Factors Influencing the Number of Current Investees for Selected Venture Capital Firms in Africa

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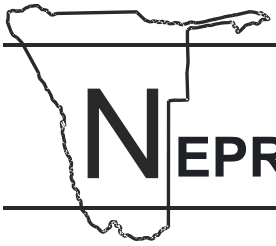

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Executive Summary

This report represents one of the first attempts to econometrically identify the factors influencing the number of current investees in venture capital firms' portfolios across Africa. It applied Ordinary Least Squares to an Analysis of Covariance model to achieve this objective using two paradigms i.e. the 'country of management' criterion, which captures the characteristics of where the venture capital firm is based and the 'country of destination' criterion, which captures the characteristics of where they invest.

Across both paradigms, there was evidence that the age of venture capital firms across Africa is related to more investees. This implies that older venture capital firms with an established reputation, more experience and a more established network of contacts, are able to attract higher deal flows and more investor financing. Also, contrary to expectation, there was evidence that venture capital firms located in Southern Africa are related to fewer investees in their portfolios. This can be attributed to the fact that relative to other regions, Southern Africa had the highest number of independent venture capital firms, which are associated with relatively higher costs than other types of venture capital firms, and a more stringent due diligence process.

Under the country of management criterion, there is evidence that venture capital firms across Africa that focus on multiple sectors are related to fewer investees, contrary to expectation. This implies that the benefit of specialisation in a single sector outweigh those of white boarding. Therefore, it can be argued that venture capitalists who decide to invest in multiple sectors need to develop the wider the skill set needed to assess and monitor a more varied pool of investees.

Also, contrary to expectation there is evidence that the number of articles published in scientific and journal articles is related to fewer investees. This implies that, in Africa, there is a dearth of seed capital to convert academic ideas into commercial ventures.

Under the country of destination criterion, there is evidence that venture capital firms located internationally are related to fewer investees. This implies that firms based on the continent benefit from a first-mover advantage. Under this paradigm, there is also evidence that a regional investment focus is associated with fewer investees due to the higher monitoring costs and more intense political pressure. Finally, there is evidence that a more conducive investment climate is related to more investees.

The findings of this report lead to several recommendations:

- Venture capital firms in Africa should invest in brand positioning and good institutional governance to build positive, long-lasting reputations.

- Venture capitalists with a regional or continent-wide focus should investigate the outsourcing of the due diligence function to firms with a wide variety of

expertise and develop a pool of highly skilled retired professionals in a wide variety of areas that they can use to monitor their investees.

- Seed capital should be channelled to converting academic ideas into commercial ventures.

- Internationally based venture capital firms should hire fund managers on the continent to also benefit from first mover advantage when seeking investees.

- Regulators should enforce investment climate frameworks to improve their investment climate because this should increase the impact of venture capital on their economies.

- A wider pool of data than is currently available should be collected on variables capturing patent applications, highest marginal tax rate, capital gains tax, financial market features, technological access and usage and political factors to determine how these investment climate components affect the impact of venture capital, measured by the number of current investees in a portfolio.

The information presented in this report should support the efforts of policymakers and practitioners in Namibia and the rest of the continent to identify best practices that can nurture and boost the effectiveness of venture capital in promoting innovation, which has positive implications for on the economy.

Table of contents

List of Tables

List of Figures

List of Equations

List of Abbreviations

ANCOVA	Analysis of Covariance
ARDC	American Research and Development Corporation
AVCA	African Venture Capital Association
BEE	Black Economic Empowerment
DEC	Digital Equipment Corporation
GDP	Gross Domestic Product
IFC	International Finance Corporation
IRR	Internal Rate of Return
OLS	Ordinary Least Squares
R&D	Research and Development
SAVCA	South African Venture Capital Association
SEC	Securities and Exchange Commission
USD	United States Dollars

1. INTRODUCTION

The need to shift towards an innovation economy to remain competitive in today's global landscape is being increasingly recognised by policymakers and the private sector (BusinessWeek, 2004). The role of the business sector in this economy is increasingly emphasised. The focus is on how to increase the number of active entrepreneurs, who will be able to increase the rate of new business formation, reduce unemployment and boost levels of economic growth and development.

In low-income countries, the vast majority of the business sector comprises of micro- or small-scale enterprises, existing alongside a few large-scale ones. In middle-income countries, medium-scale enterprises begin to account for a relatively larger share of production and employment (Hallberg, 2000). Although, Namibia is classified as a lower middle-income country, its enterprise demography is more representative of a low-income one.

In recognition of this, Namibia formulated a policy and programme on small business development in 1997. This policy identified that venture capital (also known as formative financing) was one mechanism that could be used to increase the rate of growth of existing small businesses, help the self-employed develop … businesses, reduce the rate of business failure, while increasing the rate of new business formation; and diversify the activities of the small business sector, with the aim of reducing unemployment (Republic of Namibia, 1997). Unfortunately, venture capital activity in Namibia has been minimal and where it has occurred the experience has not been favourable (Insight Namibia, 2005 & Dentlinger, 2005).

The objective of this report was to identify the factors influencing the number of current companies in venture capital firms' portfolios (investees) across Africa by applying ordinary least squares (OLS) to an analysis of covariance (ANCOVA) model consisting of one of the first datasets capturing features of venture capital firms in Africa.

This was done to highlight areas that the nascent Namibian venture capital industry may focus on to improve its chances of achieving the objectives of the policy and programme on small business development. In addition, the information presented in this report should support the efforts of policymakers and practitioners in Namibia, and the rest of the continent to identify best practices that can boost the effectiveness of venture capital in promoting innovation, which has various positive externalities on the economy.

The selection of current investees in a venture capital firm's portfolio, as an impact indictor was necessary because of data unavailability for other indicators such as the interim internal rate of return (IRR), number of exits per fund, or the firms that have raised new funds. In addition, this indicator is supported by other empirical studies (Cumming, 2004).

Furthermore, the focus of this report is on the American definition of venture capital, which refers to seed, early-stage, and expansion investments as defined in Table 1 below. It does not include any type of buyout or re-capitalisations, which are included as venture capital under the European definition. This focus is in recognition that buyouts and recapitalisations (private equity) is relatively well understood from a policy and research perspective (Jeng & Wells, 2000). In addition, by focusing on the American definition of venture capital we can capture the relative experience of venture capital firms providing early stage financing, which is the most challenging for policymakers to understand, and financiers, whether commercial or donor - to serve (Patricof & Sunderland, 2005).

Table 1: Venture Capital Definition

Financing Stage	Description
Seed	Capital provided for a business idea to support market research and initial product development
Early Stage	
Start-up Stage	Capital provided to enterprises just moving into operations but without any commercial product or service sales to support product development and initial marketing
First Stage	Capital provided to initiate commercial manufacturing and sales
Expansion Stage	
Second Stage	Capital provided for initial expansion of a company already producing and selling a product but perhaps not yet profitably
Third stage financing (also known as development or growth financing)	Capital provided for major expansion e.g. physical plant expansion, product improvement or a major marketing campaign

Source: Adongo & Stork (2006)

Following this section, which serves as Section one, the rest of this report is organised as follows: Section two presents a background to venture capital in a developing country context. Section three goes on to present the methodology adopted to achieve the main objective of this report. The results of an application of this methodology is presented and discussed in Section four. Finally, Section five presents the conclusions of this report.

2. BACKGROUND

The capital needs of micro enterprises and marginal small-scale enterprises with no growth potential are met by the microfinance industry. Likewise, the working capital and long-term financial needs of non-marginal small and medium-scale enterprises with no growth potential are being met by commercial banks. Long-term and working capital needs of large-scale enterprises can be met through domestic and international financial markets, in addition to commercial banks.

For the micro, small and medium-scale enterprises, with huge growth potential, capital needs are met by venture capital. This form of financing is defined as a professionally managed pool of money raised by a financial intermediary for making intermediate term, direct investments in private companies that are new or rapidly growing with a well-defined exit strategy. The distinguishing characteristic of venture capital from other forms of investment is that fund managers are directly involved in the management of their investees.

2.1. History of Venture Capital

The concept of venture capital began with a few very rich individuals who were willing to risk a portion of their wealth in exchange for the prospect of considerable financial or territorial rewards (Ibanez, 1989). This relationship has existed since the time of Hammurabi in the Babylonian era (Gompers and Lerner, 1999). In fact venture capitalists were responsible for financing the explorers who discovered America, the English merchant venturers and many of the businesses of the Italian city states (Ibanez, 1989).

In conventional venture capital literature it is stated that the first step towards the institutionalisation of the venture capital investment process was taken in Boston, United States by a French-born, former American brigadier-general, George F. Doriot; Massachusetts Institute of Technology President, Karl Compton, and several business leaders (Gompers & Lerner, 2001). These individuals formed the American Research and Development Corporation (ARDC) in 1946 to commercialise the technologies developed for World War II.

ARDC invested in one of the first and most successful textbook cases of venture capital, Digital Equipment Corporation (DEC), which started in 1957 with one desk and two people, and an investment of 61,400 United States Dollars (USD). By 1971 DEC employed 7,000 people, its annual sales were US$147 million and ARDC's seed money, representing 45 percent of DEC's shares, was worth USD 345.6 million (Ibanez, 1989).

In the early days of venture capital, funds were raised up front by selling shares to investors in closed-ended mutual funds. If investors no longer desired to hold the investment, they could sell the shares on a public exchange to other investors.

Since it was a liquid investment that could be freely bought or sold, the Security and Exchange Commission (SEC), the American financial markets regulator, did not preclude any class of investors from holding the shares. However, institutional investors showed little interest in these shares, citing the risks associated with such an unproven new style of investing. This resulted in the shares being marketed mostly to individuals (Liles, 1977).

To prevent unscrupulous brokers from taking advantage of inexperienced investors, the search began for a better vehicle to fund venture capital investments. The first venture capital limited partnership in the United States; Draper, Gaither, and Anderson, was formed in 1958. Unlike closed-end funds, partnerships were exempt from SEC regulations, including the exacting disclosure requirements of the Investment Company Act of 1940 in the United States. However, the set of the investors from which the funds could raise capital, was much more restricted. The interests in a partnership could only be held by a limited number of institutions and high net-worth individual investors (Gompers & Lerner, 2001). In 1979, the United States Department of Labor clarified its "prudent man" rule in a way that explicitly allowed pension fund managers to invest in high-risk assets, including venture capital. This led to an increased ability for partnerships to attract much more investor financing than was possible previously.

In Africa, several venture capital firms were operating in the 1940s. These are highlighted in Table 2 below. As opposed to ARDC, which was private and independent, the venture capital firms operating in Africa were captive, government entities i.e. public venture capital funds.[1] However, the first private, independent venture capital firm in Africa was Venfin Limited founded in South Africa in 1941. This firm was purchased by the United Kingdom based Vodafone Group in 2006.

Table 2: Venture Capital Firms Operating in Africa in the 1940s

Venture Capital Firm	Location of Fund Manager	Date of Establishment
Industrial Development Corporation	South Africa	1940
Venfin (Pty) Limited	South Africa	1941
Commonwealth Development Corporation Capital Partners	United Kingdom	1948

Source: AVCA (2004), SAVCA (2005) and NCDO & Adapppt (2005) and respective company websites.

[1] In the 1940s the Commonwealth Development Corporation (CDC) supported British colonial interests on the African continent.

2.2. Importance of Venture Capital

The importance of venture capital for investors, enterprises and the economy has been recognised in many developing countries.

For investors, the seed and early stages are characterised by high risk, illiquidity and information asymmetries that result in high administrative, information gathering and search effort costs (Adongo & Stork, 2006). Venture capital firms acting as intermediaries reduce individual risk and costs, which allows investors to gain from the potentially high returns offered by venture capital investments (Atje and Jovanovich, 1993 and Zeng, 2004).

Also, as an alternative asset, venture capital is important in portfolio diversification because of its potentially low correlation with other asset categories. However, in empirical investigations of this claim, biases arising from smoothed pricing issues may complicate the ability to obtain conclusive evidence. This occurs where infrequently traded assets, such as venture capital investees, tend to not report up to date market prices but estimates of fair value. The resulting reduction in volatility creates a smoothing effect. This induces a downward bias to the measured risk of assets and artificially low correlations with conventional financial assets and among alternative assets (Solnik & McLeavey, 2004).

For enterprises, venture capitalists offer several unique advantages compared to pure financing or pure business development service solutions.

First, some small enterprises are growing rapidly towards liquidity i.e. they are successful and stable enough so that the risk to outside lenders is reduced, but still need outside cash to sustain their growth. Others are profitable but cash poor i.e. they are rapidly expanding with fast sales growth, positive profit margins but lack marketable fixed assets or accounts receivables that are needed to reduce the lending risk (Sahlman, 1990). These enterprises typically have problems in securing long-term financing from commercial banks. They also cannot turn to public financial markets because of their small size or lack of reputation. For these enterprises venture capital firms play a valuable role in increasing access to the long-term financing they need for growth (Ueda, 2000).

Second, many small enterprises with a high growth potential cannot pass a certain level until they bring in managerial help. Most venture capital firms are led by experienced, professional managers who are not only trained in how to spot suitable investment candidates, but have "real-world" experience in growing companies. The monitoring and helpful business advice they offer based on their knowledge of markets, the entrepreneurial process and a network of contacts are exactly what is needed by these firms to help unfold their growth potential (Bottazzi, Da Rin and Hellmann, 2004).

This combination of financing and sustained enterprise-specific business support via a hybrid system between arm's length and relationship-based financing and

monitoring, without stifling initiative, cannot be performed as effectively by other financial intermediaries. Due to legal constraints, banks, pension funds, insurance companies, and money managers are unable to perform the role of hands-on investors because they are prohibited from holding large equity stakes in a company or being actively involved on a company's board of directors (Leachman, Kumar and Orleck, 2002).[2]

In addition, enterprise growth in the venture capital industry occurs outside the public market. This provides a safe haven in which firms can pursue long-term growth while sheltered from the vagaries of short-term dynamics in public stock markets (Bishop, 2004), which is a consequence of the unpredictable consequences of ownership by a large number of shareholders (Warner, 1996).

Due to these features, a growing number of studies have documented the positive impact that venture capital has in increasing the survival rate of young firms in the particularly treacherous seed and start-up stages of a new firm's lifecycle, which is important in firm creation (Belke, Fehn & Foster, 2003).

Third, venture capital is an important factor in promoting innovation and entrepreneurship. It is used to finance companies that develop new products or technologies. Kortum and Lerner (2000) show that one USD of research and development (R&D) spending in venture capital backed firms creates more patents and more radical innovations than the same expenditure in other firms. Also, where a venture capital backed firm succeeds, it inspires innovation and boosts entrepreneurism. This is evidenced in empirical studies (Kortum & Lerner, 1998).

Fourth, venture capital is also important to consumers. Venture capital firms experience a shorter time-line with respect to bringing a product to market (Hellman and Puri, 2000). This rapid market introduction is strategically important because the firm enjoys a first mover advantage. However, it may also be a source of its monopoly power.

Fifth, venture capital is also important to newly privatised enterprises that need to modernise and may be undercapitalised. Where national capital markets are still under-developed and access to international markets is limited to the largest firms, these enterprises may find that the simple distribution of shares to employees or others will not solve their need for financing (Pacanins, 1997).

Sixth, in the spirit of Pan-Africanism or as part of their expansion strategy, many businesses are extending their operations across the African continent. In most cases, this expansion occurs without a detailed knowledge of the business environment of the destination country. The informed monitoring that venture capitalists undertake as third-party investors is useful in closing information gaps

[2] Under the universal banking model, commercial banks take up equity stakes and board seats in the companies they finance.

and mitigating risk for the expanding corporation as it manages new operations in different countries (Pacanins, 1997).

Finally, venture capitalists enhance professionalisation by instilling corporate governance principles in many young firms (Keuschnigg et al, 2003). The importance of this in addressing corporate governance problems is exhibited by the observation that of the major corporate scandals over the past 25 years, none have involved venture capital supported firms. However, critics argue that if there is any impropriety, the public might not get to hear about it because many venture capital backed enterprises are private (Bishop, 2004).

The importance of venture capital to the economy occurs when a venture capital backed enterprise succeeds.

When this happens the divested firm provides benefits to a country's domestic economy in the form of job creation. The European and National (American) Venture Capital Associations and other independent empirical studies, have found that venture capital backed firms create jobs at a far faster rate than other companies. Evidence of the virtuous circle between entrepreneurial dynamism, innovation, venture capital and job creation in Namibia is exhibited in the case of Mobile Telecommunications (MTC) Namibia, a mobile telecommunications service provider. This entity, which is now a major employer in Namibia, benefited from late stage venture capital funding from Swedfund AB, a Swedish public venture capital fund.

However, a blanket claim that venture capital supports employment may not apply in all cases. Evidence shows that seed and early stage venture capital investment may not have a large impact on employment growth compared to venture capital in the expansion stage. Even at the expansion stage venture capital investment is unlikely to be of much help in preserving jobs in old and declining industries. The jobs it creates are in new and innovative firms. Therefore, it might be more accurate to argue that venture capital accelerates the process of structural change based on Schumpeter's theory of creative destruction (Griffiths & Wall, 1996). Therefore, venture capital may have a less significant effect on official unemployment rates than on employment growth (Belke, Fehn & Foster, 2003).

To the extent that venture capital backed firms create employment, they can ease the pressure on fiscal budgets in many African countries, where the salaries of a large public service are a major component. Fiscal savings can be used to support more supply-side policy interventions that focus on education, health and infrastructure provision.

Also many venture capital firms support infrastructure projects in Africa. Although, most of these funds cover larger investments in sectors like mining, transport, tourism and telecommunications (United Nations Industrial Development Organisation, 2001), some focus on smaller projects such as building hospitals e.g. Old Mutual Namibia's Managing Infrastructure for Development in Namibia

(MIDINA) fund and various other public health funds (Ikemba, 2005). These infrastructure funds also lessen pressure on fiscal budgets that have long been the only source of infrastructure finance. Such funds also have the added benefit of promoting public-private partnerships, which have the potential to extend the outreach and improve efficiency in the delivery of infrastructure services (Zaaruka, Uanguta & Kadhikwa, 2005).

More directly, venture capital can be used to support firms that address various social issues that alleviate supply side constraints. For example, towards implementing its strategy for food security the Rockefeller Foundation initiated ProVenEx, a venture capital fund that operates in Uganda (Christy & Fine, 2004). In addition, various funds have recently been set up to support social entrepreneurs by 'venture philanthropists' (Said, 2005).

Finally, a growing number of scholars have documented the positive impact that venture capital has on increasing levels of investment, utilisation of technology, productivity and sales growth. To the extent that venture capital supports innovation from diversified sources, it can play a valuable role in promoting economic diversification goals. This has positive implications for sustained economic growth.

In addition to general economic benefits, venture capital strengthens the domestic financial infrastructure. Since it involves an intermediate-term financing commitment, it stabilises international financial flows and reduces the volatile sentiment of international fund managers. This reduces the contagion effect associated with international portfolio equity flows that have been documented in the case of hedge funds, mutual funds and large institutional investors (Kaminsky, Lyons & Schmukler, 1999).

Also, to the extent that venture capital provides a channel through which domestic institutional investors can participate in investment opportunities in their local environments, it creates greater market stability and lower price volatility in emerging markets. The advantage of strong presence of domestic institutional investors was exhibited in the international financial crisis of 1998, where the greater insulation of the Chilean and South African equity markets from the adverse impact of this crisis can be partly attributed to this strong presence (Lowell, Neu & Tong, 1998).

Finally, by succeeding in creating large companies that access financing via public markets, venture capital investments contribute to the goals of financial market development (United States Department of Commerce International Trade Administration and European Commission Directorate-General for Enterprise and Industry, 2005).

Venture capital does not include buyout financing, which is the domain of private equity. Buyout financing is used to support social initiatives such as Black Economic Empowerment (BEE) in South Africa and Namibia. This is particularly important when companies seek empowerment shareholders but are often faced

with empowerment deals that do not provide market value because many potential empowerment groupings cannot finance their desired acquisitions at commercial rates (Zaaruka, Uanguta and Kadhikwa, 2005). Rather than supporting BEE through the acquisition of existing businesses, venture capital can do this by financing and supporting the creation of new businesses owned and run by previously disadvantaged groups in these countries.

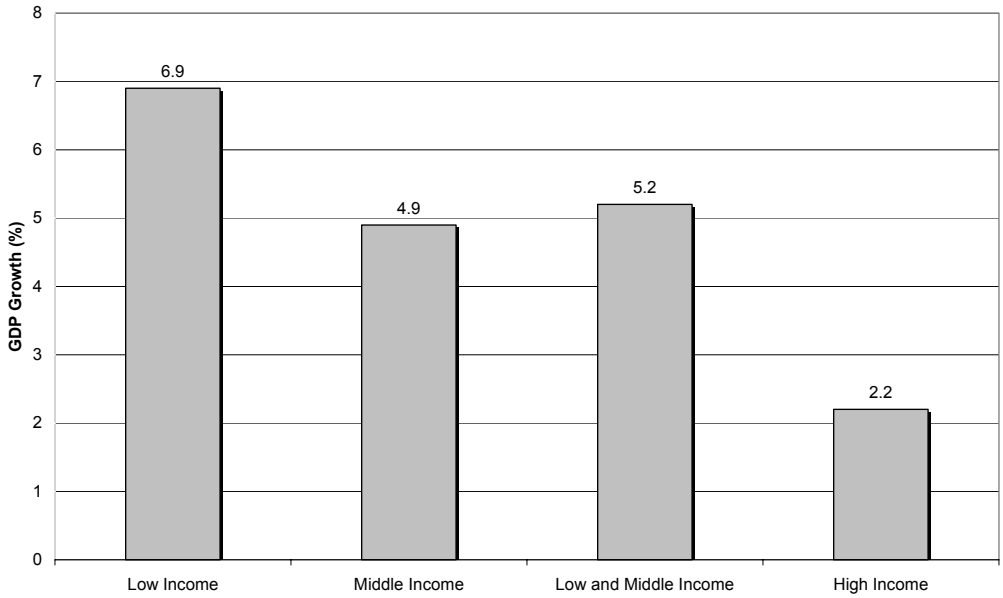
Finally, it has been argued that the growth of small firms is seen as part of a process of democratisation and increased social stability, or as an instrument of regional development (Hallberg, 2000). Venture capital may support these political and social objectives.

2.3. Venture Capital Trends in Developing Countries

There has been increasing awareness of the importance of venture capital in developing countries. One way this is exhibited is the raising of multiple funds in various emerging markets, with an increasing trend towards developed country funds increasingly investing directly in transactions in the developing world, in conjunction with these funds (Pacanins, 1997).[3] The interest of developed country fund managers in these emerging markets can be attributed to various factors.

First, in many developed countries there has been a large and growing pool of funds under management. This glut has increased fears that the developed country financial markets may be getting overheated and that attractive returns that characterise venture capital investments in many developed nations can be sustained. In response to this fear, developed country investors have begun to look for investment opportunities in emerging markets. This strategy has been supported by higher real, annual economic growth rates in low and middle income economies, which grew at 5.2% between 2002 and 2003, compared to real, annual growth rate of 2.2% in high-income economies. This is illustrated in Figure 1 below.

[3] Emerging markets are defined as a market that has begun a process of change, growing in size and sophistication in contrast to markets that are small and give little appearance of change. They are also defined as markets in developing economies with the potential for development (World Bank, 2005b).



Source: World Bank (2005a)

Figure 1: 2002 to 2003 Real GDP Growth Rates by Income Category (%)

These high growth rates have been coupled with the return on emerging market debt being 5.6% higher than treasuries and the index of share prices rising to 13% compared with less than 3% for markets in rich countries in 2005. In addition, interest rates and inflation rates in emerging markets have been low and commodity prices have been booming (Buttonwood, 2005).

Second, increasing competition amongst venture capital firms in developed countries to find companies that can provide unique investing opportunities is high. This competition has led to a decline in quality deals in these countries, which has led some of these firms to turn to new regions represented by emerging markets to try to find 'the next big thing'.

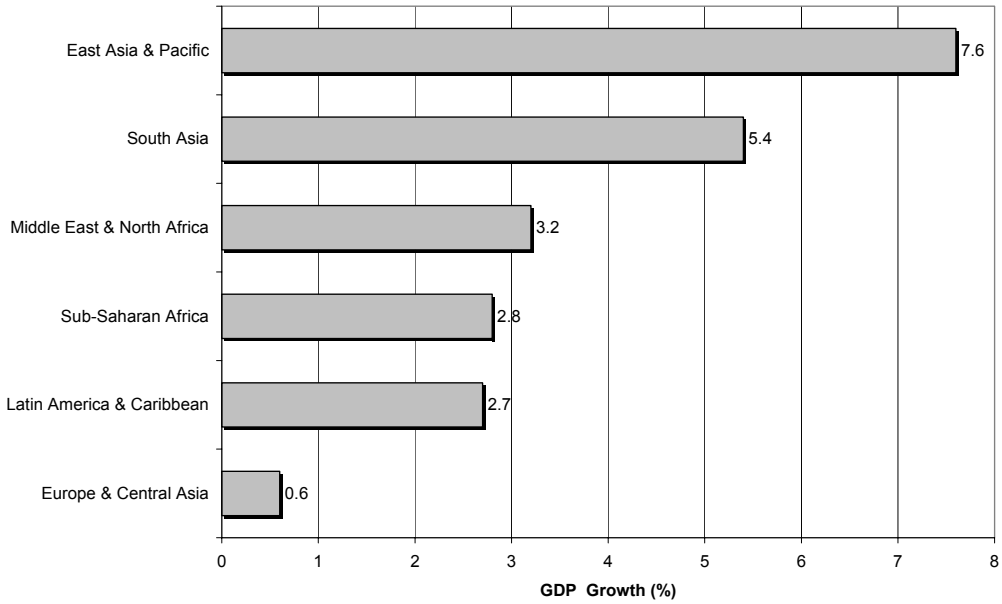
Third, fiscal pressures in the developed countries coupled with aid fatigue among donors have made it necessary for developing countries to shift their strategy to try to tap private, foreign capital instead. Venture capital represents one of these sources.

Fourth, surveys have revealed that investors face greater impediments to identifying and exploiting profitable opportunities in developing countries than elsewhere. However, the string of successful deals in developing countries such as China has counterbalanced some of the negative experience of other early investors, which has greatly increased positive perceptions resulting in a decline in risk aversion.

Fifth, developing countries have produced a lot of emigrants seeking greener pastures in developed countries. These represent a diaspora that consists of savvy investors, who have strong ties to their home regions and particular sectors. Efforts

to promote this source of venture capital has resulted in a new wave of venture capital funds that aim "go local" to an extent that is generally unprecedented in regions such as Latin America (Grikscheit, A. A., 2005).

Despite all these positive trends in developing countries, many Asian countries are growing rapidly and far ahead of most African countries as illustrated in Figure 2 below.

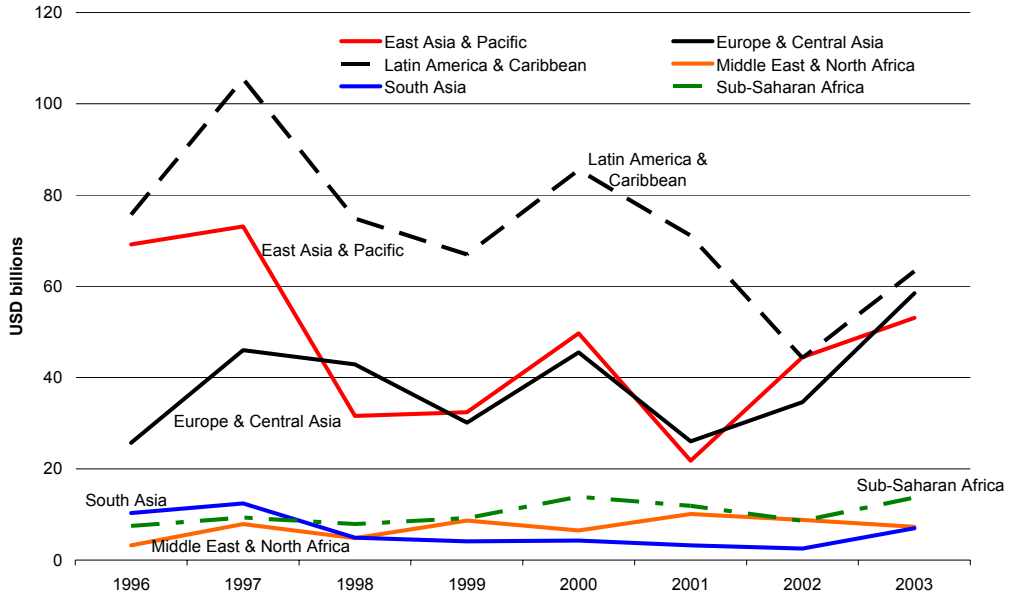


Source: World Bank (2005a)

Figure 2: 2002 to 2003 Real GDP Growth Rates by Region (%)

These differences have arisen because Asian countries have been faster at putting in place the financial infrastructure needed to efficiently absorb foreign capital. This is exhibited by the evidence that shows that the share of long-term private capital, defined as the sum of private loans (bank loans *plus* bond finance), portfolio equity flows, and foreign direct investment flowing to sub-Saharan Africa, is lower than that of all other developing regions except the Middle East, North Africa and South Asia. This is illustrated in Figure 3 below.[4]

[4] Although Latin America, the Caribbean, Europe and Central Asia have a low GDP growth rate, they still attract high levels of long-term capital flows. This contradiction can be explained by the differing investment climates in these regions.



Source: World Bank (2005b)

Figure 3: Long-term Capital Flows by Region

To catch up, most African countries will have to undertake speedy policy and structural reform to attract private flows. With increased transparency and awareness of incentives implemented to promote foreign investment through surveys such as Doing Business by the World Bank and the International Financial Corporation (IFC), there should be reduced uncertainty. In addition, countries will be pressured to compete with their counterparts resulting in a relaxation of curbs on foreign investments coupled with increased governance. This should increase investment in SSA by venture capitalist from developed and other developing countries (Cowan, 2003).

3. METHOD

This section focuses on describing the methodology that this report adopted to achieve its objective. It begins with a description of the data, sample, model and its variables, and then goes on to describe the procedure used to identify the factors influencing the number of current investees for venture capital firms in Africa.

3.1. Data

The process of obtaining data for the venture capital industry in Africa was not easy. Ibanez (1989) advances several possible reasons for this.

First, to avoid imitators who could potentially reduce the level of returns (Economist, 2004); the venture capital industry has been an inherently secretive and inward looking business where neither investors nor investees had any interest in spreading information about their investments. As a result, hard facts about venture capital are scarce. Although important information is available through self-promoting success stories, these are anecdotal (Ibanez, 1989).

Second, interest in gathering quantitative information on the venture capital industry has only begun very recently. The few private data-gathering institutions which are specialised in venture capital have in accordance with their objectives concentrated their efforts on producing information and industry directories, concerning potential suppliers of capital e.g. the African Venture Capital Association (AVCA) directory and South African Venture Capital Association (SAVCA) Yearbook.

Finally, until recently, very few institutions had discovered the developmental potential of the venture capital mechanism and expressed interest in studying its applicability to developing countries (Cowan, 2003 and Zeng, 2004).

Fortunately, since 2004 the AVCA has been compiling a continent-wide directory on venture capital firms in Africa based on survey data (AVCA, 2004). However, for statistical purposes this database may be prone to certain statistical biases (Solnik & McLeavey, 2004).

- Self-selection bias: This arises because venture capital firms decide themselves whether they want to be included in the directory. Those that have funds with unimpressive track records will not wish to be exposed;
- Instant history bias: This arises because only venture capital firms with good track records enter the directory creating a positive bias in past performance;
- Survivorship bias: This arises because unsuccessful venture capital firms tend to disappear over time and only successful ones present their data.

To avoid these pitfalls, data from the AVCA directory was complemented by data from various other sources including the Venture Capital Funds Index 2005 (NCDO and Adapppt Foundation, 2005). In addition, the KPMG SAVCA 2003 survey (KPMG, 2003) and SAVCA 2005 Yearbook (SAVCA, 2005) were used to fill in information gaps, where they existed. Where data conflicts occurred, the AVCA data was given the highest priority.

In addition, the identified venture capital firm websites, their latest annual reports and presentations at the 5th Annual AVCA conference held in Mombassa, Kenya, provided links to various other venture capital firms that were not captured by the data sources outlined in the paragraph above.

For the variables that captured the investment climate in various African countries data was obtained from various World Bank publications including the World Development Indicators (World Bank, 2005a) and the Doing Business Survey (World Bank and International Finance Corporation, 2006).

The nature of the data in this report is cross-sectional covering various countries in Africa. A cross-country variation enables the identification of common patterns across the venture capital industry on the continent. It is worth cautioning at this point that despite the identification of these broad patterns there is substantial heterogeneity in the venture capital industries of various countries in Africa because they differ along many dimensions among themselves (Harvard Business School, 1997).

A more robust identification of specific patterns would have been possible with a panel data series. This data series would have incorporated the complexity in causal dynamics across multiple venture capital firms in different countries by incorporating the ability for space and time to interact (Leachman, Kumar and Orleck, 2002). However, due to the relatively recent nature of continent-wide venture capital data collection, future studies could apply panel data techniques once a time series that is long enough has been developed for the venture capital industry in Africa.

3.2. Sample

From the data sources outlined above this report identified 155 venture capital firms operating in Africa. Between them, these firms manage 273 funds with investments in 49 African countries. From this total, 73 had complete information on the organisational variables included in the model adopted in this report. However, one of these firms reported that it supported 11,000 investees and was considered an outlier and excluded from the sample. Therefore, the sample used in this report consisted of 72 venture capital firms operating in Africa. This is illustrated in Table 3 below. Between them the venture capital firms in the sample managed 157 funds with investments in 41 African countries.

Table 3: Venture Capital Firms Operating in Africa in 2005

Location	Identified	Sample
Northern Africa	19	8
Eastern Africa	3	0
Western Africa	16	9
Southern Africa	73	38
International	45	17
Overall	155	72

Source: AVCA (2004), NCDO & Adapppt (2005), SAVCA (2005), KPMG (2003) and Internet.

The presentation in Table 3 above adopts the 'country of management criterion i.e. the country where the venture capital firm is based, which is used to record funds raised. Where several firms manage different funds under one organisational banner e.g. Aureos and Grofin, this report took the head office of these different venture capital firms as its location. The alternative 'country of destination' criterion is used to record where funds are invested i.e. which countries they go into (EVCA 2001).

Due to missing data in the variables capturing the investment climate the sample further reduced to 48 under the country of management criterion and 64 under the country of destination criterion.

3.3. Model

One model used in venture capital literature is the double moral hazard (Da Rin, Nicodano & Sembenelli, 2005). This captures the demand and supply of venture capital, where both the entrepreneur and the venture capitalist exert non-contractible effort. Ueda (2000) uses this model to explain why entrepreneurs may prefer venture capital financing to bank financing.

Another model is used by Keuschnigg (2002) to explain the venture capital connection to economic growth. This model extends the 2-period overlapping generations model of Diamond (1965) to build a model that explores how the joint inputs of both entrepreneurs and venture capitalists determine the prospects of start-up firms.

This report uses an ANCOVA model to analyse the factors the influencing the number of investees that selected venture capital firms in Africa invest in at a single point in time. The general function is outlined in Equation 1 below.

$$C_i = ORGFORM_i + LOC_i + FOCUS_i + OTHCR_i + MACRO_i + ENTRE_i + \varepsilon_i$$

Where:[5]

C represents the number of current investees in a venture capital firm's portfolio;

$ORGFORM$ represents a vector of variables that captures various organisational features of the venture capital firm;

LOC represents a vector of variable that captures the location of the venture capital firm;

$FOCUS$ represents a vector of variables that captures the focus of the venture capital firm;

$OTHCR$ represents a vector of variables that captures other characteristics of the venture capital firm;

$MACRO$ represents a vector of variables that captures various features of the macroeconomic environment;

$ENTRE$ represents a vector of variables that captures the entrepreneurial environment;

ε represents the random error term;

i = 1…48 (country of management); i = 1…64 (country of destination)

Equation 1: General Function of ANCOVA model

3.4. Procedure

This report relies on Limited Dependent Variables – LIMDEP, an econometric software, to apply the OLS technique to the model outlined above to achieve its objective of identifying the factors influencing the number of current investees for selected venture capital firms in Africa.[6]

To identify differences in the country of management versus country of destination criteria, the report analyses venture capital firms based on the location of fund management. It then goes on to analyse venture capital firms based on the location of the current investees in their portfolios. The report excludes venture capital firms that are outside of Africa, in the country of management analysis, but includes them in the country of destination analysis.

[5] See Appendix A for a technical discussion of the general function.

[6] In addition to OLS, Cumming (2004) also applies a Box Cox transformation model in his study.

4. RESULTS AND DISCUSSION

The available information on the performance of venture capital firms is scarce and difficult to assess. This arises because there is no consensus benchmark (Chemla, 2004). One performance measure used is the type of exit, where the IPO is viewed as most desirable (Frostberg, 2006). However, by far the most common performance measure is the IRR.

Use of the IRR as a performance measure compares the rate of return obtained to the estimated cost of capital. This IRR can either be a final or interim measure. Final IRR is the rate of return on exit of a portfolio company. Although some venture capital firms' funds disclose information on how well they have done in terms of IRR on exit, this is not contextualised into the risk profile of the overall portfolio e.g. the proportion of start-ups, leveraged buy-outs, the average age of the portfolio, whether the exit represented a downturn or an upturn in the macroeconomic business cycle, etc.

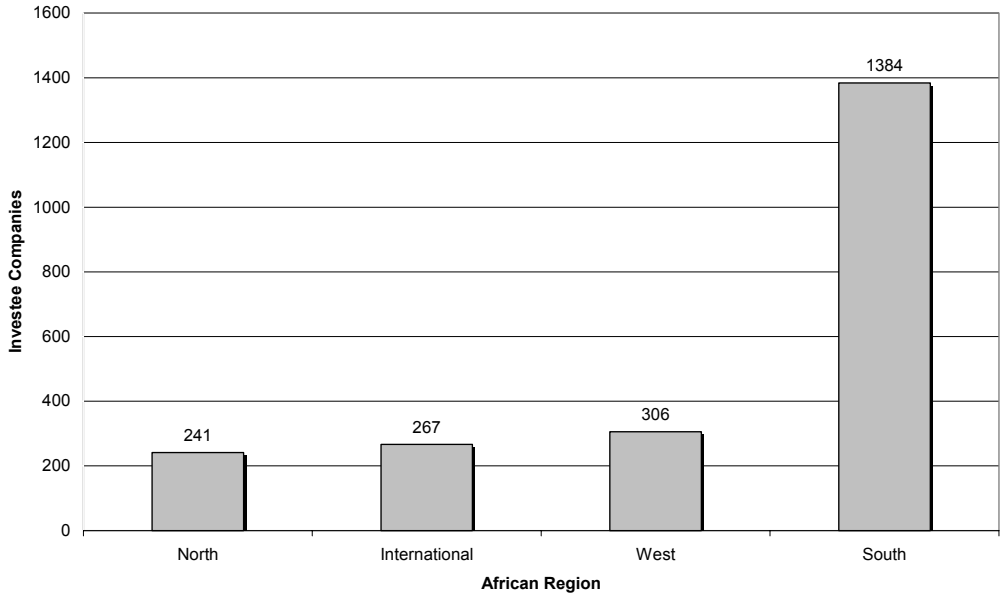
More useful is the interim IRR, which is used by various venture capital industry stakeholders including Venture Economics, a provider of information and analysis on venture capital and private equity based in the United States. It is useful when it is necessary to capture information on unfinished funds, which includes investees that have not yet been exited. The interim IRR is computed from past cash flows and the reported net asset value, which is a proxy of the value of the remaining investments that captures estimated cash flows from unknown future sales (Weidig, 2002).

However, IRR has some shortfalls. Although it can be an appropriate way to measure the return on a specific investee, this advantage does not extend to measuring performance when the investee is part of a portfolio. IRR does not allow fund managers to estimate the risk of the venture capital investment. This rules out its use in how venture capital and other asset classes are correlated, which is a very important determinant of portfolio selection. Furthermore, the use of IRR is not easy to apply in empirical studies because the returns to an individual venture capital firm typically involve many small losses and a few extreme profits that are not normally distributed (Weidig, 2002).[7] Finally, IRR can only be used when assessing long-term performance. High rates of short term return can be achieved through a few attractive divestments, while low rates may result from new funds only just beginning their investment activity. Therefore, initial returns over the first two or three years can be misleading if viewed in isolation (Zaaruka, Uanguta & Kadhikwa, 2005).

Even if IRR were chosen as the performance measure in this report, the level of reporting on IRR by venture capital firms in Africa, in any of the data sources

[7] On a fund level, this skewness is reduced because there are more underlying investees.

outlined in the previous section, does not allow the generation of a sample large enough to apply any econometric techniques at this time. Therefore, this report uses the number of current investees in a venture capital firm's portfolio as an alternative measure of performance. This impact indicator has been used in other empirical studies such as Cumming (2004). The number of investees supported by venture capital firms in Africa as of 2005 is illustrated in Figure 4 below.[8]



Note: In the South one venture capital firm reported investments of 11,000 firms, which would make the number of investees in the region 12,384. This firm was considered an outlier and excluded from this sample.

No venture capital firm with its overall head office in Eastern Africa reported any investees.

Source: AVCA (2004), NCDO & Adapppt (2005), SAVCA (2005), KPMG (2003) and Internet.

Figure 4: Number of Investees in Africa by Location of Venture Capital Firm in 2005.

4.1. Influencing Factors

Various factors potentially affect the number of portfolio companies in a venture capital firm. To identify these factors, the methodology described in the previous section was applied to the available data. The results are presented in Table 4 below.

[8] If reporting of venture capital performance data in industry directories occurs, the interim IRR may be applied in future studies.

Table 4: Regression Results for ANCOVA Model

Country of Management			Country of Destination		
Variable	Coefficient	p-Value	Variable	Coefficient	p-Value
Constant	5.7606	0.2536	Constant	9.867	0.1210
PUBLIC	0.03858	0.9408	PUBLIC	0.5401	0.3565
CORP	-1.3451	0.1157	CORP	-1.0809	0.1590
FIN	-0.0598	0.9281	FIN	-0.868996	0.1526
INDPT	-0.5360	0.3133	INDPT	-0.6951	0.1760
SEEDEARL	0.69804	0.1450	SEEDEARL	0.358	0.3244
LATER	-0.37999	0.5441	LATER	-0.2376	0.6939
NATION	0.099419	0.8349	NATION	-0.6087	0.3633
REGION	-0.36317	0.4453	REGION***	-1.26155	0.0808
INTL			INTL*	-4.7182	0.0007
NORTH	0.9004	0.3229	NORTH	0.04535	0.9695
SOUTH**	-1.87695	0.0437	SOUTH**	-2.8948	0.0218
LFSIZE	-0.0355	0.6873	LFSIZE	-0.015115	0.8865
LAGE*	1.09767	0.0001	LAGE**	0.57248	0.0227
MULSECT**	-0.74979	0.0251	MULSECT	0.09323	0.7638
MULFUND	0.33458	0.4288	MULFUND	0.6868	0.1169
MULBOT	0.49734	0.3204	MULBOT	0.2992	0.4687
SYNDICT	0.396119	0.2946	SYNDICT	0.11103	0.7367
MAJORITY	0.45016	0.3854	MAJORITY	0.380698	0.3832
LJOURN***	-0.18754	0.0794	LJOURN	-0.42897	0.1532
LGDPG			LGDPG	-0.3349	0.1698
LRLI	-0.04827	0.8597	LRLI	-0.6118	0.1119
LINF			LINF	0.4824	0.2051
LBUDBAL			LBUDBAL	0.2472	0.1162
LINVCLIM	-1.20215	0.1847	LINVCLIM***	-1.8503	0.0651
F [20, 27] = 1.66; p-value = 0.10783 R^2 = 0.540416			F [24, 39] = 1.79; p-value = 0.05171 R^2 = 0.524095		
No. of Observations: 48			No. of Observations: 64		

Note: * significant at the 1% level, ** significant at the 5% level, *** significant at the 10% level.

The rest of this section will discuss these results in three sub-sections i.e. organisational factors, state of innovation and the investment climate, in terms of both the country of management and country of destination criteria. However, before we begin the discussion the constant term needs to be explained.

The constant term represents a labour sponsored venture capital firm, located in West Africa, focusing on a single sector with a continent-wide focus with its use of a syndicated investment arrangement and taking of a majority stake unknown. Under both the country of management and country of destination criteria, this is related to more investees in a portfolio. However, based on the model in this report, there is no evidence that this relationship is robust across venture capital firms in Africa, under both criteria, because the results are not significant even at the 10% level.

4.1.1. Organisational Factors

Organisational factors focus on the venture capitalist firms' characteristics. They include the type of firm, its stage and geographical focus, its location, fund size, age, whether or not it invests in multiple sectors, manages multiple funds, adopts a multiple-bottom line philosophy, syndicated investment arrangements or acquires a majority stake in its investees.

4.1.1.1. Type of Firm

Venture capital firms can be categorised as public, corporate, finance, labour-sponsored, franchise and independent (Adongo & Stork, 2006).[9] In the sample adopted in this report, independent venture capital firms are the most common, while labour-sponsored venture capital firms are the least common. This is illustrated in Figure 5 below. It is interesting to note that the majority of international venture capital firms in the sample are public. This can be observed by the relatively larger increase in the country of destination versus country of management criteria in that category.

[9] The franchise firms such as Business Partners International, report their performance under their parent.

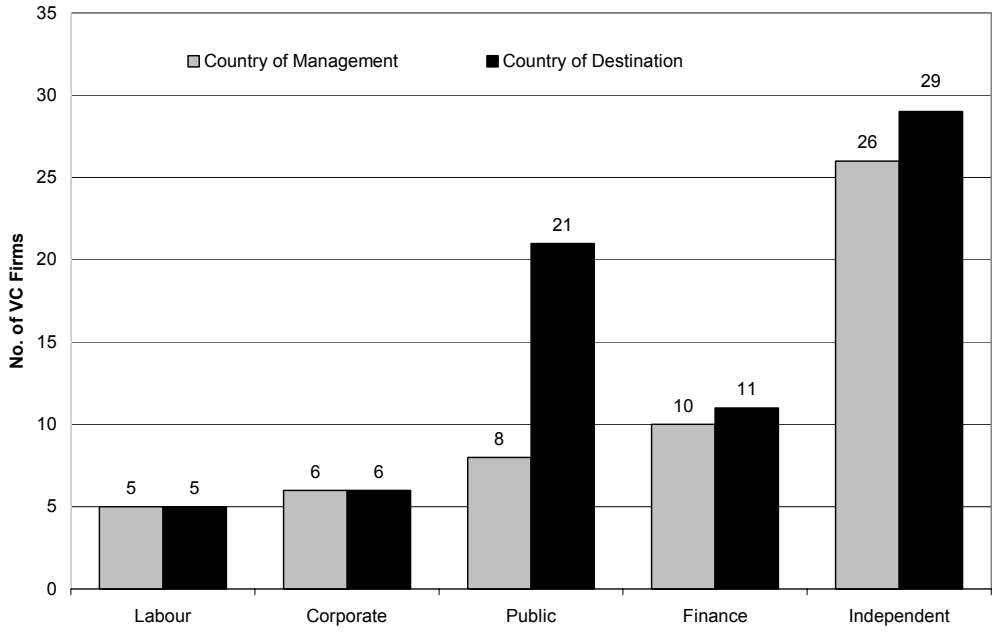


Figure 5: Number of Venture Capital Firms in Sample by Type

Cumming (2004) argues that public venture capital firms, which are associated with the public sector, are characterised by less skilled human capital, lower salaries and incentive pay, which results in less stringent due diligence. These features accompanied by political pressures to do a greater number of deals should result in these funds having more investees in their portfolio (Keuschnigg, 2003).

It is argued that corporate venture capital firms do not face the discipline of needing to return their capital to shareholders and to finance new projects through the raising of additional funds. Also, corporate middle managers are very unlikely to receive a substantial share of the wealth that the innovations they champion produce (Gompers & Lerner, 2001). In addition because they have a greater knowledge of, and interest in venture capital activity as a potential source of future profitable products; screening, appraisal and droppage rates when parent companies share the venture capital firms operating costs tend to be high (Aylward, 1998). With this incentive structure and more stringent due diligence one should expect that these firms will have fewer investees in their portfolio.

On one hand, finance venture capital firms may have incentives to maximise investments based on the hope that they will win the business of successful investees later and may not care how their portfolio performs.[10] On the other hand, banks have to adhere to tough rules on how much capital they must set aside to cover risk, and tend to pay their staff less generously than professional venture

[10] This results in perpetuated inefficiencies as in the case of Germany (Ewing & Hibbard, 2005).

capital fund managers. These opposing forces do not give a clear intuitive answer on what one should expect in terms of number of investees.

Independent venture capital firms face relatively higher per unit costs than the other type of firms outlined above. In addition, they are usually run by professional fund managers who adopt a robust approach to due diligence. Thus, it is expected that these firms will have fewer investees in their portfolio.

4.1.1.1.1.Country of Management

In conformity to theoretical expectation, the public venture capital firms in the sample are positively related to the investees in a portfolio. Similarly, the corporate venture capital firms in the sample are negatively related to investees, as theoretically expected. The negative coefficient for finance venture capital firms in the sample indicates that penalties imposed on risk by their parent financial institutions outweighs the desire to maximise current investment for future bank business. Finally, independent venture capital firms in the sample are also negatively related to the number of investees in a portfolio.

However, based on the model in this report, there is no evidence that under the country of management criterion these relationships are robust across venture capital firms in Africa because the results are not significant even at the 10% level.

4.1.1.1.2.Country of Destination

The relationships under this criterion are identical to those outlined under the country of management criterion above. Similarly, based on the model in this report, there is no evidence that under the country of destination criterion these relationships are robust across venture capital firms in Africa because the results are not significant even at the 10% level.

4.1.1.2.Stage Focus

In the sample adopted in this report, fewer venture capital firms provide seed and early stage venture capital when compared to those providing expansion financing. This is illustrated in Figure 6 below. This observation conforms to findings of venture capital in Asia, where firms focus more on later stage than early stage venture capital financing (Aylward, 1998).

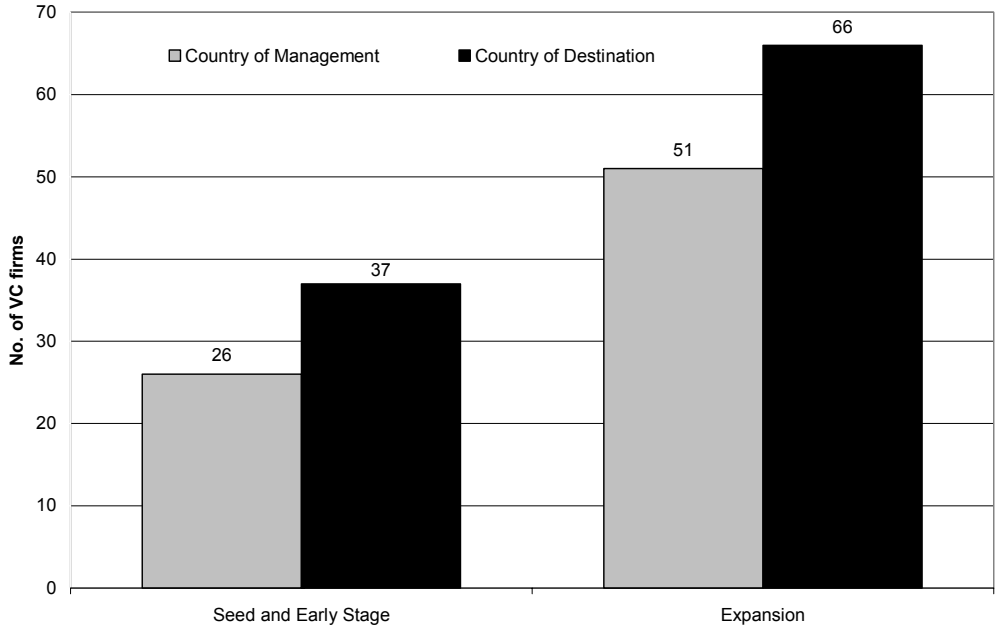


Figure 6: Number of Venture Capital Firms by Financing Stage

Various policy studies have attempted to determine the value-add of seed and early stage financing in the venture capital industry. Holmstrom and Tirole (1997) defined 'innovation ratios' as the ratio of early stage (or high-tech) investments to total venture investments, to measure the extent to which venture capital markets are active. Other studies define a venture capital concentration index where the index is composed of companies that only conduct seed and start-up investments (Israeli Financing Innovation Schemes for Europe, 2001).

The characteristics of the investees in a venture capital firm's portfolio should affect its size because of the implications on deal flow and costs. Cumming (2004) found that larger portfolios were observed among venture capitalists that invested more intensively in early stage firms in North America, suggesting a high number of quality deals.

4.1.1.2.1.Country of Management

As theoretically expected, venture capital firms in the sample that invest in seed and early stage companies are positively related to the number of investees in a portfolio. However, those in the sample that invest only in the later stage are negatively related to the number of investees in a portfolio.

However, based on the model in this report, there is no evidence that under the country of management criterion these relationships are robust across venture capital firms in Africa because the results are not significant even at the 10% level.

4.1.1.2.2.Country of Destination

The relationships under this criterion are identical to those outlined under the country of management criterion above. Similarly, based on the model in this report, there is no evidence that under the country of destination criterion these relationships are robust across venture capital firms in Africa because the results are not significant even at the 10% level.

4.1.1.3.Geographical Focus

In the sample adopted in this report, most venture capital firms focus on investments within their borders as opposed to cross-border investments. This is illustrated in Figure 7 below. It is interesting to note that the majority of international venture capital firms in the sample focus on investment opportunities on the whole continent. This can be observed by the relatively larger increase in the country of destination versus country of management criterion in that category.

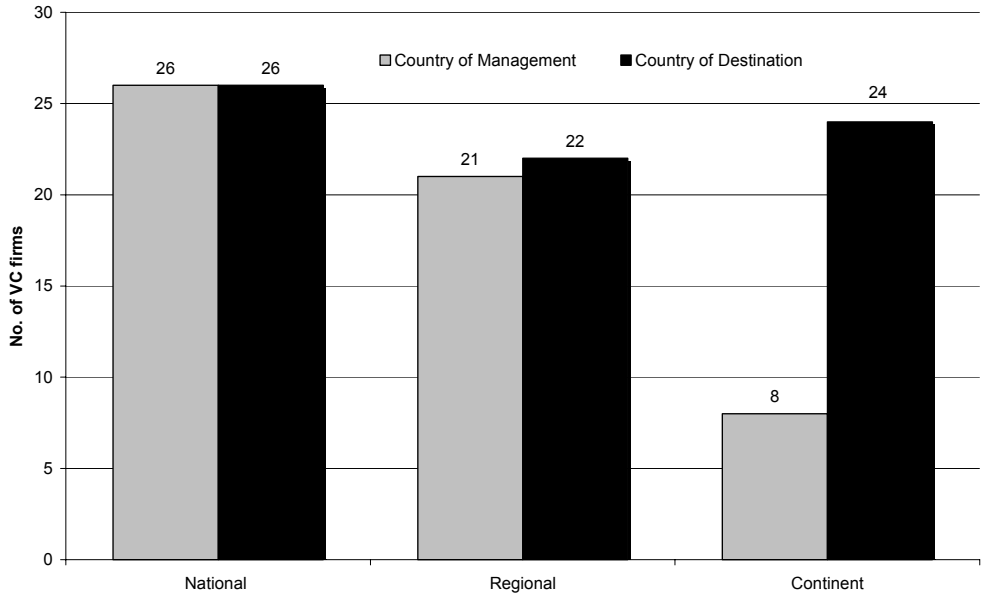


Figure 7: Number of Firms in Sample by Geographical Focus

Despite the diversification benefits and its effect on reducing overall portfolio risk that a regional or continent-wide focus implies, Cumming (2004) finds that venture capital portfolios are smaller among funds with a greater proportion of geographically disparate investments. This is explained by the fact that investees that are more geographically dispersed require extra effort to monitor, which increases the marginal costs of portfolio expansion and lowers efficient portfolio size (Keuschnigg, 2003).

An additional reason why venture capital firms that focus on a more geographically dispersed portfolio may have a smaller number of investees in their portfolios is that

they experience a higher level of political pressure, which can also increase costs due to unnecessary delays in decision making.

4.1.1.3.1.Country of Management

In conformity to theoretical expectation, the venture capital firms in the sample that have a national focus are positively related to the number of investees in a portfolio, while those that have a regional focus are negatively related to the number of investees. However, based on the model in this report, there is no evidence that under the country of management criterion these relationships are robust across venture capital firms in Africa because the results are not significant even at the 10% level.

4.1.1.3.2.Country of Destination

Contrary to theoretical expectation, the venture capital firms in the sample that have a national focus are negatively related to the number of investees in a portfolio. However, based on the model in this report, there is no evidence that under the country of destination criterion this relationship is robust across venture capital firms in Africa because the result is not significant even at the 10% level.

In conformity to theoretical expectation, the venture capital firms in the sample that have a regional focus are negatively related to the number of investees in a portfolio. Furthermore, based on the model in this report, there is evidence that under the country of destination criterion this relationship is robust across venture capital firms in Africa because the results are significant at the 10% level.

4.1.1.4.Location

In the sample adopted in this report, most venture capital firms are located in Southern Africa. This is illustrated in Figure 8 below.

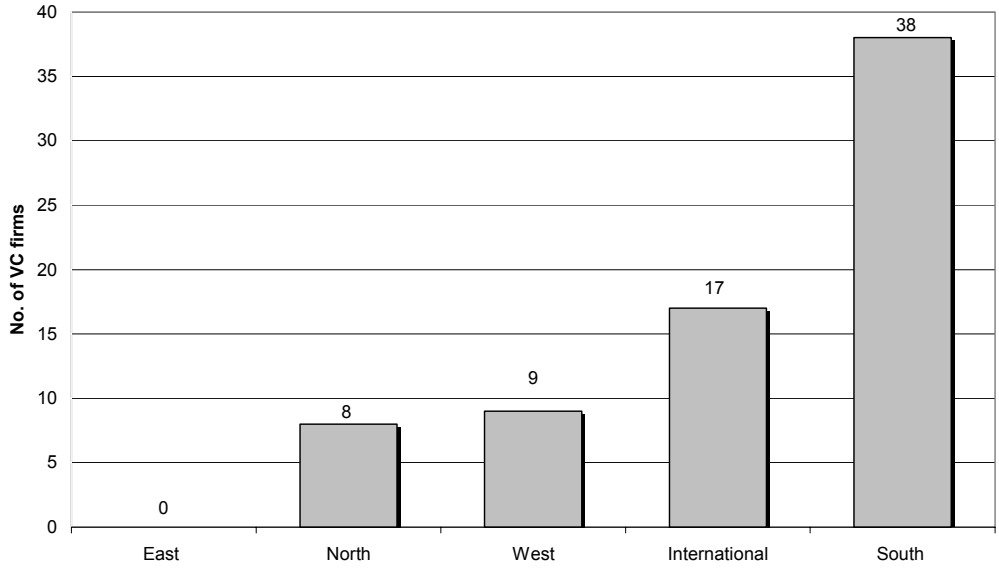


Figure 8: Number of Firms in Sample by Location

Adapppt and NCDO (2005) define the venture capital firm's location, as that of the firm managing the assets of fund. Where several firms manage different funds under one organisational banner e.g. Aureos and Grofin, this report took the head office of these different venture capital firms as its location.

The location of a venture capital firm determines its closeness to innovation clusters and the level of competition it faces, which may affect the number and quality of deals (Bishop, 2004).

4.1.1.4.1.Country of Management

From the venture capital firms in the sample, being located in Northern Africa is positively associated with the number of current investees in a portfolio. However, based on the model in this report, there is no evidence that under the country of management criterion this relationship is robust across venture capital firms in Africa because the result is not significant even at the 10% level.

But, from the venture capital firms in the sample, being located in Southern Africa is negatively associated with the number of investees in a portfolio. Furthermore, based on the model in this report, there is evidence that under the country of management criterion this relationship is robust across venture capital firms in Africa because the result is significant at the 5% level. It can be explained by the fact that, relative to other regions, Southern Africa has the most independent venture capital firms. As mentioned in earlier paragraphs, these firms are associated with fewer investees due to relatively higher costs and more stringent due diligence.

4.1.1.4.2.Country of Destination

The relationships under this criterion are identical to those outlined under the country of management criterion above. Similarly, based on the model in this report, there is evidence that under the country of destination criterion being located in Southern Africa is negatively related to the number of current investees in a portfolio. This relationship is robust across venture capital firms in Africa because the result is significant at the 5% level.

4.1.1.5.Fund Size

In the sample adopted in this report, corporate venture capital firms have the largest average fund size measured by assets under management in USD, while finance venture capital firms have the least. This is illustrated in Figure 9 below. This finding differs from those in Cumming (2004) who found that in North America, direct government investment funds and labour-sponsored funds had larger fund sizes. This difference can be easily explained by the fact that this report's analysis is conducted at the firm level as opposed to fund level as Cumming did.

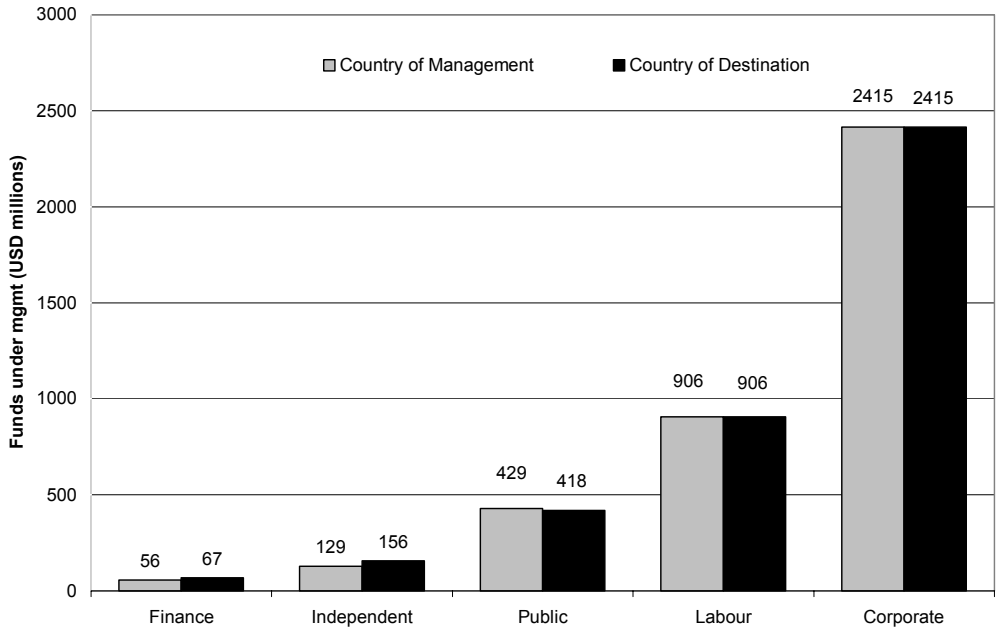


Figure 9: Average Fund Size in Sample by Type

It is intuitive to argue that a larger amount of funds under management is related to more investees. However, it is important to realise that the venture capital investment selection process is rigorous and many companies that approach venture capitalists for funding fail the selection criteria and are usually turned away.

4.1.1.5.1.Country of Management

The fund size for venture capital firms in the sample is negatively related to the number of investees in a portfolio. This does not conform to theoretical expectation and could imply that these firms in the need to drawdown commitments pursue larger size deals that are not found under venture capital but fall more in the private equity category.

However, based on the model in this report, there is no evidence that under the country of management criterion this relationship is robust across venture capital firms in Africa because the result is not significant even at the 10% level.

4.1.1.5.2.Country of Destination

The relationship under this criterion is identical to that outlined under the country of management criterion above. Similarly, based on the model in this report, there is no evidence that under the country of destination criterion this relationship is robust across venture capital firms in Africa because the result is not significant even at the 10% level.

4.1.1.6.Age

In the sample adopted in this report, most venture capital firms are less than 10 years old. This is illustrated in Figure 10 below.

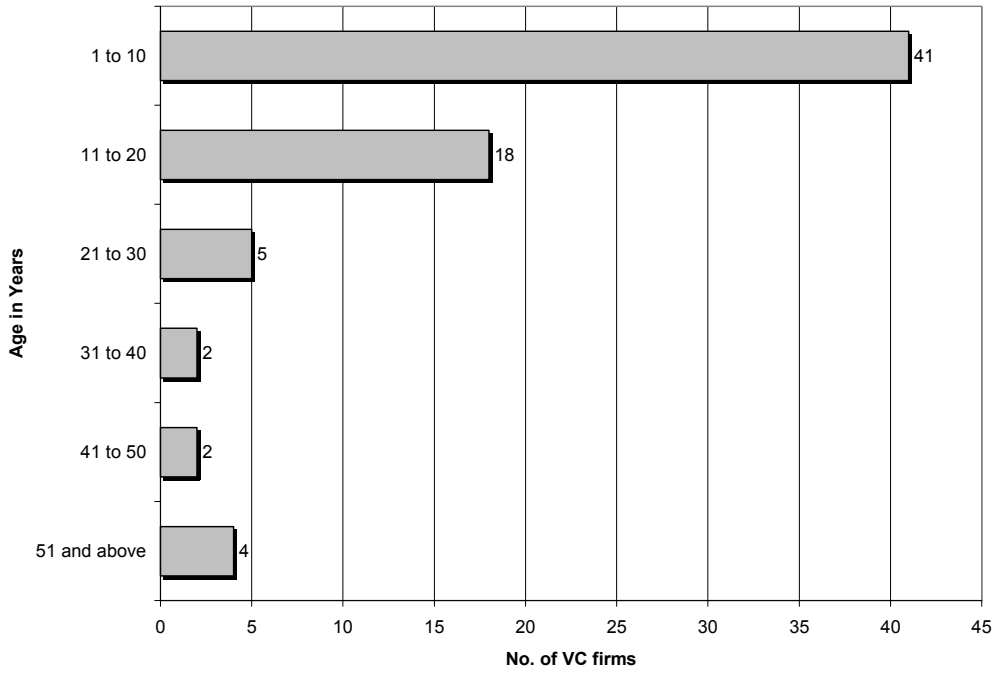


Figure 10: Number of Venture Capital Firms in Sample by Age

One can intuitively argue that the longer a venture capital firm has been in existence the larger the number of current investees in its portfolio. This can arise because of the perception that venture capital experience is acquired, not taught. Venture capital firms that have been around for a long time have built up a reputation and wide network that results in receiving more business plans from entrepreneurs and attracting more investor financing (Gompers & Lerner, 1998).

4.1.1.6.1.Country of Management

In conformity to theoretical expectation, the age of venture capital firms in the sample is positively related to the number of current investees in a portfolio. Furthermore, based on the model in this report, there is evidence that under the country of management criterion this relationship is robust across venture capital firms in Africa because the result is significant at the 1% level.

4.1.1.6.2.Country of Destination

The relationship under this criterion is identical to that outlined under the country of management criterion above. Similarly, based on the model in this report, there is evidence that under the country of destination criterion this relationship is robust across venture capital firms in Africa because the result is significant at the 5% level.

4.1.1.7.Multiple Sectors

In the sample adopted in this report, most venture capital firms focus on multiple sectors as opposed to a single one. This is illustrated in Figure 11 below.

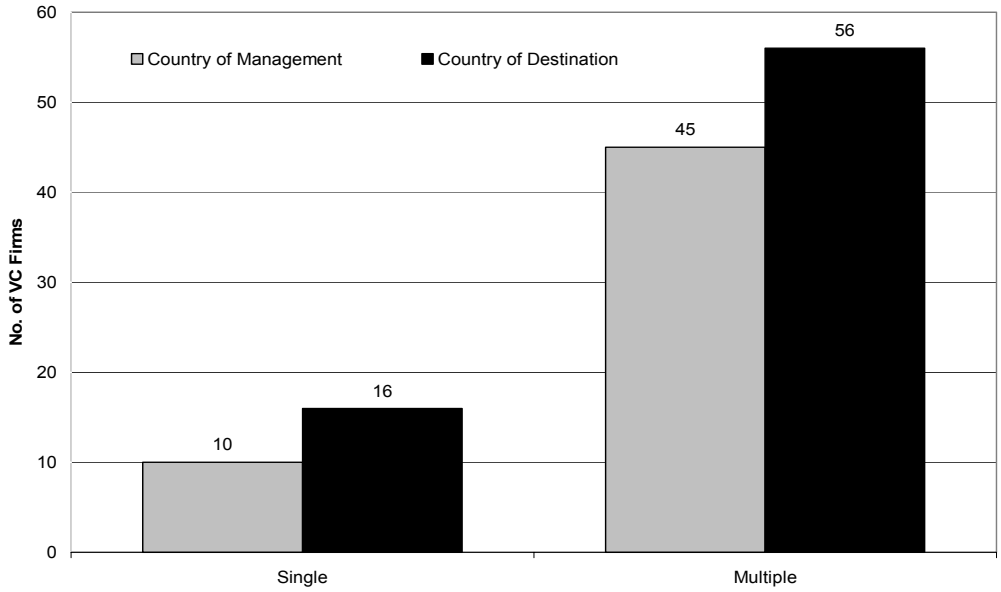


Figure 11: Number of Firms in Sample by Sectoral Focus

Venture capital firms that focus on multiple sectors realise that no one knows where the next big thing will come from. By white boarding, which is the process of searching out new fields for investment, they hedge their bets. Thus as opposed to the previous focus solely on technology, venture capitalists are increasingly aware that winnings could come from a manufacturer, a security company, or an established consumer goods company looking to expand just as readily as they could come from a hot new software company (Business Week, 2005).

However, those that focus on a single sector develop specialised experience in assessing the viability of deals and support in a particular field. Therefore, although it is intuitive to expect that venture capital firms that focus on multiple sectors will have more firms in their portfolio than those that focus on a single sector, those that focus on a single sector will have lower monitoring costs and have an easier due diligence task. For that reason, the expected relationship is ambiguous.

4.1.1.7.1.Country of Management

The venture capital firms in the sample that focus on multiple sectors are negatively related to the number of investees in a portfolio. Furthermore, there is evidence that under the country of management criterion this relationship is robust across venture capital firms in Africa because the result is significant at the 5% level.

This implies that the benefit of specialisation in a single sector outweigh those of white boarding. Therefore, it can be argued that venture capitalists who decide to invest in multiple sectors need to develop the wider the skill set needed to assess and monitor a more varied pool of investees.

4.1.1.7.2.Country of Destination

The venture capital firms in the sample that focus on multiple sectors are positively related to the number of investees in a portfolio. However, based on the model in this report, there is no evidence that under the country of destination criterion this relationship is robust across venture capital firms in Africa because the result is not significant even at the 10% level.

4.1.1.8.Multiple Funds

In the sample adopted in this report, not all firms manage only one fund. This is illustrated in Figure 12 below.

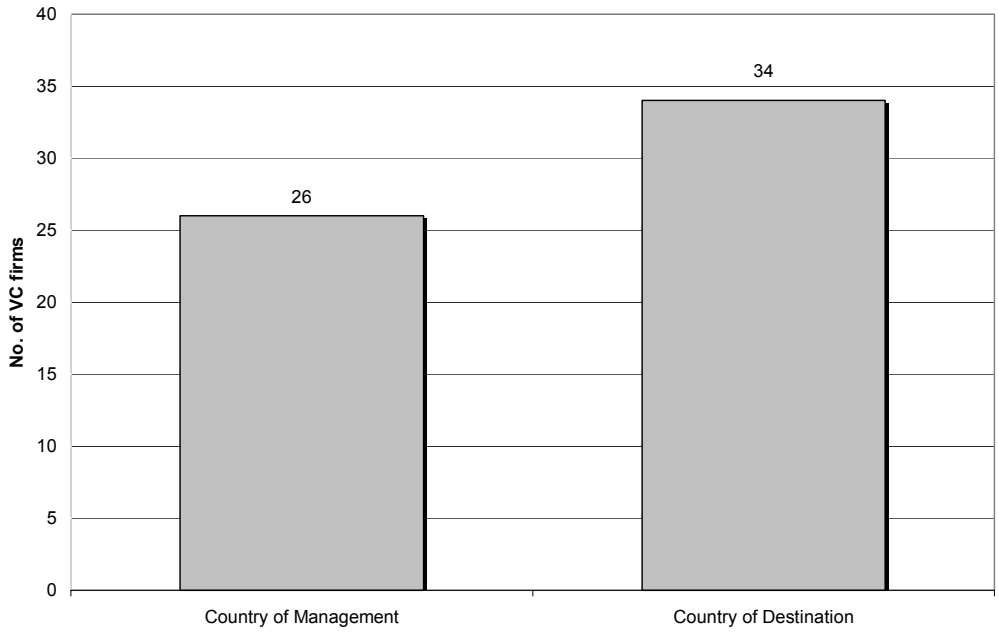


Figure 12: Venture Capital Firms in Sample Managing Multiple Funds

Where venture capital firms manage multiple funds, there is an expectation that they may have a larger portfolio of investees. This is because such firms may be able to share resources and effort across funds that result in complementarities in effort arising from scope economies. In addition, there may also be greater networking benefits than in firms that manage a single fund and benefits from co-investment in portfolio companies by partner funds (Cumming, 2004).

However, there may also be reasons why venture capital firms that manage multiple funds may have smaller portfolios. This can occur where venture capital managers take time away from operating and actively invest pre-raised capital from a first fund to start up a second one (Cumming, 2004).[11]

4.1.1.8.1.Country of Management

The venture capital firms in the sample are positively related to the number of investees in a portfolio. This suggests that the complementarities and networking benefits, which multiple funds create, are important.

However, based on the model in this report, there is no evidence that under the country of management criterion this relationship is robust across venture capital firms in Africa because the result is not significant even at the 10% level.

[11] Venture capital partnership agreements have covenants to mitigate this problem (Gompers & Lerner, 1996).

4.1.1.8.2.Country of Destination

The relationship under this criterion is identical to that outlined under the country of management criterion above. Similarly, based on the model in this report, there is no evidence that under the country of destination criterion this relationship is robust across venture capital firms in Africa because the result is not significant even at the 10% level.

4.1.1.9.Multiple Bottom Line

In the sample adopted in this report, some venture capital firms focus on multiple bottom line criteria, where in addition to financial returns they also adopt social e.g. BEE, environmental or ethical e.g. anti-corruption philosophies in their investments. This is illustrated in Figure 13 below.

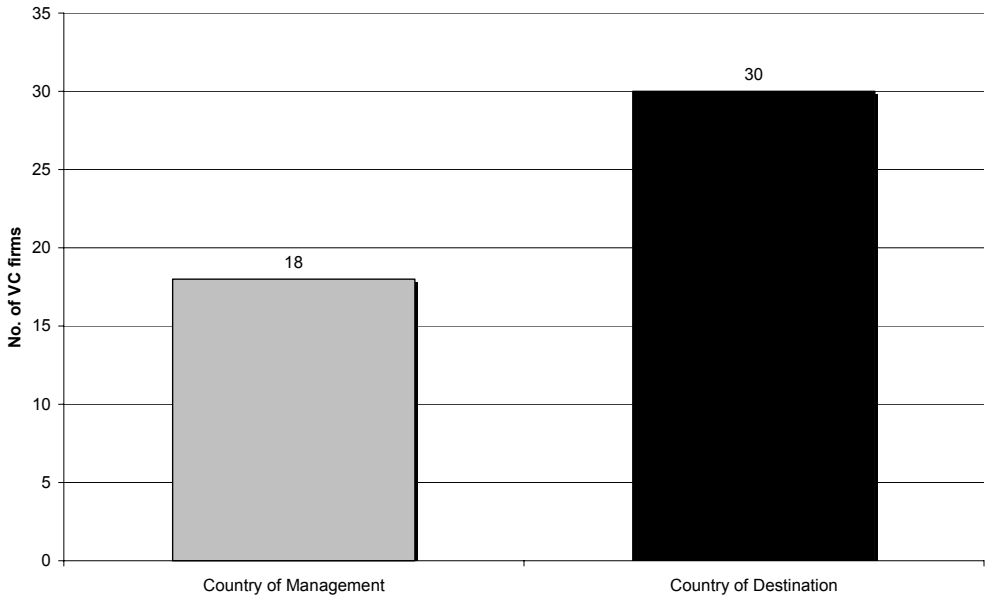


Figure 13: Number of Firms in Sample by Multiple-Bottom Line Criteria

Venture capital firms that adopt multiple-bottom line investment philosophies are distinguished by the fact that they tend to invest in projects that can bring value added in terms of social, environmental, ethical or sustainable development objectives. However, the incorporation of these philosophies is not done at the expense of requiring that investees have the potential to ensure an attractive return to the investors.

Intuitively one would expect that venture capital firms that adopt a multiple-bottom line investment approach would have fewer investees in their portfolio because of their more stringent deal selection criteria.

4.1.1.9.1.Country of Management

Contrary to theoretical expectation, the venture capital firms in the sample that have adopted multiple-bottom line investment philosophies are positively related to the number of investees in a portfolio. However, based on the model in this report, there is no evidence that under the country of management criterion this relationship is robust across venture capital firms in Africa because the result is not significant even at the 10% level.

4.1.1.9.2.Country of Destination

The relationship under this criterion is identical to that outlined under the country of management criterion above. Similarly, based on the model in this report, there is no evidence that under the country of destination criterion this relationship is robust across venture capital firms in Africa because the results are not significant even at the 10% level.

4.1.1.10.Syndication

In the sample adopted in this report, many venture capital firms use a syndicated approach when fund raising. This is illustrated in Figure 14 below.

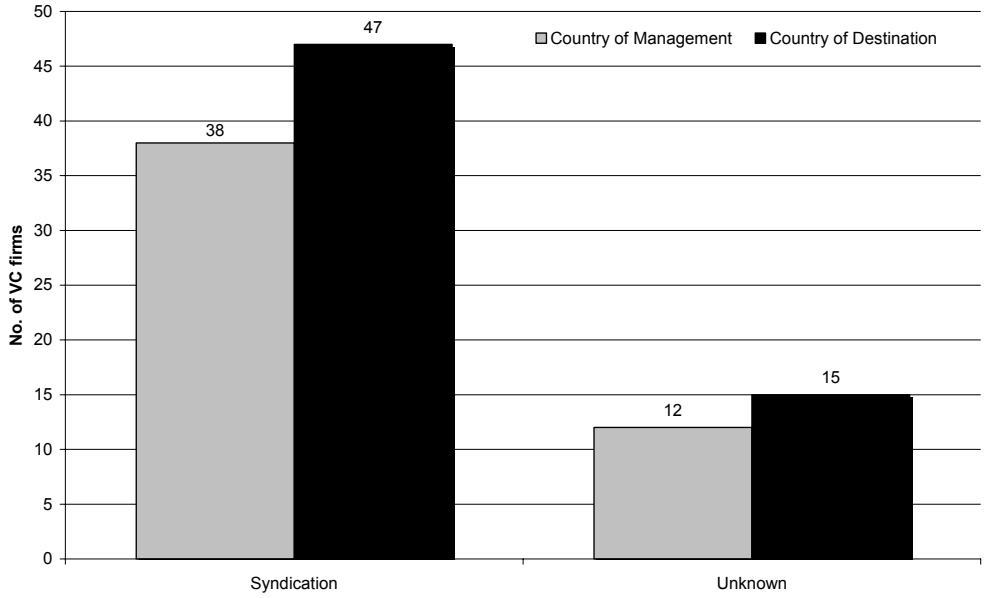


Figure 14: Number of Firms by Use of Syndicated Investor Arrangement

Venture capital finance in Africa is provided by a variety of investors. Cumming (2004) finds that in North America syndication is associated with smaller portfolios. He argues that this is because of agency problems between syndicate partners, which increase costs. However, to the extent that syndicated deal arrangements represent less risk for an individual venture capitalist, it can be related to a higher number of investees.

4.1.1.10.1.Country of Management

The venture capital firms in the sample that have adopted syndicated investment arrangements are positively related to the number of investees in a portfolio. This suggests that the mitigation of risk that syndicated deals represent is important. However, based on the model in this report, there is no evidence that under the country of management criterion this relationship is robust across venture capital firms in Africa because the result is not significant even at the 10% level.

4.1.1.10.2.Country of Destination

The relationship under this criterion is identical to that outlined under the country of management criterion above. Similarly, based on the model in this report, there is no evidence that under the country of destination criterion this relationship is robust across venture capital firms in Africa because the results are not significant even at the 10% level.

4.1.1.11.Majority Stake

In the sample adopted in this report, some venture capital firms are known to take a majority stake in their investees. This is illustrated in Figure 15 below.

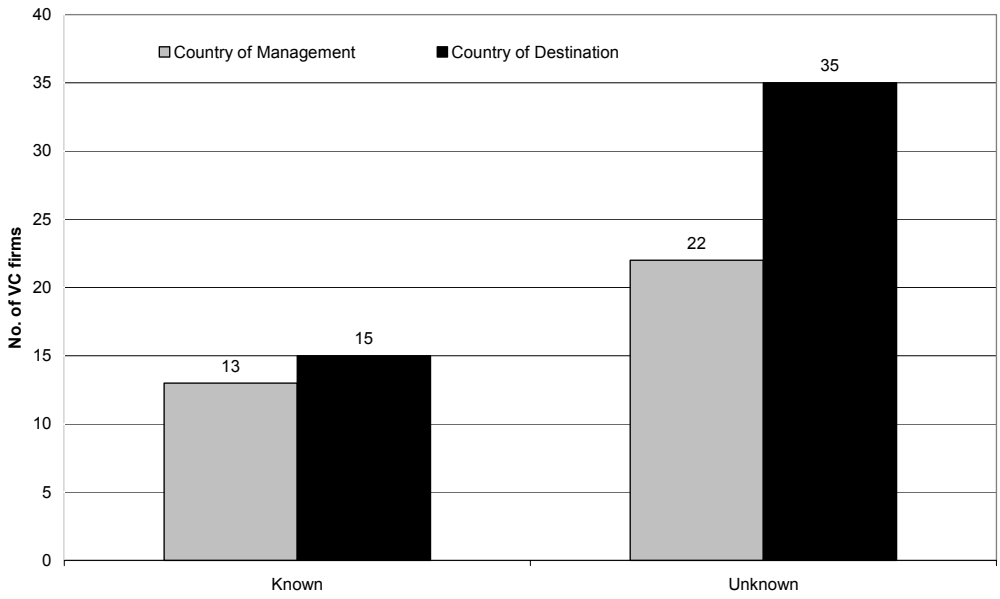


Figure 15: No. of Firms in Sample by Majority Stake in Investee

Due to equity averseness, entrepreneurs are reluctant to give up a majority stake in their investees (Adongo & Stork, 2006). In addition, venture capitalists are hesitant to take these stakes because the change in incentive structure tends to increase monitoring costs and reduces chances of success because innovative investee owners are transformed into employees.

4.1.1.11.1.Country of Management

Contrary to expectation, the venture capital firms in the sample that take a majority stake are positively related to the number of investees in a portfolio. However, based on the model in this report, there is no evidence that under the country of management criterion this relationship is robust across venture capital firms in Africa because the result is not significant even at the 10% level.

4.1.1.11.2.Country of Destination

The relationship under this criterion is identical to that outlined under the country of management criterion above. Similarly, based on the model in this report, there is no evidence that under the country of destination criterion this relationship is robust across venture capital firms in Africa because the results are not significant even at the 10% level.

4.1.2. Innovation

Although the intensity of entrepreneurship can be measured by the number of new firms registered by individuals in a fixed period of time, this information is not captured in any widely available source of data. However, the level of innovation can be proxied by various variables.

The first is the R&D expenditure as a percentage of GDP. This captures current and capital expenditures on creative work undertaken systematically to increase knowledge, including knowledge of humanity, culture and society, and the use of knowledge for new applications that includes basic and applied research and experimental development (World Bank, 2005a).

The second is the number of patent applications filed with a national patent office, by residents or non-residents of a country, for exclusive rights to an invention, which is defined as a product or process that provides a new way of doing something or a new technical solution to a problem. The patent protects the invention for the patent for a set period - usually 20 years (World Bank, 2005a). This variable captures innovative output.

However, it may also reflect the state of regulation, where low patent application could reflect more discriminating screening in the patent process (Gompers & Lerner, 1999 and Kaplan & Stromberg, 2001). In addition, it may also reflect the strength of intellectual property rights, where it is argued that countries lacking strong intellectual property rights tend to have low levels of innovation that is reflected in lower levels of patent applications (Leachman, Kumar & Orleck). Due to these competing hypotheses there is no clear theoretical or empirical consensus regarding the nature and impacts of patenting on venture capital activity (Leachman, Kumar & Orleck).

Unfortunately, in Africa, very few countries have submitted information on these two variables to widely available data sources. Fortunately, one variable that can proxy for the level of innovation in a country, where data has been collected and submitted to widely available data sources exists.

This is the number of published scientific and technical journal articles in physics, biology, chemistry, mathematics, clinical medicine, biomedical research, engineering and technology, and earth and space sciences (World Bank, 2005a). This captures the quality and output of the stock of knowledge in a country. In the sample adopted in this report, the venture capital firms exposed to the highest level of knowledge are located in Southern Africa. This is illustrated in Figure 16 below.

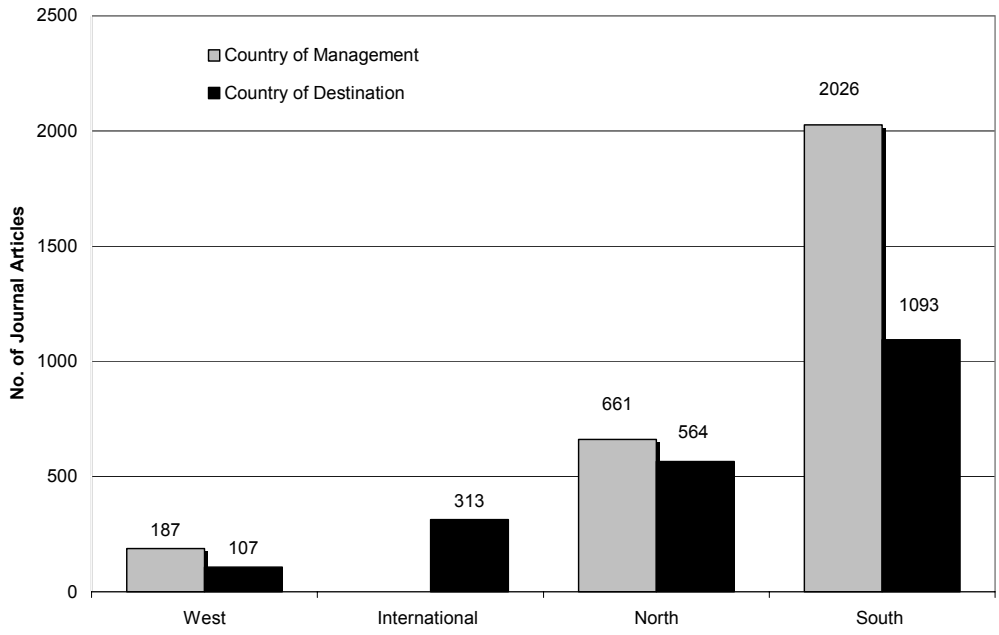


Figure 16: Average Number of Published Journal Articles in Sample by Region in 2001

Romain and van Pottelsberghe (2004) argue that countries with a higher level of innovation and a strong entrepreneurial culture are more likely to be associated with a higher number of quality deals and strong demand for venture capital. This should translate into more investees in firm portfolios.

4.1.2.1.1.Country of Management

Contrary to theoretical expectation, the number of published journal articles in the sample is negatively related to the number of investees in a portfolio. Furthermore, based on the model in this report, there is evidence that under the country of management criterion this relationship is robust across venture capital firms in Africa because the result is significant at the 5% level. This result can be attributed to the

fact that while early stage capital can be provided by the private sector there is dearth of seed capital to convert academic ideas into commercial ventures.

4.1.2.1.2.Country of Destination

The relationship under this criterion is identical to that outlined under the country of management criterion above. However, based on the model in this report, there is no evidence that under the country of destination this relationship is robust across venture capital firms in Africa because the result is not significant even at the 10% level.

4.1.3. Investment Climate

The investment climate can be separated into macroeconomic, financial, bureaucratic, fiscal, legal, technological and political components (Adongo & Stork, 2006). It is argued that a more conducive investment climate is more likely to have a greater level of venture capital activity, which should result in more investees in firms' portfolios (Belke, Fehn & Foster, 2003).

4.1.3.1.Macroeconomic

Macroeconomic factors focus on issues such as the rate of economic growth, levels of interest rate and inflation.

4.1.3.1.1.Economic Growth

Economic growth is captured by the rate of growth of GDP. This is defined as the sum of value added by all resident producers plus product taxes (less subsidies) not included in the valuation of output (World Bank, 2005a). To control for inflation, real GDP is adopted. In the sample adopted in this report, venture capital firms located in Western Africa were exposed to the highest rate of real GDP growth in 2002 under the country of management criterion. Under the country of destination criterion this changed to those in Northern Africa. This is illustrated in Figure 17 below.

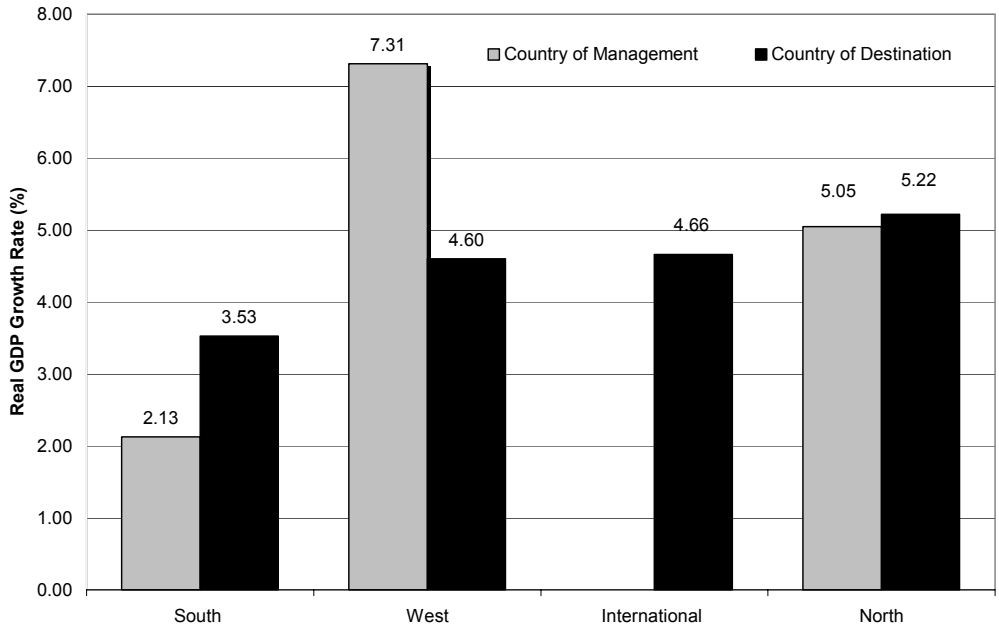


Figure 17: Average GDP Growth Rate in Sample by Region (2002 to 2003)

Empirical studies that analyse vintage cycles in the venture capital industry, where some years provide better firm planting and growing conditions than others, show that venture capital is pro-cyclical (Israeli Financing Innovation Schemes for Europe, 2001 and Romain & van Pottelsberghe, 2004). Jeng and Wells (2000) argue that this is because GDP growth leads to enhanced business opportunities, more economic success, and a more favourable environment for investors that translate into an increase in start-up activity. This implies that during periods of high growth, greater economic optimism should lead to higher deal flow and more investees in venture capital firms' portfolios.

However, investors demand higher returns when GDP growth is high. This could result in fewer investees in a portfolio because less venture capital deals are able to meet these requirements, compared to private equity opportunities. Therefore the expected relationship is ambiguous.

4.1.3.1.1.1.Country of Management

The variable capturing economic growth is not included in the country of management criterion because it is a source of severe multicollinearity.

4.1.3.1.1.2.Country of Destination

Economic growth in the sample is negatively related to the number of investees in a portfolio. This implies that the demand for higher returns outweighs the positive effect of the vintage cycle on venture capital investments. However, based on the

model in this report, there is no evidence that under the country of destination this relationship is robust across venture capital firms in Africa because the result is not significant even at the 10% level.

4.1.3.1.2.Interest Rates

The lending interest rate, which is a short-term interest rate, is the rate charged by commercial banks on loans to prime customers. The real lending interest rate is adjusted for inflation (World Bank, 2005a). In the sample adopted in this report, venture capital firms located in Northern Africa were exposed to the highest real lending interest levels in 2003 under the country of management criterion. Under the country of destination criterion, this changed to those in Western Africa.

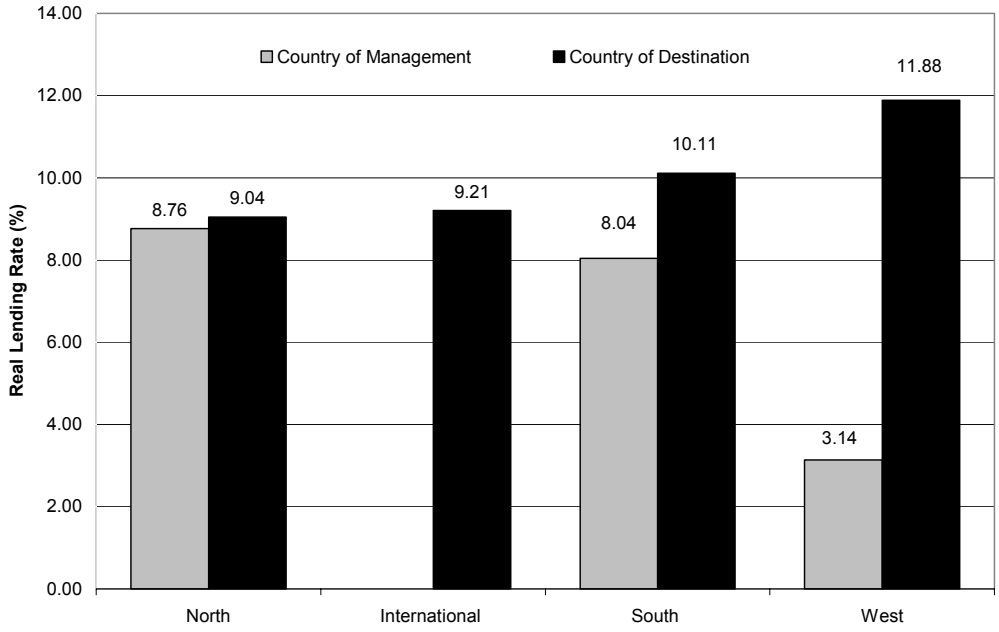


Figure 18: Average Real Lending Rate in Sample by Region (2003)

In economic theory, the real lending rate is a reflection of the real return on investment, the market consensus with respect to risk and the market clearing price for loanable funds. With respect to venture capital, developing countries that rely more heavily on bank lending may be especially sensitive to short-term lending rates (Leachman, Kumar & Orleck, 2002). If short-term interest rates increase, the attractiveness of venture financing versus credit through usual financial institutions increases from the entrepreneur's viewpoint (Romain & van Pottelsberghe, 2004). This should lead to more investees in firms' portfolios. Gompers and Lerner (1998) confirm this positive relationship between short-term, real lending rates and venture capital, empirically.

It is argued that a negative relationship exists between venture capital investment and long-term interest rates, where decreases in interest rates encourage entrepreneurship and thus the desire of people to create their own firm and to engage in R&D activities (Poterba, 1989). This can occur because higher long-term interest rates result in an increase in the return requirement that venture capitalists expect from their investments (Romain & Van Pottelsberghe, 2004). Since fewer firms qualify for venture capital funding when this occurs, one would expect that investees in firms' portfolios would be less. Unfortunately, data on long-term bond yields for a wide number of countries was unavailable at the time this study was conducted therefore; the focus is on short-term rates, leaving the investigation of the effect of long-term interest rates as a potential area for future research.

It would also be interesting to assess whether the risk premium on lending influences the number of investees in venture capital firm portfolios. However, due to the lack of adequate data at the individual country level from widely available sources this is a task that is also best addressed in future research efforts in the area.

4.1.3.1.2.1.Country of Management

Contrary to the theoretical expectation on short-term rates, the real lending interest rate is negatively related to the number of investees in a portfolio. However, based on the model in this report, there is no evidence that under the country of management criterion this relationship is robust across venture capital firms in Africa because the result is not significant even at the 10% level.

4.1.3.1.2.2.Country of Destination

The relationship under this criterion is identical to that outlined under the country of management criterion above. Similarly, based on the model in this report, there is no evidence that under the country of destination this relationship is robust across venture capital firms in Africa because the result is not significant even at the 10% level.

4.1.3.1.3.Inflation

Inflation can be measured by the implicit GDP deflator, which reflects the average annual rate of change in prices for the economy as a whole (World Bank, 2005a). In the sample adopted in this report, venture capital firms located in Western Africa were exposed to the highest inflation rates under the country of management criterion. Under the country of destination criterion, this changes to internationally located venture capital firms. This is illustrated in Figure 19 below.

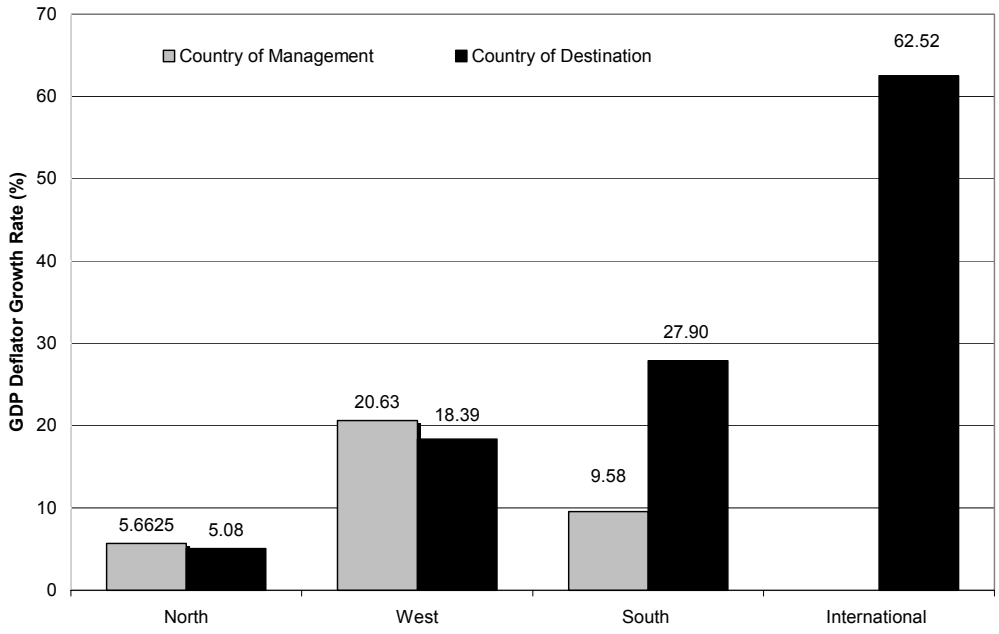


Figure 19: Average Inflation Growth Rate by Region (%)

Empirical studies on investment show that equity investments are a relatively better inflation hedge when compared to other asset classes (Reilly & Brown, 2003). Therefore, one can argue that higher inflation will result in more financing available for venture capital investment. Therefore, it is expected that high inflation rates should result in more investees in venture capital firms' portfolios.

4.1.3.1.3.1.Country of Management

The variable capturing inflation is not included in the country of management criterion because it is a source of severe multicollinearity.

4.1.3.1.3.2.Country of Destination

In conformity to theoretical expectation, inflation in the sample is positively related to the number of investees in a portfolio. However, based on the model in this report, there is no evidence that under the country of destination criterion this relationship is robust across venture capital firms in Africa because the result is not significant even at the 10% level.

4.1.3.2.Fiscal

Fiscal factors focus on issues such as the budget position and taxation. Taxation will be dealt with in the context of the investment climate index further below in this section.

The budget position can be captured by the current account balance, which is defined as sum of net exports of goods and services, net income and net current transfers (World Bank, 2005a). In the sample adopted in this report, venture capital firms located in Southern Africa were exposed to the highest budget deficits. This is illustrated in Figure 20 below.

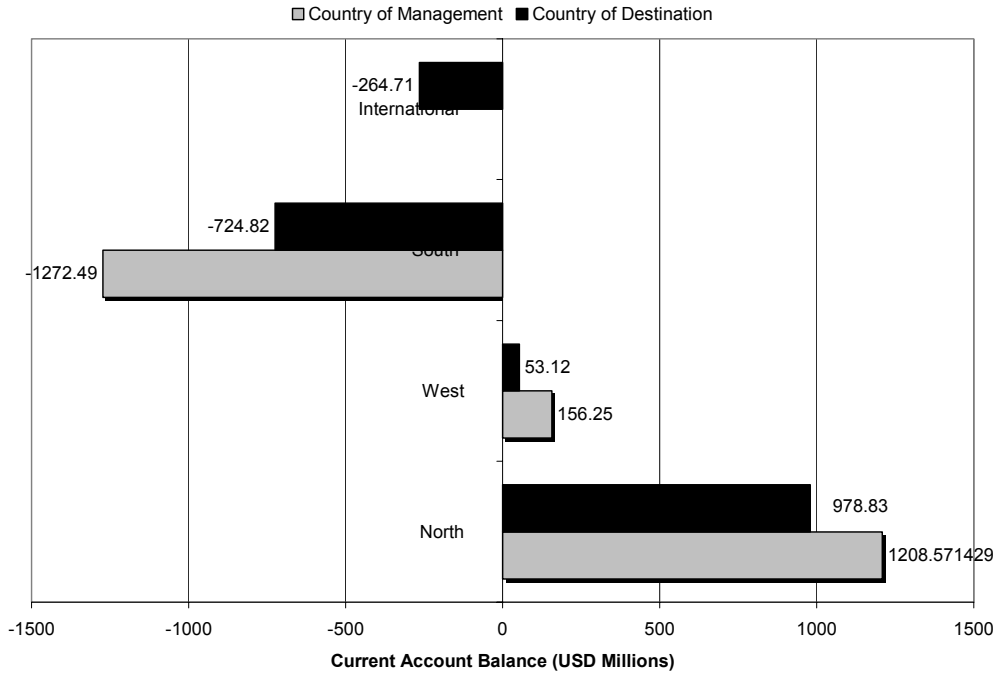


Figure 20: Current Account Balance by Region in 2003

A higher budget deficit indicates a greater level of government involvement in economic activities. In such environments, this implies a less vibrant private sector and lower levels of entrepreneurship. Therefore it is expected that venture capital firms located in environments with higher budget deficits will have fewer investees in their portfolios.

4.1.3.2.1.1.Country of Management

The variable capturing the fiscal position is not included in the country of management criterion because it is a source of severe multicollinearity.

4.1.3.2.1.2.Country of Destination

In conformity to theoretical expectation, a higher budget surplus is positively related to the number of investees in a portfolio. However, based on the model in this report, there is no evidence that under the country of destination criterion this relationship is robust across venture capital firms in Africa because the result is not significant even at the 10% level.

4.1.3.3.Financial

Financial factors focus on the amount of funding available for venture capital investment and the features of the stock market. However, due to the unavailability of data from widely available data sources at the time this study was conducted, an investigation of these factors will have to await a future study.[12]

4.1.3.4.Investment Climate Index

An investment climate index is a composite number that measures various aspects of a country's investment climate. The World Bank and IFC through the Doing Business Survey compile such an index. Its components are illustrated in Table 5 below.

Table 5: Components of Investment Climate Index

FACTOR	FOCUS
Bureaucratic	
Starting a business	• Number of procedures • Time • Cost • Minimum capital required
Closing a business	• Time • Cost • Recovery rate
Dealing with licenses	• Number of procedures • Time • Cost
Trading across borders	• Number of documents • Number of signatures • Time
Registering property	• Number of procedures • Time • Cost
Enforcing contracts	• Number of procedures

[12] The AVCA compiled its first Investment Activity Report in 2005. This can be used in future studies to provide a more accurate measure of the level of funding available for venture capital.

	• Time • Cost
Paying taxes	• Number of payments • Time
Labour Market	
Hiring and firing workers	• Difficulty of hiring • Difficulty of firing • Cost of hiring • Cost of firing • Rigidity of working hours • Rigidity of employment
Information Asymmetry	
Getting credit	• Depth of credit information • Public registry coverage • Private bureau coverage
Legal	
Getting credit [a]	• Strength of legal rights
Protecting investors	• Extent of disclosure • Extent of director liability • Ease of lodging shareholders' suit • Strength of investor protection
Fiscal	
Paying taxes [b]	• Total tax payable as percentage of gross profit

NOTE: a. This component fits better under legal factors. b. This component fits better under fiscal factors.

Source: World Bank and International Finance Corporation (2006)

4.1.3.4.1.Bureaucratic

A higher level of bureaucracy increases the cost of entrepreneurship, especially at the start-up stage. This is expected to reduce deal flow, which should translate into a lower number of investees in venture capital firms' portfolios.

4.1.3.4.2.Labour Market

Various empirical studies have found that the pro-cyclical variation of venture capital and the level of innovation in an economy are reduced by the degree of rigidity in the labour market (Belke, Fehn & Foster, 2003 and Romain & van Pottelsberghe, 2004). Therefore, it can be expected that a higher degree of labour market rigidity should lead to a fewer investees in venture capital firms' portfolios.

4.1.3.4.3.Information Asymmetry

A lower level of information asymmetry makes the cost of lending affordable to a myriad of financial institutions. Due to the greater availability of options for entrepreneurs seeking finance, venture capital deal flows will be adversely affected. However, low information asymmetry is also associated with higher levels of capital market development and better exit conditions. In addition, it is associated with an increased ability of venture capital firms to attract funds from outside investors as opposed to having to rely on internal sources of finance (La Porta, et al., 1997). Finally, low information asymmetry reduces inefficiencies associated with adverse selection and moral hazard. Therefore, it can be expected that higher levels of information asymmetry will be associated with fewer investees in venture capital firms' portfolios.

4.1.3.4.4.Legal

Legal issues pertain to the rule of law and the quality of its enforcement. These determine investor rights i.e. the right to vote out directors who do not pay dividends and to repossess collateral for non-payment of obligations. The protection of investor rights boosts their confidence and makes it easier for firms, especially start-ups, to raise external finance (Leachman, Kumar & Orleck, 2002).

It is intuitive to argue that stronger legal protection should result in more investees in venture capital firm portfolios. However, empirical studies find that the level of protection of investor rights is negatively related to venture capital (Allen & Song, 2003). This is in contrast to empirical findings on the role of law and order in the public financial markets (La Porta et al., 1997). This contradiction is reconciled by arguing that implicit relationships are more important in the venture capital industry than explicit contrasts, which gives support to arguments that venture capital fills the gap that public markets cannot. However, empirical studies find that the level of protection of creditor rights, which is argued to be more important than investor rights, is positively related to venture capital activity (Allen & Song, 2003). Therefore, this relationship is ambiguous.

4.1.3.4.5.Fiscal

It is argued that an increase in the corporate income tax rate will result in venture capital firms increasing their return requirement from investees and a reduced level of entrepreneurship because of its adverse effect on projects' expected returns (Romain & Van Pottelsberghe, 2004). Therefore, one can expect that a high

corporate income tax rate should translate into fewer investees in venture capital firms' portfolios.

It would be interesting to assess whether capital gains tax, the marginal tax rate and the tax structure influences the number of investees in venture capital firm portfolios. However, due to the lack of adequate data at the individual country level from widely available sources, this is a task that is best addressed in future research efforts in the area.

The factors outlined in Table 5 above are captured in the composite index presented in the Doing Business survey.[13] This is used to measure a country's investment climate and rank it relative to others. In the sample adopted in this report, venture capital firms located in Southern Africa were exposed to the most conducive investment climate, where a lower value indicates a higher rank. This is illustrated in Figure 21 below.

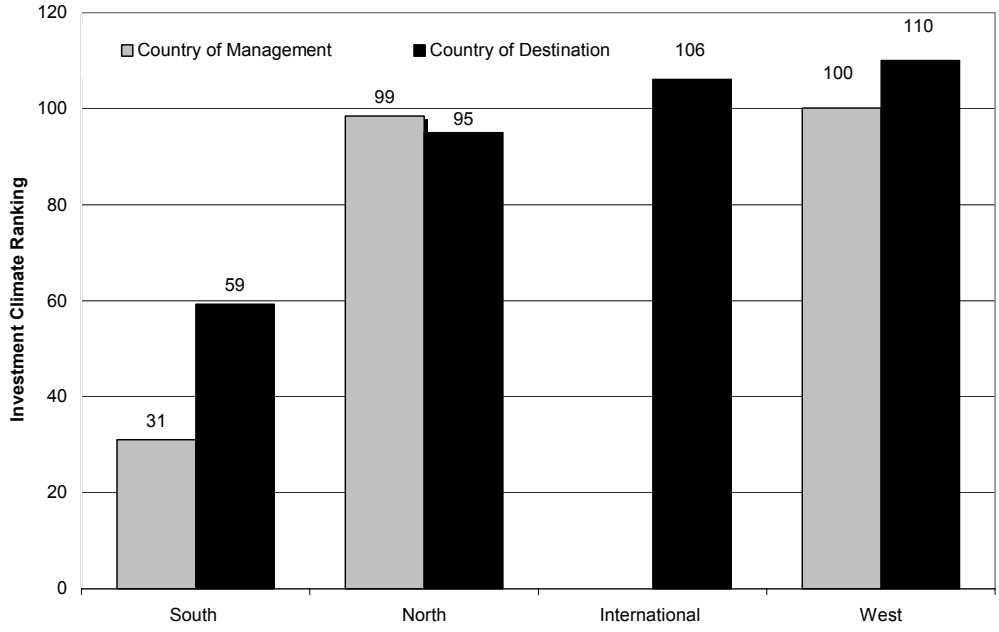


Figure 21: Average Doing Business Survey Ranking by Region in 2006

It is intuitively argued that a more favourable investment climate should be related to a more vibrant venture capital market, translating into more investees in venture capital firms' portfolios.

4.1.3.4.5.1.Country of Management

[13] Since the Doing Business measure is a ranking, the coefficient sign requires a reverse interpretation from its numerical interpretation e.g. 1 is higher than 10.

In conformity to theoretical expectation, the variable capturing the investment climate in the sample is positively related to the number of investees in a portfolio. However, based on the model in this report, there is no evidence that under the country of management criterion this relationship is robust across venture capital firms in Africa because the result is not significant even at the 10% level.

4.1.3.4.5.2.Country of Destination

The relationship under this criterion is identical to that outlined under the country of management criterion above. However, based on the model in this report, there is evidence that under the country of destination this relationship is robust across venture capital firms in Africa because the result is significant at the 10% level.

4.1.3.5.Technological

A more conducive technological environment is expected to reduce the cost of innovation. A greater ability of venture capital firms to control for risks of their investments should translate into more investees in their portfolios. NEPRU, in collaboration with the Links Centre, is currently defining an E-access and E-usage index for small and medium-scale enterprises in 14 countries in SSA (Stork & Deen-Swarray, 2006). It would be interesting to apply this index in future research efforts in the area to test this hypothesis once it is extended to more countries and to a wider profile of information and communication technology users.

4.1.3.6.Political

An uncertain political environment reduces the possibility of exit from venture capital investments, the level of innovation and the rate of innovation. Various proxies are used such as corruption perceptions, the risk of expropriation i.e. outright confiscation or forced nationalisation by the government, likelihood of contract repudiation by the government or the outbreak of wars. Although this report does not assess the influence of these factors on the number of investees in venture capital firms' portfolios, this would be interesting in future research efforts in the area.

5. CONCLUSION

This report represents one of the first attempts to econometrically identify the factors influencing the number of current investees in venture capital firms' portfolios across Africa. It applied OLS to an ANCOVA model, to achieve this objective using two paradigms i.e. the 'country of management' criterion, which captures the characteristics of where the venture capital firm is based and the 'country of destination' criterion, which captures the characteristics of where they invest.

Across both paradigms, there was evidence that the age of venture capital firms across Africa is related to more investees. This implies that older venture capital firms with an established reputation, more experience and a more established network of contacts are able to attract higher deal flows and more investor financing. Also, contrary to expectation, there was evidence that venture capital firms located in Southern Africa are related to fewer investees in their portfolios. This can be attributed to the fact that relative to other regions, Southern Africa had the highest number of independent venture capital firms, which are associated with relatively higher costs than other types of venture capital firms and a more stringent due diligence process.

Under the country of management criterion, there is evidence that venture capital firms across Africa that focus on multiple sectors are related to fewer investees, contrary to expectation. This implies that the benefit of specialisation in a single sector outweigh those of white boarding. Therefore, it can be argued that venture capitalists who decide to invest in multiple sectors need to develop the wider the skill set needed to assess and monitor a more varied pool of investees.

Also, contrary to expectation there is evidence that the number of articles published in scientific and journal articles is related to fewer investees. This implies that, in Africa, there is a dearth of seed capital to convert academic ideas into commercial ventures.

Under the country of destination criterion, there is evidence that venture capital firms located internationally are related to fewer investees. This implies that firms based on the continent benefit from a first-mover advantage. Also under the country of destination criterion, there is evidence that a regional investment focus is associated with fewer investees due to the higher monitoring costs and more intense political pressure. Finally, there is evidence that a more conducive investment climate is related to more investees.

The findings of this report lead to several recommendations. First, venture capital firms in Africa should invest in brand positioning and good institutional governance to build positive, long-lasting reputations. Second, venture capitalists with a regional or continent-wide focus should investigate the outsourcing of the due diligence function to firms with a wide variety of expertise and develop a pool of highly skilled retired professionals in a wide variety of areas that they can use to monitor their

investees. Third, seed capital should be channelled to converting academic ideas into commercial ventures. Fourth, internationally based venture capital firms should hire fund managers on the continent to also benefit from first mover advantage when seeking investees. Fifth, more information should be collected on variables capturing patent applications, capital gains tax, financial market features, technological access and usage and political factors to determine how these features affect the impact of venture capital, measured by the number of current investees in a portfolio. Finally, regulators should enforce investment climate frameworks to improve their investment climate because this has the potential to increase the impact of venture capital on their economies in a manner similar to the Chinese experience (Zeng, 2004).

Despite these findings it is important to emphasise that this report was aimed at identifying broad patterns to support the efforts of policymakers and practitioners in Namibia and the rest of the continent to identify best practices that can nurture and boost the effectiveness of venture capital in promoting innovation, which creates benefits arising from its positive externalities on the economy. Therefore, it is important to note that substantial heterogeneity in the venture capital industry exists due to differences in the countries themselves. These can be examined in the context of country-specific studies.

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Appendix A: Technical Discussion

Under the country of management criterion, the function this report estimated is specified below as follows:

$$\ln\frac{C_i}{PF_i} = \beta_0 + \beta_1 PUBLIC_i + \beta_2 CORP_i + \beta_3 FIN_i + \beta_4 INDPT_i + \beta_5 SEED_i$$
$$+ \beta_6 LATER_i + \beta_7 NATION_i + \beta_8 REGION_i + \beta_9 INTL_i + \beta_{10} NORTH_i + \beta_{11} SOUTH_i$$
$$+ \ln\beta_{12}\frac{FSIZE_i}{PF_i} + \ln\beta_{13} AGE_i + \beta_{14} MULSEC_i + \beta_{15} MULFUND_i + \beta_{16} MULBOT_i$$
$$+ \beta_{17} SYNDICT_i + \beta_{18} MAJOR_i + \ln\beta_{19}\frac{JOURN_i}{PD_i} + \ln\beta_{20}\frac{RLI_i}{PD_i} + \ln\beta_{21} INVCLIM_i + \varepsilon_i$$

Equation 2: Country of Management Estimated Function for ANCOVA model

Under the country of destination criterion, the function this report estimated is specified below as follows:

$$\ln\frac{C_i}{PF_i} = \beta_0 + \beta_1 PUBLIC_i + \beta_2 CORP_i + \beta_3 FIN_i + \beta_4 INDPT_i + \beta_5 SEED_i$$
$$+ \beta_6 LATER_i + \beta_7 NATION_i + \beta_8 REGION_i + \beta_9 INTL_i + \beta_{10} NORTH_i + \beta_{11} SOUTH_i$$
$$+ \ln\beta_{12}\frac{FSIZE_i}{PF_i} + \ln\beta_{13} AGE_i + \beta_{14} MULSEC_i + \beta_{15} MULFUND_i + \beta_{16} MULBOT_i$$
$$+ \beta_{17} SYNDICT_i + \beta_{18} MAJOR_i + \ln\beta_{19}\frac{JOURN_i}{PD_i} + \ln\beta_{20}\frac{GDPG_i}{PD_i} + \ln\beta_{21}\frac{INF_i}{PD_i} + \ln\beta_{22}\frac{BUDBAL_i}{PD_i}$$
$$+ \ln\beta_{23}\frac{RLI_i}{PD_i} + \ln\beta_{24} INVCLIM_i + \varepsilon_i$$

Equation 3: Country of Destination Estimated Function for ANCOVA model

For a full definition and description of each variable see Appendix B below.

Heteroscedasticity

Heteroscedasticity refers to the condition where the disturbances, u_i, appearing in a population regression function all have different variances.

$$E\left(u_i^{\,2}\right) = \sigma_i^{\,2} \qquad i = 1,2,3,\ldots,n$$

Equation 4: Heteroscedasticity

To control for differences heteroscedasticity the quantitative variables capturing the characteristics of the venture capital firm that would be affected by size were

normalised by the number of professional fund managers in the organisation, PF.[14] The choice of this variable to use when rationalising is based on Cummings (2004), who finds that funds that have more managers have larger portfolios. Similarly, the variables capturing innovation and the investment climate were normalised by the population density of the relevant countries, PD.

Upon estimation, an analysis of the residual arising from the estimation of the specific function in the ANCOVA model indicated that heteroscedasticity existed in the dataset used in this report. To correct for this, the robust covariance matrix procedure in LIMDEP was used.

Multicollinearity

Multicollinearity refers to a condition where the explanatory variables are linearly intercorrelated either perfectly or less than perfectly as follows:

$$\lambda_1 X_1 + \lambda_2 X_2 + \ldots + \lambda_k X_k = 0$$

Equation 5: Multicollinearity.

Multicollinearity is a feature of any econometric model and is only a problem if it is severe. Severe multicollinearity is defined as a case where the explanatory variables have a correlation factor exceeding 0.8 (Gujarati, 2003). Since our dataset consists of zero-one dummy variables, it is not easy to apply standard tests of multicollinearity such as correlation matrices or auxiliary regression analysis to assess multicollinearity.

However, severe multicollinearity did not arise in the variables capturing the venture capital firms' features. It was only identified between the quantitative variables capturing innovation and the investment climate. Where this occurred, these variables were dropped.

[14] With this normalisation, the dependent variable becomes the number of investees in a fund portfolio per fund manager, which is almost similar to Cumming (2004), who measured the investment rate per fund manager i.e. investees per fund manager over several years.

Appendix B: Descriptive Statistics for Variables in ANCOVA model

Variable	Definition	Country of Management		Country of Destination	
		Mean	Standard Deviation	Mean	Standard Deviation
DEPENDENT VARIABLE					
INV	Natural log of number of investees in venture capital firm's portfolio	0.82606	1.2357	0.57645	1.45099
ORGANISATIONAL FORM					
PUBLIC	Dummy equals one if it is a public venture capital firm	0.14545	0.355807	0.291667	0.45772
CORP	Dummy equals one if it is a corporate venture capital firm	0.10909	0.31463	0.08333	0.2783
FIN	Dummy equals one if it is a finance venture capital firm	0.18182	0.3892	0.15278	0.3623
LAB	Dummy equals one if it is a labour-sponsored venture capital firm	0.09091	0.29013	0.06944	0.25599
INDPT	Dummy equals one if it is an independent venture capital firm	0.4727	0.50386	0.40278	0.4939

LOCATION					
NORTH	Dummy equals one if firm is located in northern Africa	0.1455	0.35581	0.1111	0.3165
WEST	Dummy equals one if firm is located in western Africa	0.1636	0.3734	0.125	0.333
SOUTH	Dummy equals one if firm is located in southern Africa	0.69091	0.4664	0.52778	0.5027
INTL	Dummy equals one if firm is located outside Africa	-	-	0.2361	0.4277
FOCUS					
NATION	Dummy equals one if firm has a national investment focus	0.47273	0.50386	0.3611	0.48369
REGION	Dummy equals one if firm has a regional investment focus	0.38182	0.4903	0.3056	0.4639
CONTIN	Dummy equals one if firm has a continental	0.1455	0.35581	0.3333	0.4747

	investment focus				
SEEDEARL	Dummy equals one if firm invests in the seed and early stages	0.47273	0.50386	0.51389	0.50332
LATER	Dummy equals one if firm invests in the later stages	0.9273	0.262082	0.91667	0.2783
SINGSECT	Dummy equals one if firm invests in a single sector	0.18182	0.3893	0.2222	0.41866
MULSECT	Dummy equals one if firm invests in multiple sectors	0.8182	0.3893	0.7778	0.41866
OTHER CHARACTERISTICS					
FSIZE	Natural log of number of assets under management in USD	16.0205	2.3378	16.17297	2.15697
AGE	Natural log of firm's age in years	2.2379	0.7172	2.3503	0.7563
MAJOR	Dummy equals one if firm takes a majority stake in its investees	0.2364	0.42876	0.2083	0.40897
SYNDICT	Dummy equals one if firm adopts a syndicated	0.69091	0.46638	0.65278	0.4794

	investment strategy				
MULFUND	Dummy equals one if firm manages multiple funds	0.47273	0.50386	0.4722	0.5027
MULBOT	Dummy equals one if firm adopts multiple-bottom line philosophies	0.3273	0.4735	0.41667	0.4965
PROF	Natural log of number of professional fund managers	1.71885	0.71189	1.84967	0.81546
MACROECONOMIC					
GDPG	Natural log of the real GDP growth rate (%) in 2002			-2.60464	0.8654
INF	Natural log of the GDP implicit deflator (%) from 1990 to 2003			-1.13085	1.0351
BUDBAL	Natural log of the current account balance (USD millions) in 2003			0.4436	1.4971
RLI	Natural log of the real lending interest rate	-1.15772	1.0126	-1.5639	1.0305

	in 2003				
PD	Natural log of population density per square kilometre in 2003	3.789151	0.956799	3.983832	0.825852
ENTREPRENEURIAL ENVIRONMENT					
INVCLIM	Natural log of the ranking in the Doing Business survey of 2006	3.74658	0.6084	4.25165	0.5725
JOURN	Natural log of the number of scientific and technical journal articles published in 2005	2.8569	1.8736	1.7248	1.5812
	No. of Observations		48	No. of Observations	64

Note: The quantitative venture capital firm variables that would vary with size are normalised by the number of investment professionals. The quantitative macroeconomic variables are normalised by the population density per square kilometre in 2003.