM and DiD estimation models. Combining PSM and DiD techniques is applied in a situation where the outcome information on participants in the program and comparable individuals who did not participate is assessed as “pre” and “post” the program in question (Michalek 2007, 2008, 2009; Ravallion, 2004). One significant benefit of the PSM-DID estimator is that it permits control for unobserved time-invariant components and consequently enhances the credibility of the identification of the treatment effect.

3.6.1 Indicators of Impact Evaluation Outcome

The key driver for impact assessment of a program or intervention is to measure the degree to which the program or intervention impacts the agent. The agent is defined as a group of individuals, households, firms, cities, etc. The outcomes of interest are theoretically derived from the utility function of the agent; however, the utility is an unrealistic measurement to estimate the outcomes and it represents a broad sense of the outcomes of impact assessment (Gertler et al., 2016; Baker, 2000). For instance, to evaluate the economic effects of a microcredit programme on rural households, two indicators have been used (Hulme, 2000). The current study uses sales growth and employment growth as outcome indicators as used by Peneder (2010) and Engel (2003) in their studies.

3.6.2 Empirical Models

In evaluating the effect of venture capital financing on SMEs' growth, this study follows the impact evaluation procedures by setting participation in a venture capital financing program similarly to a job training program participation (Heckman and George, 1980) or microcredit program (Hulme, 2000). An individual, household, firm or city can be defined as a dichotomous treatment state, parallel to participants or non-participants in a venture capital

financing programme. This participation results in two potential outcomes for SMEs. Let $D = 1$ if SMEs received venture capital financing; 0 otherwise. Let Y_{i1} represent the possible outcome for SMEs which received the venture capital financing, and Y_{i0} represent the potential outcome for those that did not receive venture capital financing. Y_{i1} and Y_{i0} are mutually exclusive, and the values received depend on the participation state, and therefore a single outcome can be observed while the ‘*counterfactual*’ cannot be observed. The expected impact of venture capital funding on the outcome of the i^{th} firm in a sample is expressed as follows:

$$\delta_i = Y_{i1} - Y_{i0} \quad (3.1)$$

The actual observed outcome for a firm depends on the exclusive nature of the counterfactual and the exclusively distributed assumption (Heckman & Vytlacil, 2005; Rubin, 1990) can be described as follows:

$$Y_i = D_i Y_{i1} + (1 - D_i) Y_{i0} \quad (3.2)$$

Or

$$Y_i = Y_{i0} + \Delta_i + D_i, \text{ where } i = 1, 2, 3, \dots, n. \quad (3.3)$$

Estimating equation (3.3) to obtain the coefficient of impact δ using OLS would produce a biased result due to self-selection and endogeneity problems. Also, the literature indicates that there is more than one impact estimator for any outcome indicator. Since our research interest is to provide relevant policy implications for the targeted SMEs that need venture capital financing, we restrict our focus to estimating the programme impact using only Average Treatment Effect on Treated (ATT) proposed by Rosenbaum & Rubin (1983). Consequently,

two types of programme impact estimators are used to evaluate the effect of venture capital financing on SME growth.

3.6.3 Propensity Score Matching Approach

a) PSM estimators and assumptions

PSM is a common technique used in drawing a causal inference in programme evaluation studies. PSM is grounded on the concept of differentiating the program participation group treated groups' (i.e., venture capital funded SMEs) outcomes with the outcomes of 'comparable' non-participation control groups (i.e., non-venture capital funded SMEs). The outcome differences between these groups are ascribed to the program (Heckman, Ichimura, & Todd, 1998). This approach has been comprehensively applied to impact the evaluation of job and education programmes (see Dehejia & Wahba, 2002; Heckman et al., 1997; Titus, 2007). The empirical demonstration can be established in different areas of study. It is connected to all cases where there is treatment, i.e., treatment and control groups. The circumstances of treatment may differ. For example, Perkins et al., (2000) demonstrated how to use matching in pharmacoepidemiologic research. Bryson (2002) also conducted a study on the impact of union membership on wages of employees. Our objective is to investigate the effect of venture capital financing on SMEs' growth; the focus is on the effect of the intervention. i.e., venture capital funding on SMEs' economic performance.

Dehejia and Wahba (2002) proposed that PSM is helpful for a cross-sectional data survey, as considering the background of the survey data; it might be expensive to resurvey thousands of units in future. However, an impact evaluation study must surmount the critical estimation difficulty and tackle the probable existence of selection bias. The initial problem occurs since one will wish to establish the variance between the outcomes of participants and non-participants (i.e., Venture funded SMEs and Non-Venture funded SMEs). It is impossible to

observe both outcomes for venture capital funded SMEs and non-venture capital funded SMEs simultaneously. It is not prudent to take the mean outcome of non-venture capital funded SMEs' estimate since venture capital funded SMEs and non-venture capital funded SMEs in the absence of treatment. This leads to selection bias, for example, motivated individuals have a higher possibility of engaging in a job training program and have a higher likelihood of getting a job (Heckman 1996; Bryson 2002; Lalonde 2003).

According to Heckman et al. (1998), a significant problem about non-randomisation methods is the existence of self-selection that arises from the non-random location of the program and the non-random selection of participants that makes evaluation difficult. Bernard et al. (2010) identified three possible causes of bias. First, there are significant differences concerning treatment and control groups at household level due to the characteristics that are observable that might have a direct influence on the outcome of interest. Second, unobservable characteristics are the cause of the difference. Primary differences between those who participate and those who did not non-participate are possible to either wholly or partially reflect differences among participants and non-participants groups instead of the effect of participating in the program.

PSM deals with observed features by relating the outcomes of the treatment group and similar comparable group, based on similar observed features, which minimise the selection bias. PSM estimation becomes biased when it impossible to control for these characteristics. How to remove the unobservable characteristics is still the core problem of the PSM technique. Ravallion (2005) contends that contamination of the control group can be hard to avoid as a result of the reactions of the markets and governments.

The PSM method compares venture capital funded SMEs and non-venture capital funded SMEs with similar observable characteristics to deduce the intervention impact (Caliendo and

Kopeining, 2008). However, there are likely to exist some observations of participants in the venture capital funded SMEs and non-venture capital funded SMEs that cannot be matched as a result of significant differences in their observable characteristics. The differences in participants, such as large firms with significantly high sales revenue in the control group and low sales revenue or secluded firms with self-subsistence characteristics in the treatment group, are called outliers. These outlier participants cannot be matched using their sales revenue. Including these unmatched participants in evaluating the impact may produce misleading interpretation. One dominant characteristic of the matching method is that, after the treated and control participants are compared, the unmatched participants in the matching process are removed and are not used to assess the programme impact (i.e., matching is performed within the overlapping or common support region). Therefore, the matching algorithm can significantly reduce bias in programme evaluation studies (Heckman, Ichimura, Smith, & Todd, 1996; Rosebaum & Rubin, 1983; Setboonsarng & Parpiev, 2008).

The PSM approach can be used to assess the effect of venture capital financing. Under similar settings as in job training or microcredit programmes, the PSM method initially estimates the propensity scores of venture capital funded SMEs and non-venture capital funded SMEs based on observed characteristics and then compares the mean outcome of the venture capital funded SMEs with (similar scores) non-venture capital funded SMEs. Thus, the rationale of PSM is to choose SMEs that do not receive venture capital among all SMEs to generate a comparable group and then match outcomes of SMEs that receive venture capital. PSM depends on the critical premise that non-venture funded SMEs, among other things, must have similar outcomes as venture-backed SMEs would have acquired in the absence of VC funding. This hypothesis is called '*confoundedness*' or '*conditional independence assumption*' (CIA) (Rosenbaum & Rubin, 1993).

The core of this hypothesis is that both control and treatment groups with the identical propensity score have an equal chance of assignment to the treatment as in randomised experiments (Dehejia and Wahba, 2002). The hypothesis assumes that outcome Y is autonomous of treatment D , conditional on some covariate X following Dawid's (1979) notation is given as follows:

$$\textbf{Assumption 1. Unconfoundedness: } Y_0, Y_1 \perp\!\!\!\perp D \mid X \quad (3.4)$$

Assumption 1 enables us to define the outcome distributions of participant and non-participant groups as follows:

$$E(Y_0 \mid X, D = 1) = E(Y_0 \mid X, D = 0) \quad (3.5a)$$

$$\text{And } E(Y_1 \mid X, D = 1) = E(Y_1 \mid X, D = 0) = E(Y_1 \mid X) \quad (3.5b)$$

Equations (3.5a) and (3.5b) imply that the treated group's outcomes have the identical assignment that the control group possibly might experience if they have taken part in a venture capital funding program. Similarly to randomisation, the distributions of all related predictors X in the treated and control group balance through matching. Heckman et al. (1979) indicate that the omitted counterfactual average could be created from outcomes of the control group and treatment group as follows:

$$E(Y_0 \mid X, D = 1) = E(Y_0 \mid X, D = 0) = E(Y_0 \mid X) \quad (3.6a)$$

$$\text{and } E(Y_1 \mid X, D = 1) = E(Y_1 \mid X, D = 0) = E(Y_1 \mid X) \quad (3.6b)$$

Both equations (3.6a) and (3.6b) simultaneously define for all X .

Assumption 2. Overlap: $0 < \Pr(D = 1 | X) < 1$, for all X (3.7)

Assumption 2 suggests X's support is identical in these groups, i.e., $S = \text{Support}(X | D = 1) = \text{Support}(X | D = 0)$. This hypothesis checks X from becoming a flawless predictor since one can identify for individuals a counterpart in the control group. Matching is performed over the common support region only when there are regions where the support of X does not overlap for the treated and non-treated individuals (Lechner, 2000). Blundell et al. (2005) suggest that the interpretation of the estimated effects ought to be defined as the average treatment effect of those individuals which falls in the common support region.

According to Rosenbaum & Rubin, (1983), assumptions 1 and two are referred to jointly as 'strong ignorability.'

Heckman et al. (1997) provide an alternative assumption for estimating ATT under the matching method.

Assumption 3, Mean Independence:

$$E(Y_0 | X, D = 1) = E(Y_0 | X, D = 0) \tag{3.8a}$$

and $E(Y_1 | X, D = 1) = E(Y_1 | X, D = 0)$ (3.8b)

Based on the above assumptions ATT can be written as:

$$\delta_{\text{ATT}}^{\text{PSM}} = E(Y_1 - Y_0 | X, D = 1)$$

$$\delta_{\text{ATT}}^{\text{PSM}} = E(Y_1 - Y_0 | X, D = 1) - E_X[E(Y_0 | X, D = 1) | D = 1]$$

$$\delta_{\text{ATT}}^{\text{PSM}} = E(Y_1 - Y_0 | X, D = 1) - E_X[E(Y_0 | X, D = 0) | D = 1] \tag{3.9}$$

Thus, the first period in equation (3.9) is evaluated as treated groups and the second period from average outcomes of the corresponding control group. The outside probability takes over the assignment of covariates X in the population that is treated (Caliendo, p.33).

According to Dehejia and Wehba (2002), the PSM method produces estimates with low bias if the datasets satisfy the following conditions: (i) data for treatment and comparison groups are collected using the same questionnaire; (ii) both treatment and comparison groups are drawn from the same quarter; (iii) the dataset contains a “rich set of variables” connected to the program participation and outcome of interest (Smith & Todd 2005, p.6). Similarly, the treated and control groups’ observable characteristics, increases the likelihood of getting matches and hence reduces the bias. The PSM technique permits the regulation of possible bias such as non-placement and bias selection on observed features in participation in the program (Caliendo & Kopeinig, 2008).

In this study, various PSM estimator effects of venture capital funding on SMEs’ growth are discussed. A set of covariates are included in the regression to control for selection bias on observable factors. The set of controlling covariates should meet the conditions of matching controlling variables discussed in Rosenbaum and Rubin (1983), Zhao (2004), Imbens (2004) and Lee (2005) among others.

b) Implementation Strategies of Propensity Score Matching Estimators

Theoretically, the SMEs signify one matched pair equal to each other except in the intervention from the venture capital financing program. Thus, matching can separate the idiosyncratic effect factors from the outcome variables by reducing observed heterogeneity between the SMEs backed by venture capital and SMEs that are not backed by venture capital. The process of implementing PSM involves two phases. In the first phase, logit or probit is employed to

compute the propensity score or likelihood of obtaining venture capital funding conditional on control variables, and then classify individuals or firms into blocks based on their scores. Caliendo & Kopeinig (2008) argue that using logistics regression and probit models to estimate the propensity score yields similar results for a binary treatment case such as the one we investigate. Logistic or probit models are known as linear probability models (LPM) due to LPM's shortcoming of calculating probability more than 1 and less than 0 for some samples. Logistic regression and probit models are also preferred when the distribution of the response variable is highly skewed (Ullah, 2013; Tucker, 2011; Berhe, 2016). This process may include stepwise model selection, by reiterating steps until the closest treatment and control groups are attained. In the second phase, the computed propensity score is used together with different average treatment effect estimates to obtain Average Treatment Effect on Treated (ATT) estimation.

Different possible matching procedures can be used to examine the impact of Venture Capital Funding on SMEs' growth. One possible procedure is **nearest neighbour matching (NNM)**: It is the most straightforward matching estimator. In NNM, individuals within the control group are selected to match comparable group treated individuals who are nearest in relation to the propensity score (Caliendo & Kopeinig, 2008). NNM is computed with or without replacement. For NN by replacement, a comparable individual is matched to more than one treatment individual, which results in increased matching quality and decreases the accuracy of estimations. Whereas for NN matching without replacement, a comparable individual is used only once. NN matching without replacement increases bias, but it improves the accuracy of estimations. In a situation where the control group and treatment group are different, it is problematic to find a satisfactory matching comparison by replacement (Dehejia and Wahba, 2002). What this means is that by matching without replacement, if it happens that there is less comparison group related to the treated group, we might be forced to match the treatment group

to a comparable group which is different from the estimated propensity score (Lalonde, 1986). Pierfederico & Signore (2015) performed Nearest Neighbour Matching to trade efficiency for a lower estimation bias.

Stratification Matching: It performs matching by dividing an array of the differences of the propensity score in blocks to ensure that within individual block tests, the average propensity scores of treatment and control groups are indifferent (Becker & Ichino, 2002). The idea of matching by stratification is to divide the region of common support of the propensity score into a set of blocks and to estimate the effect in each block by subtracting the average change in outcomes of treatment and control groups. This technique is called blocking matching, interval matching and sub-classification (Rosenbaum and Rubin, 1983). A question that a researcher needs to answer is what quantity of blocks or layers are required in any experimental design? Cochrane & Chambers (1965) explained that eliminating 95% of the biases connected with the entire covariates five sub-divisions are usually adequate. Imbens (2004) observed that all predispositions under confoundedness are linked to the propensity score, the implication is the use of five blocks or layers eliminates the majority of the bias linked with the entire covariates. One technique to rationalize the selection of the number of blocks or layers is to control the balance of propensity scores within an individual block (Aakvik 2001). Stratification matching algorithm, in fact, removes observations when either a treated or a control group is not present. Therefore, the stratification method is not recommended for data in which the treated and control groups are unbalanced. Dehejia and Wahba (1999, 2002) implemented interval or stratified matching with intervals because it has been proven that five classes are often adequate to remove 95% of bias with all covariates.

Radius Matching: Radius matching is another possible matching procedure. With radius matching, ATE determines the average unit-level treatment effect of the treated whereby the

control groups within a predefined radius of propensity scores are matched to a treated group. In cases within a radius where there exists more than one control component, the mean outcome of the control component is used; bad matches are avoided by using this method and overcoming the drawback of stratification matching, so the quality of matching increases (Caliendo & Kopeining, 2008). Given the dataset, the better the quality of matching becomes with a smaller radius, since match control and treated units have close scores. However, matching by radius accepts treated units, which comprise control matches in a radius, thus assuming the radius is small, a lot of treated units may not match and are rejected. Consequently, ATT from the radius matching estimate no longer signifies the population of the treated units (Becker & Ichino, 2002; Caliendo & Kopeining, 2008). However, Dehejia & Wahba (2002) argued that radius matching employs only the number of matched units present within a predefined radius, thus allowing for the use of extra units when good matches are present and fewer units when they are not.

Kernel Matching: Kernel matching is used to match all treated components and average weights of entire controls per weights that are contrariwise related to the distance among the propensity scores of the treatment and controls (Arun, Imai, & Sinha, 2006). Kernel matching provides a solution to the problem of discarding observations in radius matching because the kernel matching estimator possesses a smaller variance because data from all or almost all control units are expended (Becker and Ichino, 2002). However, one drawback of this method is poor matching since few or several far-distance control units are likely to be expended to match with one treated unit (Caliendo & Kopeining, 2008). For instance, kernel matching was used by Oh et al. (2009) to reduce the variance of the estimated ATE.

According to Smith and Todd (2005), the quality of the matches is unaffected by the matching algorithms employed. Thus, the various matching algorithms used do not make much of a

difference regarding unbiased impact estimates. What makes a difference is the quality and availability of the underlying data, i.e., rich and high-quality data are required (Smith and Todd, 2005).

c) Choosing Covariates for Propensity Score Matching.

Choosing the covariates in the PSM method is important because they directly affect the estimation outcomes. Lee (2005) suggests that the selecting covariate X must be predetermined, which affects both Y and treatment D . Furthermore, to prevent the causality bias, X is not required to be influenced by D ; as a result, the after-treated covariate should not be controlled since it would eliminate part or all the effect of D on Y . Our choice of covariates for computing the propensity score was based on SME owners' features (such as age, gender, educational level, experience, marital status and income levels) and firm characteristics (such as firm age, size, and sector) and pre-treatment outcomes.

Conditional Independence Assumption (Rosenbaum and Rubin, 1983) means treatment must not be affected by the observable control predictors, and outcomes of interest are autonomous of the treatment assigned. Hence, the variables included must be fixed over time or quantified before the intervention (Caliendo & Kopeinig, 2008) and before-treatment variables quantified must not be influenced by the expectancy of treated group participation (Imbens, 2004). For example, if the household recognizes they will get credit, this may lead to higher expenditure even before the household is loaned the money (Doan, 2011). To meet the conditional assumption requirements that treatment (i.e., venture capital financing) does not affect our covariates or predictors (i.e., SME owners' and firms' characteristics) and the outcome of interest (i.e., sales and employment growth), our selected covariates are based on the SME owners' socio-demographic characteristics (i.e., age, gender, marital status, education,

experience, and income) as well as the firms' characteristics (such as firm age, size, legal status, and sector).

Furthermore, there must be the exclusion of variables that are not related to the outcome or unsuitable covariates of the treatment participation decision model (Rubin and Thomas, 1996; Bryson et al., 2002). Bryson, Dorsett, and Purdon (2002) suggest selecting a variable that influences only participation but not treatment outcomes. As a result, it is pointless to control for this since the outcome of interest is not influenced by this variable. In contrast, assuming a variable affects only the outcome and not the participation of the treatment group, it should not be controlled since the variable will make an insignificant difference concerning treatment and control groups. Thus, only the variables that affect the decision concurrently to participate and the outcome must be incorporated at the score estimation stage (Bryson, Dorsett, & Purdon, 2002, p. 24).

Finally, the elimination of important variables could severely escalate bias in estimates (see Dehejia Wahba 1999 or Heckman et al. 1997). If a covariate is inadequately linked with the outcomes, the treatment might decrease the precision of the estimates (Imbens, 2004). Due to uncertainty, however, it is better to add several covariates rather than small covariates (Bryson et al., 2002). Furthermore, Dehejia and Wahba, (1999) suggest starting with covariates linearly and checking whether a balancing of covariates within each stratum is obtained, and then test for the statistical significance of variances in the assignment of covariates. Once the balance is obtained, the specification is accepted. Otherwise, one should change the potential covariates into higher-order relationships and interactions until the balancing is satisfied (Grilli, & Rampichini 2011).

d) Defining the Common Support and Overlap.

Another consideration is defining the common support and overlap for the control and treated groups. The second assumption of PSM is a common support. Only a subgroup of the control group which is identical to the treatment group is employed. Thus it is necessary to validate the overlay and mutual support among the treatment and control groups. Lechner (2002) suggests inspecting the density distribution of propensity scores to validate the overlap and common support to test whether comparison concerning the treatment and control group is sizable. Imbens (2004) shows how the PSM method handles the lack of overlap. The probability or score receives a value from 0 to 1; the observations with probabilities close to one will get higher weights, which leads to an increase in the difference of the average treatment estimator. As a result, the PSM is better designed to handle restricted overlap in the covariate distributions than parametric regression models because adding control observations of outliers, i.e., scores near 0 or 1, in a parametric regression approach will lead to substantial changes in the estimated coefficients (Caliendo & Kopeinig, 2005; Li, 2012).

If the assumption of common support is violated, what happens? If treated and control observations fall outside the common support, they need to be dropped. If the number of outside-common support observations of the treatment group is large, the estimate of the within-common support observations may be distorted and false (Caliendo & Kopeinig, 2008; Imbens, 2004). Therefore, overlooking the common support problem or assessing a subpopulation within the common support may give distorted estimates and inferences (Lechner, 2002; Schreinemachers et al., 2016).

Furthermore, the lack of overlap in covariate distributions between the control as well as treatment groups might result in imprecise estimations and cause the estimators to be sensitive to the choice of specification (Crum, Hotz, Imbens, & Mitnik, 2004). Evaluators often use a

strategy of trimming the sample to address limited overlap. Crump et al. (2009) advocate discarding all units of both control and treatment groups that have an estimated propensity score external to the array [0.1, 0.9]; the authors' show that the exact gain from the method is substantial with most of the gain captured. Thus, using probit or logit models to estimate the scores will give different results when the propensity scores are close to 1 or 0, and the weights possibly will be significant, so these units might considerably affect the approximation of the treatment effects, and hence the estimation becomes inaccurate (Imbens & Wooldridge, 2009). Conversely, some external validity might be lost by altering the spotlight to average treatment effects for a sub-division in the range [0.1, 0.9] of the original sample if the dropout observations significantly affect the estimated result when large numbers of observations are discarded. The estimates could be misleading even if the strategy of estimation improves the lack of overlap (Crump et al., 2009). For example, Godtland et al. (2004) used three different steps to generate a common support of propensity scores to match non-participants to the participant sample.

e) Matching quality

The matching procedures as highlighted above try to lessen the complexity of the pre-treatment variables by reducing the variables to only one, thus bypassing the dimension problem. Nonetheless, by reducing the dimension, there is an indisputable loss of information. Therefore, it is vital to assess the quality of the matching procedures by examining the ability of the matching procedure to balance the distribution of the relevant variables in both the treatment and control groups. Several methods are available in the literature to assess the quality of matching, namely the standardized bias (SB), the pseudo- R^2 and the t-test. The primary goal of these different methods is to compare the situation before and after matching and to verify whether any differences remain after conditioning on the propensity score (Caliendo and

Kopeinig, 2008). If differences remain after matching, then the PSM does not perform successfully and should be improved by adding, for example, other variables or interaction terms in the estimation of the propensity score.

In summary, matching is expected to produce less biased results than OLS because matching compares treated groups only with comparable groups. Nevertheless, the ‘similarity’ of comparable groups to the treated group is built on observed characteristics, so there is the likelihood of bias assuming unobserved characteristics that influence both participation in treatment and outcomes of interest. The assumption is based merely on the condition that we are unable to manage the entire variables, particularly the unobserved characteristics that influence both participation in treatment and outcomes of interest (Bryson et al., 2002). However, since our data focused only on the SMEs in urban areas, the disparity between SMEs financed by venture capital and SMEs not financed by venture capital is not expected to be substantial. Hence the likelihood of bias may reduce the reliability of the matching estimates.

However, one weakness of the PSM method is that it fails to control for unobservable characteristics, which may generate a hidden bias since the scores are estimated only by observed characteristics. Dias, Ichimura, and Berg (2007) argue that if the treatment assignment and the outcomes are affected by unobservable characteristics, matching tends to give biased results because the unobservable cannot be controlled. This means that the observed characteristics may not adequately capture the individual motivation, ability, and skills, which may affect treatment participation. Again, the success of PSM strictly depends on how the control and treatment groups are related in terms of space and time, and the two groups should have as few baseline differences as possible (Lee, 2005).

3.6.4 Impact Estimation for Panel Data: Difference-In-Difference Approach

a) Difference-in-Difference estimation and assumptions

Although PSM attempts to relate the variance between the outcome variables of those who participate and those who do not non-participate in a program with comparable inherent characteristics, it cannot correct unobservable bias since it only controls for observed variables. Difference-in-difference matching estimator (DiD) eliminates any bias as a result of unobservable, time-invariant differences among the treated and matched control groups (Gilligan and Hoddinott, 2007). The DiD technique is increasingly a standard method for identifying programme impact in the absence of purely experimental data (Ashenfelter & Card, 1985; Athey & Imbens, 2006). It takes some time for a policy to be implemented or to take effect on the target group of participants. The observed outcomes over time may be ascribed not only to the treatment but also to observed and unobserved factors such as economic conditions, other concurrent policies, individual motivation, ability, etc. Thus, to assess the real effect of the policy, it is essential to exclude such undesired attributes. DiD is a technique used to estimate the effects of a treatment or event in a given period. The DiD estimation model represents the difference between the before/after situation and within subjects' differences of the treatment and control groups. Thus, it is highly appropriate in the context where a particular event (in this case, venture capital financing of SMEs) makes it desirable to investigate the before and after situation. Moreover, the attractiveness of DiD estimation is due to its straightforwardness and the possibility of sidestepping many of the endogeneity problems that occur when making comparisons concerning diverse individuals (Meyer, 1995). Card and Krueger (1994) used DiD to analyze the effects of a rise in the minimum wage on employment in New Jersey. The author employed DiD to assess the effects of immigration on native wages and employment. Bamberger, Carlton, and Newman (2004) also used DiD to investigate the effects of airline alliances on airline fares.

While the single cross-sectional evaluation prevents the issue of omitted trends when we match two groups over the same period, a single time-series model side-steps the problem of unobserved differences between groups of firms by observing the same firms before and after the treatment. The two single difference models complement each other in a double estimator model, making the DiD model a potent estimator (Roberts and Whited, 2012). It is acknowledged that the conventional DiD estimator is grounded on a strong assumption. Specifically, the conventional DiD estimator requires that, on condition that the treatment is absent, average outcomes for treated and controls must follow comparable trends over a period. This hypothesis may be unlikely if before-treatment features that are expected are linked with the changing aspects of variable outcomes which are uneven among the treated and the untreated group (Roberts and Whited, 2012). For example, Garvey and Hanka (1999) used DiD to evaluate the impact of state anti-takeover laws on leverage by exploring the data one year after the law was passed. The authors compared the leverage ratios of firms in states that approved the law (treated group) and those that did not approve the law (control group).

3.6.5 Estimation Strategy

The present study evaluates the effect of venture capital financing on SME growth in Ghana. As a preliminary check and to obtain a better understanding on the collected data, we performed multiple regression analysis for VC and non-VC backed SMEs. Multiple regression analysis is a very valuable econometric model for predicting a quantitative outcome for firms growth, and has been applied by numerous researchers. It is also applied to test hypotheses of relationships between dependent variables and independent variables along with a prediction (Dominique Salvatore, Derrick Reagle, 2002). The multiple regression model we developed has the growth of SMEs as a dependent variable, and it is measured by the number of workforce or the annual sales turnover. Whiles socio-demographic characteristics such as the SME owner's age,

gender, marital status, education, experience, income level and firms' characteristics such as firm size, age, sector, legal status, location are our explanatory variables. Our main is to investigate the effects of venture capital financing on the growth of SMEs in Ghana. In other words we seek to identify the effect of the independent variables on SMEs' growth, and what are their relationships in terms of access to VC financing.

We used a multiple regression model defined by the following equation;

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \dots + \beta_p X_p + \varepsilon \quad (3.10)$$

Where, Y = Growth of SMEs as measured by number of workforce or annual sales growth

α = Constant term, ε = error term and β_1 - β_p = coefficients of the independent variables.

The following Table 3.2 indicates the variables used in our model.

Table 3.2: Summary of Variables used in our Multiple Regression Model

Variables	Description	Sign Expected
Y	SMEs' growth (Annual Sales/Employee)	+/-
X1	VC dummy	+
X2	Gender	+
X3	Owner's Age	-
X4	Marital Status	-
X5	Education	+
X6	Experience	+
X7	Income Level	+/-
X8	Ownership	+
X9	Firm Size	+
X10	Firm Age	+
X11	Location	+/-

The next step is to estimate our PSM-Did models. To moderate the possible selection bias in the impact assessment, this study employed cross sectional data analysis due to the accessibility of data collected from sampled SMEs. Furthermore, all sampled SMEs in this study are selected from areas where venture capital financing is accessible, which helps to lessen the possible non-random program assignment bias (Nguyen, 2007).

A DiD estimation framework entails that the outcomes under investigation (such as SMEs' growth regarding annual sales and employment) be observed for the two periods. The first group, a VC backed group consists of SMEs that received venture capital support during the start of the VC financing (i.e., post-program period) but not before the start of the program (i.e., pre-program period); the second group, called the Non-VC backed group consists of SMEs that did not receive venture capital support during any period (Athey and Imbens, 2006; Bertrand et al., 2004).

The simplest set-up of DiD estimation is the case with two groups and two periods. Venture-backed SMEs (treatment group) are exposed to treatment (programme participation) in the second period but not the first period. The non-venture backed SMEs (control group) are not exposed to the treatment. Using the non-venture backed SMEs as a control group, the basic idea is to evaluate the impact of this treatment.

The standard DiD technique adopted from (Wooldridge, 2002) is regressed as follows.

$$Y_{it} = \beta_0 + \delta_0 d_{2t} + \beta P_i + \gamma M_{it} + \varepsilon_{it} \quad (3.11)$$

Where Y_{it} is the SMEs' outcome examined (i.e., annual sales or employment growth) for SME i at period t ; d_{2t} is a dummy variable which is equal to 1 for $t=2$ (post-VC financing period) and 0 for $t=1$ (pre-VC financing period) P_i is a group dummy variable which takes a value of

one if SME i belongs to the VC backed SME group and zero otherwise; M_{it} is an interaction term of the product of $d2_t$ and P_i , which shows the program participation and is equal to one if SME i obtained venture capital funding and the observation happens during the second period (i.e., receiving venture capital financing) and zero otherwise; δ_0 represents time influence suffered by both treatment and control groups; β_1 represents the potential time-invariant differences in overall averages between the two groups; γ is the primary parameter of interest which measures the average program effect on the VC backed SME (treatment) group; ε_{it} is the idiosyncratic error which is assumed to be independent and identically distributed over SMEs and time, with mean zero at each period.

The critical assumption of the standard DiD method, also called the common trend assumption, is that γ would be zero in the absence of the program, or $E[\varepsilon_{it}|M_{it}] = 0$. Thus, the average change in the outcome variables (Y_{it}) would not have been systematically different between the VC backed group and the non-VC backed group if there were no programs (Abadie, 2005a, and b; Meyer, 1995). Under this assumption, an unbiased estimation of γ can be obtained by just calculating the difference of two differences: (1) the average difference in the outcomes over the two time periods for the venture-backed group; and (2) the same differences for the non-venture backed group (Athey and Imbens, 2006; Abadie, 2005a). The following equation illustrates this:

$$\begin{aligned} \tilde{\gamma}_{sdd} &= \Delta \bar{Y}_B - \Delta \bar{Y}_N & (3.12) \\ &= E[Y_{i,t=2} - Y_{i,t=1} | P_i=1] - E(Y_{i,t=2} - Y_{i,t=1} | P_i=0) \end{aligned}$$

where “ Δ ” denotes the change from $t=1$ to $t=2$, $\tilde{\gamma}_{sdd}$ indicates the standard DiD estimator of γ the overbar represents the average across SMEs, B and N denote VC backed SMEs and non-VC backed SMEs, respectively. As a result of deducting the average differences in the Non-

VC backed group from the average differences in the VC backed group from equation (3.11), the DiD estimation strategy ensures two types of estimation bias be removed, namely bias from the cross-sectional comparison between the two groups in the post-program period, which could be due to permanent differences between these two groups (captured by β_i) but unconnected to the program, and bias from the comparison over the two periods for the VC backed groups. It could be due to time trends (captured by δ_0) but unrelated to the program (Ashenfelter and Card,1985; Abadie, 2005a; Athey and Imbens, 2006; Imbens and Wooldridge, 2007).

Table 3.3: Mean estimation from the DiD regression model.

	Post-Treatment	Pre-Treatment	Difference
Treatment	$\beta_0 + \beta_1 + \beta_2 + \beta_3$	$\beta_0 + \beta_2$	$\beta_1 + \beta_3$
Control	$\beta_0 + \beta_3$	β_0	β_3
Difference	$\beta_1 + \beta_2$	β_2	β_1

Source: Whited and Robert, 2012

The inner columns 1 & 2 in Table 3.3 are the provisional means. For instance, the average y from SMEs in the treatment group (i.e., VC backed SMEs) during the post-treatment period is $(\beta_0 + \beta_1 + \beta_2 + \beta_3)$. Similarly, the average y for SMEs in the control group (i.e., non-VC backed SMEs) during the pre-treatment period is β_0 . The outer column 3 corresponds to differences in these provisional means. The average difference in y between VC backed and non-VC backed groups during the pre-treatment period is $(\beta_0 + \beta_2) - \beta_0 = \beta_2$. The block in the bottom corner is the DiD estimate, which can be attained by either (a) differencing down the right most column, or (b) differencing across the bottom row.

3.7 Determinants of Venture Capital Investment Activity

3.7.1 Empirical Model

Our study uses a panel data model to assess the factors influencing venture capital investment activity in Ghana. The empirical investigation, both regarding model and data used is similar to that of Cherif and Gazdar (2011). The present study obtained secondary data from the World Bank database and Heritage Foundation. The dataset consists of a panel data from 15 African countries over ten-year period from 2006-2015. The list of countries includes Botswana, Cote D'Ivoire, Ghana, Kenya, Malawi, Mauritius, Mozambique, Namibia, Nigeria, South Africa, Tanzania, Uganda, Rwanda, Zambia and Zimbabwe. These countries were selected based on the Venture Capital Attractiveness Country Index Report in 2013.

Panel data inquiry is an increasingly well-known type of longitudinal data study among researchers in several fields. Cross-section observation can be households, countries, firms or individuals. In contrast to OLS regression, panel data regression has two dimensions, cross-section and time series. As a result of the two-dimensional nature of panel data, the datasets provide rich sources of information for accurate analysis (Frees, 2004; Hsiao, 1986).

Panel data regression has several advantages over one-dimensional regression. First, it permits individual differences to be controlled (Hsiao 2003). It is feasible to use either one-way or two-way examination to control for the individual and time-invariant variables, but neither a time-series nor a cross-section study can do it. This implies that by using only time-series or cross-section study that does not control for heterogeneity, the researcher may run the danger of getting biased results. Second, panel data gives additional revealing data, extra changeability, and adds a degree of freedom and extra competence (Baltagi 2005). While time-series inquiry often suffers from multicollinearity; this is less likely in panel data. In panel data, the difference in the data can be disintegrated into variation between and within variables. The former disparity is usually more significant. Because of the additional and more informative data, panel data can produce added consistent parameter estimates. Panel data can significantly increase the number of observations by merging time-series and cross-section observations. This is important for the analysis of macroeconomic and institutional determinants of venture capital investment activity, which are characterized by cross-section observations and time-series. Thirdly, panel data is used to obtain reliable estimators with the existence of variables which are omitted (Wooldridge 2002). OLS will provide biased estimators if omitted or unobservable variables are related to the dependent variables. This is a problem when investigating only cross-section data; however, panel data provides a solution to this problem. There are, however, some limitations or disadvantages associated with panel data including the following. First and foremost, design, data collection and data management can pose a problem because of the cross-section time-series aspect of information involved. Secondly, the selection of a suitable model hinges on the degree of consistency of the intercept and coefficients of the slope and the level to which some individual cross-section impacts connected with the explanatory variables can pose a problem (Song and Witt 2000). Our dataset is considered panel data because it consists of observation of subjects over time. Observing a broad cross-

section of subjects over time allows us to study the dynamic as well as the cross-sectional aspect of the problem.

To examine the determinants of venture capital investments, longitudinal data regression has been used to identify the relationship between the dependent variable and independent variables. Pooled Ordinary Least Squares (POLS), Fixed Effects Models (FEM), and Random Effects Models (REM) are types of panel estimation models.

Our dependent variable, which is the venture capital investment funds raised/early stages investments, is estimated against a set of observable factors which are expected to affect the supply and demand of venture capital investments in a country (Rin et al., 2006). Our longitudinal data is regressed as follows:

$$Y_{it} = \alpha + \beta M_{i,t} + \theta INST_{it} + \mu_{i,t}, \quad \text{for } i=1,2,\dots,N, t=1,2,\dots,T_i \quad (3.13)$$

Where Y is the dependent variable (defined as VC investments funds raised/early stage investments), M is a matrix of macroeconomic variables such as gross domestic product (GDP), interest rate, stock market capitalization, stock traded value, unemployment rate, profit and capital gains taxes, scientific and technical journal articles, etc. The INST variable is the pointer equal to institutional quality, α_i is the unobserved country-specific fixed effect, and $\mu_{i,t}$ is the error term for each observation.

3.7.2 Estimation Strategy

There are three ways to estimate a static panel data model. The choice of these three methods depends on whether the individual cross-section effects are regarded as constant, fixed or random. However, it must be said that the choice of model is not arbitrary as a statistical test must be applied to choose the appropriate model that is more consistent and efficient in analyzing a given dataset. For this reason, all three models, namely the pooled OLS model, Fixed Effect and Random Effect models will be estimated, and then the necessary tests applied before choosing the appropriate model.

(i) Pooled OLS regression

We first run Pooled OLS regression which will provide reliable and competent estimates of the homogenous intercept and slope. The good thing about the Pooled OLS model is that it is not difficult to assess since one can take all of the data and compute an OLS regression model. Nonetheless, the notion that the unit-specific effects are not different in Pooled OLS makes it very restrictive and usually unrealistic (Wooldridge, 2003). Baum (2006) argued that Pooled OLS regression can have a complex error procedure such as heteroscedasticity across panel data, serial correlation. Due to its severe limitations, the decision was to consider only FE or RE models in this study. The Pooled OLS regression model is formulated as follows:

$$Y_{it} = \beta_0 + \beta_1 + X_{it} + \beta_2 Z_{it} + u_{it} \quad (3.14)$$

Where i is the entities and t is the period, X is a vector of venture capital investments variables, and Z is a vector of control variables, while u_{it} and the coefficients represent the inherent unexplained variation (error) represented by β . In this study, the pooled OLS regression model is used if all 150 observations are pooled together and treated as if there is no difference between the estimated cross-sections (countries), based on the assumption that the dataset is a

prior homogeneous one (Asterious and Hall, 2006). However, this could only be used for studies where differences among individuals or objects within the investigated group are overlooked, which is not the case in this study. Even though this study investigates the determinants of venture capital investments in Ghana, there may be country-specific factors that play a role within this study, which suggests that differences between countries should be included as dummy variables.

(ii) Fixed Effects model

The Fixed Effects model is also identified as the least squares dummy variables (LSDV) model, where each entity control variables are constant over time but differ across entities (Stock and Watson, 2015). Further, the model permits for different constants for each group, which allows a dummy variable to be involved in the group. An assumption of the Fixed Effects (FE) model is that the coefficients slope is constant for all countries; however, the intercept differs across entities. As contended by Greene (2003), the design of the FE model assumes that variances across unit can be netted by differences in the constant term. In a fixed effects model, the error term is perceived as an unknown parameter to be estimated. According to Baltagi (2005), the fixed effects model is a suitable specification provided it concentrates on a precise set of (N) countries or regions. One advantage of the fixed effects model is that it is not required to assume the effects are autonomous of (ε_{it}) since it permits the ignored individual effects to be related to the variables included. The weakness of the fixed effects model is that it cannot assess the influence of any variable, which is time invariant. Hence, any time-invariant variable is erased by the aberrations from means transformation. Additionally, the fixed effects model drawback is the loss of a huge degree of freedom due in estimating (N-1) additional parameters.

Furthermore, many dummies might escalate multicollinearity among the regressors. The fixed effects model is denoted as:

$$Y_{it} = \beta_0 X_{it} + v_i + \varepsilon_{it} \quad (3.15)$$

Whereas v_i is the unobservable country-specific influences which vary between countries and are time-invariant. We run the fixed effect model in our study. The results of the model coefficients and its significant p-value will demonstrate the relationship between our dependent variable and independent variables.

(iii) Random Effects model

The Random Effects (RE) estimator seems to be more efficient than the Fixed Effects (FE) estimator on the assumption that the firm's impact is distributed randomly across firms. μ_i or $\mu_i + \lambda_t$ is uncorrelated with X_{it} under the RE assumptions. Consequently, the GLS estimator of Balestra and Nerlove (1966) could be adopted. The RE model is a suitable specification if (N) cross-sectional units are randomly selected from a huge population. One merit as argued by Owusu-Gyapong (1986) and Greene (1997) is that the GLS estimator is a weighted average within-group and between-group estimator, which permits the investigator to obtain evidence from the two variations. However, the weakness of the random effects model is that one should make specific hypotheses about the form of relationship between the impacts and explanatory variables involved (Hsiao 2003). The random effects model is given as follows:

$$Y_{it} = \beta_{it} X_{it} + v_i + \varepsilon_{it} \quad (3.16)$$

Whereas v_i is between country error and ε_{it} is within-country error. Accordingly, v_i are presumed to be random variables and that $\text{Cov}(X_{it} v_i) = 0$. But if $\text{Cov}(X_{it} v_i) \neq 0$ the random effect estimator is biased. Hence the Hausman specification test will be used to determine

which of these two models is appropriate. We also run the random effect model to ascertain the relationship between our dependent variable and explanatory variables.

(iv) Hausman test

To choose between the FE and RE estimation methods, Hausman (1978) proposes a misspecification test which enables it to compare random effects estimates with fixed effects estimates to determine if significant differences occur. The two estimators are consistent and should meet the true parameter values in a large sample if there is no correlation between the individual differences v_{it} and covariates variables. The RE estimator is not consistent if v_{it} is related with any of the explanatory variables, whereas the fixed effects estimator remains consistent. Five percent critical value at significance level is used to establish whether the null hypothesis of no correlation should be rejected, which means the RE model is ineffective and a fixed effects estimator should be adopted. The null hypothesis states that the individual-specific effects are uncorrelated with the explanatory variables, which means the RE model is consistent. If the null hypothesis is rejected, the fixed effects model should be used. In this study, we run the Hausman test to determine whether the FE or RE model is the appropriate model to be used. The results of the Hausman test will enable us to choose between the fixed and random models.

(V) Multicollinearity test

The problem of multicollinearity appears if two or more variables are highly correlated which might affect the estimation of the regression parameters (Hair et al., 2009). High correlation is problematic as it renders it difficult to separate the effects of two (or more) variables. Gujarati

(2003) illustrates that the existence of multicollinearity makes the assessment and the hypothesis testing about regression coefficients indeterminate. The variance inflation factor (VIF) is usually used to identify the presence of multicollinearity. We test for multicollinearity in all the regression models using the variance inflation factor (VIF) method and tolerance indices (Fox, 1991). As a rule of thumb, a maximum VIF of 10 or more is an indication of the presence of multicollinearity (Salkind & Rasmussen, 2007). If the VIF is bigger than 10 this indicates there is a problem with multicollinearity (Gujarati, 2003).

(vi) Heteroscedasticity test

We test for the presence of heteroscedasticity in our models by using the Breusch-Pagan test. Heteroscedasticity refers to the condition in which the variability of a variable (standard errors) is unequal across the range of the predicted value of the DV (Salkind & Rasmussen, 2007). The Pagan/Godfrey test is employed to assess for the presence of heteroscedasticity (Breusch, & Pagan, 1979; White, 1980).

(vii) Wooldridge Test

Finally, we test for serial correlation, since serial correlation in panel data analysis biases our model and causes the results to be inefficient. The existence of serial correlation shows that the variables in the model contravene the assumptions of the regression (Anderson et al., 2007). The results from the Wooldridge test will enable us to determine whether there is a serial correlation in the study.

3.7.3 Implementation of panel data analysis

The present study conducts fixed-effect and random-effect regression to examine the country-level predictors of the influence of venture capital investment activity. The panel data consists of observations from 15 African countries. Using the panel data technique, we estimate the effects of eight independent variables (GDP growth rate, market capitalization, the stock traded, interest rate, unemployment rate, capital gains taxes, scientific and journal articles, and index of economic freedom and a dummy variable on the dependent variable (Gros Capital Formation)).

The model is given as follows:

$$\begin{aligned} \text{GCF}_{i,t} = & \alpha + \beta_1 \text{GDP}_{i,t} + \beta_2 \text{INT}_{i,t} + \beta_3 \text{INF}_{i,t} + \beta_4 \text{UMP}_{i,t} + \beta_5 \text{MCAP}_{i,t} + \beta_6 \text{STO}_{i,t} + \beta_7 \text{CAP}_{i,t} \\ & + \beta_8 \text{IEF}_{i,t} + \text{DV}_{i,t} + u_{it} + \text{DV} \end{aligned} \quad (3.17)$$

Equation (3.16) i is used to index the countries and t is used to index time.

3.7.4 Variables used for the Panel Data Analysis

Dependent variable

Venture capital investment activity is the dependent variable. This study adopted gross fixed capital formation (GFCF) as a substitute for venture capital investment activity. This is similar to gross capital formation used by Scherlter (2003) in her study on determinants of private equity in Europe. Scherlter (2003) argued that since Europe differs in size, she scaled venture capital investment either by gross domestic product or gross capital formation. While gross domestic product approximates the overall size of a country's economy, capital formation is

used to approximate capital endowment. Capital endowment is a better measure to scale venture capital activity because of the component of venture capital.

Independent Variables

Economic growth: (GDP) According to the literature, economic growth is expressed as Gross Domestic Product growth in real terms. Several studies have shown a positive correlation between private equity investments and economic growth. Gompers and Lerner (1998) confirmed the positive impact of GDP on the development of venture capital in the U.S. Romain and van de la Potterie (2004) concluded that venture capital/private equity activity is significantly related to GDP growth. Félix et al. (2007) established GDP to be a significant driver of the venture capital market in Europe. In this study, we test the hypothesis that economic growth significantly and positively influences the venture capital investment activity. Based on the literature findings, we expect that economic growth will have a positive and significant influence on venture capital activity.

Interest rate :(lending interest rate) Romain and de La Potteria (2004) proposed long-term and short-term interest rates as the critical factors in the evolution of venture capital. Félix et al. (2007) confirmed that long-term interest rates statistically and positively affect the evolution of venture capital. We test the hypothesis that a high-interest rate is negatively and significantly related to venture capital investment activity.

Unemployment rate :(Proxy for labour market rigidities) *(defined as total unemployment in percentage of the total labour force)*. Félix et al. (2007) show unemployment rate is a macroeconomic indicator, which negatively affects the private equity investments in Europe. However, Black and Gilson (1998) believe that labour market restrictions affect venture

capital/private equity investments. We test the hypothesis that unemployment rate is negatively and significantly related to venture capital investment activity.

Market Capitalization & Stock Traded Value: Félix et al. (2007) confirmed that market capitalization is a significant driver of venture capital markets in Europe. Jeng and Wells (2000) considered the number of IPOs as a driver for the private equity market and argued that an increase in this variable reflects a dynamic stock market, which can provide exciting opportunities to disinvest for the private equity funds. The authors claimed that the number of IPOs is the most critical driver for the venture capital funds to allocate additional resources for this sector. We assume a positive and significant association between the development of venture capital investments and the size of the stock market represented by the indicators of market capitalization and the stock traded in absolute terms. Based on the literature findings, we expect that market capitalization and the stock traded significantly correlate to venture capital investment activity. We test the hypothesis that market capitalization and stock traded are positively and significantly associated with venture capital investment activity

Inflation rate: Inflation rate is the percentage change in the GDP deflator. Inflation has a negative and insignificant correlation with venture capital growth since higher inflation may be related with lower rates of return on investments comprising venture capital, which makes venture capital less attractive (Stimel, 2012). Venture capital is a replacement for other forms of financing such as bank loans or credit (see Berger and Schaeck, 2011). We test the hypothesis that a high inflation rate is negatively and significantly related to venture capital investment activity.

Capital gains taxes: The influence of a capital gains tax has been investigated in the literature. Poterba (1989) found that a reduction in the capital gains tax rate might increase commitments to venture capital funds through an increase in the demand for venture capital. Gompers and

Lerner (1998) argued that changes in tax rate affect the demand for venture funds, a capital gains tax decrease would increase the capital committed by both tax-exempt and tax-sensitive investors. We test the hypothesis that a reduction in capital gains tax is positively and significantly related to increases in venture capital investment activity.

Scientific and Technical Journal Articles published: (Substitute for R&D expenditure)

Researchers have shown that investment in scientific and industrial academic R&D expenditure can stimulate human capital endowment, and is highly correlated with VC investment (Gompers and Lerner, 1998; Schertler 2003). Gompers and Lerner (1998) showed that scientific and industrial journal article publications and R&D expenditure significantly correlates with private equity/venture capital investment activity. Megginson (2003) highlighted that countries with growing R&D, especially universities and laboratories are essential for the capital industry risk. We test the hypothesis that scientific and technical journal articles which are a component of R&D are positively and significantly correlated to venture capital investment activity.

Index of Economic Freedom: (Institutional factors): To evaluate the importance of public institutions as a determinant of European venture capital investment in Europe, Cherif and Gazdar (2011) used the index of economic freedom from the heritage foundation (1995-2007) as an indicator of institutional quality. The composite index is a simple average of 10 individual freedoms, each of which is vital to the development of personal and national prosperity. Beach and Kane (2007) have defined each of the 10 Economic Freedoms (see Beach and Kane, 2007).

Cherif and Gazdar (2011) established that the index of economic freedom has significant and positive effects on VC funds raised which signify that the institutional environment affects funds raised in Europe. La Port et al. (1997, 1998) also highlighted that the quality of a country's legal system facilitates a more favourable environment to induce venture capitalists

to invest. We test the hypothesis that the quality of institutions represented by an index of economic freedom positively and significantly affects venture capital investment activity.

Dummy Variable which takes on the value 1, otherwise zero is included to account for the effects on Ghana.

3.8 Determinants of SMEs Owners' Accessibility to Venture Capital Financing

3.8.1 Empirical framework

For many individuals the choice of commodities and services is discrete, and the traditional demand theory has to be altered to investigate such a choice (Ben-Akiva and Lerman, 1985; Gracia and Magistris, 2008, Train, 2003). Models for determining discrete choices such as SME owners' decision to access venture capital financing or not is called a qualitative choice model. The choice to access or not access venture capital falls into the qualitative choice framework. If the random term has a logistic distribution, then the decision represents a standard binary logit model. However, if it is assumed that the random term is normal, the model becomes the binary probit model (Maddala, 1993; Greene, 2000). Several studies (see Cox, Hand and Herzberg, 2005 and Horowitz and Savin, 2001) have showed that the logit and probit analyses are the most widely used methods for estimating the effects of the variation of attributes of individual decision makers on two different choices. In determining this of these two models to use, a convenience and common choice should be employed. However, Hosmer and Lemeshew (1989) recommend that the logistic regression model (LRM) is easy and flexible to use and provides meaningful interpretation. Owing to the benefits possessed by the logit model such as approximating the normal distribution quite well and analytical convenience, logit models always outdo probit models in predicting choice probabilities (Ruiz-Tagle, 2005; Stock and Watson, 2003; Ben-Akiva and Lerman, 1985). Based on the mixed

results of previous studies that have included the variables of interest here and the exploratory nature of this study, the simplicity of the logit procedure is a more suitable fit. The logit model is estimated by the maximum likelihood method used in the STATA 13 software.

3.8.2 Estimation technique:

The equation for the logit model is given as follows (Gujarati, 1995):

VC access (is a binary choice that takes one if SMEs received VC funding, otherwise, zero) = f(owners' characteristics, firm characteristics and macroeconomic factors). (3.18)

$$P_i = E(Y_i = 1 | X_{ij}) = \frac{1}{1 + e^{-Z_i}} = \frac{1}{1 + e^{-\left(\alpha + \sum_{j=1}^k \beta_j X_{ij} + e_i\right)}} \quad (3.19)$$

$$Z_i = \log\left(\frac{P_i}{1 - P_i}\right) = \alpha + \sum_{j=1}^k \beta_j X_{ij} + e_i \quad (3.20)$$

Where Y_i equal 1 if SMEs access venture capital; 0 if SMEs do not access venture capital

(SMEs' access to venture capital is measured by the rounds of financing and amount of funds raised).

P_i is the likelihood of proxy variable $Y_i=1$ (access venture capital) and $(1 - P_i)$ is the probability of $Y_i=0$,

X_{ij} are entrepreneurs' characteristics (such as age, gender, ethnicity, education level, and work experience and business plan), firms' characteristics (such as ownership type, sector

(agriculture, manufacturing or services), firm size, firm age, (number of full time employees), geographical location and macroeconomic factors (interest rate) and government policies (such as taxes and subsidies) and network characteristics (such as networks with banks, government officials, suppliers, customers and social organizations and businesses).

β_j are parameters to be estimated,

ε_{ij} is the stochastic term,

$\log\left(\frac{P_i}{1-P_i}\right)$ is termed the log-odds ratio that is the logarithm of the odds.

Equation (3.12) can be estimated by the maximum likelihood method. The log-likelihood function for the model is given as:

$$L = \prod_{Y_i=1} P_i \prod_{Y_i=0} (1-P_i) \quad (3.21)$$

3.8.3 Explanatory Variables

Dependent variable:

The dependent variable for the logit model is dichotomous in nature showing SMEs' owners access to venture capital financing, because there is no direct measurement of venture capital accessibility, the 'accessibility' is measured by using observation on SMEs owners, such as 'SMEs owners who received venture capital financing' and 'SMEs owners who did not receive venture capital financing'. This is in line with past studies which used formal and informal borrowing as accessibility to credit (see Mohamed, 2003; Ravi, 2003).

Independent Variables

Gender (-):

A study by Chaganti et al., (2005) indicates that female-led businesses prefer internal financing to external financing as compared to male-led businesses. Watson (2006) points out that female owners are less likely to use debt capital compared to male owners. Coleman and Cohn (2000) and Carter and Rosa (1998) also indicated that a manager's gender might impact the capital structure and a firm's financing decision. Further, Scott and Irwin (2009) determined that owner-managers' characteristics including gender have an effect on the use of external advice and, in turn, would reduce their difficulties. We test the hypothesis that female SME owners are negatively and significantly correlated with accessing venture capital financing.

Age (-/+):

The variable age means the age of the SME owner/manager running the business as it shows the ability of the owner/manager to establish and finance a business. Carter and Rosa, (1998) claimed that the SME owner/manager's age seems to be a significant factor in explaining a firm's financing decision where younger owners/managers tend to have significantly lower start-up capital than older managers. Similarly, Wu et al., (2008) found a relationship between managers' ages and business financing and concluded that middle aged managers have better knowledge of the financial market and are more likely to take advantage of bank financing. Vos et al., (2007), however, detected similar yet contrasting results where older SME owners/managers are less likely to seek or use external financing, while younger managers are found to use external financing actively. Again, Coleman, (2004) argued that younger SME owners/managers are considered risk-averse and therefore are willing to access external

financing. In this study, the age of SME owners/managers is hypothesized to be negatively correlated with obtaining venture capital financing.

Marital Status:

Marital status is a dummy variable indicating whether the SME owner/manager is single or married. Marriage often refers to maturity and responsibility. We test the hypothesis that a married SME owner/manager is less likely to take a risk than a single manager who is more willing to engage in risky projects. For example, Cohn et al., (1975) found that individuals that are married allocate a small proportion of wealth to risky assets. Also, Hartog et al., (2000) found married individuals were less risk tolerant than singles.

Educational background (+):

Regarding SME owner/managers' education, Zhang (2008) reveals that an entrepreneur with better formal education is more likely to employ formal financing. Similarly, managers with higher educational attainment are also found to be more likely to take advantage of bank financing (Wu et al., 2008). The SME owner's level of education also increases the probability of access to credit. This is because highly qualified owners/managers of SMEs are more efficient in their work and moreover, providers of funds have more confidence in those with higher academic qualifications than those with lower levels of qualification (Berger and Udell, 2006). Parker (2004) argues that SME managers' access to finance is linked to education and training since education and training are related to knowledge, skills and problem-solving ability to exploit opportunities. Irwin and Scott (2010) note that the more educated entrepreneurs are more likely to present positive information and businesses plans, and

therefore are more likely to receive loans from banks. Also, a study by Sena et al., (2012) determined that although not statistically significant, educational qualifications have a positive relationship with the use of external financing. In this study, educational background of SME owners/managers is hypothesized to be positively and significantly correlated to access to venture capital financing.

Experience (+):

Experience and managerial competency of SMEs owners/managers imply the quality of human capital would possibly assist negotiations with financial providers of credit. (Ahmed & Hamid, 2011). Financial providers believe that SME owners /managers are more likely to have the knowledge and skills to manage their businesses and thus lessen the risk of default (Bukvic and Barnett, 2003). Borgia and Newman (2012) found that owner-managers' experience is significantly and positively related to the level of firm leverage. In this study, SME owners/managers' experience is hypothesized to be positively and significantly related to access to venture capital financing.

Firm Age (+):

Firm age refers to the date of incorporation or registration. In this present study, firm age is hypothesized to be positively and significantly related to access to venture capital financing. Most empirical studies find a positive relation between firm age and the probability of obtaining finance (Akoten, Sawada, and Otsuka, 2006; Rodriguez et al., 2001). There is some evidence in the literature that younger firms grow more quickly; see for example Jovanovich (1982), Coad et al. (2014) and Haltiwanger et al. (2013). They may also find it more

challenging to secure external finance because of the lack of track records and the lack of security guarantees which they are required to provide.

Firm Size:

Smaller firms may have more potential for growth, but their access to external finance may also be more constrained: see for example Rahaman (2011), Du and Girma (2012), and Kim et al. (2016). Evidence from most empirical studies show that firm size is a significant factor that influences their ability to obtain external finance (Abor & Biekpe, 2005; Berger and Udell, 1998; Coleman, 2004; Coleman and Cohn, 2000). Pendula (2011) showed that small firms are more credit constrained than large firms' due to their inability to provide financial information requested by the financial institutions for screening and in most cases, they lack audited financial statements. Vos et al. (2004) argue that more prominent SMEs have more alternative sources of funds because they usually have superior track records to convince prospective creditors and investors for loan approval. We test the hypothesis that firm size is positively correlated to access to venture capital financing.

Legal Status:

The legal or ownership structure of a business is anticipated to affect its ability to obtain external financing (Binks & Ennew, 1997; Meritte, 1998; Barlow & Robson, 1999). SME owners/managers may face difficulties when attempting to obtain finance as financial providers and investors are more likely to prefer to finance incorporated firms. Mac a Bhaird and Lucy, (2006) pointed out that ownership structure of SMEs is negatively connected to external equity and positively related to internal equity. In this study, the legal status of an SME

owner/manager's firm is hypothesized to be positively and significantly correlated to access to venture capital financing.

Sector: (+)

SMEs operate in different sectors such as manufacturing, construction, wholesale and retailing, agriculture, and services. Several studies proved that factors linked to the industry or sector in which a firm operates also explain its capital structure and financial decisions (Mackay&Philips, 2005; Michaels, Chittenden & Poutziouris, 1999). Abor (2007) demonstrated that SMEs in the agricultural industry had robust capital and asset structures while those in the wholesale and retail industry showed the weakest asset structures as well as debt ratios. We test the hypothesis that SME managers operating in the manufacturing/construction sector are positively and significantly correlated to obtaining venture capital financing.

Location: (+)

Most studies have found that SME managers in the urban areas are more likely to obtain credit than those of SMEs located in rural areas. Ahmed and Hamid (2011) found that firms situated in metropolitan cities have a higher probability of obtaining credit compared to those in the rural areas. Sorenson and Stuart (2001) also found that VC firms are more likely to find entrepreneurs located within a short geographical distance from where they are based. In this study, geographical location of the firm is also hypothesized to be positively and significantly correlated to SME managers' ability to obtain venture capital financing.

Business plan: (+)

A business plan is one of the most critical factors in deciding financial assistance by most banks as it is considered the critical document needed to assess the success or prospect of an applicant's project. Delmar and Shane (2003) found a positive correlation between venture capital financing outcomes and a business plan. In this study, we test the hypothesis that there is a positive and significant correlation between SME owners' business plans and their ability to access venture capital financing.

Social Networking: (+)

Kenia, Atieno (2009) pointed out that linkages with financial institutions enable enterprises to access financial services. Networks with creditors, contacts with other enterprises and business groups also help to promote access to financial services (Atieno, 2009). Sengupta's (2011) study shows that investors not only rely on a firm's creditworthiness to finance venture capital or give a referral to someone else, but trustworthiness also plays an important role. We test the hypothesis that an SME owner/manager's social networking is positive and significantly related to his or ability to obtain venture capital financing.

Interest rate Charge: (-)

Gompers and Lerner (1998) claimed interest rate is likely to affect the supply of venture capital. If interest rates rise, the attraction for Venture Capitalists to invest in VC funds declines, and this therefore will decrease the willingness of VC investors to supply VC funds. Amonoo et al. (2003) also indicated that there is a negative relationship between interest rates and demand

for loans. This study hypothesizes that high-interest charges are negatively and significantly related to the SME owner/manager's ability to access venture capital financing.

Chapter 4

Results and Findings

4.1 Introduction

Chapter 4 provides the descriptive statistics of the survey data, panel data and the empirical results. Section 4.2 presents the SME firms' characteristics and socio-economic profiles of the respondents (i.e., SME owners/managers). Section 4.3 discusses the propensity score matching and difference-in-difference estimation results on the effects of venture capital funding on SMEs' growth in Ghana. Section 4.4 discusses the results of the macroeconomic and institutional determinants of venture capital investment activity based on static panel data. Section 4.5 presents the results of the factors that influence SME managers' accessibility to venture capital financing based on the logistic regression model.

4.2 Profile of Respondents

4.2.1 Sample Distribution

The study sample was selected based on the purposive sampling technique from a list of SMEs who are members of the Association of Ghana Industries (AGI) located in the Accra and Tema Metropolitan Areas in the Greater Accra Region. A large proportion of the sample was obtained from Accra which is the capital city, 73.8% respondents were from Accra, and 26.2% were from Tema. The sample size was based on Cochran's (1999) sample size calculation (See Appendix A). During the survey development process, contacts were made to 600 respondents who were willing to participate in the survey, and 400 responses were received, but 15 responses were discarded due to incomplete responses. Thus, our response rate was estimated at 67.0%. The useable questionnaires consist of 385 responses, 65 (16.9%) VC-backed SMEs and 320 (83.1%) Non-VC backed SMEs. We could not obtain a balanced sample size for the

VC- backed SMEs and Non-VC backed SMEs. Ideally, we would wish to have obtained a sample distribution of equal proportion. However, Smith (1997) argued that the ultimate goal of matching in observation data is to come up with a control group that has zero comparison bias, not just similar numbers. The author gives an example where matching is more efficient than multiple regression when the treated group $N_1(39)$ is much smaller than the control group $N_0(5053)$. Further, we take the example of Rosenbaum and Robin (1985). In a Danish study to evaluate the impact of prenatal exposure to an organic acid on the psychological development of children, the treated group took 221 exposed children and the control group 7027 unexposed children.

Table 4.1: Sample distribution by geographical area

	VC-backed SMEs	Non-VC backed SMEs	Total
Study Area	Count= 65	Count = 320	Count = 385
Accra	43(66.2%)	241(75.3%)	284(73.8%)
Tema	22(33.8.8%)	79(24.7%)	101(26.2%)
Total	65(100%)	320(100%)	385(100%)

Source: Survey data based on the author's calculation

The geographical distribution of the respondents in Table 4.1 shows that the sample SMEs are in two metropolises (Accra-Tema) in the Greater Accra region which are both commercial and industrial centres where most SMEs are located. The larger proportion of respondents are from Accra with 284 SMEs (73.8%) comprising 43 (66.2%) VC-backed SMEs and 241 (75.3%) Non-VC backed SMEs. The SMEs in Tema consist of 101 (26.2%) comprising 22 (33.8%) VC-backed SMEs and 79 (24.7%) Non-VC backed SMEs.

4.2.2 Firms' Characteristics

The surveyed SMEs have a wide range of business experience based on the number of years the firm has been operating since its incorporation at the time of the survey. The size of the firm is represented by the total number of employees. Table 4.2 shows 6 (9.2%) VC-backed SME managers have 2-3 years of experience compared to 62 (19.4%) Non-VC backed SME managers. Furthermore, 40 (61.5%) VC-backed SME managers have 3-4 years of working experience, while 219 (68.4%) Non-VC- backed SME managers have 3-4 years of working experience. 19 (29.29%) VC- backed SME managers have 5-6 years of working experience, while 39 (12.2%) Non-VC backed SMEs managers have 5-6 years of working experience. A chi-square of 13.947 at the 1% significance level suggests that there is a significant difference between the working experience of VC-backed SME managers and Non-VC backed managers.

Table 4.2 also shows 32 (49.2%) VC-backed SMEs are small-sized enterprises compared to 234 (73.1%) Non-VC backed SMEs. Furthermore, 33 (50.8%) VC-backed SMEs are medium-sized enterprises compared to 86 (26.9%) Non-VC backed SMEs. A chi-square of 14.444 at the 1% significance level suggests that VC-backed SMEs and Non-VC backed SMEs are significantly different in terms of size. In other words, venture-backed SMEs measured by the number of employees are significantly different from those of non-venture-backed SMEs.

Table 4.2: SMEs firm-size and experience

SME owners Experience (years)	VC-backed SMEs	Non-VC backed SMEs	Total	t-test
	Count =65	Count=320	Count=385	$\chi^2=13.947^{***}$
2-3 years	6 (9.2%)	62 (19.4%)	68 (17%)	
3-4 years	40 (61.5%)	219 (68.4%)	259 (67.3%)	
5-6 years	19 (29.2.9%)	39 (12.2%)	58 (15.1%)	
Firm Size	VC-backed SMEs	Non-VC backed SMEs	Total	t-test
	Count= (65)	Count= (320)	Count= (385)	$\chi^2 = 14.444^{***}$
6-29 Employees	32 (49.2%)	234 (73.1%)	266 (69.1%)	
30-99 Employees	33 (50.8%)	86 (26.9%)	119 (30.9%)	
Expected Count	65 (100%)	320 (100%)	385 (100%)	

Source: Author's calculation

Table 4.3: Sector in which surveyed SMEs operate

Sector	VC backed SMEs	Non-VC backed SMEs	Total	T-test
	Count=65	Count=350	Count=385	$\chi^2=2.018$
Manufacturing/Construction	10(15.4%)	57(17.8%)	67(17.4%)	
Wholesale/Retail trade	20(30.8%)	105(32.8%)	125(32.5%)	
Agriculture	19(29.29%)	103(32.2%)	122(31.7%)	
Service	16(24.6%)	55(17.2%)	71(18.4%)	
Expected Count	65(100%)	320(100%)	385(100%)	

Source: Survey data based on the author's calculation.

Notes *, **, *** denote 10%, 5% and 1% significance levels, respectively.

Table 4.3 shows 15.4% of the VC-backed SMEs operate in the manufacturing/construction sector compared to 17.8% of the Non-VC backed SMEs. Furthermore, 30.8% of the VC-backed SMEs operate in the Wholesale/Retail trade sector compared to 32.8% of Non-VC backed SMEs, followed by 29.2% VC-backed SMEs in the Agricultural sector, compared to 32.2% of Non-VC backed SMEs. According to our survey report, 24.6%VC-backed SMEs are engaged in the Service sector compared to 17.2% of Non-VC backed SMEs. The Chi-squared test of 2.018 at the 10% significance level shows significant difference in relationship between VC-backed SMEs and Non-VC backed SMEs in the industry or sector in which they operate.

Table 4.4: Profile of SME owners

Owners' Profile	VC-backed SMEs	Non-VC backed SMEs	All	t-test
<u>Owners' Gender</u>	Count=65	Count=320	Count=385	
Male	58 (89.2%)	210 (65.6%)	268 (69.6%)	$\chi^2 = 14.231^{***}$
Female	7 (10.8%)	110 (34.4%)	117 (30.4%)	
<u>Owners' Age</u>				
25-30	0 (0%)	8 (2.5%)	8 (2.5%)	$\chi^2 = 13.295^{***}$
31-39	5 (7.7%)	42 (13.1%)	47 (12.2%)	
40-49	33 (50.8%)	202 (63.1%)	235 (61.0%)	
50-59	27 (41.5%)	68 (21.3%)	95 (24.7%)	
<u>Educational Attainment</u>				
Primary education or less	0 (0.0%)	11 (3.43%)	11 (3.43%)	$\chi^2 = 8.221^{***}$
Secondary education	5 (7.7%)	260(81.25%)	265 (68.83%)	
Post-Secondary education	60 (92.3%)	49 (15.31%)	109 (28.31%)	
<u>Income</u>				
\$12,000	1 (1.5%)	37 (11.6%)	38 (9.9%)	$\chi^2 = 54.825$
\$18,000	7 (10.8%)	103 (32.2%)	110 (28.6%)	
\$20,000	26 (40.0%)	143 (44.7%)	169 (43.9%)	
\$50,000 or More	20 (30.8%)	26 (8.1%)	46 (11.9%)	
Total	65 (100)	320 (100)	385 (100)	

Source: Survey data based on the author's calculation

Notes *, **, *** denote 10%, 5%, 1% significance levels, respectively.

Table 4.4 shows 7 (10.8%) of VC-backed SMEs are female compared to 58 (89.2%) of VC-backed SMEs, while 110 (34.4%) of Non-VC backed SMEs are females compared to 210 (65.6%) of Non-VC backed SMEs. The Chi-squared test of 14.231 is statistically significant at the 1% level.

The age of the respondents' ranges from 25-59 years old and the mean age of the sample respondent is 32 years old. When grouped into different age categories, more than half (50.8%) of VC-backed SMEs owners fall into the 40-49 years old category, while the majority (63.1%) of Non-VC backed SMEs owners are in the 40-49 years old category. The mean ages of the VC-backed SME owners and Non-VC backed SME owners are different. The chi-squared test of 13.295 is statistically significant at the 1% level and shows a significant correlation in the age of the SME owners/managers. The annual income of SME owners is divided into four levels (see Table 4.4).

Furthermore, in terms of educational attainment, Table 4.4 shows that 11 (3.43%) of Non-VC backed SMEs owners have Primary education or less, while none of the VC-backed SMEs owners have any education. A total of 260 (81.25%) Non-VC backed SMEs owners have Secondary education compared to 5(7.7%) VC-backed SMEs owners with Secondary education. The table also shows that 49 (15.31%) Non-VC backed SMEs owners have Post-Secondary education while 60 (92.3%) VC-backed SMEs owners have Post-Secondary education. The chi-squared test of 8.221 is statistically significant at the 1% level.

Table 4.4 shows only 1 (1.5%) VC-backed SME owner earned an income level of \$12,000 per annum, compared to 37 (11.6%) Non-VC backed SME owners. The mean annual income of the VC-backed SME owners is \$35,076 while the mean annual income of the Non-VC backed SME owners is \$25,968.

Finally, in terms of working experience, Table 4.2 reports 6 (9.2%) VC-backed SME owners have 2-3 years of working experience, while 62 (19.4%) Non-VC backed SME owners have 2-3 years of working experience. The result also shows 40 (61.5%) VC- backed SME owners have 4-5 years of working experience and 219 (68.4%) Non-VC backed SME owners have 3-4 years of working experience. Further, 19 (29.29%) VC-backed SME owners have 5-6 years of working experience, while 39 (12.2%) Non-VC backed SME owners have 5-6 years of working experience. On the average, VC-backed SMEs owners have 3.2 years of working experience compared to an average of 2.9 years of working experience of the Non-VC backed SME Owners. The chi-square test of 13.947 at the 1% significance level shows that working experience between VC-backed SMEs and Non-VC backed SMEs is significantly different.

4.3 Impact of Venture Capital Financing on SMEs' Growth in Ghana.

To examine the effect of VC financing on SMEs' growth in Ghana, data was gathered in Accra and Tema Metropolises between June and September 2016, in the Greater Accra Region of Ghana. The survey respondents were mainly SME owners who operate in the Accra-Tema Metropolitan Areas. To use matching methods, consideration was given to collecting data from SMEs owners who receive VC funding (treated groups) and those that do not receive VC funding (control groups). The essence of the impact assessment is to compare the outcomes of VC-backed SMEs - the treated group with the control group - Non-VC backed SMEs. The treated group is the target group and selection of the target group is based on the venture capital funds received. The control group includes Non-VC backed SMEs who did not receive any form of VC funding. Describing the control group as those who had never received VC financing, at the time of the survey, but would have received VC financing later under a time-invariant condition offers a better measurement for the impact estimator (Sianesi, 2004). The comparison is between the VC-backed SMEs and the Non-VC backed SMEs who did not receive VC funding but would have received it in the next period. Furthermore, the study sample includes SME owners who qualified for venture capital financing. This method selection of respondents maximises the possibility of collecting data that shows accessibility to venture capital is highly associated with the observed factors. Given the self-selection bias that is likely to affect our sample, the observed bias due to self-selection can be controlled by using the available observed factors. However, selection bias is possible in the venture capital financing programme due to unobserved factors. For example, SME managers with political connections or religious affiliations are likely to receive preferential treatment in getting venture capital funding. This unobserved factor not only biases the prediction of obtaining venture capital financing but also leads to bias in the impact evaluation of the venture capital

scheme on the SMEs' outcomes such as sales and employment growth. Since such SMEs can earn additional income that significantly improves their sales or employment levels, this unobserved bias should be netted out in a programme impact evaluation. Treatment of the unobserved bias in venture capital financing evaluation is beyond non-experiment data, especially cross-sectional data. Due to individual heterogeneity and time-varying effects, one cannot construct the counterfactual for the treatment object to yield an unbiased comparison. Nevertheless, minimising the bias from unobserved factors can be attained by using before-treatment variables of interest data in a cross-sectional data study (Lee, 2005).

To measure the sales and employment impact of venture capital financing on SMEs' growth, this section uses annual sales and number of employees in a one-year period before the impact assessment to test if there is a relationship between the before-treatment outcome and factors that are unobserved based on factors observed. The unobserved factors can be controlled by using the pre-treatment outcome as the observed explanatory variable in the model, based on the assumption that the unobserved factor is a time-invariant effect on the outcome (Mosley, 1997). Hence, the pre-treatment data of SMEs' annual sales and number of employees are used in the estimation of impact to control for unobserved bias.

4.3.1 Estimation Strategies

The PSM method is used to obtain the coefficient of the average effect of treatment in the treated venture capital financing of SMEs. δ_{PSM}^{ATT} is given as

$$\delta_{PSM}^{ATT} = E(Y_1|X, D=1) - E_x(Y_0|X_0|X, D=0) \quad (4.1)$$

Where Y is the outcome of interest, i.e., SMEs' annual sales and the number of employees (measured in thousands of dollars and number of persons respectively).

D is programme participation; $D = 1$ if an SME is a programme participant; 0 otherwise. X is a vector of predictor of the observed factors plus the SMEs owners' features (such as age, gender, ethnicity, whether married, education), and the firms' characteristics (firm age, firm size, legal status, and sector). Also, the pre-treatment SMEs' annual sales and the number of employees in 2013 are also involved in the predictor to elucidate the programme impact estimator for each outcome of interest. The choice of the predictors to control for individual heterogeneity follows the rules that the variable should concurrently impact the programme participation and the outcome (Caliendo & Kopeninig, 2008). The predictors are chosen from the variables that are significant in determining participation in venture capital financing. Once these conditions are satisfied, a different estimate can be obtained from different matching procedures.

This study employed a logit regression model using observable variables that include SME owners' characteristics such as gender, age, marital status and education as well as firm characteristics (i.e., firm age, firm size and legal status) and pre-treatment variables (i.e., annual sales for 2013, and the number of employees for 2013) to compute our propensity score. We estimate the propensity score matching using logit regression because it is more convenient and efficient (Angrist and Pischke, 2008). However, both logit and probit models give similar results. The dependent variable is regressed on the covariates that influence the participation and outcome in the venture capital financing program. Thus, the propensity score matching is estimated based on the probability of the respondents participating in the venture capital financing program. According to Setboonsarang et al. (2008), if a variable impacts on participation but not the outcome, it is unnecessary to control for differences concerning the variable in the treatment against the control groups. Similarly, if the variable impacts on the outcome but not the treatment prospect, it is unnecessary to control for the variable as the outcome will not significantly vary in treatment against the control groups. Variables that

impact neither the treatment nor outcome are also insignificant. As a result, only those variables that impact on both the treatment and outcome are essential for the matching and are used in the logit model for the estimation of the propensity score.

We compute the propensity score for participant and non-participant SMEs. The dependent variable is a binary variable that takes on a value of one if the SMEs are venture capital funded, zero otherwise. Table 4.5 shows the propensity score estimation by logistic regression. The propensity score is calculated based on the likelihood of participation in the venture capital financing programme. Different distribution of the propensity scores obtained from the selected covariates as documented in Table 4.5 and the balancing test for the group are carried out to ensure that the mean propensity score is not different for the treated and control groups in each block. This guarantees that a good comparison is built for the selected covariates since the balancing property is satisfied, common support is well-defined and used for purposes of matching purposes. Finally, the nearest neighbour matching (NNM) and Kernel matching (KM) algorithms are used to estimate the average treated effect on treated (ATT) on venture capital financing on SMEs' outcomes regarding sales and employment growth. The estimated results for VC financing on SMEs' growth are presented and discussed in the next section.

4.4 Empirical Results

4.4.1 Impact of Venture Capital financing on SMEs' growth.

As a preliminary check on our data collected, we performed multiple regression and our results are shown in Table 4.5

Table 4.5: Estimated Results of Our Multiple Regression Model

Firm Growth	Coeff.	Std. Err	t	P> t
Treatment	.6788102***	.0619958	10.95	0.000***
gender	-.0502238	.046758	-1.07	0.283
Age	.0161385	.0355879	0.45	0.650
M. status	-.128995**	.0529119	-2.44	0.015
Education	.0734091**	.0352976	2.08	0.038
Experience	-.0186866	.0444261	-0.42	0.674
Income	-.0211083	.0225494	-0.94	0.350
Ownership	.0174569	.0455213	0.38	0.702
F. Age	.0467718	.0447736	1.04	0.297
F. Size	.1083379**	.052774	2.05	0.041
Locaton	.0101417	.0551772	0.18	0.854
Cons	.0502614	.1772269	0.28	0.777
F=	0.0000			
Pseudo R²=	0.3652			
Ajusted R²	0.3465			
Observations	385			

Notes: *, **, *** represent 10%, 5%, 1% respectively.

The results of our estimation show that there is positive and significant relationship between SMEs' growth and venture capital financing. This finding is consistent with past studies (Peneder, 2010; Engel, 2003). Married is negative and significantly related to SMEs' growth and VC financing. This may probably be because married individuals are less risk tolerant than singles (Hartog et al., 2000). Education has a positive and significant relationship with the SMEs' growth and venture capital financing. This is probably because highly qualified owners/managers of SMEs are more efficient in their work and moreover, providers of funds have more confidence in those with higher academic qualifications than those with lower levels of qualification (Berger and Udell, 2006). This is probably because well-educated entrepreneurs have the managerial skills in terms of planning, marketing, and production and therefore reflecting on firm performance. Firm size of the SMEs is positive and significantly related to SMEs' growth and venture capital financing. Firm size has also been widely recognized as a significant determinant of accessibility to financing. Most empirical studies find a positive relation between firm size and the probability of obtaining finance (Akoten, Sawada, and Otsuka, 2006; Rodriguez et al., 2001). There is enough evidence from most empirical studies which shows that firm size is a significant factor that influences their ability to obtain external finance (Abor & Biekpe, 2005; Berger and Udell, 1998; Coleman, 2004; Coleman and Cohn, 2000).

The next step was to determine the propensity score of our VC participation in the venture financing program using logit regression mode. The results of the logit model for propensity scores are reported in table 4.6. The estimated coefficients show that the probability of participation is significantly influenced by four explanatory variables. The coefficient for gender is negative and significant at the 5% level, and age is positive and significant at the 5% level. Further, income and legal status are positive and significant at the 1% level, respectively.

The results of our propensity score estimation indicate that the p-value is significant at the 1% level, log-likelihood is -115.59337, pseudo R² value is 0.3387 and LR-chi-squared is 118.41 with a p-value of 0.000 at the 1% significance level, which means our model is well-fitted.

The pseudo R² value shows how well the covariates explain the participation probability. A low pseudo R² value means that SME participants do not have many distinct characteristics overall and thus finding a good match between participant and non-participant SMEs becomes easier. After matching, there should not be any systematic differences in the distribution of covariates between both treated and control groups, and hence, the pseudo R² value should be very low (Caliendo and Kopeining, 2005).

The results of our logit regression as showed in table 5.4 indicate that four variables are significantly related to SMEs' participation in venture capital financing program. These four variables are gender, age, income and legal status of the firm. As indicated in the above table, there is negative and significant relationship between gender and SME owners/managers' participation in venture capital financing program. This may probably be because females are less likely to participate in venture capital financing program as compared to the male counterpart. This is because empirical evidence has shown that women-led businesses are risk averse as compared to men-led businesses (Chaganti, 1986, Croson and Gneezy, 2009; Byrnes et al., 1999) Also female entrepreneurs are less likely to raise capital from external sources (Robben and Walken, 2002). Other likely reasons may include the small size of most women-owned firms (Riding and Swift, 1990), lack of financial sophistication (Brush, 1992) and possible discrimination (Brush, 1992).

The age variable is also seen to be positive and significantly related to SME owners/managers' participation in venture capital financing program. This may probably be because, younger SME owners/managers are more likely to participate in venture capital financing program as

compared their older counterparts. This is because younger owners are considered to be less risk averse than older owners so they are more willing to raise capital from external sources (Coleman, 2004b; Vos et al., 2007). The income variable is positively and significantly related to venture capital financing. This may be because the low-wealthier entrepreneurs are less likely to acquire external financing as compared to wealthier entrepreneurs (Lofstrom and Bates 2013).

The legal status variable is also positively related to SME owners/managers' participation in a VC financing program. This is because incorporated firms are more likely to receive external financing from banks and other financial institutions because they may be perceived as formal and credible (Cassar, 2004).

The other variables such as marital status, education, experience, firm size, firm age, sector/industry have no significant effect on SME owners/managers' participation in a VC financing program. This contradicts the findings from past empirical studies which indicate a correlation between entrepreneurs' education and their ability to obtain external financing (Becker 1964, Bates 1990, Robinson & Sexton 1994, Cressey 1996, Chandler & Hanks, 1998, Baum & Silverman, 2004). It is also inconsistent with the conclusion of MacMillan et al., (1985) who indicated that the entrepreneur's qualities eventually influence the investment decision, especially a thorough familiarity with the industry/market, leadership capability and ability to assess and manage risks.

Table 4.6: Logit Results of SMEs' Programme Participation

Variables	Coefficients	Std. Error	t-test	P-value
Gender	-.8985429*	.5228816	-1.72	0.086
Age	.4795455*	.2798241	1.71	0.087
Marital Status	-.5572087	.4465129	-1.25	0.212
Education	.4922107	.4170498	1.18	0.238
Experience	.3170132	.4167145	0.76	0.447
Income	.8609693***	.1876839	4.59	0.000
Legal Status	2.430341***	.5839555	4.16	0.000
Firm Age	.1291241	.3932986	0.33	0.743
Firm Size	.2939372	.3843375	0.76	0.444
Sector	.2003227	.1848419	1.08	0.278
Pre-sales 2013	2.24e-07	1.40e-07	1.60	0.109
Pre-employment 2013	.0274642	.0229396	1.20	0.231
Constant	-10.96319	1.976734	-5.55	0.000
LR-Chi (2)	118.41			
Pseudo R²	0.3387			
Log-likelihood	-115.59337			
P-Value	0.0000			
Number of Observations	385			

Notes *, **, *** represents 10%, 5%, 1% significance levels, respectively

We then compute the distribution of the propensity score for each SME included in the treated and control groups to identify the existence of common support.

Before we implement the matching of the treated and control groups, we undertook three significant tasks. We first estimated the predicted values of programme participation (propensity scores) for all participant and non-participant SMEs. Second, to satisfy the overlap assumption, we imposed a common support condition on the propensity score distributions of the SMEs with and without programme participation (i.e., venture capital financing).

Third, we discarded observations whose predicted propensity scores fell outside the range of the common support region. The estimated propensity scores differed between 0.024 and 0.92 for SME participants (treated groups) and between 0.025 and 0.88 for SME non-participants (control groups). The relevance of the propensity score estimation is to balance the distributions of significant variables in both treated and control groups, and not to get a precise prediction of selection into treatment.

Based on the logit model results, propensity scores are estimated, and the specification is balanced based on the balancing test. The region of common support is [0.02401465, .92121572] (see Appendix C).

Next, we check for the balancing of propensity score and covariates. To check the characteristics of the treatment and control group after the matching procedure, we conduct two types of balancing tests (see Appendix C). If the covariates are similar after matching, then the matched comparison group can be considered as counterfactual (Lee, 2008). For this reason, two types of balancing tests are used in this study to analyze the matching quality, particularly, the joint significance and pseudo R^2 , and the t-test. The results of the t-test (See Appendix C) show that the differences in all covariates became insignificant after the matching

procedure, which indicates that the characteristics of the control group are sufficiently similar after matching.

Furthermore, the result shows the pseudo-R-squared values reduced from 0.338 to 0.080 after the matching. The balancing tests confirmed that there is no systematic difference among the covariates used for matching between the treated group and after-matching control groups. The results demonstrate that the matching process can balance the characteristics of the treated and comparable control groups.

Finally, we chose different matching algorithms to estimate the average treatment effect on the treated (ATT). In other words, we applied matching algorithm methods to estimate the effects of venture capital financing on SMEs' growth (outcomes). Four different algorithm methods can be used to estimate the ATT, namely, the nearest neighbour matching method, the radius matching method, the kernel matching method, and the stratification matching method. We chose the nearest neighbor matching and kernel matching methods to estimate the ATT. The estimates of the average treatment effect of the venture capital financing programme participation on the treated (ATT) are summarized in Tables 4.7 and 4.8 for the two outcomes using nearest neighbour matching, and kernel matching routines.

Table 4.7: Estimation of Average Treatment Effects on Treated (ATT) on Annual Sales and Employment (Nearest Neighbour Matching)

Outcome Variables	Treated	Control	ATTR	Std. Err	t
Annual Sales	65	34	0.011	0.017	0.648
Employment	65	34	0.054	0.015	3.591***

Notes *, **, *** represents 10%, 5%, 1% significance levels, respectively

Column 1 in Table 4.7 specifies the outcome variables of interest in the propensity score function and the second and third columns report the treated and control variables used in the matching process. The fourth column shows the ATT for annual sales or employment by the nearest neighbour matching, while the fifth and sixth columns display the standard error and p-value, respectively. The result shows VC backed SME participation in the venture capital financing programme impact on their annual sales with the nearest neighbourhood matching method ($t=0.684$) but is not statistically significant. The average treatment effect on the treated (ATT) on annual sales for VC backed SMEs increased by 1.1 percent.

The VC backed SMEs' participation in the venture capital financing programme has a significant impact on employment with the nearest neighbourhood matching method ($t=3.591$) at the 1% significant level. The average effect on the treated (ATT) on employment for VC - backed SMEs rose by 5.4 percent. This implies that the number of employees of VC- backed SMEs increased by 5.4 percent.

Table 4.8: Estimation of the Average Treatment Effects on Treated (ATT) Annual Sales and Employment (Kernel Matching)

Outcome Variables	Treated	Control	ATTR	Std. Err	t
Annual Sales	65	184	0.012	0.014	0.841
Employment	65	184	0.050	0.012	4.258***

Notes *, **, *** represent 10%, 5%, 1% significance levels

Table 4.8 shows VC-backed SMEs' participation in venture capital financing has no significant impact on SMEs' annual sales with the Kernel matching method ($t=0.841$). Column 2 in Table 4.8 shows the treated group (65) and column 3 shows the control group (184). Column 4 depicts the average treated effects of the treated (0.012), and column 6 indicates the t-test (0.841). The average treatment effect on the treated (ATT) on annual sales for VC-backed SMEs increased by 1.2 percent.

The result of VC-backed SMEs' participation in the venture capital financing programme on employment with the Kernel matching method is ($t=4.258$) statistically significant at the 1% level. The average treatment effect on the treated (ATT) on employment for VC-backed SMEs is 5.0 percent and statistically significant at the 1 percent level. This implies that the number of employees in SMEs, which received venture capital financing increased by 5.0 percent.

Although the propensity score matching method is a useful technique to control for bias due to unobserved factors in impact assessment, the results must be interpreted with care as shown in the deliberation between Dehejia (2005) and Smith and Todd (2005) mainly with matching constructed on cross-sectional data. Firstly, unmeasured characteristics or time effects cannot be controlled by cross-sectional data. Secondly, bias-related errors with cross-sectional matching estimates may be large, without a good set of predictors or if treated and control SMEs are not strictly comparable, for instance, SMEs located in different markets (Smith and Todds,2005). Hence, it is suggested that methods that control for unobserved bias such as the DiD method based on panel data are used if data are available. Given the availability of a panel dataset to control for unobserved bias, to measure the impact of venture capital financing on SMEs' growth, the DiD model is discussed in the next section.

4.5 SMEs' effect estimation with the standard difference-in-difference models

To reduce any bias estimation and to control for the unobservable heterogeneities, which may impact our results based on the PSM method, this study evaluates the impact on SMEs' growth by combining a standard difference-in-difference (DiD) estimation technique based on equation (4.2). The standard DiD is used to determine the effect of venture capital financing on SMEs' growth regarding annual sales and employment growth. The treatment variable which is venture capital financing program participation is of the binary form where SME owners' participation in the program (i.e., SMEs receiving venture capital financing) takes on the value 1 or 0 otherwise. The model estimated is a logarithmic function where the outcome variable is the standard logarithm of the SMEs' growth measurement such as annual sales and number of employees making the calculations not sensitive to distant observations on the dependent variables (Wooldridge, 2007). Consequently, the coefficient (γ) of the treatment variable, if multiplied by 100, measures the estimated average percentage change in the firms' outcomes (annual sales and number of employees) concerning the treatment variable (Wooldridge, 2007; p.2002).

The following equation gives the standard DiD model:

$$Y_{it} = \beta_0 + \delta_0 d_{2t} + \beta_1 P_i + \gamma M_{it} + \varepsilon_{it} \quad (4.2)$$

Where Y_{it} is the SMEs' outcome investigated (SMEs' annual sales and number of employees) for SME i at period t ; d_{2t} is a time dummy variable which is equivalent to one for $t=2$ (post-treatment period) and zero for $t=1$ (pre-treatment period); the dummy variable for both treated and control groups is P_i and takes a value of one if the SME owner i belongs to the treatment group and zero otherwise; an interaction term of the product of d_{2t} is M_{it} and P_i , which shows the participation in the programme is equal to one if SME owner I , received venture capital and the observation happens in the second period (i.e., received the venture capital funding),

and zero otherwise; δ_0 represents time effect suffered by both treatment and control groups; B_i represents the possible time-invariant difference of the total means between the two groups; γ is the principal parameter of interest which measures the average programme effect on receiving venture capital financing; ε_{it} is the idiosyncratic error expected to be independent and identically assigned over SMEs and time, with zero at each period.

Table 4.9: Impact of Venture Capital on SMEs' Growth Using Standard DiD estimation.

	<i>VC-backed SMEs (N=65)</i>			<i>Non-VC backed SMEs (N=184)</i>			<i>DiD</i>
	<i>Year</i>	<i>Year</i>	<i>Difference</i>	<i>Year</i>	<i>Year</i>	<i>Difference</i>	<i>Impact estimator</i>
	<i>2013</i> <i>(1)</i>	<i>2015</i> <i>(2)</i>	<i>(2012-2015)</i> <i>(3)</i>	<i>2012</i> <i>(4)</i>	<i>2015</i> <i>(5)</i>	<i>(2012-2015)</i> <i>(6)</i>	<i>(7)</i>
<i>Outcome variable(Y_{it})</i>	<i>Y_{B.13}</i>	<i>Y_{B.15}</i>	<i>D₁= Y_{B.13}-Y_{B.15}</i>	<i>Y_{N.13}</i>	<i>Y_{N.15}</i>	<i>D₂=Y_{N.13}-Y_{N.15}</i>	<i>γ_{sdd} =D₁-D₂</i>
<i>Log of annual sales</i>	<i>5.739</i> <i>(.0767)</i>	<i>5.823</i> <i>(.0758)</i>	<i>0.0841***</i> <i>(.0074)</i>	<i>5.439</i> <i>(.0464)</i>	<i>5.508</i> <i>(.0477)</i>	<i>0.0690***</i> <i>(.0036)</i>	<i>0.0150**</i> <i>(.0077)</i>
<i>Log of number of employees</i>	<i>1.253</i> <i>(.0252)</i>	<i>1.400</i> <i>(.0222)</i>	<i>.1475***</i> <i>(.0092)</i>	<i>1.139</i> <i>(.0115)</i>	<i>1.249</i> <i>(.0102)</i>	<i>1.104* **</i> <i>(.0042)</i>	<i>.0371***</i> <i>(.0090)</i>

Notes: The figures represent the average log of annual sales and number of employees, respectively; Standard errors are numbers in parentheses; ***, **, * denote the 1%, 5%, and 10% significance levels, respectively.

Table 4.9 shows the result of the impact of venture capital financing on SMEs' growth, measured by the annual sales and number of employees, has dramatically improved for the VC-backed SMEs (treated group) between 2013 and 2015 (see column 3 in table 4.8). For instance, the average annual sales for the VC-backed SMEs (treated group) increased by almost 8.4% over the three years and are significant at the 1% level. Likewise, the average number of employees for the VC-backed SMEs (treated group) during the same period increased by 14.7% and is significant at the 1% level. It is important to note that the significant increase in annual sales and the number of employees for the VC-backed SMEs can be attributed to a combination of time influence and impact of the venture capital injection. To separate the true programme impact on the VC-backed SMEs, the potential time trend must be controlled for.

The average changes in outcome for the Non-VC backed SMEs (control group) between 2013-2015 are taken to estimate the time trend suffered by the VC-backed group (column 6 in table 4.8). After netting out the average increases between the treated and control group (column 7 in Table 4.8), the standard DiD estimates suggests that the average annual sales for VC-backed SMEs increase by 1.5% as a direct result of SMEs' participation in the programme and is positive and significant at the 5% level. Similarly, the standard DiD estimates for VC-backed SMEs on the number of employees increase by 3.7%, based on the participation in the venture capital financing programme. The impact of the programme on the VC-backed SMEs is positive and statistically significant at the 1 % level (column 7 in table 4.8). Based on the standard DiD estimation, the impact of the venture capital financing programme on the participants' annual sales and the number of employees is positive and significant. The results show that VC-backed SMEs are likely to improve their annual sales and employment growth, and this is consistent with similar empirical studies by Peneder (2010), Alemany & Marti (2005), Belke et al. (2004) and Engel (2003).

Peneder (2010) sampled 166 firms with and 663 firms without venture capital financing in Austria between 1996 and 2005 using 2-stage propensity score matching, Pender established that sales growth is faster in VC-backed firms compared to Non-VC backed firms. Alemany and Marti (2005) also examined 323 VC backed firms in Spain between the period 1989 and 1998, and found that VC-funded firms exhibit faster growth in sales, gross margin, total assets, intangible assets and corporate tax, and as well, growth in employment increased by 30.5%. Belke et al., (2004) who used dynamic panel data in 20 OECD countries found that Venture Capital has a positive and significant impact on sales and employment. Similarly, Engel (2003) studied 1000 start-up firms in Germany based on propensity score matching and found that surviving VC-funded firms realize higher growth rates compared to surviving Non-VC funded firms.

In summary, the results of our study using both the PSM and DiD estimation models revealed that VC-backed SMEs perform better regarding sales and the number of employees, partly due to the access by programme participation entrepreneurs to venture capital funding to grow their businesses. The treated groups matched with the control group, which exhibited more improvement in output as validated by our results. We can conclude, that venture capital financing of SMEs at the early growth stage greatly enhanced their growth regarding annual sales and number of employees hired.

4.6 Descriptive Statistics and Empirical Results on Determinants of Venture Capital Investment Activity.

4.6.1 Descriptive Statistics of panel data

This section presents the descriptive statistics of the explanatory variables used in the models.

Table 4.10: Descriptive statistics of the macroeconomic and institutional variables

Variables	Observations	Mean	Std Dev.	Minimum	Maximum
GFCF	150	22.99514	8.51943	0	54.46886
GDP growth rate	150	5.099922	3.64063	-17.66895	14.046
Interest rate	150	14.75892	8.784081	0	46.01
Unemployment	150	9.466122	8.111279	0	37.59
Market Capitalisation	150	19.7748	43.06532	0	253.91
Stock Traded	150	5.638633	22.64991	0	136
Inflation rate	150	178.0555	1993.886	-2.39871	24411.03
Capital gains tax	150	25.59215	24.93519	0	95.67
Scientific & Technical Journal	150	780.3524	1846.579	0	9679.1
Index of Economic Freedom	150	466.463	71.81108	237.5111	624.6778
Dummy: Ghana	150	0.93333	0.2502795	0	1

Table 4.10 provides a summary of the descriptive statistics for the explanatory variables used in this study. The number of observations for our panel data was 150. The average GCFC was 22.99%, with a maximum of 54.46 and a minimum of 0. This indicates that the level of venture capital investments in these countries is likely to be low. This is because venture capital financing is in its infant stage in most of the African countries.

The average GDP growth rate was 5.09%, with a minimum of -17.67 and maximum of 14.04. The average GDP growth rate of 5.09% indicates that higher economic growth is likely to increase venture capital investment activity. This is consistent with past studies of Gompers et al. (2008) and Bonini and Alkan (2009) who argued that higher GDP growth rate plays a significant role in attracting venture capital investment.

The average interest rate was 14.75%, while the maximum was 46.06 and minimum of 0. The average interest rate of 14.75% shows a higher interest rate reduces the attractiveness of risky capital. This is consistent with previous studies of Gompers et al (2008) and Felix et al. (2007).

The average unemployment rate was 9.46 %, with a maximum of 37.59 and minimum of 0. The average unemployment rate of 9.46 % shows an increased unemployment rate in all the countries has a positive and significant effect on venture capital investment activity. This is consistent with past studies of Sherlter (2003) and Black and Gilson (1998) who argued that labour market rigidities have significant and positive impact on venture capital investments.

The average market capitalization was 19.77%, while the maximum was 253.91 and the minimum 0. The average stock traded as a percentage of GDP was 5.65%, with a maximum of 136 and a minimum of 0. The average market capitalization of 19.77% and average stock traded as a percentage of GDP of 5.65 % show a decrease in stock market liquidity. This is inconsistent

with the findings of Jeng and Wells (2000) and Gompers and Lerner (1989) who argued that the liquidity of the stock market has a positive and significant impact on venture capital investments. This is probably because most financial markets in Sub-Saharan African region are less developed.

The average inflation rate was 178%, with a maximum value of 24411.03 and a minimum value of -2.39. The average inflation rate of 178% shows that an increase in inflation rate has a negative and significant correlation with venture capital investments. This is consistent with the findings of Elsiefy (2013) who argued that a higher inflation rate has a negative and significant impact on venture capital investments especially at start-up and early stage of investments.

The average capital gains tax was 25.59%, with a maximum value of 95.67 and a minimum value of 0. The average capital gains tax of 25.59% shows that an increase in capital gains tax has a negative and significant impact on venture capital investments. This is inconsistent with findings of Gompers et al. (2008) and Groh and Lichtenstein (2009) who argued that lower corporate tax on average are strong incentive for investors.

The average scientific and technical journal articles used as a proxy for R&D expenditure was 780.3%, with a maximum value of 9679.1 and a minimum value of 0. This shows that an increase in R&D expenditures has a positive and significant impact on venture capital investment activity. This is consistent with past studies of Gompers and Lerner (1998) and Scherlter (2003) who argued that R&D expenditures have a positive and significant correlation with venture capital investments intensity. The average index of economic freedom was 466.6%, with a maximum value of 624.6778 and a minimum value of 237.5111. This indicates that the quality of institutions in the region affects venture capital investment activity. This is consistent with past studies of Cumming et al. (2006) and La Porte et al. (1998) who argued

that the quality of a country's legal system has a significant and positive association with venture capital market development. One possible reason may be that the institutions in Sub-Saharan African region are weak.

As a preliminary assessment of our data, we performed time series and cross sectional data analysis. Tables 4.11 and 4.12 show the results of our estimation.

Table 4.11: Estimation of Result of Time Series

GFCF	Coeff.	Std. Err	t	P> t
GDP growth rate	.4495664***	.1002294	4.49	0.000
Interest rate	.3449384***	.037886	9.10	0.000
Unemployment rate	.377114***	.03672	10.27	0.000
Market Capitalization as of GDP	-.0281333	.0249646	-1.13	0.260
Stock Traded as of GDP	.0600899	.053532	1.12	0.262
InflationCPI	-.0002125	.0037334	-0.06	0.955
Profit Capital Gains Tax	-.0083685	.0163637	-0.51	0.609
Scientific& technical journals	-.0012172***	.0002732	-4.46	0.000
Index	.0228417***	.0060571	3.77	0.000
Cons	2.822587	2.943553	0.96	0.338
F=	0.0000			
Wald Chi	358.14			
Log likelihood	-483.6928			
Observations	150			

Notes: *,**,*** represent 10%,5%,1% respectively

Five of the explanatory variables namely GDP growth, interest rate, unemployment rate, scientific and technical journals and index of economic freedom which represent the quality of institutions are significantly related to venture capital investments activity. The coefficient for the GDP growth variable is positive and significantly related to VC investment activity. This implies that there is a positive and significant correlation between economic growth and venture capital investments activity. This is consistent with the findings of past studies (Gompers and Lerner, 1998; Felix et al., 2007 and La porte et al., 2004). The coefficient for the interest rate variable is positive and significantly related to venture capital investment activity. The result is consistent with previous studies (Felix et al., 2007), which confirmed a positive and significant relationship between long term interest rate and venture capital development. The coefficient for the unemployment rate variable is positive and significant. This implies that unemployment is significantly related to venture capital investment activity. This is consistent with the findings of Felix et al. (2007) who found a positive relationship between unemployment rate and venture capital investments activity in Europe. This may probably be due to the high unemployment rate in Ghana, which is likely to motivate self-employment, which also triggers the demand for and supply of venture capital financing.

The coefficient of Scientific & Technical journals, which is a proxy for research and development expenditure is negative and significant. This finding is inconsistent with past studies (Gompers and Lerner, 1998; Schertler, 2003) which showed a significant relationship between research and development expenditure and venture capital investments activity. This is probably because less emphasis is placed on research and development expenditure in Ghana. The coefficient for the index variable is positive and significant. This implies there is a positive and significant correlation between the quality of institutions and venture capital

investments activity. This finding is consistent with previous studies (La porte et al.1997/1998; Cumming et al., 2006), which highlighted that the quality of a country's legal institutions is significantly correlated to investments. The four other variables namely market capitalization, stock traded as a percentage of GDP, inflation rate and capital gains taxes are insignificant. These results are inconsistent with past studies which revealed that market capitalization and stock traded, inflation rates and capital gains taxes are significantly related to venture capital investments activity (Jeng and Wells, 2000; Felix et al., 2007, Poterba, 1989, Gompers and Lerner, 1998). This may be because the stock market in Ghana is not well developed compared to the stock markets in Europe or the US.

Table 4.12: Estimation Results of our Cross Sectional Analysis

GFCF	Coeff.	Std. Err	t	P> t
GDP growth rate	.7706644	.9380449	0.82	0.449
Interest rate	.2329417	.3066833	0.76	0.482
Unemployment	.0358821	.2655165	0.14	0.898
Market Capitalization as of GDP	.0328637	.1997208	0.16	0.876
Stock Traded as of GDP	.2021404	.5142422	0.39	0.710
Inflation CPI	-.0060872	.0104942	-0.58	0.587
Profit Capital Gains Tax	-.0301403	.1199405	-0.25	0.812
Scientific and technical journals	-.0048674	.0050194	-0.97	0.377
Index	.0294343	.034203	0.86	0.429
cons	-.5733705	12.66708	-0.05	0.966
F=	0.2053			
R-squared-	0.7954			
Adjusted R²-	0.4270			
Observations-	15			

Notes: *, **, *** represents 10%, 5%, 1% respectively

Our estimated results show nine explanatory variables are insignificantly related to venture capital investments activity. Further, Table 4.2 shows six estimated variables are positive and insignificant while three are negative and insignificant. Our results are inconsistent with past studies (Gompers and Lerner, 1998; Jeng and Wells, 2000, Felix et al., 2007, Puri and Hellman, 2001). Further, our F-test is statistically insignificant at 0.2053, which implies our model is not well fitted. This implies that cross sectional data analysis is not suitable for our research study.

4.6.2 Empirical Models

This section explores the underlying relation between venture capital investment activity and the influence of macroeconomic and institutional factors by comparing 15 selected countries in Sub-Sahara Africa from 2006-2015. These countries are Botswana, Cote d'Ivoire, Ghana, Kenya, Malawi, Mauritius, Mozambique, Namibia, Nigeria, South Africa, Uganda, Rwanda, Zambia, and Zimbabwe.

The macroeconomic and institutional factors include GDP growth rate, stock market capitalization, the stock traded as a percentage of GDP, unemployment rate, interest rate, inflation rate, profits, capital gains taxes, scientific and technical journal articles, a dummy variable which denotes 1 if VCI occurs in Ghana, otherwise zero and index of economic freedom are annual data obtained from the World bank database and Heritage Foundation. The panel data covers a period of ten years from 2006-2015. Many studies have examined the determinants of venture capital investment activity in the finance literature. Some investigate only the macroeconomic factors; while others assess both macroeconomic and institutional factors. (For example, Gompers and Lerner, 1998; Jeng and Wells, 2000; Scherlter, 2003; Romain and de La Potterie, 2004; Felix et al.2007; Cherif and Gazdar, 2011).

The present study used the panel data method to estimate the determinants of venture capital investment activity in 15 selected countries in Sub-Sahara Africa including Ghana. The equation to be estimated is as follows:

$$GFCF_{it} = \alpha_0 + \beta_1 GDP_{it} + \beta_2 INT_{it} + \beta_3 UMP_{it} + \beta_4 MCAP_{it} + \beta_5 STO_{it} + \beta_6 INF_{it} + \beta_7 CAP_{it} + \beta_8 SJT_{it} + \beta_9 IEF_{it} + \mu_i + \lambda_t + DV_{it} + u_{it} \quad (4.3)$$

Where the subscript i represents the individual countries ($i=1\dots15$), and the subscript represents the tenth year ($t=1\dots10$) μ_i the unobservable heterogeneity (individual effects) which is specific for each country, λ_t is the parameters of time dummy variables, and u_{it} is the error term.

Table 4.13: Dependent and Explanatory Variables used in Our Panel Data Analysis

Variable	Variable Name	Variable Description	Unit Measurement
GFCF	Gross fixed capital formation	The dependent variables (proxy venture capital investment activity).	US dollars(\$)
GDP	Gross domestic product	Gross domestic product growth rate is the level of economic activity in a country.	Percentage (%)
INT	Interest rate	Long-term interest rate (cost of borrowing)	Percentage (%)
UMP	Unemployment rate	Measures the rigidities of the labour market	Percentage (%)
INF	Inflation rate	Measures changes in the consumer price index	Percentage (%)
MCAP	Market Capitalization	Stock market capitalization as a percentage of GDP	% of GDP
STO	Stock Traded Valued	Listed companies on a country's stock exchange as percentage of GDP	% of GDP (%)
STJ	Scientific and Technical Journal Articles	Proxy for industrial and academic research expenditure	US dollars(\$)
IEF	Index of Economic Freedom	The aggregate of some ten indices developed by the Heritage Foundation to measure institutional quality).	Numeric value
DV	Dummy: Ghana	Dummy variable for Ghana(it takes the value 1, if VCI occurred in Ghana otherwise zero.	Numeric value

Before the estimation of our panel data regression, diagnostic tests were conducted to enhance the robustness of the findings. First, Variance Inflation Factor (VIF) was used to test for multicollinearity among the independent variables. VIF is used in panel data to detect collinearity among predictors that may affect our result estimation.

The VIF indicates whether a predictor has a strong linear relationship with other predictors in the model. The largest VIF should not be greater than 10, and the average VIF should not be much bigger than 1 (Field, 2005). If VIF is above 10, this means there is multicollinearity in the model (White, 1980). The VIF mean of 3.38 in our model shows the model does not suffer from multicollinearity (see Appendix D). Similarly, we need to test if heteroscedasticity exists and the Breusch-Pagan test is applied to ascertain if heteroscedasticity is present in our model. It shows a chi-square of 0.15 and is insignificant at $p = 0.7002$ level, which means that heteroscedasticity is absent in our model (See Appendix D).

Finally, we conduct a test for serial correlation, to ascertain if there is a serial correlation in our model. This is because serial correlation in a panel data model causes the results to be inefficient. This study used Wooldridge's serial correlation test (Wooldridge, 2002). Our results show that the variables used in our models are not serially correlated (see Appendix D).

To estimate the determinants of venture capital investment activity in Ghana, three different models are tested to determine which model is appropriate for our panel data analysis. The models are OLS pooled regression (the Common Constant Method) the Random Effects Model and the Fixed Effects Model.

To choose between Pools OLS, Fixed Effects, and Random Effects Models, we used the Breusch-Pagan Lagrange Multiplier (LM) test, proposed by Breusch and Pagan (1980) to determine whether to use the Pools OLS or the alternative or Random Effects models. Our results show that the LM test is highly significant at the 1% level (see Appendix D). The LM

test tests for random individual effects against the null of the pooled model based on the multiplier (LM) principle (Gujaranti, 2003). Therefore, it rejects the null hypothesis, suggesting that the Random Effects Models are more appropriate. Tables 4.14, 4.15 and 4.16 show the results of our estimates for the Pools OLS, Fixed Effects and Random Effects Models, respectively.

Table 4.14: Estimated Results of the Pooled OLS Model.

Variables				
GFCF	Coefficients	Std. Err	t	P> t
GDP Growth	.6120669***	.1785271	3.43	0.001
Interest rate	-.0176498	.0790667	-0.22	0.824
Unemployment rate	.2822357***	.0881228	3.20	0.002
Market Capitalization	-.0595119	.045498	-1.31	0.193
Stock Traded Value	.1384496	.0919277	1.51	0.134
Inflation rate	-.0004267	.000315	-1.35	0.178
Taxes	-.029226	.030289	-0.96	0.336
Scientific & Technical Journal Articles.	-.0015106**	.0005398	-2.80	0.006
Index of Economic Freedom	.0323416***	.0099866	3.24	0.002
Dummy: Ghana	-1.086947	2.73251	-0.40	0.691
Constant	5.788122	5.758601	1.01	0.317
R²	0.2918			
F	0.0000			
Number of Observations	150			

Notes *, **, *** represents 10%, 5%, 1% significance levels, respectively

Table 4.15: Estimated Results of the Fixed Effects Model.

Variables				
	Coefficients	Std. Err	t	P> t
GFCF				
GDP Growth	.4288602 ***	.1330366	3.22	0.002
Interest rate	-.1532752	.1185033	-1.29	0.198
Unemployment rate	-.0925857	.1127908	-0.82	0.413
Market Capitalization	.0051648	.0397347	0.13	0.897
Stock Traded Value	-.0037214	.0785746	-0.05	0.962
Inflation rate	-.0001492	.0002352	-0.63	0.527
Taxes	-.004833	.026849	-0.18	0.857
Scientific & Technical Journal Articles.	.0003798	.0005236	0.73	0.470
Index of Economic Freedom	.0195785	.0149973	1.31	0.194
Dummy: Ghana				
Constant	14.58297*	7.959133	1.83	0.069
R²	0.1317			
F	0.0321			
Number of Observations	150			

Notes *, **, *** represents 10%, 5%, 1% significance levels, respectively

Table 4.16: Estimated Results of the Random Effects Model.

Variables				
GFCF	Coefficients	Std. Err	t	P> t
GDP Growth	.4564711 ***	.1353746	3.37	0.001
Interest rate	-.0992326	.1026596	-0.97	0.334
Unemployment rate	.0097665 ***	.1035966	0.09	0.001
Market Capitalization	-.005741	.0392179	-0.15	0.884
Stock Traded Value	.0129245	.0776397	0.17	0.868
Inflation rate	-.0001764	.0002399	-0.74	0.462
Taxes	-.0075184 **	.0266367	-0.28	0.008
Scientific & Technical Journal Articles.	-.0000562	.0005036	-0.11	0.911
Index of Economic Freedom	.0276566 **	.0125769	2.20	0.028
Dummy: Ghana	-1.638033	6.057931	-0.27	0.787
Constant	10.97548	9.302344	1.18	0.238
R²	0.1191			
F	0.0259			
Number of Observations	150			

Notes *, **, *** represents 10%, 5%, 1% significance levels, respectively.

The Hausman test (1978) is used to choose between the Fixed Effects and Random Effects models statistically. The purpose of this common test in the literature is to check for strict homogeneity. The Hausman test works to facilitate the differences between the two approaches by examining for correlation between the independent variables and the individual random effects. The result of the Hausman specification test indicates the p-value of a 0.0614 insignificance level. Hence, the random effects model is accepted for our model estimation.

The results of our random effects estimate in table 4.16, shows four out of ten independent variables have significant effects on venture capital funds raised including GDP growth rate, and index of economic freedom.

The coefficient of GDP growth is positive and significant at the 1% level. This indicates there is a positive and significant relation between GDP growth rate and venture capital funds raised. This implies that GDP growth is a contributing factor to venture capital investment activity. The result is consistent with the findings of Mayer (2010), Felix et al. (2007), Romain and La Potterie (2004) and Gompers and Lerner (1998) who established that there is a positive and significant relation between GDP growth and venture capital investments. The authors concluded that GDP growth has effects on venture capital investment activity.

However, it contradicts the findings of Jeng and Wells (2000) and Marti and Balboa (2004) who did not find any significant relation between GDP growth and venture capital. Jeng and Wells (2000) examined VC/PE firms in 21 OECD countries between 1986-1995 using panel data and established that GDP growth and market capitalization did not influence venture capital activity. Similarly, Marti and Balboa (2004) studied PE/VC firms in 16 OECD countries between the period 1991-1999 and found no significant influence of GDP growth on venture capital fund raising activity. Jeng and Wells argued that GDP growth rate and market

capitalization are part of IPO activity which is considered a significant determinant of venture capital. This is probably because an active stock market provides liquidity and exit for venture capital firms.

The coefficient of the unemployment rate, which is a proxy for labour market rigidities is positive and significant at the 5% level. This implies that the unemployment rate can be attributed to increase in VC investments activity. According to economic theory, the production of goods and services essentially has two factors: Labour and Capital (Rodriguez, 2015). Labour and capital are elasticity of substitution in the production function, this enables firms to vigorously switch labour with capital as the price of investments goods falls (Karabarbounis and Neiman, 2014). Thus, according to production theory, labour and capital are perfect substitutes (Miller, 2008). Hence, from our results the higher unemployment rate may be positive and significantly related to higher investments because firms may choose to substitute or replace labour demand for capital-intensive projects. This will trigger decrease in the demand for labour and increase venture capital investment activity.

However, it contradicts the findings of Jeng and Wells (2000) who found a negative correlation between labour market rigidities and venture capital activities in their study of venture capital investments in 21 countries for the period 1986-1995. The authors found negative and significant correlation at the early stage of investments. This is because labour market regulation subdued venture capital growth in Europe particularly in sectors with high labour volatility (Bozkaya and Kerr, 2011).

The coefficient for the capital gains tax is positive and significant. This implies that there is a significant relationship between capital gains tax and venture capital funds raised. This in line with the findings of Poterba (1989 and Gompers and Lerner (1998) who claimed a decrease in capital gains tax is likely to increase commitment to venture capital funds raised. The findings

support our results that a reduction in capital gains taxes increases venture capital investment activity. On the contrary, interest rate, market capitalization, stock traded value as a percentage of GDP, inflation, scientific, and technical journal articles and index of economic freedom do not have any significant influence on venture capital funds raised.

The coefficient of index of economic freedom is positive and significant at the 5% level. This indicates that there is a positive and significant relation between index of economic freedom and venture capital investments activity in Ghana. This is consistent with similar findings by Cherif and Gadzar (2011), La Porte et al. (1987) and Cumming et al. (2006) who argued that the quality of institutions are related to investments flows in a country.

Overall, the results show that GDP growth rate, unemployment rate, capital gains taxes and index of economic freedom play a significant role in determining venture capital investments activity in Ghana. The improvements in economic activity, unemployment rate, which represent the rigidities of the labour market, taxes and institutional quality promote venture capital development.

However, our findings do not identify any evidence of inflation rate, stock market development, and technical journal articles as drivers of venture capital development as past studies showed (Gomper and Lerner, 1998b; Black and Gilson, 1998; Cherif and Gardaz, 2011; Jeng and Wells, 2000).

Our results are insignificant; this may probably be because the financial markets as well as research and development in Ghana are not well developed as compared to the developed countries.

For instance, Gompers and Lerner (1998b) found a significant and positive relation between market capitalization and industrial and academic research (R&D expenditure) and venture

capital activity, Black and Gilson (1998) claimed there is a significant association between market capitalization through IPO activity and venture capital activity. Cherif and Gardaz (2011) revealed that market capitalization and index of economic freedom as an indicator of institutional quality have a significant effect on venture capital activity in Europe.

However, Jeng and Wells (2000) argued that an active stock market is critical for a healthy venture capital market development. The coefficient for our dummy variable is negative and insignificantly related to venture capital investments activity. Thus, our dummy variable for Ghana is negative and insignificant. This may probably be because institutions (financial and legal) in Ghana, as in most developing countries, are not well developed (Agyeman, 2010).

We conclude that there is a significant and positive relationship between GDP growth rate unemployment rates, capital gains taxes and the index of economic freedom which represent institutional quality and are the main drivers of venture capital investments activity in Ghana.

4.7 Factors influencing SME Owners' Accessibility to Venture Capital Financing:

4.7.1 Logit Model Analysis

This study employed the binary logistic regression to investigate the SME owners' accessibility to venture capital financing using entrepreneurs' characteristics, firms' characteristics and macroeconomic factors as predictors. The binary logistic regression model was chosen because of the discrete nature of our data. The logistic regression model (equation 3.18) was used to investigate the factors that influence SME owners' accessibility to venture capital, and the maximum likelihood estimation technique was used.

The logistic regression model successfully predicts the likelihood of SME owners obtaining venture capital funding at 86.05%. The likelihood ratio test has a chi-square of 108.66 with 14 degrees of freedom and rejects the null hypothesis that the parameter estimates for the model

are equivalent to zero, at the 1% significance level. It can be established that the explanatory power of the logistic model is satisfactory, and the model can be used to explain the likelihood of SME owners' accessibility to venture capital.

Table 4.14 shows that six explanatory variables used are significantly related to SME owners-managers' accessibility to venture capital financing. These six variables of *gender, location, education, business plan, social networks and interest rate* are significantly associated with venture capital accessibility, whereas the *age of the SME owner, Age2, marital status, ownership, firm age, firm size, and sector* are insignificantly associated with SME owners' accessibility to venture capital.

The results reveal that the coefficient 'gender' is negative and significant at the 5% level. This indicates that female SME owners are less likely to access venture capital financing than their male counterparts. One possible explanation is that past studies show that women on average are significantly more risk-averse than men financially and therefore are less likely to apply for venture capital financing compared to their male counterparts (Oslen and Cox, 2001; Bernasek and Shwiff, 2001). Further, the result supports the empirical evidence of Chaganti et al., (2005) that female-led businesses prefer internal financing to external financing. It is also consistent with the findings of Fay and William, (2003) and Nelson et al., (2009) that women entrepreneurs attempting to access venture capital are challenged by institutional gender discrimination and perceptions.

The coefficient of location is positive and significant at the 1% level. This implies that SMEs which are located close to VC firms have a higher possibility of obtaining venture capital funding. The possible reason is that Venture Capitalists prefer to invest in businesses that are close in geographical proximity to enable them to have constant monitoring of their operations. Hence SMEs in urban areas closer to Venture Capital firms are more likely to attract venture

capitalists than in rural areas. This is consistent with the findings of Sorensen and Stuart (2001) who found that VC firms are more likely to fund entrepreneurs located a short geographical distance from where they are based. Further, it is similar to the findings of Ahmed and Hamid (2011) who also found that firms located in metropolitan cities have a higher probability of obtaining finance as compared to others located in rural areas.

The coefficient of education is positive and significant at the 5% level. This implies that SME owners' education is correlated to the likelihood of obtaining Venture Capital funds from VCs. This is probably because VCs may invest their funds in young firms based on the education of founders. This result is consistent with similar findings of Parker (2004) who argued that SMEs owners' access to external finance is linked to education and training since education and training are related to knowledge, skills and problem solving ability to explore opportunities.

The coefficient for a business plan is positive and significant at the 5% level. This shows that SME owners' business plan is correlated to venture capital accessibility and implies that SME owners with a business plan are more likely receive venture capital funding. This result is consistent with similar findings by Delmar and Shane (2003) who find a positive association between a business plan and VC financing. This is probably because as suggested by the authors, a business plan assists in validating entrepreneurs' business operational activities and reduces the possibility of failure.

The coefficient of social networking is negative and significant at the 5% level. This indicates a correlation between SME owners' social networking and venture capital accessibility. It implies that SME owners with social ties are more likely to receive venture capital financing. Our result is consistent with several empirical studies that found VCs tend to invest in firms where they know the entrepreneur directly or indirectly (Fried and Hisrich, 1994; Shane and Stuart, 2002). This is probably because VCs may want to deal with entrepreneurs that they are

familiar with. As argued by Shane and Stuart (2002) entrepreneurs with social capital involving pre-existing direct or indirect relationships with VC investors have a higher prospect of receiving VC funding at the early stage of their business. Hence social networks play a significant role in entrepreneurs' ability to obtain VC funding.

The coefficient of high-interest rate is negative and significant at the 1% level. This indicates that SMEs are less likely to get access to venture capital financing when interest rates are high. According to Gompers and Lerner (1998) the interest rate is likely to affect the supply of and demand for venture capital funds. If the interest rate rises, the attraction of venture capital funds for venture capitalists to invest in deteriorates and this therefore will decrease their willingness to supply venture capital funds. Further, evidence from past studies shows that interest rates are positively and significantly related to venture capital investments (Felix et al., 2007; Romain and de La Potterrie, 2004). The results confirm the findings of Amonoo et al. (2003) which suggest that a higher interest rate is negatively and statistically significant to the demand for credit.

Table 4.17: Logit estimates for SME owners' accessibility to venture capital financing

Independent Variable	Estimated Coeff.	Std. Error	Odd Ratio	Marginal Effect(dx/dy)
Gender	-.8588254**	.4830545	.4236594	-.0476682
Age	-.3317653	.4726642	.7176557	-.0209067
Age ²	-.7602783	.6106193	.4675363	-.0569185
Married	-.157789	.3962052	.8540299	-.0102803
Education	2.339068 **	1.103653	10.37157	.1473999
Experience	.440814	.3720854	1.553972	.0277786
Ownership	.0353616	1.706577	1.035994	.0022186
Firm Age	.1917017	.3185617	1.211309	.0120804
Firm Size	.6357036	.3485501	1.88835	.0446335
Sector	.0400552	.1612129	1.040868	.0025241
Location	-.5785014 **	.3624483	.5607381	-.0389361
Business Plan	2.367198 **	1.703067	10.66746	.1346078
Networking	-2.126738 **	1.124207	.1192256	-.1340196
Interest rate Charge	-1.546586 *	.3593936	.2129739	-.1312355
Constant	-5.464835			
McFaded R-squared	0.3108			
Log Likelihood	-120.47297			
LR Statistics	108.66			
Number of Observations	385			

Notes: *, **, *** denotes 1%, 5%, 10% respectively.

Table 4.17 indicates that the coefficients for the rest of the explanatory variables: Age, Age², Experience, Marital Status, Ownership type, Firm Age, Firm Size, and Sector are insignificant and have no influence on SME owners' accessibility to venture capital funding.

According to Train (1986) and Greene (2003), the estimated logistic regression coefficients attained by maximum likelihood approximation do not generate direct economic interpretation. The sign of an estimated coefficient only provides the direction of the result of that explanatory variable on the likelihood of success (i.e., an observation at value one). To deal with this shortcoming, marginal effects, the change in the predicted possibility connected with variations in the explanatory variables are computed (Greene, 2003).

The marginal effects for the regressors of the logit model are shown in Table 4.15. For instance, the marginal effect of gender shows that on average one additional male-led SME owner obtaining venture capital funding will decrease the likelihood of a female-led SME owner obtaining venture capital funding by 4.7 percent. The marginal effect of location shows that on average a one percent surge in the location of SME owners in an urban area will increase the owners' probability of obtaining venture capital funding by 3.8 percent. The marginal effect of SME owners' experience shows that on average, a one percent increase in owners' education will increase the possibility of receiving VC funding by 14.7 percent. Similarly, the marginal effect of SME owners with business plans indicates that on average a one percent increase in SME owners having a business plan will improve their possibility of obtaining VC funding by 13.4%. Additionally, for the marginal effect of SMEs owners with social networks, on average a one percent increase in social networks will improve the possibility of receiving VC funding by 13.3 percent.

Further, the marginal effect of higher interest rates shows that on average, a one percent rise in the interest rate will reduce the chances of SME owners obtaining venture capital funding by 13.1 percent.

The empirical results from the logistic regression indicate that gender, geographical location, education, business plan, social networks and interest rate are the six main influences on SME owners' accessibility to venture capital financing. For instance, the probability of female-led SME owners obtaining venture capital funding is lower compared to male-led SME owners, because female owners may be risk averse and therefore prefer to use internal financing rather than external financing or are discriminated against by venture capitalists. The results also suggest that SMEs which are geographically close to VC firms are more likely to attract venture capital investment funds from VCs than SMEs which are located remotely from VC firms since Venture Capitalists prefer to fund SMEs which are closer to their locality to monitor their activities (Sorensen and Stuart, 2001). Further, SMEs owners with higher education and training are more likely to obtain VC funding from VC investors (Gompers et al., 2006). Also, SME owners with social networks are more likely to access VC funding from VCs (Shane and Stuart, 2002).

Finally, a higher interest rate implies that venture capitalists are unlikely to supply VC funds, and therefore the probability of SME owners obtaining venture capital financing is reduced (Gompers and Lerner, 1989; Felix et al., 2007).

4.8 Other Factors Influencing SME Owners' Accessibility to Venture Capital Financing

In this section, some qualitative information collected from the survey questionnaire which was used to investigate the effect of venture capital financing on SMEs' growth in Ghana, but was not analyzed in the empirical models, is discussed.

Knowledge about Venture Capital Financing Programmes

As table 4.18 shows, of the total number of 320 Non-VC backed SME respondents, 208 reported that they did not know of the existence of Venture Capital financing programmes. Three key reasons were given for their lack of knowledge and one was the lack of understanding of the 'Venture Capital Financing' concept (65%). This was followed by 80 respondents who cited inadequate promotion of venture capital financing by both the electronic and print media (25%), while 32 (10%) of the respondents cited the lack of awareness about the location of the venture capital firms' offices (10%).

Table 4.18: Knowledge about the venture capital financing programmes.

Reasons	Non-VC backed SMEs	
	N=320	
	Count	% of N
1. Lack of understanding of the Venture Capital Financing Concept	208	65%
2. Inadequate promotion of the Venture Capital financing programme in the media	80	25%
3. Lack of awareness about the location of the offices of Venture Capital firms	32	10%
Total	320	100

Notes N represents the number of responses

Main reasons for not accessing Venture Capital Financing

According to the survey results, 75% (240) of the Non-VC backed SMEs respondents reported that they did not need to access Venture Capital Financing in the past two years. This confirms that demand for external financing determines household/firms' access to external financing to a large extent.

The result also shows that of 80 Non-VC backed SMEs owners who required Venture Capital Financing, 56 (17.5%) had applied for Venture Capital financing but were unsuccessful, and 24 (7.5%) had resorted to other informal sources (i.e., friends and family members, micro-finance).

No need to access Venture Capital Financing

Table 4.19 denotes the main explanations by Non-VC backed SMEs who do not need to access Venture Capital Financing. Approximately 20.83% of the 240 Non-VC backed SMEs said they did not need venture capital funding because they had adequate funds. In the same vein, 27.08% of respondents cited the fear of losing control rights over their businesses as the main reason for not accessing venture capital funding. Furthermore, 22.92% of the respondents said they would not access venture capital funding due to the complex application process, while 19.17% of the respondents also cited the lack of information for not accessing venture capital funding. Lastly, 10% of the respondents cited strict legal requirements as the main reason for their decision not to access Venture Capital Financing.

Table 4.19: SMEs which do not need to access venture capital financing.

Reasons	Non-VC backed SMEs N=240	
	Count	% of N
Have adequate funds	50	20.83
Fear of losing control rights	65	27.08
Due to complex application process	55	22.92
Due to lack of information	46	19.17
Due to strict legal requirements	24	10.00
Total	240	100

Notes N represents the number of responses

Main reasons for some Non-VC backed SMEs' rejection

Table 4.20 shows the main reasons why the Non-VC backed SMEs' applications for venture capital financing were unsuccessful or rejected from the respondents' viewpoints. Approximately, 46.4% of the 56 Non-VC backed SMEs owners who applied for the venture capital financing, but were unsuccessful in obtaining the funds, reported that their applications were denied because they did not have any business plan. Similarly, 25% of the respondents claimed their application was denied because of inadequate financial record-keeping and 21.4% considered that they were rejected because they did not meet the necessary legal requirements. A further 7.1% reported that their applications were rejected because they did not have links with government officials.

Table 4.20: Reasons for Non-VC backed SMEs' refusal of venture capital financing.

Reasons	Non-VC backed SMEs N=56	
	Count	% of N
1. Lack of business plan	26	46.4%
2. Inadequate financial record keeping	14	25%
3. Do not meet basic legal requirements	12	21.4%
4. No links with government officials	4	7.1%
Total	56	100

Notes N represents the number of responses

Reasons for future applications for Venture Capital Financing

Non-VC backed SMEs respondents were asked to state whether in future they would consider applying for venture capital financing. From the total of 240 Non-VC backed SME respondents who did not apply for venture capital financing, 140 respondents signalled their intention to obtain venture capital financing in future (58.3%) while 70 of the respondents indicated that they would not consider obtaining it in future (26.2%). In addition, 30 of the respondents stated that they did not know whether they would consider obtaining venture capital financing in future (12.5%).

We can conclude that more effort should be made by policymakers in the form of education to create awareness and understanding among potential SME entrepreneurs about the benefits of accessing venture capital funding. This will offer young entrepreneurs the opportunity to develop and grow their businesses to create more jobs and increase their sales revenue. Additional publicity and awareness should be generated through the electronic and print media. Seminars and workshops should be organized for business associations to promote the venture capital financing concept in Ghana for the benefit of all stakeholders. Finally, the government should create an enabling environment for entrepreneurs by ensuring macroeconomic stability and develop a vibrant financial market and institutional framework that will boost investments and enhance economic development.

Chapter 5

Summary and Conclusion

5.1 Introduction

The chapter summarizes the study. Section 5.2 presents a summary of the research background, research objectives, sample selection, data and methodology and main findings. Section 5.3 discusses implications of the research findings for academics, policymakers, and SME owners/managers. Section 5.4 presents the limitations of the study and Section 5.5 provides recommendations for future research.

5.2 Summary and Main Findings

5.2.1 Background of the study and design

The lack of access to finance has been recognized as a significant problem facing SMEs not only in Ghana (Aryeetey et al.1994; Mensah, 2004, Abor and Quartey, 2003) but globally (Kauffmann, 2005; Turner et al., 2008). According to extant literature, one key obstacle to SMEs' growth in Ghana is inadequate financing (Kwanin, Nyantakyi & Kyereh, 2015; Ackah & Vuvor, 2011, Abor&Biekpe, 2006; Boapeah, 1993). Consequently, various institutions, including the government, have established various initiatives to address the financing constraints that SMEs face. Specifically, the government has set up various institutions and funds, either alone, or with the support of donor agencies, aimed at addressing the problem of lack of finance for SMEs by providing start-up capital and other funding prospects, regularly at reduced rates. Some examples of the funds under these schemes include but are not limited to Youth Enterprise Schemes (YES), the Export Development and Agricultural Investment Fund (EDAIF), the Micro-finance and Small Loan Centre (MASLOC) and the Venture Capital Trust Fund (VCTF). The drive for the formation of these official schemes is to increase the

flow of finance and credit to SMEs in order to increase their operational capacities, so that they can increase productivity, and be internationally competitive.

In Ghana, the VCTF was established with the purpose of offering investment capital for the promotion of SMEs. Furthermore, the VCTF provides for the development of the venture capital market in Ghana. The establishment of the fund formed part of the government's vision to establish a mechanism for making low-cost financing available to SMEs to support growth in the productive sectors of the Ghanaian economy and subsequently generate jobs and create wealth (Act 680, 2004). The VCTF offers credit and equity funding to suitable VC companies to assist SMEs which qualify for equity, quasi-equity and credit support.

After more than a decade since the operationalization of the venture capital fund many wonder about the impact of the venture capital on SMEs' development in Ghana and what challenges entrepreneurs face in accessing venture capital funding in Ghana. It is in the light of these questions that the researcher sought to undertake this research study.

Objectives of this Study

Research objective one empirically investigates the impact of VC financing on SMEs' growth and development in Ghana. Precisely, this study measures the effects of VC financing on SMEs regarding growth in annual sales and employment. Using a combination of PSM-DiD estimation models, the results of the study showed that SME owners/managers who received venture capital funding achieved significant growth in annual sales and employment as compared to those who did not receive venture capital funding. This is consistent with the findings of Alemany and Marti (2005); Engel (2003) and Peneder (2010).

Research objective two examines the determinants of venture capital investment activity in Ghana within the context of the Sub-Sahara Africa region. The empirical results based on the panel data model technique established that GDP growth rate, unemployment rate (labour

market rigidities) and capital gains taxes are significantly correlated to venture capital investment activity in the region. These findings conform to similar findings of Gompers and Lerner (1998); Felix et al. (2007); Poterba (1989) and Romain & La Portterie (2004). The study also revealed that the components of the index of economic freedom such as property rights, freedom from corruption, business freedom and investment freedom which denote institutional quality are significantly associated with venture capital investment activity. This is consistent with the findings of Cherif and Gazdar, (2011); La Porte et al., (1997/98); Cumming et al. (2006).

Research objective three identifies and analyzes the factors that influence SME owners/managers' accessibility to venture capital financing in Ghana. The results of our logit regression model show that the variables of gender, experience, geographical location, business plan, social networking and the interest rate charged are significantly associated with SME owners/managers' ability to obtain venture capital financing from venture capital investors. These results are consistent with similar findings from Carter and Rosa (1998), Sorensen and Stuart (2001) and Gompers and Lerner (1998).

Accordingly, the study findings will enrich the existing literature on venture capital financing in Ghana. The focus of this study is on SMEs that represent more than 90% of all businesses in Ghana and play a significant role in the country's economic development. Our results support the theoretical findings in the literature that venture capital financing leads to better firm performance; and that a country's GDP growth rate, labour market inflexibility, and reduction in capital gains taxes and components of the index of economic freedom such as control of corruption, property rights, business and financial freedom have influence on venture capital investment activity. Finally, our results showed that factors such as the gender of SME owners/managers, experience, geographical location, business plan, social networking and the

interest rate charged are significantly associated with SMEs' likelihood of obtaining venture capital funding in Ghana.

This study was conducted in the Greater Accra region, the second most populous region after the Ashanti region where an estimated 16.3% of the total population of Ghana live and 40% of the country's national income is generated (Farvatcque-Vitkovic,2008) and more importantly, more than 60% of the SMEs in the country operate (GSS,2011).

Data from primary and secondary sources are used to explore the impact of venture capital financing on SMEs' growth and to identify the determinants of venture capital investments as well as to assess the factors influencing entrepreneurs' accessibility to venture capital financing.

Primary data was collected through personal interviews with SME owners with structured questionnaires. Based on the purposive sampling technique, a total of 400 SMEs from Accra and Tema Metropolitan Areas in the Greater Accra region were surveyed between June and September 2016. In all, 400 responses were collected, and 15 were rejected due to the incomplete filling in of questionnaires. Thus, the response rate was 67%, and usable responses were 385 which consisted of 65 VC-backed SMEs and 320 Non-VC backed SMEs. Secondary data were obtained from the World Bank database and the Heritage Foundation over ten years from 2006-2015.

The data was analyzed with descriptive statistics and regression analysis. The descriptive statistics included frequency analysis and test of independence (Chi-square test). PSM-DiD estimation models, panel data analysis (Fixed effects/Random effects) and binary logistic regression were used to investigate the impact of venture capital financing on SMEs' growth, determinants of venture capital investment activity and factors influencing SME owners/managers' accessibility to venture capital financing in Ghana.

5.2.2 Overview of the Main Findings

The findings of this study provide a strong proof of the existence of a relationship between venture capital funding and SME growth regarding sales and employment growth. Our combined PSM-DiD estimation results reveal the statistically significant impact on annual sales and employment of venture-backed SMEs at 1.5 percent and 3.7 percent respectively. Our results conform to the findings by Davila et al. (2003), Peneder (2010) and Engel (2003).

However, our results contradict the findings of Manigart & Hyfte, (1999); Bottazzi and Da Rin (2002) and Bürghel et al. (2000) who did not find a significant effect of venture capital financing on sales and employment growth. Manigart and Hyfte (1999) studied 187 Belgium firms and detected that firms that receive venture capital financing experience more significant growth regarding total assets and cash flows, but not the growth of sales revenue and employment. Using a sample of 511 VC-firms listed on Europe's new stock market, Bottazzi and Da Rin (2002) showed that European VC-backed companies do not experience faster sales and employment growth than non-VC backed companies. Bürghel et al. (2000) analyzed the growth of sales and employees of 500 start-ups localized in Germany and the UK but failed to detect any effect of VC financing.

This is probably because VC-backed firms specialize in selecting the most promising ventures and provide value-added services to the firms they invest in. Thus, VC-backed SMEs are most likely to outperform Non-VC backed SMEs which are relatively well established at the same time, because VCs select or pick the most promising start-up firms, and provide value added services such as marketing and management support, business advisory services and assist in the recruitment of qualified personnel, provide access to market and suppliers and other business related services, such as the provision of professional advice to management team, as

well as sitting on a company's board to work closely with the management team (Timmons and Bygrave,1986; Hellman and Puri,2002; Gorman and Sahlman,1989).

Concerning determinants of venture capital investment activity, our findings revealed that GDP growth, unemployment rate, and capital gains taxes are positively associated with venture capital investment activity regarding the macroeconomic factors. This result is consistent with the findings of Mayer (2010; Gompers and Lerner (1998), Felix et al. (2007) and Romain and La Portterie (2004). However, it contradicts the findings of Jeng and Wells (2000) and Marti & Balboa (2004) who found no significant effect of GDP growth on venture capital investment activity. Jeng and Wells (2000) argued that GDP growth and a vibrant stock market provide liquidity and exits for Venture Capitalists during IPOs.

On institutional determinants of venture capital investment activity, our findings indicate that components of the index of economic freedom, which represent the quality of institutions, are significantly associated with venture capital investment activity. This is consistent with the results of Cherif and Gazdar (2011) who examined the determinants of institutional venture capital investment using the index of economic freedom as an indicator of institutional quality. The authors found that institutional environment plays an essential role in determining the investment of European venture capital. The legal environment strongly influences the size and liquidity of a country's capital market and local firms' ability to receive outside funding (La Porte et al., 1997 and 1998). Glaeser et al. (2001) and Djankov et al. (2003, 2005) suggested that parties in common law countries find it easier to enforce their rights from the commercial contract. Cumming et al., (2006) found that the quality of a country's legal structures is even more strongly connected to facilitating VC backed IPO exits than the size of a country's stock market. The authors found that differences in legal origin and accounting standards across countries have a significant impact on the governance of investment in the VC market.

We estimated the factors that determine SME owners/managers' likelihood of obtaining VC funding. Our results show that gender, experience, geographical location, business plan, social networking and interest rate charge have a significant influence on SMEs obtaining venture capital funding. Whereas SME owner-managers' age, marital status, educational attainment, firm size, firm age, legal status, and sector have no significant influence on SMEs obtaining venture capital funding.

The findings show that the variable gender is associated with accessibility to venture capital financing which is consistent with similar findings of Coleman and Robb (2012), Verhuel & Thurik (2001), Green et al. (2000) and Carter and Rosa (1998). Similarly, studies by Bennet and Dann (2000), Chaganti et al. (1995) and Haynes & Haynes (1999) show that female SME owners/managers prefer to use internal financing rather than external equity compared to male SME owners/managers. This implies that women-led businesses are less likely to access VC funding than men-led businesses.

Furthermore, the finding shows that there is an association between entrepreneurs' experience and access to venture capital financing. This result is consistent with past studies that revealed a correlation between the experience of entrepreneurs and access to external financing (Gompers et al., 2006; Kaplan and Stromberg, 2004; Hsu, 2007). This may probably be because there are significant differences between experienced entrepreneurs' access to financing compared to novice entrepreneurs (Gompers et al., 2006). Experienced entrepreneurs received venture capital funding at an earlier stage of their company's growth. A study by Kaplan and Stromberg (2004) noted that the contractual provisions of venture capital financing contracts showed that experienced entrepreneurs received more favourable terms than novice entrepreneurs. Further, Hsu (2007) investigated 149 early stage start-up firms and found that

entrepreneurs' past firm-founding experience increased both the likelihood of obtaining VC investments through a direct connection and the valuation of the start-up by VCIs.

Our findings also show a strong association between the entrepreneurs' geographical location and access to VC funding. SMEs that are located close to venture capital firms have a higher likelihood of obtaining venture capital (Sorensen and Stuart, 2001). Ahmed and Hamid (2011) also found that firms located in metropolitan cities have a higher probability of obtaining finance compared to firms located in rural areas.

The results also revealed that there is an association between an entrepreneur's business plan and his or her ability to obtain venture capital financing. Our result is consistent with the findings of Delmar and Shane (2003) who found a positive correlation between VC funding outcomes and business planning. This is probably because business plans assist in validating entrepreneurs' businesses and reduce the possibility of failure. According to the authors, business plans assist founders to make decisions, hasten new product development and reduce the likelihood of business failure. Thus, business plan activity reduces the risks of dissolution of the start-up, while it has a positive effect on product development (Delmar and Shane, 2004).

Our findings also indicate an association between SME owner-managers' social networking and venture capital accessibility. Our result is consistent with numerous empirical studies that show that VCs tend to invest in firms where they know the entrepreneur directly or indirectly (Fried and Hisrich,1994; Shane &Stuart, 2002; Starr & MacMillan, 1990). This may be because venture capital investors receive so many business applications for funding, and social networks play a significant role in influencing which applications will receive favourable venture capital funding (Fried and Hirsch,1994). As noted by Shane and Stuart (2002) entrepreneurs with social capital involving pre-existing direct or indirect associations with

venture capital investors have a higher likelihood of receiving funding at the start-up stage of their business.

Lastly, our results show a significant association between lending interest rate charge and SME owner-managers' ability to obtain VC funding. Our result is consistent with the findings of Romain and La Potterie (2004) who found a significant correlation between long-term interest rate and private equity in 16 OECD countries. Our result is consistent with the findings of Bawuah et al., (2014) who established that the majority of SMEs resort to the use of equity financing for their operation due to the high-interest rate. Further, our results indicate that there is a strong correlation between interest rate and venture capital investment activity. This confirms Gompers and Lerner's (1998) suggestion that the interest rate is likely to affect the supply of and demand for venture capital funds. If the interest rate rises, venture capitalists' attraction towards investment in venture capital funds deteriorates and this therefore will decrease their willingness to supply venture capital funds.

However, the results of our study show that the age of the owner, marital status, education, firm *age*, firm size, and *sector* did not have any significant effect on SMEs' access to venture capital financing. This contradicts the findings from past literature which indicate a correlation between entrepreneurs' education and their ability to obtain external financing (Becker 1964, Bates 1990, Robinson & Sexton 1994, Cressey 1996, Chandler & Hanks, 1998, Baum & Silverman, 2004). It is also inconsistent with the conclusion of MacMillan et al., (1985) who indicated that the entrepreneur's qualities eventually influence the investment decision, especially a thorough familiarity with the industry/market, leadership capability and ability to assess and manage risks.

There are several possible reasons for these contradictory results. For example, many SME owners/managers are older people who are less likely to access external financing than younger

SME owners/managers (Vos et al., 2007). Similarly, many of the SME owners/managers are married and are less risk tolerant (Hortog et al., 2000). Further, many of the SME owners/managers in Ghana have a low level of education and skill training (Aryeetety et al.1994) and are less likely to obtain external financing. Lastly, many of the SMEs are in the wholesale/retail and service sector with a weak assets structure and are therefore less likely to obtain external financing (Abor,2007).

5.3 Implications of the Findings

The findings of this study have significant ramifications for researchers or academia, entrepreneurs, and policymakers. Firstly, for researchers or academia, the findings will assist them to gain better knowledge about factors that underpin VC financing decisions and will be of benefit regarding understanding of their impact on small businesses. The findings of this study showed that SMEs which receive VC financing experience better performance regarding sales and employment growth as suggested by Alemany & Marti (2005) and Peneder (2010). This is probably because, in addition to the VC funds they also receive value added services such as technical expertise, networks and marketing/management support from venture capitalists (Gompers and Lerner, 1989). The value-added services in addition to the funds VC-backed SMEs received create synergies on their business performance in terms of increase in sales revenue and growth in employment.

Secondly, for entrepreneurs, the findings indicate that potential entrepreneurs could take advantage of the venture capital to explore innovative ideas and make business proposals to seek funding from venture capitalists in order to build ventures and thus turn their innovative ideas to marketable products and services. Further, our finding reveals that potential entrepreneurs need to consider the geographical location when establishing their businesses,

since the findings of our study showed that venture capitalists are likely to invest in businesses that are close in proximity to where they are located so that they can monitor their operations.

Thirdly, for policymakers, it proposes the need for a better macroeconomic and institutional environment to be created through the formulation and implementation of suitable policies and a regulatory framework, such as increasing GDP growth, and promoting the protection of property rights to facilitate the development of a dynamic venture industry, in order to promote the growth of the SME sector in Ghana. Both entrepreneurs and government stand to benefit from long-term enterprise growth if better-co-ordinated support is offered to the SME sector. This is because the sector will be able to generate more jobs and create wealth and thereby improve government revenues by way of taxes (Agyapong, 2010).

Fourthly, educational programmes through the media both print and electronic and other outreach programmes should be organized to educate and inform potential SME owners about the use of venture capital funding as an alternative source of finance. This will offer accurate and updated information about venture capital financing to potential SME owners who intend to or in future want to obtain venture capital funding to manage their businesses.

Further, the venture capital centres must be decentralized in all the regions and districts in Ghana to make them accessible to potential SME owners to ease the burden and cost of coming all the way to the capital city to access funding from the VCFS. Our results showed that location of a business entity influences its ability to obtain venture capital funding. Sorensen and Stuart (2010) suggested that VCs are willing to provide venture capital funds to businesses that are closer to their sites in order to supervise or monitor their activities. This study perceived that most SMEs in Ghana are not able to access venture capital funding because of their remoteness from venture capital firms. Indeed, the majority of SMEs in Ghana are in the rural areas, hence

by decentralizing the venture capital financing scheme in Ghana, these rural SMEs can access these VC fund managers.

Lastly, policymakers should institute gender-sensitive programmes that encourage more women to use venture capital to finance their business operations since women are in the majority within the SME sector. The government should offer special incentives to women-led businesses by giving them some percentage holdings in venture capital funding programmes. For instance, in a government venture capital support programme, it may be decided to reserve 15% -20% of funds solely for women-led businesses to access to develop their businesses. The government can also provide tax incentives for Venture Capitalists who invest their funds in women-led businesses. Also, through technical and managerial training and education, more women would come to understand and appreciate the use of venture capital to improve and grow their businesses.

5.4 Research Limitations

This study has some limitations with regard to the scope of the study, data and estimation techniques. The scope of the study is limited to only one region in Ghana, even though data used in this study is obtained from SMEs covering different areas within the region. Hence one should exercise caution when interpreting our findings and should confine them to our study sample.

The data and information collected for the study were restricted to SMEs in the urban areas of Accra and Tema, as well as to SMEs who applied for venture capital funding at the time of the survey since the majority of the SMEs under study are in the urban centres. SMEs who applied for venture capital financing, but were denied or rejected were also not included in our model

due to inadequate information. The findings, therefore, are limited to SMEs in the urban cities which received venture capital funding.

Further, our study suffers from a sample distribution problem, which is caused by the availability of data. It is not surprising that a study of this nature on a topic such as the impact of venture capital financing on SMEs' growth and development in a developing country like Ghana could pose such a problem. Even though it is ideal to have a balanced sample distribution, our sample size was unbalanced regarding the matched treatment group of 65 VC-backed SMEs as comparable to the control group of 320 Non-VC backed SMEs. This is because many of our VC backed SMEs are unwilling to share primary information, especially about disclosure of financial information. Nevertheless, Smith (1997) gives an example where matching is more efficient than multiple regression when the treated group, i.e., N_1 (39) is much smaller than the control group, i.e., N_0 (5053). The author argued that the ultimate goal of matching in observation data is to come up with a control group that has a zero comparison group bias, not just similar numbers across the control group and treated groups.

The researcher combined PSM and DiD estimation methods to determine the effect of venture capital financing on SMEs' growth. PSM is used to match all programme participants with non-participants with the identical likelihood of participating in the programme based on observable characteristics (see Dehejia & Wahba 2002; Baker 2000; Rosenbaum and Rubin 1983). The possibility of adopting this matching method originates from the approximation of propensity score (participation probability), which is responsive to specifications assumed (Dehejia and Wahba, 2002). Thus, impact assessment may be inconsistent due to different specifications used for the propensity score. Nonetheless, PSM-DiD offers the best alternative to deal with the issues of selection bias and endogeneity in a non-experimental study of this nature.

The researcher compared the treatment and control groups for the impact evaluation and used the outcomes (such as Sales and Employment growth) of the control group to approximate the counterfactual outcomes of venture capital for non-programme participants. In a situation where the control group does not offer a precise comparison group to the treatment group, the trustworthiness of the impact estimation results will be diminished, mostly in models, which use cross-sectional data.

Furthermore, the estimated outcomes such as sales and employment growth are likely to be affected by unforeseen circumstances such as fire outbreaks, flooding or burglary (business disruptions). This might lessen the accuracy of our impact estimations. As such, this research does not consider the influence of business disruptions on venture capital funding on SMEs' growth. This is a result of a lack of data linked to a business disruption in both the before and after-programme periods during our survey. Again, the study only demonstrates a significant impact of venture capital funding on SMEs' growth in a cross-sectional model, while the long-term effect is not included because many of the SMEs are young. Hence, a longitudinal data analysis of our study may show different results.

Finally, due to lack of financial resources and time constraints, the study could not be carried out in the whole of the country, but was limited to the Greater Accra region of Ghana.

5.5 Recommendations for Future Research

We recommend that future investigation can be conducted by using a dynamic panel dataset estimation technique to evaluate the long-term effect of venture capital financing on SMEs' growth. The use of dynamic panel data analysis will significantly improve the estimation results of the impact of venture capital financing on SMEs' development in future studies. A

dynamic panel data analysis will be able to capture accurately the dynamics of SMEs' performance before and after receiving venture capital financing. This is because the dynamic panel data method can capture the dynamic effects on SMEs' performance prior to and after the policy intervention, such as the variation in SMEs' performance after receiving venture capital funding (Blundell and Bond, 1998; Arellano and Bond, 1991).

Future research can also be conducted based on a case study to assess the impact of the venture capital market on Ghana's economy. This is because, through case studies, much detailed information can be collected which other research designs would not easily obtain. Thus, the study on the impact of the venture capital market on Ghana's economy will increase the validity and reliability of the findings.

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Appendices

Appendix -A

Sample Size Calculation

The study sample size is determined by the Cochran (2007) formula used in most primary data collections:

Formula is:

$$n = \frac{Z^2 pq}{e^2}$$

Where:

n is sample size

Z^2 is the abscissa of the normal curve that cut off an area at the tail

e is the desired level of precision

p is the estimated proportion of an attribute that is present in the population

q is 1-p

This study chooses a level of confidence at 95% (or $\pm 5\%$ precision) and assumes $p = 0.5$, $q = 0.5$. Therefore, according to the above formula, the total sample size will be 385 SME owners/managers. The study distributed questionnaires to 600 respondents to obtain sufficient and completed responses for the analysis.

Appendix -B

Questionnaire

Code No. _____

An empirical analysis of Venture Capital Financing on SMEs Growth and Development in Ghana.

Instructions: For each question with boxes provided, please tick your answer(s); otherwise, please follow the instructions given to answer the questions. Only summary measures and conclusions from this survey will be reported. **There are 5 sections, you only need to answer the relevant parts, please follow the guidelines.** Your participation is voluntary, and all of your answers will be kept confidential.

Section 1.

This section asks all respondents about their sources of credit in general

Q1 What is the main problem confronting your business over the past 2 years? (You may choose more than one)

- Finding customers (1)
- Competition (2)
- Cost of production and/or labour (3)
- Access to finance (4)
- Non-availability of skilled staff or experience personnel (5)
- Government regulation (6)
- Electricity supply (7)
- Others (please specify) _____(8)

Q2 Did you have any difficulty in obtaining loans in the last 2 years?

- Yes (1)
- No (2)

Q3 If No in Q2, why not? (You may tick more than one)

- Enough Savings/Have other source of funds (1)
- Get direct government assistance (2)
- Afraid to borrow (3)
- Have personal inheritance (4)
- Do not qualify (5)
- Information processing is time consuming and difficult (6)
- Do not need to borrow (7)
- Others, (please specify) _____ (8)

Q4 If yes in Q2, what are the reason(s)? (You may tick more than one)

- Scared of high interest rate (1)
- Do not have adequate documents (2)
- Do not have adequate collateral (3)
- Do not have relations with credit officials (4)
- Business performance was not good (5)
- Unstable income repayment (6)
- Others (please specify) _____ (7)

Q5 Which source(s) of credit did you obtain? (You may tick more than one)

Formal finance		Informal finance	
Commercial banks		Private money lenders	
Rural banks		Friends/relatives	
Development bank		Trade creditors	
Micro finance institutions			
Credit Unions			
Government support schemes			
Financial services NGOs			
Others			

Q6. What was the percentage share from each source? (The sum of these sources of financing add up to 100%)

Formal finance		Informal finance	
Commercial banks		Private money lenders	
Rural banks		Friends/relatives	
Development banks		Trade creditors	
Micro finance institutions			
Credit Unions			
Government support schemes			
Financial services NGOs			
Others			

Q7 Did any of your loans in question Q6 require collateral(s)?

- Yes (1)
- No (2)

Q8 If Yes, what type of collateral(s)? (You can tick more than one)

- Land title certificate (1)
- Housing (2)
- Equipment capital (3)
- Personal belongings (such as (car, gold, stocks, etc.) (4)
- Others, (please specify) _____ (5)

Q9 Please circle the number (from 1 to 5) best describing the extent to which your business has utilized personalities, networks, and connections in 2015 operation where 1 indicates "very little" and 5 indicates "Very extensive" NA means Not Applicable.

	Very little		Average	Very extensive	NA
Commercial bank officials					
Rural bank officials					
Government officials					
Suppliers (e.g. input suppliers, material suppliers)					
Customers					
Social Organization or NGOs					
Business Associates					
Others					

SECTION 1(PART II)

Accessibility to Credit in 2015
--

Q10 Did you borrow any loan in 2015?

- Yes (1)
- No (2)

Q11 If yes, how many credit suppliers did you approach during 2015?

- 1-2 (1)
- 3-4 (2)
- 5-6 (3)
- More than 7 (4)
- Others (please specify) _____

Q12 What percentage of your loan applications were successful during 2015?

- Above 80% (1)
- 60%-80% (2)
- 40%-60% (3)
- 20%-40% (4)
- Less than 20% (5)
- Others (please specify) _____ (6)

Q13 What was the total amount of your loan(s) in 2015? _____

Q14 What was the purpose(s) of your loan? (You may choose more than one)

- As start-up capital (1)
- Working capital, cash flow (2)
- Purchase equipment/vehicles (3)
- Buying land/building (4)

- Improve building (5)
- Research and development (6)
- Business expansion/growth (7)
- Training/Staff development (8)
- Others (please specify) _____ (9)

Q15 How many percent did the loan(s) meet your capital needs?

- Above 80% (1)
- 60%-80% (2)
- 40%-60% (3)
- 20%-40% (4)
- Less than 20% (5)
- Others (please specify) _____ (6)

Q16 Which types of formal or/and informal finance(s) did you borrow from in 2015? (You can tick more than one)

Formal finance		Informal finance	
Commercial banks		Private money lenders	
Rural banks		Friends/relatives	
Development banks		Trade creditors	
Micro finance institutions			
Credit Unions			
Government support schemes			
Financial services NGOs			
Others			

Q17 What was the interest rate you paid for the loan in 2015? _____ (Per year)

Q18 What type of ownership would you consider your business?

- Household business establishment (1)
- Private (sole proprietorship) (2)
- Collective/Cooperative (3)
- Limited liability company (4)
- Joint stock company with state capital (5)
- Joint stock company without state capital (6)
- Joint venture with foreign capital (7)

Q19 What was your main business activity in 2015?

- Agriculture (1)
- Industry (2)
- Services (3)
- Trade (4)
- Others (please specify) _____ (5)

Q20 Given a choice, which type of borrowing would you prefer?

- Formal lenders (1)
- Informal lenders (2)

Q21 How would you rate your access to credit in the last 2 years?

- Difficult (1)
- Neutral (2)
- Easy (3)
- Uncertain (4)

Q22 The following factors are important to” my business in choosing creditors”; please circle the suitable number from 1 to 5 where 1 indicates “strongly disagree” and 5 indicates “strongly agree”.
 Strongly disagree Neutral Strongly agree

	Strongly disagree		Neutral		Strongly agree
No collateral					
Lower interest rate					
Immediate loan release/faster processing					
Having a borrowing relationship with the creditor					
No/less complicated lending procedure					
Better lending terms					
Others (please specify)					

Q23 Did you apply for venture capital financing in the last 2 years?

- Yes (1)
- No (2)

SECTION 2.

This section is for all respondents who use Venture capital in their business

Q1 How did you get to know about venture capital financing? (You may choose more than one).

- Newspaper publication (1)
- Radio (2)
- Internet (3)
- Business Associates (4)
- Government Agencies (5)
- Others, (please specify) _____ (6)

Q2 Did you get approval for your venture capital application from the venture capitalists?

- Yes (1)
- No (2)

Q3 If No in Q.2, what were the reasons your application for venture capital was rejected? (You can choose more than one)

- No credit history (1)
- Inadequate financial records (2)
- Lack of quality management team (3)
- Poor business plan (4)
- No links with government officials (5)
- Others, (please specify) _____ (6)

Q4 If yes in Q.2 do you think any of the following factor(s) played a role in securing the venture capital financing for your business? (You may tick more than one)

- Economic outlook (1)
- Quality of business plan (2)
- Quality of management team (3)
- Work experience (4)
- Prospect of the business (5)

- Quality of products/services (6)
- Others (please specify) _____ (7)

Q5 How long did it take you to access venture capital financing for your business?

- less than 1 year (1)
- 1-2years (2)
- 2-3years (3)
- 3-4years (4)
- Others (please specify) _____ (5)

Q6 What was the estimated amount that your business was able to raise from the venture capital firm? _____

Q7 How many percent did the funds raised (s) meet your capital needs?

- Above 80% (1)
- 60%-80% (2)
- 40%-60% (3)
- 20%-40% (4)
- Less than 20% (5)
- Others (please specify) _____ (6)

Q8 At what stage was venture capital first used in your business?

- Seed (1)
- Start-up (2)
- Early Stage (3)
- Later Stage (4)
- Maturity Stage (5)
- Others (please specify) _____ (6)

Q9 How many times did you apply for venture capital financing for your business?

- Once (1)
- Twice (2)
- Thrice (3)
- Four times (4)
- Others (please specify) _____ (5)

Q10 How far is your business location from where you sourced the Venture Capital institution?

- 1-5 kilometers (1)
- 6-10 kilometers (2)
- 11-15 kilometers (3)
- 16-20 kilometers (4)
- More than 20 kilometers (5)
- Others (please specify) _____ (6)

Q11 Did you receive any form assistance from any person(s) in accessing venture capital financing for your business? (You may choose more than one)

- Friends (1)
- Relatives or Family members (2)
- Business Associates or Partners (3)
- Government Officials (4)
- Social Organization/NGOs (5)
- Others, (please specify) _____ (6)

Q12 It is much easier to access venture capital financing for your firm or business than other financing such as bank loans, from money lenders and trade credit.

- I strongly agree (1)
- I agree (2)
- I disagree (3)
- I strongly disagree (4)

Q13 In what way(s), has the infusion of venture capital financing affected your business growth?

- Increased (1)
- Decreased (2)
- Stagnated (3)
- I don't know (4)

Q14 The infusion of venture capital financing has contributed to the improvement in your business growth in what ways? (You may choose more than one).

- Value added service (1)
- Quality of management (2)
- Oversight over financial management (3)
- Change in marketing strategy (4)
- Improved innovation and product quality (5)
- Others, (please specify) _____ (6)

Q15 How would you describe the effect of venture capital financing on your profit margin?

- Increased (1)
- Decreased (2)
- Stagnated (3)
- I don't know (4)

Q16 How would you describe the effect of venture capital financing on your annual sales?

- Increased (1)
- Decreased (2)
- Stagnated (3)
- I don't know (4)

Q17 How would you describe the effect of venture capital financing on your total assets?

- Increased (1)
- Decreased (2)

- Stagnated (3)
- I don't know (4)

Q18 How would you describe the effect of venture capital financing on the number of employees?

- Increased (1)
- Decreased (2)
- Stagnated (3)
- I don't know (4)

Q19 What were your estimated amounts of annual sales, revenue and profit margin as well as the workforce between 2014 and 2015?

	Before Venture Capital (2014)		After Venture Capital (2015)	
Annual Sales (\$)				
Total revenue (\$)				
Profit Margin (%) approximate				
Full time workers				
Part time workers				
Permanent workers				
Temporary workers				

Q20 What was the estimated value of total assets for the business between 2014 and 2015?

	Before Venture Capital (2014)		After Venture Capital (2015)	
Building (\$)				
Machinery & Equipment (\$)				
Furniture and Office Equipment (\$)				
Commercial Vehicles (lorries, vans, cars, etc.)				

Q21 How would you rank the following factors/ conditions which determine venture capital investments activity? 1= strongly agree 2=partially agree 3=moderately agree
4= partially disagree 5=strongly disagree

Q22 In your opinion, what role can policy makers play in addressing the challenges and/or obstacles your business faces in accessing venture capital financing? (you may tick more than one)

- Government must improve macro-economic environment (1)
- Legal and regulatory framework must be improved (2)
- Ensure a vibrant stock market (3)
- Discourage bribery and corruption (4)
- Education and training for skilled professionals (5)
- Provide more financial resources (6)
- Tax incentives (7)
- Others (please specify) _____ (8)

Q23 In your opinion, what is/are the challenge(s) and/or obstacle(s) facing your business in accessing venture capital financing? (You may tick more than one)

	1	2			3	4	5	
Gross domestic product (GDP %)								
Interest rate (%)								
Unemployment rate (%)								
Size and liquidity of the stock market (\$)								
Labour market rigidity								
Taxation (capital gains tax)								
Research and Development Expenditure								
Bribery and Corruption								
Protection of property rights								
Rule of law								
Political Stability								
Human Capital Development								

- Lack of good corporate governance practice (1)
- Weak stock market (2)
- Unstable macro-economic environment (3)
- Bureaucracy (4)
- Lack of expertise or Service professionals (5)
- Bribery and Corruption (6)
- Weak legal and regulatory framework (7)

- Lack of tax incentives (8)
- Lack of general public knowledge about the venture capital industry (9)
- Inadequate finance or limited sources of capital (10)
- Inadequate exit options (11)
- Others, (please specify) _____ (12)

Q24 How would you rate the performance of the venture capital industry currently?

- Excellent (1)
- Very good (2)
- Average (3)
- Good (4)
- Poor (5)

This section is for all respondents who DO NOT use venture capital in their business

SECTION 3

Q1 Why did you not apply for venture capital financing for your business?

- Have adequate funds (1)
- Fear of losing control rights/ownership right (2)
- Due to complex application process (3)
- Due to lack of information about venture capital financing (4)
- Due to strict legal requirements (5)
- Others (please specify) _____ (6)

Q2 What is your preferred source of credit? (You may choose more than one)

- Bank loan/Overdraft (1)
- Borrow from friends/relatives (2)
- Trade credit from business partners or suppliers (3)

- Private money lenders (4)
- Leasing/factoring (5)
- Others,(please specify) _____ (6)

Q3 Why do you prefer that source of credit to venture capital for your business?

- It is easy to acquire (1)
- The risk is less as compared to venture capital (2)
- To avoid interference in the running of the business (3)
- The process is complex (4)
- Others, (please specify) _____ (5)

Q4 How long does it take you to access credit from your source?

- 1-2 weeks (1)
- 3-4 weeks (2)
- 5-6 weeks (3)
- 7-8 weeks (4)
- Others (please specify) _____ (5)

Q5 What was the main source of capital when starting your business?

- Personal savings (1)
- Friends and family members (2)
- Commercial bank loan (3)
- Private money lenders (4)
- Micro-finance institutions (5)
- Social Organizations/NGOs (6)
- Others (please specify) _____ (7)

Q6 What percentage of credit you requested did you receive?

- 100% (1)
- 80-90% (2)
- 50-70% (3)

- Less than 50% (4)
- 20-30% (5)
- Others, (please specify) _____ (6)

Q7 How many times did you apply for the credit facility?

- Once (1)
- Twice (2)
- Thrice (3)
- Four times (4)
- Five times (5)
- Others (please specify) _____ (6)

Q8 What were the estimated amounts of your business annual sales, total revenue and profit margin as well as number of workforce between 2014 and 2015?

	(2014)		(2015)	
Annual Sales (\$)				
Total revenue (\$)				
Profit Margin (%) approximate				
Full time workers				
Part time workers				
Permanent workers				
Temporary workers				

Q9 What is the estimated value of assets for your business between 2014 and 2015?

Assets	(2014)		(2015)	
Building (\$)				
Machinery & Equipment (\$)				
Furniture and Office Equipment (\$)				
Commercial Vehicles (lorries, vans, cars, etc.)				

Q10 How would you describe the growth of your business?

- Increased (1)
- Decreased (2)
- Stagnated (3)
- I don't know (4)

Q11 How would you describe your profit margin in 2015 as compared to 2014?

- Increased (1)
- Decreased (2)
- Stagnated (3)
- I don't know (4)

Q12 How would you describe your total asset in 2015 as compared to 2014?

- Increased (1)
- Decreased (2)
- Stagnated (3)
- I don't know (4)

Q13 How would you describe the number of persons employed in 2015 as compared to 2014?

- Increased (1)
- Decreased (2)
- Stagnated (3)
- I don't know (4)

Q14 In future, would you consider venture capital infusion as an option in your business?

- Yes (1)
- No (2)
- I don't know (3)

SECTION 4.

Characteristics of business (For all Respondents)
--

Q1 What type of ownership would you consider your business?

- Household business establishment (1)
- Private(sole proprietorship) (2)
- Co-operative Society (3)
- Limited liability company (4)
- Joint Stock Company with State capital (5)
- Joint Stock Company without State capital (6)
- Joint Stock Company with foreign capital (7)
- State Enterprise (8)
- Others, (please specify) _____ (9)

Q2 How long have you been operating your business?

- Less than 1 year (1)
- 1-2 years (2)
- 3-4 years (3)
- 5-6 years (4)

- More than 6 years (5)
- Others, (please specify) _____ (6)

Q3 Where is your business located?

- Accra Metropolis (1)
- Tema Metropolis (2)
- Suburb of Accra (3)
- Rural district in Accra (4)
- Others,(please specify) _____ (5)

Q4 Is your business a registered company?

- Yes (1)
- No (2)

Q5 If you answered No in Q4, why is your business not registered?

- Registration process is too cumbersome (1)
- High cost of registration fees (2)
- To avoid payment of taxes (3)
- Do not know how to go about registration process (4)
- It takes too long to get business registered (5)
- Others (please specify) _____ (6)

Q6 If yes, when was the business incorporated.....

Q7 What type of business activity are you engaged in?

- Wood, furniture and other wood products (1)
- Chemicals, pharmaceutical and health products (2)
- Food products and beverages (3)
- Foot-wear, textiles, jewelry and wearing apparel (4)
- Books and stationery (5)
- Fabricated metals products and machinery (6)
- Others (please specify) (7)

Q8 What sector or industry is your business operating in?

- Manufacturing/Construction (1)
- Wholesale or retail trade (2)
- Agricultural/Forestry/fishing (3)
- Services (4)
- Merchandising (5)
- Others (please specify) _____ (6)

Q9 How would you classify your business?

- Micro enterprise (1)
- Small sized enterprise (2)
- Medium sized enterprise (3)
- Large enterprise (4)

Q10 What was the total number of employees in your business in 2015?

- 1-5 persons (1)
- 6-9 persons (2)
- 10-29 persons (3)
- 30-99 persons (4)
- 100-150 persons (5)
- Others, (please specify) _____ (6)

Q11 Compared to 2014, what was the status of your business's total sales revenue in 2015?

- Increased (1)
- Decreased (2)
- Stagnated (3)
- I don't know (4)

Q12 Compared to 2014, what was the estimated value of the total assets of your business in 2015?

- \$10,000 (1)
- \$100,000 (2)
- \$1,000,000 (3)
- More than \$1,000,000 (4)
- Others, (please specify) _____ (5)

Q13 Compared to 2014, what was the estimated profit margin of your business in 2015?

- \$5,000-\$9,000 (1)
- \$10,000-\$14,000 (2)
- \$15,000-\$19,000 (3)
- \$20,000-\$29,000 (4)
- \$30,000-\$49,000 (5)
- Others (please specify) _____ (6)

Q14 Compared to 2014, what were your business total sales in 2015?

- \$20,000-\$50,000 (1)
- \$100,00-\$99,999 (2)
- \$1,000,000-\$1,999,999 (3)
- \$2,000,000-\$2,999,999 (4)
- Others (please specify) _____ (5)

SECTION 5.

Socio-demographics characteristics (For all Respondents)

Q1 Your gender?

- Male (1)
- Female (2)

Q2 Your age group?

- 25 years (1)
- 30 years (2)
- 31-39 years (3)
- 40-49 years (4)
- 50-59 years (5)
- Others (please specify) _____ (6)

Q3 Your marital status?

- Single/Never married (1)
- Married (2)
- De facto relationship (3)
- Divorced (4)

Q4 Your educational level?

- No formal education (1)
- Primary School (2)
- Junior High Scholl (3)
- Senior High School (4)
- Technical/ Vocational School (5)
- Diploma (6)
- Bachelor degree (7)
- Post-graduate(Master/PhD (8)
- Others (please specify) _____ (9)

Q5 What is your ethnicity?

- African (1)
- Asian (2)
- White/European (3)
- Arabian (4)
- Latino (5)
- Others (please specify) _____ (6)

Q6 What is your current position in the business?

- Owner/Manager/CEO (1)
- Chief finance officer (2)
- Marketing officer (3)
- Chief Accountant (4)
- Human Resource manager (5)
- Others (please specify) _____ (6)

Q7 How long have you been in your current position?

- Less than 1 year (1)
- 1-2 years (2)
- 2-3 years (3)
- 4-5 years (4)
- 6-7 years (5)
- Others (please specify) _____ (6)

Q8 How many members are there in your household? _____

Q9 How many income earners are there in your household _____ Persons)

Q10 Is your business the main source of income for your household?

- Yes (1)
- No (2)

Q11 If No, what is the main source of your household income?

- Salary from paid jobs (1)
- Pension (2)
- Other members' business (3)
- Returns from investments (e.g. Property, Stocks, Bonds, Gold, etc.) (4)
- Others (please specify) _____ (5)

Q12 What is your annual income?

- \$12,000 (1)
- \$15,000 (2)
- \$20,000 (3)
- \$25,000 (4)
- \$50,000 (5)
- More than \$50,000 (6)
- Others (please specify) _____ (7)

Q13 Have you taken any of the following professional training courses? (You can tick more than one)

- Business management skills (1)
- Leadership skills (2)
- Accounting and/or financial management (3)
- Human resource management (4)
- Marketing (5)
- Company and tax law (6)
- Others (please specify) _____ (7)

Your participation in this survey is greatly appreciated. Thank you for your time and if you have further comments about Venture Capital Financing SMEs, please feel free to comment in the space provided below. Once again, we assure you that your identity will remain STRICTLY CONFIDENTIAL.

Appendix-C

C1. Results of Propensity Score Estimation and Region of common support.

Estimation of the propensity score

```
Iteration 0: log likelihood = -174.80079
Iteration 1: log likelihood = -127.21391
Iteration 2: log likelihood = -117.19957
Iteration 3: log likelihood = -115.69341
Iteration 4: log likelihood = -115.59403
Iteration 5: log likelihood = -115.59337
Iteration 6: log likelihood = -115.59337
```

```
Logistic regression          Number of obs =      385
                             LR chi2(12)  =     118.41
                             Prob > chi2   =      0.0000
Log likelihood = -115.59337   Pseudo R2    =      0.3387
```

Treatment	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
Gender	-.8985429	.5228816	-1.72	0.086	-1.923372	.1262861
Age	.4795455	.2798241	1.71	0.087	-.0688996	1.027991
MaritalSta~s	-.5572087	.4465129	-1.25	0.212	-1.432358	.3179404
Education	.4922107	.4170498	1.18	0.238	-.3251919	1.309613
Experience	.3170132	.4167145	0.76	0.447	-.4997322	1.133759
Income	.8609693	.1876839	4.59	0.000	.4931156	1.228823
LegalStatus	2.430341	.5839555	4.16	0.000	1.28581	3.574873
FirmAge	.1291241	.3932986	0.33	0.743	-.6417269	.8999752
FirmSize	.2939372	.3843375	0.76	0.444	-.4593504	1.047225
Sector	.2003227	.1848419	1.08	0.278	-.1619608	.5626062
annuals~2013	2.24e-07	1.40e-07	1.60	0.109	-5.00e-08	4.97e-07
NoofEmp~2013	.0274642	.0229396	1.20	0.231	-.0174965	.0724249
_cons	-10.96319	1.976734	-5.55	0.000	-14.83752	-7.088867

Note: the common support option has been selected
The region of common support is [.02401465, .92121572]

Description of the estimated propensity score
in region of common support

Estimated propensity score

	Percentiles	Smallest		
1%	.0249508	.0240147		
5%	.0324031	.0241127		
10%	.0391975	.0249508	Obs	249
25%	.0765023	.0261671	Sum of Wgt.	249
50%	.1737111		Mean	.2558158
		Largest	Std. Dev.	.2246263
75%	.3825963	.8657154		
90%	.6092909	.889792	Variance	.050457
95%	.7040301	.8962067	Skewness	1.036887
99%	.889792	.9212157	Kurtosis	3.089236

Step 1: Identification of the optimal number of blocks
Use option detail if you want more detailed output

The final number of blocks is 5

This number of blocks ensures that the mean propensity score
is not different for treated and controls in each blocks

This table shows the inferior bound, the number of treated and the number of controls for each block

Inferior of block of pscore	Treatment		Total
	0	1	
.0240147	119	14	133
.2	43	12	55
.4	14	20	34
.6	7	14	21
.8	1	5	6
Total	184	65	249

Note: the common support option has been selected

End of the algorithm to estimate the pscore

C2-Quality matching -Balancing tests

```
. pstest Gender Age MaritalStatus Education Experience Income LegalStatus FirmAge FirmSize Sector annualsales2013 NoofEmployees2013, _treated(
> Treatment) both
```

Variable	Unmatched Matched	Mean		%reduct		t-test		V(T)/ V(C)
		Treated	Control	%bias	bias	t	p> t	
Gender	U	.10769	.34375	-58.7		-3.83	0.000	.
	M	.10769	.21538	-26.8	54.4	-1.67	0.097	.
Age	U	3.3385	3.0313	47.8		3.43	0.001	0.86
	M	3.3385	3.1538	28.7	39.9	1.58	0.117	0.76
MaritalStatus	U	1.7538	1.7625	-2.0		-0.15	0.882	1.04
	M	1.7538	1.7077	10.7	-433.3	0.59	0.557	0.90
Education	U	2.8923	2.7813	25.6		1.71	0.087	0.52*
	M	2.8923	2.7846	24.9	3.0	1.38	0.169	0.49*
Experience	U	3.2	2.9281	47.3		3.54	0.000	1.12
	M	3.2	3.0769	21.4	54.7	1.30	0.194	1.53
Income	U	3.5077	2.5969	97.3		7.24	0.000	1.08
	M	3.5077	3.5231	-1.6	98.3	-0.09	0.930	0.85
LegalStatus	U	1	.56563	116.5		6.64	0.000	0.00*
	M	1	1.1077	-28.9	75.2	-2.78	0.006	0.00*
FirmAge	U	3	2.6625	57.8		4.27	0.000	1.02
	M	3	2.9385	10.5	81.8	0.65	0.519	1.40
FirmSize	U	1.5077	1.2688	50.3		3.86	0.000	1.29
	M	1.5077	1.4769	6.5	87.1	0.35	0.728	1.00
Sector	U	2.6308	2.4875	14.3		1.07	0.285	1.10
	M	2.6308	2.5846	4.6	67.8	0.25	0.804	0.89
annualsales2013	U	1.3e+06	5.8e+05	57.6		4.89	0.000	2.20*
	M	1.3e+06	1.1e+06	11.1	80.8	0.57	0.570	1.27
NoofEmployees2013	U	20.108	13.497	76.7		7.10	0.000	3.50*
	M	20.108	19.708	4.6	93.9	0.22	0.825	1.21

* if variance ratio outside [0.61; 1.64] for U and [0.61; 1.64] for M

Sample	Ps R2	LR chi2	p>chi2	MeanBias	MedBias	B	R	%Var
Unmatched	0.338	118.21	0.000	54.3	54.0	170.4*	0.49*	36
Matched	0.080	13.65	0.253	15.0	10.9	65.5*	1.61	18

* if B>25%, R outside [0.5; 2]

Appendix- D

D1. Summary of diagnostics tests for Panel data analysis

Breusch-Pagan Lagrange Multiplier Test (LM) Reject/Not Reject H_0 (Not rejected)	$\text{chibar2}(01) = 84.28$ $\text{Prob} > \text{chibar2} = 0.0000$
Variance Inflation Factor for multicollinearity Reject/Not Reject H_0 (Not rejected)	Mean VIF = 3.38(<10)
Breusch-Pagan Cook-Weisberg test Reject/ Not Rejected H_0 reject at 1%	$\text{chi2}(1) = 0.15$ $\text{Prob} > \text{chi2} = 0.7002$
Wooldridge test for Serial Correlation Reject/Not Rejected H_0	$F(1, 14) = 25.236$ $\text{Prob} > F = 0.0002$

Appendix -E

G1. Description of Variables used in the Logit Regression Model

Variable Name	Variable Type	Variable Description
<i>Demographics</i>		
Gender Gender of SME owner/manager	Binary	Gender of SME owner (1=female, 0=male)
Age (years)	Continuous	Age of SME owner/manager (in years)
Married	Binary	1=Married, 0 otherwise
Education	Binary	1=Post-Secondary education, otherwise 0
Experience(years)	Continuous	Number of working experience (in years)
<i>Firm Characteristics</i>		
Firm age (years)	Continuous	Date of incorporation to survey date
Firm size (persons)	Continuous	Measured by number of employees
Location (distance)	Binary	1=urban area, otherwise 0
Ownership	Binary	1=Incorporated, otherwise 0
Sector/Industry	Continuous	Operational area of business
<i>Socio-economics</i>		
Business plan	Binary	1= Has business plan, otherwise 0
Interest rate charge (%)	Binary	1= high interest payment, otherwise 0
Networking	Continuous	Affiliated to networks such as government officials, Bankers, Investors, NGOs, etc.