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2013-08-27
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AFRICAN FRONTIER MARKETS: EXTENT OF ILLIQUIDITY AND INHERENT PRIVATE EQUITY INVESTMENT OPPORTUNITIES

by

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687615

A research report submitted in partial fulfillment of the requirements for the degree Master in Management (Finance and Investments) at the

UNIVERSITY OF THE WITWATERSRAND BUSINESS SCHOOL

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ABSTRACT

This study investigates the current private equity market in African frontier markets as well as inherent investment opportunities in these African frontier markets. The research includes an analysis of, inter-alia, the following: the development of capital markets in Africa, the classification of African frontier markets, the measurement of liquidity, the relationship between liquidity and asset prices and the history of private equity. This study will highlight to policymakers both in African and in donor capitals the need to implement strategies that will support investment (especially private equity investment) into the continent. The research carried out in this study should contribute to a better understanding of illiquidity risks of African frontier markets and show how these can be mitigated. This study will also provide key information on African frontier markets to investors and fund managers in order for them to understand that a typical investment strategy for investing in developed markets cannot be applied to frontier markets. The study analyses data of listed stocks on selected African stock exchanges and compares this to data for similar stocks listed on developed world stock markets to examine the relationship between liquidity, earnings multiples and market capitalisations for these stocks. Interestingly, results show that, while there is no relationship between the liquidity of stocks and the Price Earnings (PE) multiples of stocks, there is strong evidence to suggest that a relationship exists between the liquidity of stocks and the Enterprise Value to EBITDA (EV/EBITDA) multiples of stocks. Furthermore, we find strong evidence that African frontier market stocks are significantly less liquid and have lower earnings multiples than stocks with similar market capitalisations listed on stock exchanges in the developed world.

1. INTRODUCTION

A very common consideration for investors investing in public equity markets is the earnings multiple of a company. However, many investors (with the exception of sophisticated investors such as mutual fund managers or other investment professionals) tend to overlook the importance of liquidity of stocks. This study examines the relationship between asset prices and liquidity.

Private equity is probably one of the most misunderstood investment classes, probably because so few people actually know how it works. Very often private equity is associated with opportunistic asset strippers and people who destroy companies. Just like private equity, African frontier markets is a region that few investment managers know a lot about probably because it is not traditionally a geographical region that investment managers typically look to invest in. This study will provide information on the investability of African frontier markets as well as some insights into private equity.

Finally, a sample of stocks in African frontier markets will be compared to their global counterparts and the results will be analysed in detail.

1.1 PROBLEM STATEMENT

Illiquidity is a major constraint on Africa's stock markets. Kenny and Moss (1998) found that the limited number of small bourses in Africa (excluding South Africa) are highly illiquid and that in 1995 eight of the world's 12 most illiquid exchanges were in Africa. They also found that a major concern for overseas institutional investors that prevented them from participating in African stock markets were risks associated with illiquidity. This view is supported by Moss et al. (2007) who found that African stock markets are not treated differently to other stock markets because if African stock markets were treated differently, then investors would not act in a rational manner in respect to the continent's investment opportunities. Moss et al. (2007) found that certain hurdles such as lack of information, perceptions of excessive risk, or other unknown variables were systematically discouraging investors from bringing their capital into Africa. Because they found that investors are acting rationally in terms of investing in African stock markets, they concluded that the primary deterrents preventing foreign institutional investors from investing in African stock markets (other than South Africa) are the small size of the markets and the low levels of liquidity in these markets. According to Reuters (2011), poor but fast-growing, Malawi and other Sub-Saharan African countries would offer huge opportunities to international equity investors were it not for the liquidity scourge. Markets across the continent are hampered by a lack of liquidity, making it nearly impossible to take stakes in all but the biggest firms (Reuters, 2011).

The low liquidity of African stock markets is likely to have the effect of undermining market efficiency. Fama (1970) developed the idea of market efficiency by analysing the timely incorporation of information into stock prices. Fama (1970) found that markets can take on one of three forms, namely: weak form - where only historical information is factored into stock prices; semi-strong form - where all publicly available information is factored into stock prices; or strong form where non-public information known by investors or groups (who have monopolistic access to this information)

is factored into stock prices. The view that illiquidity leads to inefficiency is supported by Chordia et al. (2008) who found that improved liquidity appeared to engender a higher degree of informational efficiency.

A liquid market is one in which buyers and sellers can trade into and out of positions quickly and without having large price effects. Therefore, in order to better understand the illiquidity of African frontier markets, we will examine to what extent they are efficient. Smith et al. (2002) tested whether eight African stock markets follow a random walk using multiple variance ratio tests and found that of the eight markets tested (South Africa, Egypt, Kenya, Morocco, Nigeria, Zimbabwe, Botswana and Mauritius), only the JSE (South Africa) was found to follow a random walk and therefore to be weak form efficient. All the other markets were found to be inefficient. This finding was supported by Yartey and Adjasi (2007) who also concluded that African stock markets are small, illiquid, with infrastructural bottlenecks and weak regulatory institutions.

Moss et al. (2007) suggest that South Africa is now a leading destination of capital, but that few managers invest elsewhere on the continent. Africa's frontier markets (those outside South Africa) still only receive a tiny fraction of capital investment funds that are earmarked for emerging markets. Therefore, stocks listed on Africa's frontier markets are more thinly traded than their global counterparts which results in investors facing higher transaction costs and having more difficulty to liquidate their investments. The illiquidity of African frontier markets is a vicious circle because if markets are illiquid and inefficient, then this drives market participants away. Chuan (1994) found that the illiquidity of emerging markets is a serious impediment to institutional investors' purchases of emerging market securities.

Trading in illiquid markets can also be problematic. Amihud et al. (2005) found that in illiquid markets, market participants have difficulty in locating a counterparty who is willing to trade a particular security or a large enough quantity of a given security to meet the requirements of the investor. Furthermore, they found that in an illiquid market, once a counterparty is located, the agent must negotiate the price in a less than perfectly competitive environment since alternative trading partners are not immediately available.

Stocks in illiquid markets may also be significantly mispriced because the real price of a stock cannot be discovered. Price discovery is the mechanism by which asset market prices are formed. It is a process of information aggregation, where market participants' opinions about an asset's value are summarized in that asset's market price. Because shares are not frequently traded in illiquid markets like frontier markets, there is often a lack of information on stock prices, which hinders price discovery. Therefore, stock prices may become "out of date" or "stale" because recent information released to market participants has not yet been accounted for in current share prices because no trading has occurred since the information was released to the market. The only way information can

be factored into a stock price (i.e. change the stock price) is through a trade, so a trade has to occur for information to be taken into account in the share price.

When markets are illiquid, companies often find it challenging to raise capital via public equity markets (whether by way of initial public offering or secondary equity offering). This view is supported by Mensah (2003) who believes that Africa's capital markets are relatively undeveloped and that as a result, the vast majority of African companies do not rely on external equity finance. For years, companies in African frontier markets have suffered because many of them may not have not been able to tap into the public equity capital markets to raise capital for expansion. This has no doubt hindered the growth and the development of firms operating on the continent.

It has been said that private equity investment could alleviate the illiquidity problem in frontier markets. Bekker (2011) recommends that due to liquidity constraints investors should have a private equity mind set when approaching Africa. Apps (2011) concurs with Bekker's view and says that with Africa's stock markets relatively shallow, illiquid, and underdeveloped, taking a stake in companies through private equity is one of the few ways investors can access some of Africa's emerging economies. Furthermore, because private equity is based on the premise of long term investing (private equity funds typically have long investment horizons i.e. between five and seven years), no portfolio rebalancing (buying and selling of shares) usually occurs in this investment period. This is in stark contrast to mutual funds and asset managers who invest in listed stocks and continuously rebalance their portfolios (i.e. buy and sell shares) in order to, inter-alia, de-risk, remain within the fund mandate, and/or maximise performance. Private equity managers tend to follow a buy and hold strategy (i.e. no shares are usually sold before the end of the investment period and shares are only sold when, inter-alia, the investment has performed sufficiently well to allow the private equity firm to exit from the investment – i.e. the target internal rate of return has been achieved).

But the illiquidity of African frontier markets is also a problem for private equity firms wanting to invest in Africa for the following two reasons:

1. Because private equity firms often rely on the share price of listed companies (as proxies) to assist in valuing unlisted companies, a technique called "pure play". The pure play method is a method for estimating the cost of capital for an unlisted company and involves examining other listed companies, which operate in a similar line of business and inferring a cost of capital based on their capital structures and betas. As noted above, price discovery is a problem for stocks in illiquid markets and therefore private equity firms risk overvaluing a company and paying too much for it.
2. It can be very challenging for private equity funds to exit investments. With limited opportunities for initial public offerings in thinly traded, mostly illiquid African stock exchanges, the most common exit for a private equity fund selling a portfolio company is via

the "trade sale" where a strategic buyer purchases the company (Apps, 2011). But trade sales in African frontier markets are also problematic due to the limited number of buyers of companies present in African frontier markets.

Africa will continue to profit from rising global demand for oil, natural gas, minerals, food, arable land, and other natural resources. The continent boasts an abundance of resources, including 10% of the world's reserves of oil, 40% of its gold, and 80% to 90% of the chromium and platinum group metals. Foreign direct investment in Africa has increased from $9 billion in 2000 to $62 billion in 2008 – almost as large as the flow into China, when measured relative to GDP (Alatovik et al., 2010). The biggest problem investors face in capitalising on the future growth of the African continent is the illiquidity of stocks listed on African frontier stock markets. Therefore, it is key that another investment medium be identified which is more suitable for investment in African frontier markets.

This paper attempts to build on the African frontier market literature by assessing the risks as well as the opportunities that frontier markets present. In determining the illiquidity of African frontier markets, a sample of selected stocks listed on the following exchanges:

- Botswana Share Market
- Bourse Regionale des Valeurs Mobilieres (Ivory Coast)
- Nairobi Stock Exchange (Kenya)
- Tanzania Stock Exchange
- Uganda Stock Exchange
- Lusaka Stock Exchange (Zambia)
- Ghana Stock Exchange[1]

will be closely examined and compared to a sample of stocks with the same market capitalizations listed on the biggest stock exchanges in developed markets. Details of how the stock markets and the stocks trading on those exchanges were selected are set out in chapter 2 of this document.

1.2 PURPOSE STATEMENT

The purpose of this paper is as follows:

1. To examine both the liquidity and the relative prices (earnings multiples) of frontier market stocks compared to stocks in developed markets to ascertain whether there is a relationship between liquidity and asset prices (measured by way of earnings multiples) and whether

African frontier market stocks are indeed more illiquid than stocks trading on developed markets.

[1] Note that the required data for the stocks selected on the Ghana Stock Exchange could not be obtained and thus a sample of stocks (with the same market capitalisation of the stocks selected on the Ghanaian Stock Exchange) was selected from the Nigerian Stock Exchange.

2. To explore whether African frontier market stocks are "cheaper" than stocks in developed markets by examining the average Enterprise Value to EBITDA (EV/EBITDA) and Price earnings (PE) multiples of frontier market stocks and seeing how they compare to stocks with similar market capitalisations listed on exchanges in developed markets.
3. To provide broad insight into private equity, African frontier markets, the illiquidity of African frontier markets and inherent private equity investment opportunities in African frontier markets.

1.3 RESEARCH OBJECTIVES AND AIMS

Objective 1: To determine to what extent the illiquidity of stocks influences asset prices (EV/EBITDA and PE multiple) and vice versa.

Objective 2: Determine whether African frontier market stocks are, on average, "cheaper" than their counterparts in the developed world (i.e. have lower PE and EV/EBITDA multiples).

Objective 3: Provide insights into African frontier markets and private equity activity in African frontier markets.

1.4 QUESTIONS OF THE STUDY

Going by the purpose of this study the following specific questions are relevant:

1. Are African frontier market stocks more illiquid than similar stocks (similar by way of market capitalisation) trading on exchanges in developed markets?
2. Are African frontier market stocks "cheaper" (meaning they have lower PE and EV/EBITDA multiples) than similar stocks (i.e. same market capitalisations) in the developed markets?
3. To what extent do relationships exist between the following variables: PE or EV/EBITDA multiples and market capitalisation of stock and liquidity of stocks?
4. What has been the impact of the illiquidity of stocks in African frontier market stocks on the development of these markets?
5. Is private equity a suitable investment medium for African frontier markets?

1.5 SIGNIFICANCE OF THE STUDY

This study will examine the effects of the illiquidity of listed African frontier market stocks on asset prices in these markets. The study will explore whether private equity is a suited investment vehicle for long term investment into African frontier markets. The research carried out in this study should contribute to a better understanding of illiquidity risks of African frontier markets and show how these can be mitigated. Furthermore, it will highlight to investors the attractive investment opportunity that African frontier markets present.

Amihud et al. (2005) found that costs of illiquidity affects security prices because investors require compensation for bearing these costs. This study will provide market participants and investors with a better understanding of illiquidity in African frontier markets. Investors can use this information to more accurately determine what additional compensation to demand for bearing these illiquidity costs (by factoring them into the offered price for an African frontier market asset). Furthermore, a better understanding of illiquidity in African frontier markets will help to stimulate more investment into African frontier markets thereby improving liquidity in these markets. And liquidity is likely to be a key driver of the development of African frontier markets.

This paper aims to help inform policymakers both in African and in donor capitals to consider and implement strategies that will support investment (especially private equity investment) into the continent. In addition, it will provide insight to African leaders and politicians as to the constraints that private equity investors, wishing to invest in African frontier markets, face. In addition, if the decision-making process of private equity fund managers can be better understood by African leaders, then they will have a better idea of what policies to implement to encourage more private equity investment. This paper seeks to show that an increase in private equity investment will significantly boost the economic growth of the African frontier market by providing access to much needed equity capital (required for expansion) to local companies. Furthermore, this paper seeks to show the close

connection and interdependence between public and private capital markets by showing that the private equity assets of today are likely to become the listed stars of the future when private equity managers elect to exit from portfolio companies by way of a listing. By stimulating future listings of local companies on local African frontier stock exchanges, private equity investment can help stock exchanges in African frontier markets to grow through an increase in the number of listings.

Investors who read this paper will gain a better understanding of what causes stocks in African frontier markets to be the illiquid. If the causes and effects of illiquidity in these markets is better understood, then investors may be more willing to invest more funds in these stock exchanges.

Investors and fund managers who read this paper will also gain a better understanding of African frontier markets. Hopefully, they will better understand that the typical investment strategy for investing in developed markets cannot be applied to frontier markets. Finally, investors and market participants should realise that with the correct investment strategy (i.e. a long term - buy and hold – strategy), excellent returns can be realised by investing in African frontier markets.

1.6 METHODOLOGY

The most straightforward method of measuring liquidity is simply to calculate the share turnover. Share turnover ("turnover") is a measure of stock liquidity calculated either by dividing the total number of shares traded over a period (i.e., a day) by the average number of shares outstanding for the period or by dividing the value traded (on a day) by market capitalization. The higher the share turnover ratio, the more liquid the share of a company.

Turnover is also the most common measure employed in the literature and has been used by both Rouwenhorst (1999) and Bekaert and Harvey (2003). However, while turnover captures trading frequency it is often limited in its appeal as it only focuses on trading volume and does not take into account return. Another illiquidity measure, called ILLIQ; is the daily ratio of absolute stock return to its dollar volume, averaged over some period (Amihud, 2002). This method explicitly takes into stock account returns (in order to measure liquidity). However, this method is not applicable for measuring liquidity in this study as the focus of this research report is on asset prices (measured using PE and EV/EBITDA ratios) and not asset returns for listed investments (i.e. listed stocks). Therefore, the research conducted in this paper, will use the turnover method to measure liquidity.

The primary focus of this study will be to analyse the relationship between liquidity and asset prices of stocks or indices in the developed world compared to the following stock exchanges in African frontier markets:

- Botswana Share Market
- Bourse Regionale des Valeurs Mobilieres (Ivory Coast)
- Nairobi Stock Exchange (Kenya)
- Tanzania Stock Exchange
- Uganda Stock Exchange
- Lusaka Stock Exchange (Zambia)
- Ghana Stock Exchange

The variables that will be analysed are as follows:

$EV/EBITDA_D$	Enterprise Value ("EV") to earnings before interest, tax, depreciation and amortisation ("EBITDA") multiple for stocks on listed on exchanges in the developed world ("EV/EBITDA of developed world stock")
$EV/EBITDA_F$	EV to EBITDA multiple for stocks listed on exchanges in African frontier markets ("EV/EBITDA of African frontier market stock")
$EV/EBITDA_A$	EV to EBITDA multiple for stocks listed on exchanges in both developed world and African frontier markets ("EV/EBITDA of developed world and African frontier market stocks")
PE_D	Price earnings (net profit after tax) ("PE") multiple for stocks listed on exchanges in the developed world ("PE of developed world stock")
PE_F	Price earnings (net profit after tax) ("PE") multiple for stocks listed on exchanges in African frontier markets ("PE of African frontier market stock")
PE_A	Price earnings (net profit after tax) ("PE") multiple for stock listed on exchanges in both developed world and African frontier markets ("PE of developed world and African frontier market stocks")
L_D	For developed world stocks: Total number of shares traded on a daily basis divided by the number of shares in issue for a stock or total value of shares traded on a daily basis divided by the daily market capitalisation of a stock ("Liquidity of developed world stock")

$\mathbf{L_F}$	For African frontier markets: Total number of shares traded on a daily basis divided by the number of shares in issue for a stock or total value of shares traded on a daily basis divided by the daily market capitalisation of a stock ("Liquidity of African frontier market stocks")
$\mathbf{L_A}$	For developed world stocks and African frontier markets: Total number of shares traded on a daily basis divided by the number of shares in issue for a stock or total value of shares traded on a daily basis divided by the daily market capitalisation of a stock ("Liquidity of developed world stocks and African frontier market stocks")
$\mathbf{M_D}$	Daily market capitalisation for stock on exchange in the developed world divided by the GDP of the country on the exchange which the stock is listed ("Market capitalisation as a % of GDP of developed world stock")
$\mathbf{M_F}$	Daily market capitalisation for African frontier market stock divided by the GDP of the country on the exchange which the stock is listed ("Market capitalisation as a % of GDP of African frontier market stock")
$\mathbf{M_A}$	Daily market capitalisation (divided by the GDP of the country on the exchange which the stock is listed) for stock on exchange in the developed world and African frontier market stock ("Market capitalisation as a % of GDP of developed world stock and African frontier market stock")

The variables (as set out above) which I collected, ranged over a 5 year period, and therefore the data collected represents time series data. The frequency of data collected was daily. The data was then converted to cross sectional data by obtaining the average value (for the 5 year period examined) of each variable for each stock. The converted data (cross-sectional data) was used to examine trend behaviour to see if there is a relationship between price ($\mathbf{PE_A}$ and $\mathbf{EV/EBITDA_A}$), liquidity ($\mathbf{L_A}$) and market capitalisation as a % of GDP ($\mathbf{M_A}$) for all stocks selected. The statistical techniques of correlation and multiple regression was used to determine whether a relationship existed between the variables.

The data was obtained from the Capital IQ research portal which is used by all of the local (South African) investment banks.

1.7 LIMITATIONS

While the purpose of this study is to examine the effects of the illiquidity of African frontier markets, only seven exchanges in African frontier markets have been selected for the study. Furthermore, only certain stocks on each exchange was included in the research. However, these stocks are a representative proxy for the African frontier market as a whole. As noted before, South Africa is not regarded an African frontier market and is therefore excluded from this study.

1.8 OUTLINE OF THE STUDY

The background literature section will present a set of thematic literature reviews relevant to the study, paying special attention to the definition of a frontier market, the development of African frontier markets, illiquidity of African frontier markets, the private equity model, private equity investment in African frontier markets and investment opportunities in African frontier markets. Section three discusses the methodology used to obtain the relevant data and the adjustments made to the data. Section four is an analysis of the results obtained from the data and finally section five will draw conclusions about this study and the implications of illiquidity of African frontier markets.

2. BACKGROUND LITERATURE

Chapter 2 deals with a diverse range of topics. To make it easier for the reader/reviewer, the discussion on each aspect was included under its own heading.

2.1 THE EFFECTS OF THE 2008/09 FINANCIAL CRISIS ON AFRICAN INVESTMENT

According to Chea (2011), other than foreign direct investment (FDI) focused on natural resources extraction, most countries in Sub-Saharan Africa (SSA) have received very little private capital in the past primarily because of low income and weak economic policies. However, this changed in the early 2000s when abundant global liquidity combined with improved economic policies in many African countries led to a surge in capital flows to SSA. But with the onset of the financial crisis in 2008/09, there was a large reversal of capital flows as foreign investors liquidated investments in order to place cash in so called "safe havens" (i.e., "safe" investments in the developed world). In 2010 things changed again as portfolio equity flows to SSA countries increased by 10%, reaching $11 billion, as investors sought to take on more "risky" investments in search of much needed yields. Chea (2011) believes that it is very likely that the establishment of a number of a SSA focused private equity funds is likely to have had a large influence on the increase in portfolio equity flows in 2010.

2.2 DEVELOPMENT AND CHARACTERISTICS OF CAPITAL MARKETS IN AFRICA

"The fundamental role played by the financial sector is to facilitate the reallocation of funds from agents (individuals) with an excess of capital given their investment opportunities towards agents (firms) with a shortage of funds vis à vis their investment opportunities" (Rajan and Zingales, 1998).

While some researchers such as Demirque-Kunt and Levin (1996), Levine (1997), Levine and Zervos (1996) and Yarty (2008) have found that stock markets can stimulate economic growth others such as Arestis et al.(2001), Orilk (2009) and Zang and Kim (2007) have found that no significant relationship exists between stock market development and economic growth.

Levine (1997) believes that the development of financial markets and institutions are a vital and inextricable part of the growth process and that financial development is a good predicator of future rates of economic growth, capital accumulation and technological change. In the last decade, the number of stock markets in Africa has grown significantly. In 1989 there were 8 stock exchanges in

Africa while in 2007 there were 19 stock markets in Africa (Yartey and Adjasi, 2007). Today there are 29 stock exchanges in Africa representing 38 nations' capital markets. But only four of these have a market capitalisation greater than $50 billion (Campbell, 2009).

One school of thought believes that stock markets in Africa will boost domestic savings and increase the quantity and quality of investment on the continent (Kenny and Moss, 1998). Others believe that stock markets in Africa might not perform efficiently in developing countries and that it may not be feasible for all African countries to promote stock markets given the enormous costs and poor financial structures prevalent in most African countries (Singh, 1999).

Another problem with stock markets in Africa is that they don't necessarily provide a source of funding for private companies, who most need it. Historically, the principal role of the financial sector in African markets has been to provide a source of domestic funding to the local government to offset its budgetary deficits. This meant that because of the crowding out trading activity by local governments, a very low level of new capital was left for the private sector (Hearn and Piesse, 2005).

Furthermore, there is evidence to suggest that not all countries will benefit in the same way from the formation of an official stock exchange. Bekaert, Harvey and Lundblad (2005) found that the largest growth response to equity market liberization ensues to countries with above average financial development, better legal systems, better quality institutions and better investor protection.

In the past, an unfriendly investment environment and archaic laws on foreign ownership of shares have adversely affected the development of local stock markets in Africa. Although many African markets have opened up to foreign participation, with low or no limit on foreign ownership of shares, a few do still have foreign participation restrictions. The most notable of these is Kenya and Zimbabwe, where foreign ownership of shares on stock markets cannot exceed 40%, and Ghana where the ceiling for foreign ownership is set at 74% (Yartey and Adjasi, 2007).

The banking system is still the dominant source of finance in most, if not all, African countries (Kenny and Moss, 1998). But supporters of capital market development believe that newly established stock exchanges in African countries will provide a source of funding to finance industrial expansion. They believe that newly created stock exchanges will mitigate concentration risk, attract domestic savings and encourages international portfolio investment and FDI (Hearn and Piesse, 2010b). Harsch (2003) concurs with this view and believes that financial markets are at the forefront of African development policy because of their potential role as a primary source of funding for industrial development and economic growth.

Many African countries have been pushing for the development of a system of regional groups that cluster around a more developed market. Supporters of the idea believe that it may have widespread

effects if these markets are found to be part of an effective network and hence integrated in a similar manner (Hearn and Piesse, 2005). African countries have been trying to promote this regional integration in an effort to attract global portfolio investment and capital flows at competitive rates. The planned integration model was based on the premise that key regional hub markets (such as Kenya for East Africa and South Africa for Southern Africa) would drive growth. However, progress has stalled in North Africa due to a lack of political will and the dominance of the banking sector as a capital market (Hearn, 2012).

Similarly, in West Africa, differences arising from the inconsistency between Francophone and Anglophone legal and accounting systems is causing disagreement over macroeconomic and financial integration (Joireman, 2005). West Africa is dominated by three principal markets, Nigeria and two much smaller markets, namely: BRVM (Cote d'Ivore) and Ghana. There are substantial differences in the legal and accounting principles between the French civil code law market of BRVM and the two English common law markets of Ghana and Nigeria (Hearn and Piesse, 2010a). East Africa is dominated by the Nairobi Stock Exchange (NSE), which is also the centre for East African capital market integration proposals, alongside established exchanges in Uganda and Tanzania and a smaller market in Rwanda (Hearn and Piesse, 2010a).

There is a clear division and very little integration between West African states which use a French civil code legal regime and other states in Africa which use the English common law (La Porta et al., 2008). There is also little integration reported amongst SSA countries, with the principal exception being between Namibia and South Africa, which do demonstrate a high degree of cointegration (Hearn and Piesse, 2002). Clearly, Africa still has very a long way to go before integration between the various states, like the European Union in Europe, is achieved.

Traditionally, a stock market is expected to encourage savings by providing individuals with an additional financial instrument that may better meet their risk preferences and liquidity needs (Levine and Zervos, 1998). But shareholdings in African equity markets are dominated by large family, state and corporate block-shareholders resulting in an extremely low free float (Hearn and Piesse, 2010a). The reason for this is that domestic participation in African financial markets is low (Hearn and Piesse, 2005) because the local population (who have little stock market awareness) prefer investing in physical assets such as livestock and agricultural commodities rather than investing in westernised financial products such as listed equities or other monetary instruments (Kenny and Moss, 1998). Another major problem in Africa is the high level of poverty. In SSA over 300 million people live on less than US$1 per day (World Bank, 2004) and savings rates as a proportion of GDP in Africa is much lower than that of developed countries (Hearn and Piesse, 2010b).

In many countries in SSA, the transition from a bank-based to a security market-based financial system has resulted in the establishment of many new equity markets over a very brief period of time.

This transition, which came about because of a radical policy shift towards increased privatization, has created a greater demand for access to capital. (Hearn and Piesse, 2005). However, many markets in Africa are small and therefore major scale inefficiencies exist in these markets, unlike large markets which are cost efficient intermediaries and have sufficient breadth and depth to ensure price efficiency (Hearn and Piesse, 2010b).

Hearn and Piesse (2005) believe that one of the reasons why these new African markets are so volatile is because they are vulnerable to the significant amount of private capital investment that is attracted to emerging markets. They are of the opinion that the increase in the level of foreign portfolio in African markets is primarily due to the reform of regulation, particularly with respect to ownership and income repatriation, as well as the removal of capital controls.

A major difficulty associated with establishing stock markets in developing and emerging countries is the perception that such markets are denominated by social, economic, and political uncertainties that ultimately have significant effects on market stability (Hearn and Piesse, 2005). Furthermore, many African countries have unstable macro-economic environments that create information asymmetries for both domestic and international investors (Hearn and Piesse, 2010b).

La Porta et al. (1997) identified legal origin as a crucial determinant of protection for minority shareholders against expropriation by corporate insiders and further determined that common law systems provide better protection than civil law ones. Laderkarl and Zervos (2004) theorised that one of the factors that determines the investability of a country is the stability and effectiveness of its legal and regulatory framework. They went on to say that a key part of determining investability for foreign investors in local markets is the security and availability of the assets in which they have invested.

Except for the Johannesburg Stock Exchange and, to a lesser degree, the Nairobi Stock Exchange, none of the SSA stock markets provide a realistic source of financing for local businesses. As noted before, many of the stock exchanges in SSA were purely formed to facilitate the privatization of state-owned enterprises and despite many forces persuading their growth, even the most advanced securities markets in SSA remain relatively immature, illiquid and undercapitalised. As a result, it is common for trading in African stock exchanges to occur in only few stocks and the level of capital investment in most stock exchanges remains insignificant in comparison to the GDPs of these countries. In addition, many of the enterprises listed on African stock exchanges are family owned business further hindering trading of the stocks (Jackson, 2010). From the above it is clear that illiquidity is a major problem for almost all of the 29 African stock exchanges (only a few exchanges such as the Johannesburg Stock Exchange don't suffer from significant illiquidity and thin trading) and that illiquidity is one of the major factors inhibiting the growth of African exchanges.

2.3 FRONTIER MARKETS

The term "frontier markets" was coined by the IFC's Farida Khambata in 1992 when he used it to describe a subset of emerging markets. Frontier markets are investable but have lower market capitalisation and liquidity than the more developed emerging markets (Al-Jafari et al., 2011)

According to Speidell and Krohne (2007), frontier markets are countries that have not become large or wealthy enough for their stock markets to be included in the current emerging market universe. Frontier markets are said to be the new emerging markets characterized by small size, lack of liquidity and underdevelopment. There is no generally accepted list of frontier markets and different investment banks have their own coverage. It is clear that South Africa, the powerhouse of the African continent, better fits the description of an emerging market rather than a frontier market. In 2005, the JSE Securities Exchange accounted for 94% of Sub-Saharan Africa's total market capitalisation and was more than 14 times larger than all of the other African stock markets (in existence at the time) combined (Moss et al., 2007).

Despite its original definition, a universally accepted definition of frontier markets does not exist. Frontier markets include countries in early stages of development as well as small but highly developed countries and markets recently opened to foreign investment. Growth in frontier markets is driven more by the local economy than the global economy and so they are less reliant on imports and exports than emerging markets (Wright, 2008). However, the general view is that, over time, frontier markets will become more liquid and start to exhibit similar risk and return characteristics as larger and more developed emerging markets.

As per the latest FTSE classification (as of September 2010), the following African countries are included in the frontier markets list (FTSE, 2010):

- Botswana
- Côte d'Ivoire
- Kenya
- Mauritius
- Nigeria
- Tunisia

As per the latest MSCI Barra classification (as of May 2009), the following African countries are included in the frontier markets list (MSCI, 2009):

- Kenya
- Mauritius
- Nigeria

- Tunisia

As per the latest Standard & Poor classification (as of April 2011), the following African countries are included in the frontier markets list (Standard&Poor, 2011):

- Botswana
- Côte d'Ivoire
- Ecuador
- Ghana
- Kenya
- Mauritius
- Nigeria
- Tunisia

In most cases, African markets are small and inactive and, consequently, may not be very effective. The exception to this is South Africa, which has a highly successful financial market and a stock exchange that is linked with world capital markets (Hearn and Piesse, 2005).

Some researchers believe that countries such as Nigeria and Zimbabwe should not be considered frontier markets (Magnusson and Wydick, 2002). This is interesting to note as Nigeria is included on all three formal "frontier market" classifications, namely FTSE, MSCI Barra and Standard&Poor. What we can deduce from this is that the classification of frontier markets appears to be subjective. As can be seen in Chapter 3, for the purpose of this study, Nigeria was deemed to be a frontier market country.

A common feature of many frontier market countries is that they frequently have highly skewed income and wealth distributions which result in political economic distortions. This is evident in both Swaziland and Mozambique where stock markets were established to create a means to transfer ownership from the state to the private sector as part of a privatization program. However, because of the low level of participation by the local population in the local stock markets in these countries, the stock exchanges have simply provided a vehicle to transfer ownership from the state to controlling block-holders. This has resulted in a few wealthy "elite" controlling the stock markets in these countries (Hearn and Piesse, 2010b).

2.4 ILLIQUIDITY OF FRONTIER MARKETS

Liquidity is by nature a difficult concept to define largely because of its ability to transcend a number of transactional properties of markets including tightness, depth and resilience (O'Hara, 2003).

A common source of illiquidity in illiquid markets is the difficulty in locating a counterparty who is willing to trade a particular security or a large quantity of a given security (Amihud et al., 2005).

Active participation from institutional investors is associated with an increase in liquidity in equity markets. Institutions hold about 50% of the market value of the New York Stock Exchange (NYSE) and in recent years have accounted for over 80% of the trading volume (Wang, 2003).

As noted before, because of low levels of regulation, the unstable macro-economic environments and the highly skewed income and wealth distributions of many African countries, liquidity in these stock markets is often very low (Hearn and Piesse, 2010b). Other factors that impact liquidity are the shortage of investment options (i.e. a narrow range of products) and slow progress in market development and related infrastructure in these countries (Hearn and Piesse, 2005). Other causes of illiquidity in many African frontier markets are: the limited trading hours, the little awareness by the local population of the existence of a local stock market, the low savings rate of the domestic populations in African countries, the low ratios of market capitalisation to GDP and the few individual and institutional investors (both local and international) who trade and invest on local stock markets (Hearn and Piesse, 2005).

Common reasons often cited for the lack of international investors investing in African stock markets are: inadequate legal protection for investors, the illiquidity of the African stock markets and poor supervision, monitoring and regulation (Hearn and Piesse, 2005). However, even if a large number of foreign institutional investors wanted to make large investments in frontier markets, these markets lack the capacity to absorb such institutional inflows. Large institutional inflows from foreign investors would be extremely problematic as large trades would have a significant impact on stock prices (Wright, 2008).

Hearn and Piesse (2010a) found that while liquidity effects are considerable across all SSA regional markets, size effects are prominent especially in Namibia and Zambia. Furthermore, they found that there are considerable limitations in the application of the mean-variance modelling techniques in Africa's smaller frontier equity markets owing to the severity of illiquidity causing segmentation and the lack of viable SSA regional benchmarks indices.

Hearn and Piesse (2010b) find that a major cause of illiquidity in African markets is the lack of involvement by domestic investors as well as a lack of retail and institutional investor base. Only the elite and wealthy invest in the local stock market because the majority of the population are economically disadvantaged and the usual intermediary function of banks and other financial institutions is severely restricted. With the exception of the Johannesburg Stock Exchange (JSE), Africa's stock markets are small, illiquid, have few listed assets, lack the necessary infrastructure and

offer a very limited range of tradable instruments compared with developed markets (Hearn and Piesse, 2010b).

Finally, it is interesting to note that concerns around the severity of illiquidity in Africa's emerging markets were cited as the reason for the demise of the Morgan Stanley Africa Fund and the more recent suspension of the New Star Asset Management's pan-Africa investment fund (Hearn, 2009).

2.5 MEASURING ILLIQUIDITY OF STOCK MARKETS

Liquidity is an extremely complex concept. However, simply stated, liquidity is the ease of trading a security (Amihud et al., 2005).

Due to its multi-dimensional characteristics, there is no single measure that can capture all aspects of liquidity (Benić and Franić, 2008). According to von Wyss (2004), liquidity may be grouped into the following three concepts:

1. The ability to trade at all. If there is no liquidity at all in the market then no trading can take place. There has to exist at least one bid and one ask quote to make a trade possible.
2. The ability to buy or to sell a certain amount of a share and to what extent the trade influences the quoted price. In a liquid market, it is possible to trade a certain amount of shares with little impact on the quoted price.
3. The ability to buy and to sell a stock at about the same price at the same time (i.e. the width of the bid-ask spread).

Brennan et al. (1998) found that the stock volume has a significant adverse effect on the cross-section of stock returns and that the negative effect of size is also taken into account in returns. Amihud (2002) examined the relationship between stock returns and liquidity over time. The illiquidity measure employed by Amihud in conducting his study was a liquidity measure called ILLIQ, being the daily ratio of absolute stock return to its dollar volume, averaged over some period. Therefore, ILLIQ measures the daily price response associated with one dollar of trading volume and gives a rough indication of the associated price impact.

Other measures of illiquidity are the bid ask spread (quoted or effective) and the transaction-by-transaction market impact. The problem with these measures is that they require a lot of microstructure data that is often not available (Amihud, 2002).

The turnover ratio, which is a simplistic yet very effective measure of liquidity, is simply the trading volume divided by the number of shares outstanding over a certain period of time. Amihud and Mendelson (1986) found that turnover is negatively related to illiquidity costs. Atkins and Dyl (2012)

found that there is a strong positive relationship between the bid–ask spread and the turnover ratio that measures holding period.

For the purpose of this study, the turnover ratio will be used to measure liquidity.

2.6 ASSET PRICES IN FRONTIER MARKETS

Hearn and Piesse (2010b) found that the Swaziland and Mozambican stock exchanges do not function efficiently primarily because of illiquidity and that this had a detrimental impact on price discovery. But there are many factors other than illiquidity that impacts asset prices. For instance, Lerner and Schoar (2005) found that firm valuations are significantly higher in nations with a common law tradition and superior legal enforcement.

Private equity managers pay about five to six times earnings before interest, tax, depreciation and amortisation (EBITDA) for firms in large African markets (such as South Africa) and three to four times in smaller African markets (African frontier markets). This compares favourably to Europe where prices are often above ten times EBITDA (Minney, 2011).

2.7 LIQUIDITY AND ASSET PRICES

The more liquid a financial asset is, the higher the price for which it can be sold. Conversely, the less liquid an asset is the lower the price for which it can be sold. Therefore, investments with less liquidity must offer higher expected returns to attract investors (Amihud and Mendelson, 1991).

An asset is liquid if it can effortlessly and quickly be sold at the current market price at a low cost. Therefore, illiquidity is directly related to the costs of executing a transaction in the market place (Amihud and Mendelson, 1991).

In economies, assets are valued for both their rate of return and their liquidity, in other words, their usefulness in the transaction process. And when more sellers are familiar with a particular asset, it becomes more liquid and hence more useful in the exchange process. This makes buyers want more of the asset causing the price to increase. Once liquidity is factored into the pricing model of an asset, it becomes evident that an asset can be valued for far more (or far less) than its rate of return. A good example of this is fiat money (money that derives its value from government regulation or law), an asset that has a perfectly predictable dividend of 0 and as a result should have a price of 0 according to standard finance theory. However, in monetary economics, agents may value fiat currency, even though it provides a lower return than other assets, simply because it provides transaction services. The value of fiat money can be interpreted as the liquidity premium (Lester et al., 2010).

2.8 INVESTING IN FRONTIER MARKETS IN AFRICA

Stevenson (2008) believes that frontier markets offer a unique combination of high-growth potential and market inefficiency that can lead to above-average returns.

There are two schools of thought as to why African frontier markets are not receiving more equity investment. The first is the "market failure view" which is based on the principle that investors are not responding rationally to the continent's investment opportunities because of various hurdles such as lack of information and perceptions of excessive risk. The second "market works" view argues that there is nothing unique, unusual or extraordinary about Africa and that investors value African investments in exactly the same way as they would value investments in the developed world (Moss et al., 2007). Moss et al. (2007) are of the view that African markets are not treated differently than other markets and that the primary deterrent (to investing in African markets) for foreign institutional investors is the small size and low levels of liquidity in African markets. Moss et al. (2007) found strong evidence that the "market works" problem was the primary reason for the low levels of equity investment in frontier markets.

2.9 BACKGROUND ON PRIVATE EQUITY

The private equity market has received little attention in academic literature and the lack of attention is partly due to the nature of the instrument itself. Until the mid-1970s, mainly wealthy families, industrial corporations and financial institutions, which invested directly in issuing firms, undertook private equity investments. However, in the late 1970s/early 1980s this changed when professional private equity managers, who made investments on behalf of institutional investors, emerged. That led to the creation of the limited partnership structure (now the dominant form of intermediary in private equity), whereby institutional investors act as limited partners (LPs) and the investment managers take the role of general partners (GPs) (Minney, 2011).

Private equity funds are created as partnerships by financial services firms, by inviting investors such as pension funds, development finance institutions (such as the IFC, a division of the World Bank, and the Commonwealth development Corporation, which is wholly owned by the UK government), insurance companies, banks or rich people to commit a certain amount. These funds are then used to invest in companies which are not quoted on a stock exchange (i.e., private companies). When private equity funds invested in listed companies, these companies are usually immediately de-listed" from the stock exchange and turned into private companies. One of the primary reasons for investing in private companies is that there is no obligation to publish financial information and other detailed data for private companies (i.e. audited financial statements, quarterly earnings, trading updates and other

announcements). Therefore, private companies can operate without public scrutiny. There are four main categories of funds that private equity firms use for their investments. These are: venture capital funds, buyout funds, infrastructure funds and hedge funds. Venture capital funds take risk by investing in less established companies. Buyout funds invest in established companies often with the use of leverage (debt). Infrastructure funds buy stakes in enterprises, projects (often making use of project finance) or companies operating in the infrastructure space (i.e., water, electricity, gas, toll roads, ports or airports). Hedge funds are vehicles set up to make any kind of investment in search for short-term profits (Hall, 2006).

The GPs specialise in finding, structuring and managing equity investments in closely held (and often controlled) private companies (Minney, 2011). By doing this, GPs of private equity funds acts as financial and risk intermediaries because of the validation processes and screening mechanisms that they employ in choosing suitable investments. Therefore, the value of the GPs of private equity funds (or simply the private equity fund managers) depends on the quality of the risk intermediation services that they perform for their investors (LPs) (Agmon and Messica, 2009).

Because they are among the largest and most active shareholders, partnerships have significant means of exercising both formal and informal control (often called "negative control"), and thus are able to direct companies to serve the interests of their shareholders (investors in the private equity funds, i.e., LPs). At the same time, organisational and contractual mechanisms are employed to ensure that the interests of the GPs and LPs are aligned (Banerjee, 2008). This would include for instance, an incentive scheme, commonly referred to as "carry" whereby the GPs invest a portion of their own capital alongside the LPs. The "carry" is a disproportionate share (usually around 20%) of the extra annual return over an agreed hurdle rate. The revenues earned by GPs include an annual management fee (usually around 2%) and the "carry" (Minney, 2011). The carry is only paid out to GPs after the LPs have received back all of the money they invested in the fund together with their allocated portion of the profits that the fund earned when it exited from its investments. Private equity investments are typically illiquid and an LP may expect to be tied into a fund investment for up to 10 years until the fund's managers have exited from the fund's investments and the fund is closed or wound-up and the proceeds given back to investors (Minney, 2011).

In the past 15 years, the private equity market has been the fastest-growing corporate finance market when compared to the public equity and bond markets as well as the market for private placement of debt. In terms of outstandings, the private equity market is roughly one-sixth the size of the commercial bank loans and commercial paper markets. The most impressive of all though, is the fact that in recent years private equity capital raised by partnerships has equalled, and sometimes even exceeded, new capital raised on stock markets through initial public offerings (IPOs) (Banerjee, 2008).

There is a view that the public equity markets have come to be characterised by information asymmetries and incentive problems. The disjunction between ownership and control (the agency problem) has encouraged perceptions that managers of companies are pursuing their own interests and feathering their own nests at the expense of shareholder interests. Furthermore, it has been argued that shareholder value is maximised when private equity firms take over and manage corporations because of the way private equity managers monitor and discipline the management of a company. As noted before, private equity firms also have organisational and contractual mechanisms that ensure that the interests of the GPs (managers) and the LPs (investors) are aligned. However, the biggest value add that private equity firms provide is the specialised skill of finding, restructuring and carefully managing closely held private equity assets as these are skills that investors typically do not possess (Chandrasekhar, 2007). In summary, there is a strong argument for saying that private equity firms are better at maximising shareholder wealth because they take a much more active role in managing companies they invest in than what passive equity investors do.

Private equity firms have also been able to buy assets for lower prices. Historically, private equity have participated in "proprietary" deals in which they are the only bidders and usually the purchase price in these deals are lower than what it would have been if there were competing bidders. However, due to an increase in competition, firms and investors wishing to sell assets are now increasingly resorting to auction sales in order to maximise the price (Chandrasekhar, 2007).

Strömberg (2007) in his paper titled: "The new demography of private equity" analysed 21,000 leveraged buyout/private equity transactions that were concluded in the period 1970 to 2007. He found that the most common exit route for private equity is trade sales to another corporation which accounted for 38% of all exists. The second most common exit route he found to be secondary buyouts which accounted for 24% of all exists. IPOs only accounted for 13% of all exits. He also found no evidence that the growth in private equity has been at the expense of public stock markets. In fact, he found that the flow from private to public equity markets was net positive (by 5%) over the analysed period. He went on to say that private equity backed companies in economies with less developed financial markets are particularly likely to eventually go public, which suggests that private equity can play a role in promoting stock markets in these countries when private equity firms exit investments by way of listing on a domestic exchange. He also found that that most of the firms going public originate from acquisitions of private companies. Therefore, support exists for the notion that public and private equity markets are compliments rather than substitutes.

2.10 PRIVATE EQUITY IN EMERGING MARKETS AND AFRICA

From 2003 to 2006, the money raised by international, primarily American, private equity funds for investment in emerging markets went up almost ten times, from circa $3.5 billion to circa $33 billion (Agmon and Messica, 2009). Agmon and Messica (2009) argue that private equity investments in emerging markets is another expression of FDI where firms (firms here being private equity funds) from developed countries export specific factors of production (these factors of production being high-risk sector specific capital that is provided in exchange for ownership) to small countries and emerging markets as a way to generate value to all stakeholders.

Because private equity investors largely appear to support the view that African frontier market assets are cheap (low PE and EV/EBITDA multiples, especially forward looking multiples), the continent appears to have become a target for private equity investors. And when formal markets are illiquid, private equity becomes the ideal investment vehicle. Already, the Public Investment Corporation (PIC), South Africa's government pension fund and the continent's top public pension manager, has indicated that they have committed to investing as much as $3.8 billion in African private equity markets. The PIC further confirmed that the state-run fund manager has been given the green light to invest 10% of its portfolio outside of South Africa, with half of that - about R50-billion - earmarked for Africa (Engineering News, 2012).

Financial FDI as practiced by private equity funds can be a powerful contributor to economic and business growth in emerging markets. The unique relatively short term nature of private equity investment makes it an appropriate instrument for the transition period that the world of international business is experiencing regarding the role of emerging markets. This is so because the period of private equity investment is long enough to allow the transfer of information and learning to firms in emerging markets to take place. But it also allows local stakeholders to resume full ownership of firms once the process is completed (i.e. when the private equity firm exists from its investment) (Agmon and Messica, 2009).

The potential of some African countries in attracting private equity funds is not being fully realised due to the absence of appropriate financial systems in these countries. A well-developed financial system is necessary to enhance the import of sector specific (high-risk) capital and the only feasible way to accommodate private equity investment in emerging markets is to import specific high-risk capital from the US and other major capital markets. Most private equity funding in the world comes from institutional investors in the US and other developed nations and these investors will not commit to investing in a country unless there is an acceptable level of transparency and corporate governance in that country (Agmon and Messica, 2009). Eid (2006) also believes that the private equity sector has proved to be a significant mechanism for knowledge transfer through partnerships and joint ventures

with global firms. Furthermore, Eid (2006) is of the view that there is broad consensus that one solution for Africa's large unemployment trap is higher private sector investment through private equity investment.

One of the main reasons cited by private equity firms as to why it is important to develop a vigorous private equity sector in the African continent is to "institutionalize and formalize entrepreneurship" (Eid, 2006). Eid (2006) found that finance is not the biggest hurdle in promoting private equity investment in emerging markets. Instead, she believes that what is missing is formal channels that link finance with promising entrepreneurs.

Lerner and Schoar (2005) find that in countries with civil law where legal enforcement is difficult, private equity investors rely more heavily on obtaining majority control of the firms they invest in and have more board representation. In these countries, the inability to separate cash flow rights from control rights distorts the contracting process and private equity firms have to rely on ownership to substitute for the lack of contractual protections.

As noted before, private equity investments are held for a relatively short period of time, investors usually exit after 5-7 years. Exit is not a well understood concept and is often criticized as being a sign of the greediness of private equity investors. But, it is not, because when a private equity firm exists from an investment, it simply means that the change is complete. Private equity investors usually require a return on investment in excess of 25% per annum and the only way to achieve such a high return is by implementing change. In order to generate value in existing companies, there needs to be a change. This change in companies can take various forms. It could be a change in the capital structure of a company through the introduction of debt (typical in a leveraged buyout private equity transaction) or a change in the business model of the company. Private equity investors are active investors and implement change by virtue of the fact that they exert some level of control on a company and actively manage their investment. Private equity investment always involves some level of control because even if the private equity investor does not have a controlling share, it will make sure it has a sufficiently large shareholding in a company to allow it to exercise significant influence over the company. Once the change process necessary for the private equity fund to realise its short-term "abnormal return" is complete, the private equity investor will look to exit from the investment in order to be able to move on to the next project. This does not detract from the long term existence of the company that was the target of the private equity investment because once the change has been successfully implemented, the company can be sold through an IPO or it can be sold to another company through a merger or acquisition transaction. Because the need for change and value creation are greater in emerging markets than developed countries, private equity investment is much needed in the context of emerging markets (Agmon and Messica, 2009).

It is widely known that many companies in Africa have become non-competitive as many countries on the continent went through a process of trade liberization. The result may be underutilized assets, lost jobs and a general loss for the economy as a whole. Private equity can potentially be the catalyst to rectify these problems. Faraḡ et al (2004) found that a major problem for private equity firms operating in emerging markets was finding people with the necessary skills and experience to manage private equity backed enterprises. This finding was consistent with Bliss (1999), Karsai et al. (1998), and Chu and Hirsch (2001). Investors (or LPs) rely on the quality of the GPs they invest in and the GPs rely on the quality of the managers in the companies which they invest in (Groh, 2009). Groh (2009) found that the limited debt financing available in emerging markets also hinders private equity investment in the region as private equity funds cannot obtain the desired returns by leveraging transactions.

Black and Gilson (1998) emphasize the important role that the professional infrastructure that accompanies stock market-centred capital markets plays by allowing private equity firms to exit from their investments by way of IPOs. However, they also name it a "chicken and egg problem" in that a risk capital market requires a stock market with a professional finance community. The stock market will be ineffective without a professional finance community. But instead of creating multiple new stock markets, they recommend that corporations in emerging markets piggyback on well-established financial communities and stock markets in the US, Europe and Asia.

In a survey by Coller Capital and US-based Emerging Markets Private Equity Association (EMPEA), the main structural problems in SSA were identified. Forty seven percent (47%) of respondents said that the primary deterrent to investing in SSA is the fact that there are too few established fund managers in the region and about 25% said that the primary deterrent to investing in SSA is the limited scale of opportunity to invest (as the markets are too small). Only 14% of the respondents said that they were discouraged by the difficulty in exiting their investments and only 2% said that valuations are a problem (Minney, 2011).

Other challenges that come with investing in Africa are: the ability to execute transactions in an environment where high-quality management is scarce, supply chains are weak and the general state of infrastructure is poor (Minney, 2011).

Exit options for African private equity are evolving and private equity firms are no longer limited to listing firms on domestic exchanges on the African continent. In recent years African private equity exits have included listings on international stock exchanges such as the New York Stock Exchange (NYSE) and the London Stock Exchange. For instance, Emerging Capital Partners, an international private equity firm headquartered in Washington DC that focuses on investing across the African continent including Francophone Africa, used the NYSE Euronext Paris to exit its shares in rubber

producer Société Internationale Plantations d'Hévéas, a leading producer of natural rubber in Africa (Minney, 2011).

Supporters of private equity believe that it will become the most important channel for the development of the African continent and therefore policymakers should concentrate on making the environment stable and investable to encourage private sector investors to invest for the long term. The key strength of private equity is that investors bring both money and effective management skills, including new strategic thinking, introductions to new markets or partners and more effective ways of operating (Minney, 2011). Therefore private equity investment is ideally suited for the African continent where relevant skills, experience and investors are in short supply.

Private equity funds from emerging markets are driven by growth and efficiency at the micro level and escalating urbanisation and consumer demand at the macro level. This trend toward more concentrated population and consumer demand have driven both urbanisation and infrastructure investment which was historically economical because of scattered populations over undeveloped areas. Funds that have investments in Africa have to factor in political risks and ensure that investments are properly diversified. The uprisings in North Africa have directed investors' attention to more stable SSA countries (Battersby and Lu, 2011).

2.11 PRIVATE EQUITY FIRMS OPERATING IN AFRICA

Major private equity investors in Africa include the development finance institutions (DFIs) such as the International Finance Corporation (IFC), CDC from the United Kingdom (previously the Commonwealth Development Corporation), France's Proparco, the Netherlands Development Finance Company (FMO) and the German Investment and Development Corporation (DEG). The leading private equity fund managers in Africa include Aureos, Actis, Emerging Capital Partners, African Capital Alliance, Carlyle, and Helios and Kingdom Africa Management (formerly known as Kingdom Zephyr Africa Management) (Minney, 2011).

In Africa, most private equity investments usually follow the "growth capital" model whereby investors buy shares in a profitable company with a good track record and assist the company through the next growth stage (Minney, 2011).

2.12 PRIVATE EQUITY INVESTMENT OPPORTUNITIES IN AFRICA

Climate change represents a significant investment opportunity for the African private equity market. Investment in renewable energy such as solar, wind, hydro-electric and waves, and innovation

focused on developing these sustainable sources of energy, will contribute not only to the creation of a sustainable world but also to the creation of much needed jobs in various sectors. Development finance will remain a key source to unlock investment opportunities in renewables. The Africa EU Renewable Energy Cooperation Programme has already committed to investing $30 billion in Africa. However, development finance alone will not make renewable energy projects successful but by combining development finance with private equity investment (i.e. when development finance organisations co-invest with private equity investors), the efficiency of such programmes will be enhanced (Battersby and Lu, 2011).

Public Private Partnerships (PPPs) are a specific form of privatization which usually involves the formation of a new company which has the right to a long-term stream of revenue from the state, or a monopoly license. The state shares the risk and responsibility with private firms and ultimately retains control of the assets. PPPs have the potential to bring the efficiency of business to public service and solve SSA's profound infrastructure backlogs (for instance, in SSA almost 600 million people lack access to electricity and 300 million people have no access to safe water). African governments are looking to PPPs to radically improve infrastructure and enhance service delivery to their people (Farlam, 2005). As a result, there are opportunities for private equity companies to invest in construction companies that partner with governments by way of PPPs.

Historically, natural resources have been the source of much private sector development in Africa. Oil and other natural resources will continue to present great investment opportunities in Africa (Alatovik et al., 2010). For instance, a recent estimate determined that the Democratic Republic of the Congo (DRC) has a mineral wealth of approximately $24 trillion (Morgan, 2009).

Silk Invest manages the African Food Fund, a private equity fund that invests in processed food, beverages and quick service restaurants on the African continent. According to Silk Invest, Africa's per capita consumption of products such as diary and dried food is still significantly lower than the rest of the world and as a result, African food companies can grow over 10 times in the future (Maritz, 2013). According to Alatovik et al. (2010), food and beverage spending will account for circa 40% of all household spending in Africa in the period 2008 to 2020. Silk Invest estimates that Africa needs to build 100 million housing units over the coming few years to eradicate slums and believes that there are good investment opportunities in affordable housing (Maritz, 2013).

Africa's consumer-facing sectors (consumer goods, telecom and banking, among others) present the largest investment opportunity. These sectors are already growing two to three times faster than in those countries belonging to the Organisation for Economic Co-Operation and Development (OECD). Africa's household spending in 2008 was $860 billion which was more than India and Russia. This is projected to rise to $1.4 trillion by 2018 (Alatovik et al., 2010). Africa has a youthful population that could almost double to 2 billion by 2050 and it is the rise of the emerging middle class that will

continue to drive consumer demand. As a result, private equity investors are seeing opportunities in growth sectors such as consumer products, telecommunications and financial services (Kamhunga, 2012). There are already many global and homegrown players operating in the consumer goods and services sector who have been expanding aggressively into Africa. These include: Unilever which has a presence in 21 countries, Standard Chartered which operates in 14 countries, Ecobank (29 countries), MTN (21 countries) and Shoprite (17 countries) (Alatovik et al., 2010).

Agriculture also represents a significant investment opportunity. Sixty percent of the world's uncultivated arable land is on the African continent and the crop yields are currently very low. The barriers to raising production in Africa are well-known and include: lack of advanced seeds and other inputs suited to the continent's ecological conditions, inadequate infrastructure to bring crops to market, perverse trade barriers and tax incentives as well as unclear land rights. But if Africa can overcome these barriers, it is estimated that agricultural output could grow from $280 billion in 2010 to as much as $880 billion (assuming prices of resources remain at 2008 levels) by 2030 (Alatovik et al., 2010).

Africa's labour force is expanding more rapidly than anywhere in the world. The continent currently has more than 500 million in the working age (15 to 64 years old) and by 2040 this number is projected to exceed 1.1 billion (more than India and China). If Africa can provide young people with the education and skills they need, the continent's large workforce could become a significant engine of global consumption (Alatovik et al., 2010).

3. DATA AND METHODOLOGY

Chordia et al. (2008) examined the effects of illiquidity by studying aggregate market spreads, depths and trading activity for US equities over an extended sample. By contrast Amihud (2002) used data obtained from examining individual stocks in determining illiquidity. This research will be conducted using data obtained from examining individual stocks. Furthermore, the study will be an empirical study using cross-sectional data. The cross-sectional data was obtained by converting time series data to cross-sectional data.

This study compares the average liquidity, average PE and average EV/EBITDA multiples for a sample of African frontier market stocks to a sample of stocks in the developed world with similar market capitalisations. The data obtained covers a five year period from 15 February 2008 to 15 February 2013. All the data was obtained from the following source: Capital IQ, a leading provider of multi-asset class and real time data, research and analytics. The average values of the data obtained (cross-sectional data) was then used to run statistical procedures on.

The methodology applied to select the stock markets is as set out below.

<u>African frontier stock markets</u>

- *Botswana Stock Exchange:* This exchange was selected as Botswana is listed as a frontier market in both the latest FTSE and Standard & Poor classification. The exchange currently has a market capitalisation of approximately $51.6 billion (as at 8 February 2013) and it currently has about 37 market listings. However, it must be noted that Anglo American plc, an entity that is also listed on the London Stock Exchange (LSE) (this is its primary listing) as well as the Johannesburg Stock Exchange (JSE), comprises circa $42.1 billion of the Botswana Stock Exchange's market capitalisation. Similarly, Investec Limited, a stock which is also listed on the LSE and JSE comprises approximately circa $6.4 billion of the Botswana Stock Exchange's market capitalisation. Both Anglo American plc and Investec Limited were excluded from the sample of stocks selected.
- *Bourse Régionale de Valeurs Mobiliéres SA (BVRM)*: The BVRM exchange is a regional stock exchange serving the following countries: Benin, Burkina Faso, Guinea Bissau, Côte d'Ivoire (Ivory Coast), Mali, Niger, Senegal and Togo. The exchange is located in Abidjan, Côte d'Ivoire. The exchange was selected as Ivory Coast is listed as a frontier market in both the latest FTSE and Standard & Poor classification. The exchange currently has a market capitalisation of approximately $6.2 billion and it currently also has about 37 market listings. It is interesting to note that this exchange is dominated by Sonatel S.A. (a company that provides telecommunications services under the Orange brand to approximately 14.5 million subscribers

primarily in Africa, Asia, the United States, and Europe) which comprises c. 53% of the market capitalisation of BVRM. Sonatel S.A. has a market capitalisation of $3.3 billion.

- *Nairobi Stock Exchange:* This exchange was selected as Kenya is listed as a frontier market in the latest FTSE, MSCI Barra and Standard & Poor classification. The exchange currently has a market capitalisation of approximately $16.5 billion and it currently has about 63 market listings. This exchange is dominated by East African Breweries Limited (a company that engages in marketing, brewing, manufacturing, and selling drinks, glass containers, malt, and barley in Kenya, Uganda, and Tanzania) and Safaricom Limited (a company that provides mobile phone, fixed line wireless telecommunication, Internet, and data services in Kenya). Together both companies comprise circa 32% of the market capitalisation of the Nairobi Stock Exchange. East African Breweries Limited has a market capitalisation of circa $2.7 billion and Safaricom Limited has a market capitalisation of circa $2.5 billion. Furthermore, the next three largest companies (by market capitalisation) on the Nairobi Stock Exchange, namely Kenya Commercial Bank Limited, Equity Bank Limited and Barclays Bank Of Kenya Limited, together comprise circa 20% of the market capitalisation Nairobi Stock Exchange.
- *Ghana Stock Exchange:* This exchange was selected as Ghana is listed as a frontier market in the latest Standard & Poor classification. The exchange currently has a market capitalisation of approximately $31.5 billion and it currently also has about 37 market listings. The exchange is dominated by two dual listed firms, namely AngloGold Ashanti Limited (which has a market capitalisation of circa $11.2 billion) and Tullow Oil plc (which has a market capitalisation of circa 16.8 billion). AngloGold Ashanti Limited is listed on the following exchanges (in addition to the Ghana Stock Exchange): New York Stock Exchange, Johannesburg Stock Exchange (primary listing), London Stock Exchange and the Australian Stock Exchange. Tullow Oil plc is listed on the following exchanges (in addition to the Ghana Stock Exchange): London Stock Exchange (primary listing) and the Irish Stock Exchange. Both AngloGold Ashanti Limited and Tullow Oil plc were excluded from the sample of stocks selected (we have not considered them to be frontier market companies). If the market capitalisation of AngloGold Ashanti Limited and Tullow Oil plc are excluded, the market capitalisation of the Ghana Stock Exchange is only somewhere in the region of circa $3.5 billion.

  Note that Ghana Stock Exchange was replaced with the Nigerian Stock Exchange. After selecting the companies on the Ghana Stock Exchange that we wished to obtain data for, we noted that it was not possible to obtain the required data: volume of shares traded on a daily basis and value of shares traded on a daily basis. Therefore, we selected ten companies on the Nigerian Stock Exchange with the same market capitalisations as those selected on the Ghana Stock Exchange. The reasons why the Nigerian Stock Exchange was selected are set out further below.

- *Dar es Salaam Stock Exchange:* Although not included in the latest FTSE, MSCI Barra or Standard & Poor classification of frontier markets, Tanzania has many of the characteristics of a frontier market country (namely private-sector led growth and investable markets) and therefore the Dar es Salaam Stock Exchange was selected as an exchange to be included in this study. Furthermore, Tanzania was identified as one of the key eight Sub-Saharan countries (the other countries are Botswana, Ghana, Kenya, Mozambique, Nigeria, Uganda and Zambia) which together account for almost 50% of Africa's GDP (Nellor, 2008). The exchange currently has 14 company listings and has a current market capitalisation for equities only of circa $1.9 billion.
- *Uganda Securities Exchange:* Uganda is not included in the latest FTSE, MSCI Barra or Standard & Poor classification of frontier markets but this exchange was selected for inclusion in this study for the same reason as the inclusion of the Dar es Salaam Stock Exchange. The exchange currently has 15 company listings (7 of these are Kenyan firms which are cross-listed on the Ugandan stock exchange) and has a current market capitalisation of approximately $5.8 billion. However, it must be noted that Kenyan cross-listed firms account for c. 89% of the market capitalisation of the Ugandan Stock Exchange and that the largest of these, East African Breweries Limited, accounts for circa $2.8 billion (c. 48%) of the market capitalisation of the Ugandan Stock Exchange.
- *Lusaka Stock Exchange:* This exchange was selected as Zambia is listed as a frontier market in the latest Standard & Poor classification. The exchange currently has a market capitalisation of approximately $13.9 billion and it currently and has about 22 companies listed on the exchange. The exchange is dominated by Shoprite Holdings Limited and First Quantum Minerals Limited. Shoprite Limited, which has a primary listing on the Johannesburg Stock Exchange, trades at a 40%-50% discount to its JSE value and has a market capitalisation on the Lusaka Stock Exchange of approximately $6.1 billion. First Quantum Minerals Limited has a primary listing on the Toronto Stock Exchange and has a market capitalisation of approximately $5.1 billion on the Lusaka Stock Exchange. Together, both Shoprite Holdings Limited and First Quantum Minerals Limited comprise circa. 80% of the total market capitalisation of the Lusaka Stock Exchange. Both Shoprite Holdings Limited and First Quantum Minerals Limited were excluded from the sample of stocks selected (we have not considered them to be frontier market companies).
- *Nigerian Stock Exchange:* This exchange was selected (to replace the Ghana Stock Exchange) as Nigeria is listed as a frontier market in the latest FTSE, MSCI Barra and Standard & Poor classification. The exchange currently has a market capitalisation of approximately $57 billion and it currently and has about 198 companies listed on the exchange. The exchange is dominated by Dangote Cement Plc, which has a market capitalisation of circa $16.7 billion, accounting for c. 29% of the exchange's total value (market capitalisation).

It is worth noting that although Namibia is listed as a frontier market in the latest Standard & Poor classification, no listed Namibian stocks were included in this study. The reason for this is that of the 34 listings on the Namibian Stock Exchange, only 7 are local listings. In addition 17 of the 34 companies listed on the Namibian Stock Exchange are also listed on the Johannesburg Stock Exchange. Furthermore, the Namibian and the South African economies are very closely integrated and therefore, Namibia (like South Africa) is more of an emerging market country rather than a frontier market country.

Developed world stock markets

The seven largest stock markets (by market capitalisation) were chosen as the pool from which to select developed world stocks. These 7 exchanges are:

- NYSE Euronext (USA);
- NASDAQ OMX (USA);
- Tokyo Stock Exchange (Japan);
- London Stock Exchange (LSE);
- Hong Kong Stock Exchange;
- Shanghai Stock Exchange (China); and
- TMX Group (Canada).

The methodology applied to select the individual stocks is as set out below.

African frontier stocks

The 10 largest stocks by market capitalisation for each African frontier stock market were selected. [Note that the 10 largest stocks on the Ghana Stock Exchange were selected to be included in the sample but then when it was discovered that the required data for these stocks was not available, 10 stocks of the same size (market capitalisation) as the Ghana stocks were selected from the Nigerian Stock Exchange.] Dual-listed stocks that have a primary listing in another country that is not considered an African frontier market were excluded from the sample. Specifically, the following stocks were excluded:

- Anglo American plc: listed on the Botswana Stock Exchange but has a primary listing on the London Stock Exchange
- Tullow Oil plc: listed on the Ghana Stock Exchange but has a primary listing on the London Stock Exchange
- AngloGold Ashanti Limited: listed on the Ghana Stock Exchange but has a primary listing on the Johannesburg Stock Exchange

- Shoprite Holdings Limited: listed on the Lusaka Stock Exchange but has a primary listing on the Johannesburg Stock Exchange
- First Quantum Minerals Limited: listed on the Lusaka Stock Exchange but has a primary listing on the Toronto Stock Exchange
- Investec Limited: listed on the Botswana Stock Exchange but has a primary listing on the Johannesburg Stock Exchange

Developed world stocks

The market capitalisation of the African frontier stocks selected ranged from $5.3 million to $3.3 billion. Stocks on developed world stock markets with the same market capitalisation as those on African frontier markets were selected. Each developed world stock that was the closest match (by market capitalisation) to the African frontier market stock was selected. To the extent possible, equal amounts of stocks from each developed world exchange were selected.

Data obtained

We analysed the following data for each stock selected for a five year period or for as long as the stock has been trading (whichever period was longer):

- Average market capitalisation on a daily basis (in US dollars)
- Average daily volume of shares traded as a percentage of the number of shares in issue on the day
- Average daily value of shares traded as a percentage of the daily market capitalisation
- Average daily price earnings (PE) ratio
- Average daily enterprise value to earnings before interest, taxation, depreciation and amortisation (EV/EBITDA)

Adjustments made to the data

The data obtained was sorted and filtered in such a manner to exclude weekends. We did not eliminate public holidays (or any other day on which an exchange may have been closed) from the data. As this approach was applied consistently to all selected stocks on all exchanges, we believe that any effect (which would not be significant) would have no overall effect on our results.

While analysing the data we noted that many of the stocks (both African frontier market stocks and the developed market stocks) had PE and EV/EBITDA ratios at some time period in the last 5 years in excess of 30 times (sometimes as high as 250 times). These are clearly outliers. The extraordinary high earnings multiples could have been caused by errors in the data or some unusual event, such as very low profits in a certain period. The reasons for the extraordinary earnings multiples is beyond the

scope of this research. We noted that in many cases where we observed these unusual multiples, they were only evident for a short period of time in the 5 years analysed and more often than not, the multiples would return to normal levels. Therefore, in determining the average PE and EV/EBITDA ratio for each stock, we excluded any multiples on any day that were not within the range 3.0x to 22.0x. Therefore, it was not possible to obtain the average PE and EV/EBITDA ratios for these stocks as they were outliers and were not included in the data.

Summary of the data

The stocks from the Ghanaian Stock Exchange that were replaced with stocks from the Nigerian Stock Exchange are set out below:

Table 1: Chosen firms from the Ghanaian Stock Exchange

#	Exchange	Ticker	Company name	Market cap (millions in US$)
82	Ghana Stock Exchange	GHSE:SCB	The Standard Chartered Bank Ghana Ltd	700.0
83	Ghana Stock Exchange	GHSE:EBG	Ecobank Ghana Ltd	463.0
84	Ghana Stock Exchange	GHSE:GCB	Ghana Commercial Bank Ltd.	357.0
85	Ghana Stock Exchange	GHSE:UNIL	Unilever Ghana Ltd.	330.0
86	Ghana Stock Exchange	GHSE:GGBL	Guinness Ghana Breweries Ltd.	325.0
87	Ghana Stock Exchange	GHSE:CAL	CAL Bank Ltd	170.0
88	Ghana Stock Exchange	GHSE:TOTAL	Total Petroleum Ghana Ltd	165.0
89	Ghana Stock Exchange	GHSE:SG-SSB	SG-SSB Ltd	122.0
90	Ghana Stock Exchange	GHSE:PZC	PZ Cussons Ghana Ltd	103.0

Further, the overall sample, alongside specific relevant data are presented in the following table:

Table 2: Sample firms and corresponding test variables (cross-sectional data)

African frontier market stocks									
#	Exchange	Ticker	Company name	Market cap (millions in US$)	Market cap as a % of GDP	% of shares in issue traded on a daily basis (average over 5-year period)	% of value of shares traded on a daily basis (average over 5-year period)	Adjusted Daily Average PE Ratio (excl outliers) (average over 5-year period)	Adjusted Daily EV/EBITDA ratio (excl outliers) (average over 5-year period)
72	Botswana Share Market	BSM:FNBB	First National Bank of Botswana Ltd	$946.8	3.00567%	0.00502%	0.00502%	14.4	NA
73	Botswana Share Market	BSM:BARCLAYS	Barclays Bank of Botswana Ltd	$729.5	2.31593%	0.00820%	0.00820%	12.5	NA
74	Botswana Share Market	BSM:LETSHEGO	Letshego Holdings Ltd	$510.8	1.62165%	0.04857%	0.04857%	9.1	NA
75	Botswana Share Market	BSM:STANCHART	Standard Chartered Bank Botswana Ltd	$385.0	1.22212%	0.00422%	0.00422%	14.5	NA
76	Botswana Share Market	BSM:BIHL	Botswana Insurance Holdings Ltd	$356.4	1.13141%	0.01194%	0.01194%	8.6	5.9
77	Botswana Share Market	BSM:CHOPPIES	Choppies Enterprises Ltd	$330.7	1.04984%	0.01398%	0.01398%	14.5	10.1
78	Botswana Share Market	BSM:SECHABA	Sechaba Brewery holdings Ltd	$260.1	0.82568%	0.01888%	0.01888%	12.4	7.7
79	Botswana Share Market	BSM:NAP	New Africa Properties Ltd	$165.0	0.52372%	0.00424%	0.00424%	NA	NA
80	Botswana Share Market	BSM:FURNMART	Furnmart Ltd	$127.9	0.40606%	0.00499%	0.00499%	11.1	7.4
81	Botswana Share Market	BSM:ENGEN	Engen Botswana Ltd	$123.9	0.39319%	0.00503%	0.00503%	10.2	6.1
82	Nigerian Stock Exchange	NGSE:DIAMONDBNK	Diamond Bank Plc	$668.6	0.14824%	0.08495%	0.08495%	9.2	NA
83	Nigerian Stock Exchange	NGSE:SKYEBANK	Skye Bank Plc	$542.0	0.12017%	0.07343%	0.07343%	7.1	NA
84	Nigerian Stock Exchange	NGSE:JBERGER	Julius Berger Nigeria PLC	$508.7	0.11279%	0.03316%	0.03316%	12.1	4.6
85	Nigerian Stock Exchange	NGSE:TOTAL	TOTAL Nigeria Plc	$302.9	0.06716%	0.02019%	0.02019%	14.2	8.4
86	Nigerian Stock Exchange	NGSE:UNITYBNK	Unity Bank Plc	$209.2	0.04639%	0.03963%	0.03963%	7.7	NA
87	Nigerian Stock Exchange	NGSE:OKOMUOIL	The Okomu Oil Palm Company Plc	$163.0	0.03613%	0.04669%	0.04669%	5.9	10.4
88	Nigerian Stock Exchange	NGSE:NASCON	National Salt Company Nigeria Plc	$159.4	0.03535%	0.03989%	0.03989%	NA	6.3
89	Nigerian Stock Exchange	NGSE:CAP	Chemical and Allied Products plc	$113.9	0.02525%	0.02042%	0.02042%	12.0	12.2
90	Nigerian Stock Exchange	NGSE:BAGCO	Nigerian Bag Manufacturing Company Plc	$108.1	0.02398%	0.03676%	0.03676%	12.4	7.1
92	Bourse Regionale des Valeurs Mobilieres	BRVM:SGBC	Société Générale de Banques en Côte d'Ivoire, S.A.	$420.2	1.16732%	0.00352%	0.00350%	NA	NA
93	Bourse Regionale des Valeurs Mobilieres	BRVM:SPHC	Societe Africaine des Plantations d'Heveas SA	$404.4	1.12335%	0.01851%	0.01850%	NA	3.4
94	Bourse Regionale des Valeurs Mobilieres	BRVM:SLBC	Societe de Limonaderies et Brasseries d'Afrique SA	$409.1	1.13627%	0.00084%	0.00084%	NA	6.7
95	Bourse Regionale des Valeurs Mobilieres	BRVM:ONTBF	ONATEL-SA	$310.4	0.86216%	0.00243%	0.00243%	NA	4.7
96	Bourse Regionale des Valeurs Mobilieres	BRVM:SOGC	Société des Caoutchoucs de Grand-Béréby S.A.	$280.9	0.78039%	0.01051%	0.01049%	Outlier	5.2
97	Bourse Regionale des Valeurs Mobilieres	BRVM:CIEC	Compagnie Ivoirienne d'Electricité	$238.6	0.66268%	0.00537%	0.00535%	8.6	4.7
98	Bourse Regionale des Valeurs Mobilieres	BRVM:STBC	Societe Ivoirienne Des Tabacs S A	$182.1	0.50588%	0.00518%	0.00515%	NA	4.7
99	Bourse Regionale des Valeurs Mobilieres	BRVM:SDSC	Bollore Africa Logistics Cote d'Ivoire	$154.6	0.42950%	0.00189%	0.00187%	NA	NA
100	Bourse Regionale des Valeurs Mobilieres	BRVM:CFAC	CFAO Motors Cote d'Ivoire SA	$139.5	0.38741%	0.00190%	0.00187%	17.8	7.8
101	Bourse Regionale des Valeurs Mobilieres	BRVM:PALC	Palmci SA	$137.6	0.38232%	0.02182%	0.02181%	NA	4.7
102	Bourse Regionale des Valeurs Mobilieres	BRVM:SNTS	Sonatel S.A.	$3 449.6	9.58233%	0.01389%	0.01389%	NA	5.5
103	Nairobi Stock Exchange	NSE: EABL	East African Breweries Ltd	$2 771.3	3.64648%	0.02586%	0.02586%	NA	4.2
104	Nairobi Stock Exchange	NSE: SAFCOM	Safaricom Ltd	$2 465.8	3.24441%	0.04795%	0.04795%	16.6	9.9
105	Nairobi Stock Exchange	NSE: KNCB	Kenya Commercial Bank Ltd	$1 186.7	1.56150%	0.05038%	0.05038%	13.1	5.1
106	Nairobi Stock Exchange	NSE: EQBNK	Equity Bank Ltd	$1 151.8	1.51557%	0.05336%	0.05336%	9.5	NA
107	Nairobi Stock Exchange	NSE: BCBL	Barclays Bank Of Kenya Ltd	$1 013.8	1.33390%	0.01775%	0.01775%	11.3	NA
108	Nairobi Stock Exchange	NSE: SCBL	Standard Chartered Bank Kenya Ltd	$949.4	1.24916%	0.00723%	0.00723%	11.3	NA
109	Nairobi Stock Exchange	NSE: BMBC	Bamburi Cement Ltd	$890.8	1.17214%	0.01039%	0.01039%	12.3	NA
110	Nairobi Stock Exchange	NSE: COOP	The Co-operative Bank of Kenya Ltd	$643.5	0.84666%	0.02402%	0.02402%	13.0	7.7
111	Nairobi Stock Exchange	NSE: BATK	British American Tobacco Kenya Ltd	$605.0	0.79608%	0.02845%	0.02845%	11.5	NA
112	Nairobi Stock Exchange	NSE: NMG	Nation Media Group Ltd	$466.3	0.61360%	0.01862%	0.01862%	13.5	8.0
113	Tanzania Stock Exchange	DAR:TBL	Tanzania Breweries Ltd	$512.0	0.69193%	0.00068%	0.00680%	15.9	9.4
114	Tanzania Stock Exchange	DAR:NMB	National Microfinance Bank Plc	$354.3	0.47879%	0.00911%	0.00911%	5.5	3.5
115	Tanzania Stock Exchange	DAR:TWIGA	Tanzania Portland Cement Company Ltd	$285.8	0.38617%	0.00744%	0.00744%	6.3	NA
116	Tanzania Stock Exchange	DAR:TCC	Tanzania Cigarette Company Ltd	$265.1	0.35827%	0.00320%	0.00320%	8.2	4.5
117	Tanzania Stock Exchange	DAR:CRDB	CRDB Bank Plc	$206.1	0.27849%	0.00706%	0.00706%	NA	NA
118	Tanzania Stock Exchange	DAR:SIMBA	Tanga Cement Company Ltd	$93.3	0.12615%	0.00568%	0.00568%	6.6	NA
119	Tanzania Stock Exchange	DAR:PAL	Precision Air Services PLC	$54.5	0.07361%	0.00013%	0.00013%	6.1	3.4
120	Tanzania Stock Exchange	DAR:SWISSPORT	Swissport Tanzania Ltd	$42.7	0.05765%	0.00503%	0.00503%	Outlier	9.2
121	Tanzania Stock Exchange	DAR:DCB	Dar es Salaam Community Bank Ltd	$12.3	0.01658%	0.02769%	0.02769%	9.5	3.7
122	Tanzania Stock Exchange	DAR:TOL	TOL Gases Ltd	$6.7	0.00912%	0.02716%	0.02716%	NA	NA
123	Uganda Stock Exchange	UGSE:UMEME	Umeme Ltd	$182.5	0.35785%	0.11395%	0.11395%	NA	NA
124	Uganda Stock Exchange	UGSE:SBU	Stanbic Bank Uganda Ltd	$95.9	0.18796%	0.02453%	0.02453%	16.5	6.1
125	Uganda Stock Exchange	UGSE:DFCU	Development Finance Company of Uganda Ltd	$93.1	0.18257%	0.00255%	0.00255%	8.5	NA
126	Uganda Stock Exchange	UGSE:BOBU	Bank of Baroda (Uganda) Ltd	$41.9	0.08225%	0.01493%	0.01493%	9.2	NA
127	Uganda Stock Exchange	UGSE:BATU	British American Tobacco Uganda Ltd	$41.6	0.08164%	0.00170%	0.00170%	9.7	NA
128	Uganda Stock Exchange	UGSE:NVL	New Vision Printing and Publishing Company Ltd	$17.2	0.03371%	0.01747%	0.01747%	11.5	4.6
129	Uganda Stock Exchange	UGSE:UCL	Uganda Clays Ltd	$11.8	0.02313%	0.00841%	0.00841%	16.7	5.5
130	Uganda Stock Exchange	UGSE:NIC	National Insurance Corporation Ltd	$5.3	0.01038%	0.00374%	0.00374%	Outlier	7.1
131	Lusaka Stock Exchange	LUSE:CELTEL	Celtel Zambia Plc	$610.6	2.65473%	0.00441%	0.00441%	7.5	4.5
132	Lusaka Stock Exchange	ENXTPA:MLZAM	ZCCM Investments Holdings (	$44.9	0.19506%	0.00776%	0.00776%	NA	NA
133	Lusaka Stock Exchange	LUSE:ZSUG	Zambia Sugar plc	$316.9	1.37772%	0.00215%	0.00215%	Outlier	13.0
134	Lusaka Stock Exchange	LUSE:LAFARGE	Lafarge Cement Zambia Plc	$308.0	1.33935%	0.01078%	0.01078%	NA	NA
135	Lusaka Stock Exchange	LUSE:ZANACO	Zambia National Commercial Bank Plc	$316.8	1.37747%	0.00425%	0.00425%	NA	NA
136	Lusaka Stock Exchange	LUSE:ZAMBREW	Zambian Breweries Plc	$294.3	1.27949%	0.00091%	0.00091%	NA	NA
137	Lusaka Stock Exchange	LUSE:SCZ	Standard Chartered Bank Zambia Plc	$269.5	1.17192%	0.00135%	0.00135%	NA	NA
138	Lusaka Stock Exchange	LUSE:ZAMBEEF	Zambeef Products Plc	$171.8	0.74714%	0.03306%	0.03306%	NA	NA
139	Lusaka Stock Exchange	LUSE:CEC	Copperbelt Energy Corporation PLC	$150.1	0.65280%	0.01145%	0.01145%	NA	NA
140	Lusaka Stock Exchange	LUSE:NATBREW	National Breweries Plc	$111.6	0.48508%	0.00270%	0.00270%	NA	NA
141	Lusaka Stock Exchange	LUSE:ZAMEFA	Metal Fabricators of Zambia PLC	$19.3	0.08389%	0.00426%	0.00426%	NA	NA
142	Lusaka Stock Exchange	LUSE:BATA	Zambia Bata Shoe Company PLC	$9.5	0.04140%	0.00247%	0.00247%	NA	NA
Average				**$427.6**	**0.87075%**	**0.01794%**	**0.01803%**	**11.6**	**6.8**

Table 2: Sample firms and corresponding test variables (cross-sectional data) (cont'd)

Developed market stocks									
#	Exchange	Ticker	Company name	Market cap (millions in US$)	Market cap as a % of GDP	% of shares in issue traded on a daily basis (average over 5-year period)	% of value of shares traded on a daily basis (average over 5-year period)	Adjusted Daily Average PE Ratio (excl outliers) (average over 5-year period)	Adjusted Daily EV/EBITDA ratio (excl outliers) (average over 5-year period)
1	London Stock Exchange AIM Market	AIM:ACMG	ACM Shipping Group plc	$40.2	0.00164%	0.06132%	0.06131%	8.4	4.7
2	London Stock Exchange AIM Market	AIM:CMX	Catalyst Media Group Plc	$40.4	0.00165%	0.03477%	0.03477%	8.0	8.4
3	London Stock Exchange AIM Market	AIM:HMLH	HML Holdings PLC	$9.1	0.00037%	0.01636%	0.01637%	14.2	7.7
4	London Stock Exchange AIM Market	AIM:MIRA	Mirada Plc	$6.5	0.00026%	0.02099%	0.02100%	NA	NA
5	London Stock Exchange AIM Market	AIM:MTL	Metals Exploration Plc	$89.0	0.00364%	0.13891%	0.13891%	NA	NA
6	London Stock Exchange AIM Market	AIM:PRO	Progressive Digital Media Group PLC	$280.1	0.01146%	0.02661%	0.02661%	NA	16.7
7	London Stock Exchange AIM Market	AIM:RKH	Rockhopper Exploration plc.	$669.6	0.02739%	1.01893%	1.01893%	NA	NA
8	London Stock Exchange	LSE:GEMD	Gem Diamonds Ltd	$360.1	0.01473%	0.28836%	0.28836%	9.4	6.2
9	London Stock Exchange	LSE:KCOM	KCOM Group PLC	$599.7	0.02453%	0.16923%	0.16923%	12.8	6.1
10	London Stock Exchange	LSE:MTC	Mothercare plc	$407.6	0.01667%	0.33886%	0.33886%	16.4	7.6
11	London Stock Exchange	LSE:RCDO	Ricardo plc	$322.9	0.01321%	0.06778%	0.06778%	11.8	7.2
12	Nasdaq Capital Market	NasdaqCM:CLRX	CollabRx, Inc.	$6.7	0.00004%	0.54678%	0.54678%	Outlier	4.6
13	Nasdaq Capital Market	NasdaqCM:DLHC	DLH Holdings Corp.	$10.2	0.00007%	0.23187%	0.23188%	10.5	7.7
14	Nasdaq Capital Market	NasdaqCM:ISRL	Isramco Inc.	$271.3	0.00174%	0.05132%	0.05131%	12.8	12.8
15	Nasdaq Global Market	NasdaqGM:CFNB	California First National Bancorp	$165.3	0.00106%	0.03613%	0.03612%	14.4	NA
16	Nasdaq Global Market	NasdaqGM:CYTX	Cytori Therapeutics, Inc.	$176.8	0.00113%	0.90360%	0.90360%	NA	NA
17	Nasdaq Global Market	NasdaqGM:JCS	Communications Systems Inc.	$93.4	0.00060%	0.20358%	0.20358%	13.0	5.4
18	Nasdaq Global Select Market	NasdaqGS:AMBA	Ambarella, Inc.	$260.4	0.00167%	0.79826%	0.79826%	14.3	8.5
19	Nasdaq Global Select Market	NasdaqGS:DMND	Diamond Foods, Inc.	$313.4	0.00201%	2.38831%	2.38831%	12.1	12.8
20	Nasdaq Global Select Market	NasdaqGS:DRIV	Digital River Inc.	$496.0	0.00318%	1.67299%	1.67299%	16.7	8.5
21	Nasdaq Global Select Market	NasdaqGS:IART	Integra LifeSciences Holdings Corporation	$1 122.4	0.00719%	0.74012%	0.74012%	17.8	10.4
22	New York Stock Exchange	NYSE:AL	Air Lease Corporation	$2 587.9	0.01659%	0.15663%	0.15663%	19.4	NA
23	New York Stock Exchange	NYSE:CLNY	Colony Financial, Inc.	$1 138.3	0.00730%	0.54167%	0.54166%	12.4	NA
24	New York Stock Exchange	NYSE:CQB	Chiquita Brands International Inc	$324.6	0.00208%	1.56896%	1.56896%	9.6	7.4
25	New York Stock Exchange	NYSE:GDP	Goodrich Petroleum Corp.	$464.0	0.00297%	2.79227%	2.79227%	7.1	9.6
26	New York Stock Exchange	NYSE:GSE	GSE Holdings Inc.	$130.9	0.00084%	0.06583%	0.06583%	Outlier	8.3
27	New York Stock Exchange	NYSE:LGF	Lions Gate Entertainment Corp.	$2 769.9	0.01776%	0.70129%	0.70129%	Outlier	16.4
28	New York Stock Exchange	NYSE:LUB	Luby's, Inc.	$220.8	0.00142%	0.23102%	0.23102%	17.1	9.6
29	New York Stock Exchange	NYSE:NGS	Natural Gas Services Group Inc.	$227.1	0.00146%	0.77985%	0.77984%	14.3	6.5
30	New York Stock Exchange	NYSE:ORA	Ormat Technologies Inc.	$955.0	0.00612%	0.46918%	0.46918%	19.3	14.1
31	New York Stock Exchange	NYSE:PULS	Pulse Electronics Corporation	$12.1	0.00008%	0.73703%	0.73703%	9.6	8.5
32	The Stock Exchange of Hong Kong Ltd.	SEHK:1009	International Entertainment Corp	$168.7	0.06412%	0.02602%	0.02602%	12.0	6.5
33	The Stock Exchange of Hong Kong Ltd.	SEHK:1047	Ngai Hing Hong Co. Ltd.	$17.1	0.00651%	0.02739%	0.02739%	8.7	9.6
34	The Stock Exchange of Hong Kong Ltd.	SEHK:1263	PC Partner Group Ltd	$56.5	0.02148%	0.00390%	0.00390%	6.6	4.0
35	The Stock Exchange of Hong Kong Ltd.	SEHK:159	Brockman Mining Ltd	$487.3	0.18525%	0.07246%	0.07246%	7.3	Outlier
36	The Stock Exchange of Hong Kong Ltd.	SEHK:2010	Real Nutriceutical Group Ltd	$361.8	0.13755%	0.45045%	0.45045%	9.3	10.2
37	The Stock Exchange of Hong Kong Ltd.	SEHK:328	Alco Holdings Ltd	$126.3	0.04803%	0.04696%	0.04696%	6.8	4.4
38	The Stock Exchange of Hong Kong Ltd.	SEHK:332	Ngai Lik Industrial Holdings Ltd	$143.2	0.05445%	0.50979%	0.50979%	6.2	9.3
39	The Stock Exchange of Hong Kong Ltd.	SEHK:497	CSI Properties Ltd	$423.2	0.16088%	0.34228%	0.34228%	6.5	10.1
40	The Stock Exchange of Hong Kong Ltd.	SEHK:65	DeTeam Company Ltd	$119.4	0.04539%	0.38413%	0.38413%	9.0	9.6
41	The Stock Exchange of Hong Kong Ltd.	SEHK:74	Great Wall Technology Co. Ltd.	$248.5	0.09447%	0.17044%	0.17044%	6.9	9.3
42	The Stock Exchange of Hong Kong Ltd.	SEHK:8158	China Bio-Med Regeneration Technology Ltd	$156.8	0.05962%	0.21890%	0.21890%	12.4	Outlier
43	Singapore Stock Exchange	SGX:KI3	Hu An Cable Holdings Ltd.	$93.1	0.02847%	0.10100%	0.10100%	5.4	5.2
44	Shenzhen Stock Exchange	SZSE:000558	Lander Real Estate Co., Ltd.	$479.8	0.00387%	1.32366%	1.32366%	16.2	15.1
45	Shenzhen Stock Exchange	SZSE:000623	Jilin Aodong Medicine Industry Group Co., Ltd	$3 321.2	0.02682%	1.43685%	1.43685%	12.7	10.1
46	Shenzhen Stock Exchange	SZSE:000815	MCC Meili Paper Industry Co., Ltd	$297.0	0.00240%	2.35820%	2.35820%	13.7	15.4
47	Shenzhen Stock Exchange	SZSE:000828	Dongguan Development (Holdings) Co., Ltd.	$844.6	0.00682%	0.45061%	0.45061%	15.4	13.3
48	Shenzhen Stock Exchange	SZSE:000993	Fujian Mindong Electric Power Co. Ltd.	$588.2	0.00475%	1.35745%	1.35745%	Outlier	17.7
49	Shenzhen Stock Exchange	SZSE:002300	Fujian Nanping Sun Cable Co., Ltd.	$360.9	0.00291%	0.53277%	0.53277%	18.8	15.9
50	Shenzhen Stock Exchange	SZSE:002544	GCI Science & Technology Co. ,Ltd.	$311.1	0.00251%	0.49124%	0.49124%	19.1	16.0
51	Shenzhen Stock Exchange	SZSE:002579	Huizhou China Eagle Electronic Technology Co., Ltd	$165.5	0.00134%	0.50597%	0.50597%	Outlier	17.2
52	Shenzhen Stock Exchange	SZSE:300127	Chengdu Galaxy Magnets Co.,Ltd.	$524.3	0.00423%	0.88670%	0.88670%	Outlier	17.9
53	The Tokyo Stock Exchange	TSE:1405	Sala House Co. Ltd.	$38.5	0.00083%	0.06255%	0.06255%	8.2	10.1
54	The Tokyo Stock Exchange	TSE:2288	Marudai Food Co., Ltd.	$420.0	0.00910%	0.15358%	0.15358%	12.3	5.3
55	The Tokyo Stock Exchange	TSE:2729	JALUX Inc.	$123.9	0.00268%	0.06930%	0.06930%	16.0	7.6
56	The Tokyo Stock Exchange	TSE:3053	Pepper Food Service Co. Ltd.	$18.4	0.00040%	0.10941%	0.10760%	Outlier	7.7
57	The Tokyo Stock Exchange	TSE:4681	ResortTrust Inc.	$1 002.1	0.02171%	0.27742%	0.27742%	13.3	4.9
58	The Tokyo Stock Exchange	TSE:4799	Agrex Inc.	$94.4	0.00204%	0.07571%	0.07571%	11.8	3.7
59	The Tokyo Stock Exchange	TSE:6454	Max Co. Ltd.	$600.1	0.01300%	0.13505%	0.13505%	15.6	6.8
60	The Tokyo Stock Exchange	TSE:6459	Daiwa Industries Ltd.	$290.5	0.00629%	0.14818%	0.14818%	5.3	Outlier
61	The Tokyo Stock Exchange	TSE:8056	Nihon Unisys, Ltd.	$706.4	0.01530%	0.43784%	0.43784%	12.6	4.7
62	The Toronto Stock Exchange	TSX:CRK	Crocodile Gold Corp.	$141.4	0.00978%	0.28092%	0.28092%	NA	Outlier
63	The Toronto Stock Exchange	TSX:DEE	Delphi Energy Corp.	$166.6	0.01152%	0.38880%	0.38880%	10.0	5.3
64	The Toronto Stock Exchange	TSX:HNZ.A	HNZ Group Inc.	$300.3	0.02077%	0.17023%	0.17022%	7.6	4.4
65	The Toronto Stock Exchange	TSX:IBG	IBI Group Inc.	$107.7	0.00745%	0.19694%	0.19694%	11.4	8.7
66	The Toronto Stock Exchange	TSX:IVW	Ivernia Inc.	$103.7	0.00717%	0.12459%	0.12459%	3.8	Outlier
67	The Toronto Stock Exchange	TSX:LNF	Leon's Furniture Ltd.	$10.4	0.00072%	0.01968%	0.01968%	14.4	6.9
68	The Toronto Stock Exchange	TSX:LSG	Lake Shore Gold Corp.	$313.8	0.02170%	0.43636%	0.43636%	Outlier	14.3
69	The Toronto Stock Exchange	TSX:PDL	North American Palladium Ltd.	$325.4	0.02251%	0.23595%	0.23595%	Outlier	9.5
70	The Toronto Stock Exchange	TSX:PHX	PHX Energy Services Corp.	$258.5	0.01788%	0.19115%	0.19115%	13.3	10.2
71	The Toronto Stock Exchange	TSX:VNP	5N Plus Inc.	$181.0	0.01252%	0.33284%	0.33284%	15.2	10.7
Average				**$409.4**	**0.01910%**	**0.46961%**	**0.46959%**	**13.7**	**11.2**

From the above tables the following can be noted:

- That the stocks traded on African frontier markets are more thinly traded than their counterparts (stocks of similar size) listed on stock exchanges in developed countries. The average percentage

of shares in issue traded on a daily basis for the African frontier markets stocks selected is only 0.01794% compared to 0.46961% for stocks listed on stock markets in developed markets. Similarly, the average percentage of value of shares in issue traded on a daily basis for the African frontier markets stocks selected is only 0.01803% compared to 0.46959% for stocks listed on stock markets in developed markets. Note that the difference between the average percentage of volume of shares in issue traded on a daily basis on a daily basis and the average percentage of the value of shares in issue traded on a daily basis was not considered to be significant for both African frontier market stocks and developed market stocks, and hence was not investigated further.

- That the average PE ratios of the developed market stocks over the last 5 years has only been slightly higher than the African frontier market stocks (13.7 times versus 11.6 times).
- That the average EV/EBITDA ratios of the developed market stocks over the last 5 years has been almost double that of the African frontier market stocks (11.2 times versus 6.8 times).

Comparison to results from other research

Jefferis and Okeahalam (2000) determined the annual turnover ratio (value of shares traded in a period divided by the market capitalisation) for various stock exchanges (based on total trading for the 1998 calendar year). For ease of reference, their annual turnover percentage was converted to a daily turnover ratio (assuming trading occurred on each exchange for 250 days in the 1998 calendar year). Their results are set out below:

- Cote d'Ivoire 2.6% (0.0104% daily);
- Ghana 4.8% (0.0192% daily)
- Botswana 10.6% (0.0424% daily)
- Kenya 4.0% (0.016% daily)
- Nigeria 5.2% (0.0208% daily)

Their liquidity appear to be in line with our average daily liquidity for the African frontier market stocks selected, namely a daily average of 0.018% (based on 5 year historical data).

Moss et al. (2007) found similar results. They determined the annual turnover ratio (value of shares traded in a period divided by the market capitalisation) for various stock exchanges (based on total trading for the 2005 calendar year). For ease of reference, their annual turnover percentage was converted to a daily turnover ratio (assuming trading occurred on each exchange for 250 days in the 2005 calendar year). Their results are set out below:

- Botswana 1.96% (0.0078% daily)
- Cote d'Ivoire (BRVM) 1.81% (0.0072% daily)

- Ghana 3.8% (0.0154% daily)
- Kenya 7.56% (0.030% daily)
- Nigeria 9.9% (0.0395% daily)
- Uganda 2.0% (0.008% daily)
- Zambia 20.3% (0.08% daily)

Their liquidity also appears to be in line with our average daily liquidity for the African frontier market stocks selected, namely a daily average of 0.018% (based on 5 year historical data).

Correlation and multiple regression

Regression is a tool that is used to analyse the relationship between two or more variables. Regression quantifies the effect of an explanatory variable (X) on a dependent variable (Y). Regression is used when many variables are being analysed and the relationship between the variables are complex. R-squared (R^2) is a value that is derived from a regression model which indicates to what extent one or a set of variables explains another variable – the dependent variable. This R^2 is commonly referred to as a measure of fit (Koop, 2006).

Correlation is the simplest regression model and can only be used when only two variables are being analysed. Although correlation is a useful tool it does not necessarily imply causality between two variables (Koop, 2006). Multiple regression extends the simple regression (i.e. correlation) to the case where there is more than one (i.e. many) explanatory variables. However, in the case of multiple regression, R^2 is a measure of the explanatory power of all the explanatory variables together rather than just one explanatory variable as in the simple regression model (Koop, 2006).

Regression coefficients (i.e., $\boldsymbol{\beta_1}$ and $\boldsymbol{\beta_2}$) are the marginal effects and measure the effect on Y caused by a change in X. A hypothesis test of whether $\beta = 0$ can be used to find out whether the explanatory variable belongs in the regression. If the P-value for the hypothesis test of whether $\beta = 0$ is less than 0.05 then the hypothesis can be rejected at the 5% level of significance. Therefore, one can conclude that X does belong in the regression. In addition if the confidence intervals does not contain zero (in other words both numbers included in the confidence interval are positive numbers or both are negative numbers), then the hypothesis test of whether $\beta = 0$ can be rejected.

Another hypothesis test that can be used to determine whether regression helps to explain the dependent variable is to test whether $R^2 = 0$. If $R^2 \neq 0$, then the hypothesis that $\beta = 0$ can be rejected. However, $R^2 = 0$ can also be used as a test to verify whether all of the explanatory variables jointly have any explanatory power for the dependent variable. By contrast the t-statistic of $\beta = 0$ is used to check whether a single individual explanatory variable has explanatory power (Koop, 2006).

In order to determine, whether a relationship exists between market capitalisation, earnings multiples and the liquidity of shares we ran multiple regressions on each of these inputs for all the stocks selected (both African frontier market stocks and developed market stocks). We ran three multiple regressions with three different dependent variables, namely market capitalisation as a % of GDP, earnings multiples and the liquidity of shares. We ran these three multiple regressions for both earnings multiples, namely PE ratio and EV/EBITDA ratio. We also tested correlation between all three inputs (market capitalisation as a % of GDP, earnings multiples and the liquidity of shares) for both earnings multiples (PE ratio and EV/EBITDA ratio). The results are set out in section 4.

4. RESULTS

Set out below are the results of the analytical procedures performed. Note that we have split the results into 4.2 which is the testing performed using PE ratios and section 4.3 which is the results of testing performed using EV/EBITDA ratios.

4.1 CONVERSION OF TIME SERIES DATA TO CROSS-SECTIONAL DATA

The data obtained (daily variables for selected stocks over a 5-year period) was time-series data. This data was then analysed and outliers were excluded. From this adjusted data (daily variables), the average values[2] were obtained and therefore the data was converted from time-series data to cross-sectional data, where the ordering of the data does not matter. Because cross-sectional[2] data was used for the regression tests performed, it was not necessary to test for stationary data.[3]

[2] The cross-sectional data on which statistical procedures were performed is set out in Table 2 on page 38 and 39.

[3] In the regression context, it is important for data to be stationary since the same results which apply for independent data holds if the data is stationary. Furthermore, the use of stationary data, avoids the problem of spurious regression, whereby a variable with a time trend is correlated with another variable (that also has a time trend) and such correlation does not result from any direct relationship between the variables. Cross-sectional data, by nature, is stationary and cannot be non-stationary (Koop, 2006).

4.2 USING PE RATIOS:

The findings from the tests of correlation are as follows:

- No relationship exists between the liquidity of selected stocks and the PE ratios of the selected stocks (statistically insignificant correlation of 0.13).
- No relationship exists between the PE ratios of selected stocks and the market capitalisation as a % of GDP of the selected stocks (statistically insignificant correlation of 0.048).
- No relationship exists between the market capitalisation as a % of GDP of selected stocks and the liquidity of the selected stocks (statistically insignificant correlation of negative 0.24).

Table 3: Multiple regression of average liquidity of each stock on average PE ratio of each stock and average market capitalisation as a % of GDP of each stock

SUMMARY OUTPUT: Multiple regression for all stocks only (PE ratios)

Regression Statistics	
Multiple R	0.277978932
R Square	0.077272287
Adjusted R Square	0.05784644
Standard Error	0.005053335
Observations	98

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	2	0.000203156	0.000101578	3.977807931	0.021927762
Residual	95	0.002425939	2.55362E-05		
Total	97	0.002629095			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	0.00113656	0.001686116	0.674069722	0.501903889	-0.0022108	0.004483924
Adjusted Daily Average PE Ratio (excl outliers)	0.000196801	0.000138715	1.418739139	0.159247549	-7.8584E-05	0.000472186
Market cap as a % of GDP	-0.19612555	0.078348959	-2.5032311	0.01401315	-0.3516679	-0.0405832

From the above we can see that the average PE ratio (explanatory variable) of the stocks selected does not have any explanatory powers for the liquidity of the selected stocks (the dependent variable), all other explanatory variables being equal. We know this since the P-value for coefficient $\boldsymbol{\beta_1}$ *(average daily PE Ratio)* is not less than 0.05 indicating that the coefficient $\boldsymbol{\beta_1}$ *(average daily PE Ratio)* is not statistically significant at the 5% level. In addition, the confidence interval for $\boldsymbol{\beta_1}$ *(average daily PE Ratio)* does contain zero, further confirming that $\boldsymbol{\beta_1}$ *(average daily PE Ratio)* does not have explanatory powers for the liquidity of the selected stocks.

From the above we can see that the coefficient $\boldsymbol{\beta_2}$ *(market cap as a % of GDP)* does appear to have explanatory powers for the liquidity of the selected stocks (the dependent variable) as the P-value (of 0.014) is less than 0.05 confirming that the coefficient $\boldsymbol{\beta_2}$ *(market cap as a % of GDP)* is statistically significant at the 5% level. Furthermore, $\mathbf{R^2}$ = 0.078 and the P-value for testing whether $\mathbf{R^2}$ = 0

(Significance F) is 0.022, therefore $\mathbf{R^2} \neq 0$. In addition, the confidence interval for $\boldsymbol{\beta_2}$ *(market cap as a % of GDP)* does not *c*ontain zero, further confirming that $\boldsymbol{\beta_2}$ *(market cap as a % of GDP)* does have explanatory powers for the liquidity of the selected stocks. The above table indicates that an increase in the market capitalisation as a % of GDP will reduce the liquidity of a stock. This is counter-intuitive and the reason for this apparent anomaly is as follows. The stocks selected from the developed world all have relatively small market capitalisations when compared to the GDPs of the respective countries whereas the stocks selected from the developing world (namely, African frontier market stocks) all have relatively large market capitalisations when compared to the GDPs of the respective countries. As a result, the average market capitalisation as a % of GDP for the selected African frontier market stocks is 0.87%, which is approximately 45 times larger than the 0.19% average market capitalisation as a % of GDP for the selected developed market stocks. Furthermore, the developed market stocks selected are all stocks with relatively small market capitalisations when compared to the largest market capitalisation stocks in the developed (i.e. stocks such as Apple Inc., Exxon Mobil, PetroChina, Microsoft etc.). To put it into perspective, the developed world stock with the largest market capitalisation included in our sample is Jilin Aodong Medicine Industry Group, a company listed on the Shenzhen Stock Exchange with a market capitalisation of approximately $3.3 billion. All of the companies listed above (namely Apple Inc., Exxon Mobil, PetroChina and Microsoft) have market capitalisations in excess of $250 billion making them all at least 75 times larger than the largest developed world company stock included in our sample. Therefore, the relationship identified in this regression (namely that an increase in the market capitalisation as a % of GDP will reduce the liquidity of a stock) is only likely to apply to the selected sample of stocks and this relationship will not hold if the sample was extended to include the entire population of stocks in the world (i.e., all stocks in the world). Therefore, this finding should be disregarded.

(Amihud, 2002) performed a similar regression test in his research. Using data for the period 1964 to 1997, he regressed the average monthly cross-sectional stock returns on the logarithm of the market capitalization of the stocks at the end of the year and obtained a coefficient of negative 0.134. This is very similar to the result we obtained for $\boldsymbol{\beta_2}$, namely negative 0.196. This finding from Amihud (2002) is also counter-intuitive because one would expect there be a positive relationship between the market capitalisation of a stock and the return of a stock, yet Amihud found that the relationship was negative. Amihud (2002) did not offer an explanation for this finding in his research paper.

Table 4: Multiple regression of average PE ratios of each stock on average market capitalisation as a % of GDP of each stock and average liquidity of each stock

Regression Statistics	
Multiple R	0.151708656
R Square	0.023015516
Adjusted R Square	0.002447422
Standard Error	3.698612474
Observations	98

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	2	30.61500386	15.30750193	1.118991178	0.330875153
Residual	95	1299.574752	13.67973423		
Total	97	1330.189756			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	11.07530659	0.488967253	22.65040555	4.49847E-40	10.10458386	12.04602932
Market cap as a % of GDP	47.2921298	59.00665608	0.801471104	0.424859094	-69.8508934	164.435153
Liquidity of shares (average of % of volume of shares in issue traded on a daily basis and % of value of shares in issue traded on a daily basis)	105.4262367	74.30981057	1.418739139	0.159247549	-42.0973893	252.9498627

From the above we can see that neither the liquidity of shares nor the average market capitalisation as a % of GDP (explanatory variables) of the stocks selected have any explanatory powers for the PE ratios of the selected stocks (the dependent variable), all other explanatory variables being equal. We know this since the P-value is not less than 0.05 for any of the explanatory variables indicating that neither of the coefficients $\boldsymbol{\beta_1}$ *(market cap as a % of GDP)* or $\boldsymbol{\beta_2}$ *(liquidity of shares)* are statistically significant at the 5% level.

Table 5: Multiple regression of average market capitalisation as a % of GDP of each stock on average liquidity of each stock and average PE ratio of each stock

SUMMARY OUTPUT: Multiple regression for all stocks only (PE ratios)

Regression Statistics	
Multiple R	0.25308194
R Square	0.064050468
Adjusted R Square	0.044346268
Standard Error	0.006409331
Observations	98

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	2	0.000267066	0.000133533	3.250599673	0.043101312
Residual	95	0.003902555	4.10795E-05		
Total	97	0.004169621			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	0.002552706	0.002127612	1.199798651	0.233201202	-0.00167114	0.006776551
Liquidity of shares (average of % of volume of shares in issue traded on a daily basis and % of value of shares in issue traded on a daily basis)	-0.31550289	0.12603826	-2.5032311	0.01401315	-0.56572048	-0.06528531
Adjusted Daily Average PE Ratio (excl outliers)	0.000142016	0.000177194	0.801471104	0.424859094	-0.00020976	0.00049379

From the above we can see the coefficient $\boldsymbol{\beta_1}$ *(liquidity of shares)* does appear to have explanatory powers for the market capitalisation as a % of GDP of stocks selected (the dependent variable) as the P-value of 0.014 is less than 0.05, confirming that the coefficient $\boldsymbol{\beta_1}$ *(liquidity of shares)* is statistically significant at the 5% level. The table above indicates that an increase in the liquidity of a stock will reduce the market capitalisation as a % of GDP of a stock. As noted above, this counter-intuitive finding is an anomaly caused by the fact that the developed world stocks selected for this research all have relatively small market capitalisations when compared to the GDPs of the respective countries. This finding will also be disregarded as the relationship is not likely to hold true for the entire population of stocks (i.e. all stocks in the world).

From the above we can see that the coefficient $\boldsymbol{\beta_2}$ *(PE ratio)* has no explanatory powers for the market capitalisation as a % of GDP of a stock (the dependent variable) as the P-value (of 0.42) is not less than 0.05. In addition, the confidence interval for $\boldsymbol{\beta_2}$ *(PE ratio)* does *c*ontain zero, further confirming that $\boldsymbol{\beta_2}$ *(PE ratio)* does not have explanatory powers for the market capitalisations as a % of GDP of the stocks selected.

4.3 USING EV/EBITDA RATIOS:

The findings from the tests of correlation are as follows:

- No relationship exists between the liquidity of selected stocks and the market capitalisation as a % of GDP of the selected stocks (statistically insignificant correlation of negative 0.18).
- A significant positive relationship exists between the EV/EBITDA ratios of selected stocks and the liquidity of the selected stocks (statistically significant correlation of 0.44). Therefore, companies with more liquid shares tend to have higher EV/EBITDA ratios and/or vice versa.
- No relationship exists between the market capitalisation as a % of GDP of selected stocks and the EV/EBITDA ratios of the selected stocks (statistically insignificant correlation of negative 0.18).

Table 6: Multiple regression of average liquidity of each stock on average EV/EBITDA ratio of each stock and average market capitalisations as a % of GDP of each stock

SUMMARY OUTPUT: Multiple regression for all world stocks only (EV/EBITDA ratios)

Regression Statistics	
Multiple R	0.450366145
R Square	0.202829664
Adjusted R Square	0.185686216
Standard Error	0.00487039
Observations	96

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	2	0.000561294	0.000280647	11.83132259	2.64318E-05
Residual	93	0.002206025	2.37207E-05		
Total	95	0.002767319			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	-0.001746151	0.001283165	-1.360815703	0.176860618	-0.004294263	0.00080196
Adjusted Daily EV/EBITDA ratio (excl outliers)	0.000614013	0.000137661	4.460324076	2.28778E-05	0.000340645	0.000887381
Market cap as a % of GDP	-0.050217244	0.044508229	-1.128268762	0.262108682	-0.138601765	0.038167277

From the above we can see that the coefficient $\boldsymbol{\beta_2}$ *(market cap as a % of GDP)* has no explanatory powers for the liquidity of stocks selected (the dependent variable) as the P-value (of 0.26) is not less than 0.05. However, we can see the coefficient $\boldsymbol{\beta_1}$ *(EV/EBITDA ratios)* does have explanatory powers for the liquidity of stocks selected (the dependent variable) as the P-value is less than 0.05 confirming that the coefficient $\boldsymbol{\beta_1}$ *(EV/EBITDA ratios)* is statistically significant at the 5% level. Furthermore, $\mathbf{R^2}$ = 0.203 and the P-value for testing whether $\mathbf{R^2}$ = 0 (Significance F) is not equal to 0. In addition, the confidence intervals for $\boldsymbol{\beta_1}$ *(EV/EBITDA ratio)* does not *c*ontain zero, further confirming that $\boldsymbol{\beta_1}$ *(EV/EBITDA ratio)* does have explanatory powers for the liquidity of the selected stocks. The above table indicates that an increase of 1 in the EV/EBITDA multiple for the selected stocks will add an

additional 0.061% to the liquidity of a stock (measured as average value of shares traded on a daily basis divided by market capitalisation or average volume of shares traded on a daily basis divided by number of shares in issue).

Table 7: Multiple regression of average EV/EBITDA ratio of each stock on average market capitalisation as a % of GDP of each stock and average liquidity of each stock

SUMMARY OUTPUT: Multiple regression for all world stocks only (EV/EBITDA ratios)

Regression Statistics	
Multiple R	0.448992126
R Square	0.20159393
Adjusted R Square	0.184423907
Standard Error	3.329784641
Observations	96

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	2	260.3567611	130.1783806	11.74104015	2.84059E-05
Residual	93	1031.134315	11.08746575		
Total	95	1291.491076			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	7.509861347	0.422495774	17.77499753	1.15608E-31	6.670868472	8.348854223
Market cap as a % of GDP	-32.33004298	30.45292912	-1.061639846	0.29114839	-92.80352487	28.14343891
Liquidity of shares (average of % of volume of shares in issue traded on a daily basis and % of value of shares in issue traded on a daily basis)	287.0003669	64.34518255	4.460324076	2.28778E-05	159.2235866	414.7771472

From the above we can see that the coefficient $\boldsymbol{\beta_1}$ *(market cap as a % of GDP)* has no explanatory powers for the EV/EBITDA of the selected stocks (the dependent variable), all other explanatory variables being equal, as the P-value (of 0.29) is not less than 0.05. However, we can see the coefficient $\boldsymbol{\beta_2}$ *(liquidity of shares)* does have explanatory powers for the EV/EBITDA multiple of the stocks selected (the dependent variable) as the P-value is less than 0.05 confirming that the coefficient $\boldsymbol{\beta_2}$ *(liquidity of shares)* is statistically significant at the 5% level. Furthermore, $\mathbf{R^2} = 0.202$ and the P-value for testing whether $\mathbf{R^2} = 0$ (Significance F) is not equal to 0. In addition, the confidence interval for $\boldsymbol{\beta_2}$ *(liquidity of shares)* does not *c*ontain zero, further confirming that $\boldsymbol{\beta_2}$ *(liquidity of shares)* does have explanatory powers for the EV/EBITDA multiples of the selected stocks. The above table indicates that an increase of 0.01% in the liquidity of a share (measured as average value of shares traded on a daily basis divided by market capitalisation or average volume of shares traded on a daily basis divided by number of shares in issue) will add an additional 2.87 to the EV/EBITDA multiple of a stock.

Amihud (2002) regressed stock returns from 1964 to 1997 on the cross-sectional mean-adjusted daily ratio of a stock's absolute return to its dollar trading volume (a measure called ILLIQ, which was

averaged every year across all stocks) and found the coefficient to be equal to 0.162, indicating that there is a positive relationship between stock returns and trading volume. Amihud's finding indicates that a 1% increase in the liquidity of a share (measured over a 1 year period) will increase the annual return of the stock by 16.2%. If we assume that there are 250 trading days in a calendar year, this means that a 0.004% increase in the daily liquidity of a share will increase the daily return of a share by 0.0648%. Although this finding cannot be directly compared to our results (as we have measured the effect of increased liquidity on the EV/EBITDA ratio of a stock and not the return of a stock), it does confirm that the same principle or relationship holds true, namely that there is a positive relationship between the liquidity of a stock and the return or value of a stock. Amihud did not perform a regression to test to examine the relationship between the liquidity of stocks and the valuation of stocks (i.e., PE ratio, EV/EBITDA ratio or stock price).

Table 8: Multiple regression of average market capitalisation as a % of GDP of each stock on average liquidity of each stock and average EV/EBITDA ratio of each stock

SUMMARY OUTPUT: Multiple regression for all world stocks only (EV/EBITDA ratios)

Regression Statistics	
Multiple R	0.20949186
R Square	0.043886839
Adjusted R Square	0.023325266
Standard Error	0.011270152
Observations	96

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	2	0.00054221	0.000271105	2.134410563	0.124074425
Residual	93	0.011812519	0.000127016		
Total	95	0.012354729			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	0.00771527	0.002889985	2.669656943	0.008961019	0.001976331	0.013454208
Liquidity of shares (average of % of volume of shares in issue traded on a daily basis and % of value of shares in issue traded on a daily basis)	-0.26889639	0.23832654	-1.128268762	0.262108682	-0.742165665	0.204372885
Adjusted Daily EV/EBITDA ratio (excl outliers)	-0.000370368	0.000348864	-1.061639846	0.29114839	-0.001063143	0.000322407

From the above we can see that neither the coefficient $\boldsymbol{\beta_1}$ *(liquidity of shares)* or $\boldsymbol{\beta_2}$ *(EV/EBITDA ratio)* have any explanatory powers for the market capitalisation as a % of GDP of stocks selected (the dependent variable), all other explanatory variables being equal. We know this because the P-value is not less than 0.05 for any of the explanatory variables (coefficients $\boldsymbol{\beta_1}$ or $\boldsymbol{\beta_2}$) indicating that neither of the coefficients $\boldsymbol{\beta_1}$ *(liquidity of shares)* or $\boldsymbol{\beta_2}$ *(EV/EBITDA ratio)* are statistically significant at the 5% level. In addition, the confidence intervals for both $\boldsymbol{\beta_1}$ *(liquidity of shares)* and $\boldsymbol{\beta_2}$ *(EV/EBITDA*

*multiple) c*ontain zero, further confirming that neither of them have explanatory powers for the liquidity of the selected stocks.

4.4 SUMMARY OF FINDINGS

The key findings from the study are set out below.

Table 9: Significant relationships identified through correlation

Summary of findings: Significant relationships identified through correlation		
Variable #1	**Variable #2**	**Correlation**
Liquidity of shares	EV/EBITDA multiple	0.44

From the above we can see that we found evidence that a relationship exists between the EV/EBITDA multiple of a stock and the liquidity of a stock.

Table 10: Summary of significant relationships identified through multiple regression tests

Summary of findings: Significant relationships identified through multiple regression tests	
Relationship	**Effect**
The EV/EBITDA multiple of a stock does appear to influence the liquidity of a stock	An increase of 1 in the EV/EBITDA multiple of a stock will add an additional 0.061% to the liquidity (measured as average value of shares traded on a daily basis divided by market capitalisation or volume of shares traded on a daily basis divided by number of shares in issue) of a stock
The liquidity of a stock does appear to influence the EV/EBITDA multiple of a stock.	An increase of 0.01% in the liquidity of a share (measured as average value of shares traded on a daily basis divided by market capitalisation or volume of shares traded on a daily basis divided by number of shares in issue) will add an additional 2.87 to the EV/EBITDA multiple of a stock.

From the above we can see that we found evidence that the EV/EBITDA multiple of stock does appear to influence the liquidity of a stock. Similarly, we also found evidence that the liquidity of a stock does appear to influence the EV/EBITDA multiple of a stock.

5. CONCLUSION

Results of the study confirm that African frontier market stocks are indeed "cheaper" than their global counterparts as they have lower average PE and EV/EBITDA multiples. This reaffirms what has been stated in the literature review, namely that African frontier assets are attractively priced compared to their global counterparts and the continent offers good value to investors who are willing to take on the inherent risks that accompany investing in African frontier markets.

The results of the study also confirm that African frontier market stocks are indeed significantly more illiquid than their global counterparts. As noted in the literature review, the best way for investors to mitigate the risks associated with illiquidity is to make sure the investment horizon is long (5-7 years) and rather to look at investing in the non-public equity market (i.e. invest in private companies). This is precisely the strategy of private equity fund managers who, in recent times, have started paying closer attention to the African continent.

Leaders and policymakers of African countries should adopt policies to stimulate investment into their country, paying special attention to private equity investors because of the suitability of the asset class for long term investment in African frontier markets. Private equity investment will significantly boost the economic growth of African frontier markets by providing access to much needed equity capital (required for expansion) to local companies who have traditionally relied heavily on the banking system for expansionary capital. Furthermore, because of the interdependence between public and private capital markets, private equity investment will stimulate future listings of local companies on local African frontier stock exchanges.

Policymakers of African countries should also adopt policies that encourage the harmonisation of the different Francophone and Anglophone legal and accounting systems, which will lead to better integration between African countries. This standardisation of laws will provide foreign investors with more comfort around investing in African frontier markets, specifically by providing them with more certainty around asset security.

Policymakers should also implement policies that support a stable and effective legal and regulatory framework. This will provide investors in African frontier markets with a lot of comfort that unlawful expropriation of assets is not a big risk in these countries.

Finally, because a primary deterrent to investing in African frontier markets is the limited scale of investment opportunities, policymakers of African frontier markets should implement economic policies to stimulate entrepreneurship, such as tax breaks for start-up companies and financial support

for small enterprises. Local entrepreneurs who build successful businesses in African frontier markets will create new investment opportunities for international investors (who will look to invest in these local businesses).

Based on the results of the regression analysis performed, we find strong evidence to suggest that there is a relationship between the EV/EBITDA multiple and the liquidity of a stock. This confirms our other finding which shows that, on average, African frontier stocks have lower liquidity and lower earnings multiples than their global counterparts. Our finding is also consistent with that of Lester et al. (2010) who found that the liquidity of an asset affects its price.

Surprisingly, the results of the study find that there is no relationship between the PE multiple and the liquidity of a stock (even though we found strong evidence that a relationship exists between the EV/EBITDA multiple and the liquidity of a stock). Although the cause of this anomaly is beyond the scope of this paper, we offer the following explanation. EBITDA is deemed to a better measure of profitability and is the most universally accepted profit measure used by investment and other finance professionals (i.e. investment bankers) to measure the financial performance of a company. It is the preferred profit measure because it enables a better comparison between different companies (operating in different industries) because the effects of different asset bases (it is a pre-depreciation profit measure), different takeover histories (it doesn't take into account amortisation stemming from goodwill), different tax structures (taxation is not taken into account in EBITDA) and different capital structures (interest payments are not taken into account in EBITDA) are cancelled out. In addition, EBITDA is a closer approximation of free cash flow and is therefore the preferred profit measure used by investment bankers (who use free cash flow to value a company) and other finance professionals. Therefore, the PE multiple (which uses net profit after tax) may not be an accurate reflection of the value of a company (EV/EBITDA is a much better reflection of value).

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