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Effect of cross listing on stock liquidity in East Africa security exchanges

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EFFECT OF CROSS LISTING ON STOCK LIQUIDITY IN EAST AFRICA SECURITY EXCHANGES.

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DECLARATION

I declare that this work has not been previously submitted and approved for the award of a degree by this or any other University. To the best of my knowledge and belief, the thesis contains no material previously published or written by another person except where due reference is made in the thesis itself.

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APPROVAL

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VT OMNES
VNVM SINT

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LIST OF ABBREVIATIONS AND ACRONYMS

BOK	Bank of Kigali
CFO	Chief Finance Officer
CMA	Capital Markets Authority
DSE	Dar-es-salaam Stock Exchange
EABL	East African Breweries Limited
FSX	German Stock Exchange
LSE	London Stock Exchange
NASDAQ	Nasdaq Stock Exchange
NSE	Nairobi Securities Exchange
NYSE	New York Stock Exchange
RSE	Rwanda Stock Exchange
TSX	Toronto Stock Exchange
USE	Uganda Securities Exchange
VIF	Variance Inflation Factor

ABSTRACT

Despite the huge importance of stock liquidity of listed firms, little is known on whether cross-listing has an effect on stock liquidity for all cross listed firms in East Africa. This research study aimed at determining the effect of cross-listing on stock liquidity of cross-listed firms in East Africa and further the effect on the relationship between liquidity drivers and stock liquidity. The perception of management of listed firm's on cross-listing was also assessed. The study used both primary and secondary sources of data. The secondary data were collected from the share pricelists for nine cross-listed firms in East Africa. The primary data were obtained through issue of questionnaires to thirty five finance managers and CFOs of East Africa listed firms to assess their perception of factors that motivate and hinder cross-listings as well as effect of cross-listing on liquidity. Random effects panel regression and test of equality of means were used to analyze the secondary data whereas the primary data was analyzed using descriptive statistics and triangulated to secondary data findings. The regression model output indicated that no significant relationship exists between cross-listing and stock liquidity as measured by bid-ask spread in the short run and long run. Further, the analysis on individual cross-listing events indicated that majority of the cross-listings did not yield significant improvements in stock liquidity both in the short run and long run. Management of listed firms perceive that most cross-listings in East Africa are majorly motivated by need to signal better future prospects to investors and to exploit growth opportunities. Investors who are interested in stock liquidity are encouraged to look at whether other strategies including rights issue and stock splits improve stock liquidity of East Africa firms since investing in cross-listed firms may not be quite beneficial. Researchers and scholars are encouraged to research on whether strategies such as rights issue and stock splits improve stock liquidity. One limitation of this study was that it focused on East Africa which comprises of frontier markets and hence the results cannot be conclusively generalized to the emerging and developed markets. Future researchers can explore the emerging and developed markets and find out if the findings will be similar. The study contributes to knowledge through analyzing the market width aspect of liquidity and comparing the effect of cross-listing in the different East Africa markets since they are developed differently.

CHAPTER ONE

INTRODUCTION

1.1 Background of the study

Majority of capital markets are not perfect and therefore information asymmetries and transaction costs to a certain extent lead to market segmentation. The aftermath of this is that a given market becomes the market leader for a given stock at a given time (Errunza & Miller, 2000). With this in mind, managers make decisions that aim at being market leaders and getting better prices for their stock (Chouinard & D'Souza, 2004). This is however not easily achievable and particularly for firms in countries that are still developing. This is because their capital markets are less developed as a result of various factors including economic conditions such as institutional factors, environmental factors, lack of expertise, historical factors, informational factors and low technological processes as compared to developed markets(Adjasi & Yartey, 2007)

One of the solutions proposed to firms over this factors hindering development of stock market is regional integration in the case of developing countries (Tahari, Sole, Sensenbrenner, De Vrijer, & Moretti, 2007). Researchers advocating for regional integration have found out that it can lead to economies of scale, improved efficiency, synergies, economic growth and flow of foreign funds into the market (Adelegan & Ariyo, 2008) Cross listing is one of the ways through which regional integration can be achieved. Cross listing happens when a listed firm trades its ordinary shares in other security exchanges besides the domestic exchange (Onyuma, Mugo, & Karuiya, 2012).

Investors can access foreign shares easily, and the cross-listed firm benefits from the fact that there is a signaling effect to domestic investors that the firm's quality is non-disputable as proven by its capability to meet the requirements needed for being listed internationally. This signal that has a positive effect leads to more trade of the firm's shares by home investors (Abdallah, Abdallah, & Saad, 2011).Firms consider cross listing in markets that will offer a broad investor base, better liquidity for their stocks and elevated accessibility of equity capital(King & Mittoo, 2007). Enhanced liquidity of stocks is considered as an important expected benefit of cross listing to firms because it translates into reduced cost of equity capital through reducing the trading costs for shareholders and reducing the illiquidity premium.(Bris,Cantale,Hrnjic&Nishiotis,2007). Additionally, investors majorly attempt to invest in liquid stock since stock with high power of liquidity are considered to perform better (Chouinard & D'Souza, 2004).

Stock liquidity indicates the ability to trade large quantities of the stock at low cost and with less impact on price. The aspects of depth and width are the two major liquidity dimensions. The different aspects of liquidity are measured using a vast number of measures. The depth aspect is assessed by the turnover rate calculated by dividing the total number of shares traded with the total number of outstanding shares (Lo& Wang 2000) and volume which assesses the depth aspect of liquidity by capturing the quantity of shares per given time (Amihud, Mendelson, & Pedersen, 2005).On the contrary, the width aspect is assessed by the trading cost as measured by the bid-ask spread representing the cost incurred by a trader while executing a trade.A minimal bid-ask spread is considered desirable as it indicates higher stock liquidity.

Trading quantity is assessed through the turnover rate and trading volumes(Lybek & Saar, 2002).The liquidity ratio (LR) better described as the Amivest liquidity measure is another indicator of liquidity. Amivest is assessed through measuring change in stock price and while drawing conclusions, the assumption is that the higher the liquidity ratio the greater the depth (Amihud, Mendelson, & Lauterbach, 1997).The probability of information based trading (PIN) is another measure of liquidity. The measure is arrived at by computing the trading percentage whose base is private information of all the trading that is observed.

Findings of studies conducted on cross-listing and stock liquidity from a global perspective have been diverse. Chouinard and D'Souza,(2004) in a study on The Rationale for Cross-Border Listings in US exchanges argued that an increase in market depth and trading volume emerged due to cross listing. The study also stated that liquidity improved majorly when the primary market continues to have a significant percentage of its trading volume and in instances where there are strict restrictions on cross-border trading. Karolyi, (2003), in a study on the world of cross listing found out that the magnitude of enhanced liquidity related to the percentage of total trading volume that was captured by the new market and the restrictions pressed on foreigners before listing.

Halling, Pagano, Randl, and Zechner,(2008) found that for cross listings on US exchanges, stock liquidity on the foreign market was better for companies from countries that were located near the US than for firms from developing countries. Hauser, Yankilevitz, and Yosef ,(2011) in a study on the effects of Dual Listing on Share Prices and Liquidity of Israel firms found that trade volume of the dual listed companies had improved by close to 123%. On the contrary, the above findings were contradicted by Silva and Chavez (2008) who in a study on Latin American firms found that

American Depository Receipts don't always show improved liquidity in the home market as an aftermath of cross listing. Berkman and Nguyen,(2010) reported that USA cross-listings did not result to positive changes in domestic liquidity as measured by probability of informed trading, bid-ask spread and turnover rate.

Another set of global researchers were concerned about the factors that motivated firms to cross-list.Cross-listings and especially in large international exchanges are majorly motivated by lower cost of equity, access to increased firm value, legal bonding, market access, and effective corporate governance (Cetorelli & Peristiani ,2010; Dodd, 2013). Firm's that cross-list from markets with poor legal protection to countries with more stringent legal protection systems are likely to benefit. This is as a result of the many advantages that arise from cross-listing to more prestigious markets (Chan, Hsu, & Lee, 2013).

Africa cross-listings have been steered by an initial public offering and secondary market listing. Some of the cross listed firms have achieved reduced cost of capital as a result of improved firm's information environments. Over the years improved stock liquidity has been reported for cross-listed firms as a result of availability of information to potential traders and accounting information being of higher quality(Patell,2006).Cross listing in Africa began with South Africa's Johannesburg Securities Exchange (JSE) cross listing on the Namibia Stock Exchange (NSX) in 1992.Since then, JSE has cross-listed in more than twenty firms on the NSX. Regional cross-listing has also taken place between stock markets of Botswana and South Africa; Malawi and South Africa; Nigeria and South Africa; Zambia and South Africa in 2003; and Ghana and South Africa in 2004 (Adelegan, 2009).There are diverse findings in Africa as well. According to Dabengwa, (2017) there was no evidence to indicate that firms in JSE benefited by cross-listing in other Sub-Saharan Africa Exchanges. On the other hand, (Adelegan, 2009) showed that regional cross-listing improved the depth of stock market and the performance of stock markets of countries with regional cross-listings was found to be better than the performance of countries without regional cross listing.

In East Africa, a joint stock exchange taskforce report concerning cross-border listing was signed in the year 2000 by Kenya, Uganda, and Tanzania. Kenya Airways and East African Breweries Ltd were the first Kenya listed firms to cross-list at USE in 2001 and 2002 respectively. In 2004,Kenya Airways cross listed at DSE as EABL followed suit in 2005.Jubilee Holdings cross listed in USE and DSE in 2006 as KCB opened its USE and DSE doors in 2008.Equity group cross listed in USE in 2009 as KCB cross listed in RSE in the same year. Centum and Nation Media followed suit in 2010 with Centum trading in USE and Nation in both USE and DSE. In 2011,Nation media cross listed in DSE followed by Umeme limited a company whose home market is USE cross listing in NSE in 2012.Uchumi supermarket cross listed in RSE and USE in 2013 and DSE in 2014.Bank of Kigali whose primary listing is Rwanda is the latest cross-listing in East Africa after listing its shares in NSE bourse in 2018.

The Kenyan securities exchange, NSE, is considered to be a highly liquid market and active in terms of trades when comparison is made with the other markets in the East Africa region (Makau, Onyuma and Okumu,2015). However, low level of securities market liquidity is still one of the huge challenges facing NSE especially in the equity and bonds markets (CMA Kenya,2016).The low liquidity level is one of the main motivation behind managerial decisions to cross-list (Charitou & Louca, 2009). The stock market in Uganda (USE) is considered to be nascent and small with its major challenges being a limited number of listings and low market capitalization. Most of the Uganda companies in the private sector fear loosing control to shareholders and hence have a negative attitude towards listing and further still cross-listing (Bulere,2015).Investors' trade less as a result of fear that the Uganda market will fail to absorb demand and supply offers leading to poor market liquidity (CMA Uganda,2017).

The Tanzania exchange, DSE, is hindered from growth by a number of challenges including lack of liquidity, low market capitalization, poor macro- economic high transaction costs, lack of skillful human resources, and lack of public awareness. Investors face liquidity challenges during diversifying their securities. The Rwanda Securities Exchange is faced by illiquidity challenges as well .Generally, the East Africa Security Exchanges are considered illiquid arising from the fact that there are relatively fewer listed-company shares that are available for active trading in this markets.(Musonera&Safari,2008)

Various studies with diverse findings have been done on what effect cross-listing has on the stock liquidity in the various East Africa exchanges and majorly on Kenya. Makau, Onyuma, and Okumu, (2015) indicated that the effect of cross listing on liquidity was not statistically significant in East Africa but their general conclusion was that cross-listing can boost the firm's stock liquidity with the measure of liquidity used determining whether it is a positive or negative direction. According to Areba ,(2013) cross listing explained 62.2% of the variance on share liquidity among the cross listed companies in NSE and there existed a moderate positive correlation between the price of cross listed shares and the volume of the share that were traded at the securities market.

On the contrary, Makanga & Gateri, (2014) found out that there was no significant difference in liquidity before and after cross-listing which was a sharp contrast from the expected results. Only five companies were assessed as the other three did not meet the data criteria. Additionally, Wanjiru,(2013) studied the relationship between cross listing and stock liquidity in East Africa and found an increase in the volumes of shares traded and an increase in market capitalization of the cross listed firms. However, the results did not show a significant increase in the liquidity of the cross listed securities and hence he concluded that cross listing in the East African Securities exchanges did not improve significantly the liquidity of the cross listed securities.

Previous studies done on cross listing and liquidity in East Africa (Areba, 2013; Makanga and Gateri, 2014; Wanjiru, 2013; Makau, Onyuma, and Okumu, 2015) assessed stock liquidity using the descriptive research methodology and assessed liquidity from the depth perspective using the turnover rate and liquidity ratios measures. This study took a different approach by assessing liquidity from the market width perspective through the bid ask spread measure by use of panel regression model for market width. According to Amihud et al., (1997) and Corwin and Schultz,(2012) one of the best measures of liquidity is the bid-ask spread, either quoted or effective. Panel regression model has been considered to be one of the most preferred tools among researchers in the analysis of indicators in many performance studies. The model is advantageous because it's considered to be empirically robust (Hsiao, 2014).Also, previous studies on cross listing and stock liquidity at East Africa analysed four to seven firms out of the ten firms. This was because there was no sufficient data for the other firms at the time when the research was done. This study analysed nine of the ten cross listed firms in East Africa.

1.2 Statement of the problem

The liquidity preference theory that was first proposed by Economist John Maynard Keynes,(1935) argued that investors prefer to invest in liquid investments that are easier to sell quickly for full value. Cross-listing improves stock liquidity and poor stock liquidity has been cited as one of the deficiencies of a segmented market which can be mitigated by cross-listing (King & Mittoo, 2007).Stock liquidity is important for listed firms because it is one of the key considerations that investors make while investing in a given company. Investors are majorly concerned about three things including the return the stock will earn, the risk involved and the liquidity power. Liquidity power is vital because it indicates how easily an investor can buy and sell a stock. A company with poor liquidity will have less investor base translating to low capital for the firm(Chouinard & D'Souza, 2004) . Despite the huge importance of cross listing to solve the poor stock liquidity problem, most of the listed companies in East African countries are yet to cross-list (Onyuma, Karuiya &John,2012).

Terrorist attacks in New York in the year 2001, led investors to appreciate the huge importance of liquidity. The stock exchanges were closed for four days leading to loss of access to cash and investments for investors. There was no guarantee on ability to sell stocks easily and quickly and this created panic in the markets(Brounen & Derwall, 2010). Also, the global financial crisis led market participants to understand the importance of liquidity in functioning financial markets. Prior to the crisis, market participants could easily access to readily available funding but this changed post the crisis. Failure to manage liquidity since market participants were not prepared for the crisis led to the sudden fall financial institutions that were considered to be too big to fail (International Monetary Fund, 2016). It is important to study the effect of cross listing on stock liquidity because liquidity has been said to be the heart of stock markets. This is because it has some implications for traders, regulators, stock exchanges and even listed firms (Ali&Boadu,2016).

Empirical studies on the impact of international cross-listing on stock liquidity have different findings. Some researchers have established a positive impact(Chouinard & D'Souza, 2004b) ;Karolyi and Foerster ,2004; Michael et al. ,2008; Hauser et al.,2011) between cross-listing and stock liquidity while others have found an adverse effect (Silva and Chávez ,2008; Berkman and Nguyen (2010). Several studies in East Africa have assessed the impact of cross-listing on stock

liquidity. Makau, Onyuma, and Okumu ,(2015) reported that cross-listing can boost the firm's stock liquidity with the measure of liquidity used determining whether it is a positive or negative direction. Similary, Areba (2013) found a moderate positive correlation between the price of cross listed shares and the volume of the share that were traded at the securities market. On the other hand, Makanga and Gateri ,(2014) and Wanjiru ,(2013) found no significant difference in liquidity before cross listing and after cross listing.

It would be of great importance to further analyse the market width aspect of stock liquidity by analyzing the effect of cross listing on stock liquidity and stock liquidity drivers in East Africa Exchanges. This is because, stock liquidity plays a huge role in investment decisions and there exists a methodological gap on measurement of trading cost aspect of liquidity as proxied by the bid-ask spread. Additionally, there is an existing gap on how market participants perceive cross listing and comparison of the effect of cross-listing in the different East Africa markets since they are developed differently as a contribution to knowledge.

1.3 Research Objectives

1.3.1 General objective

The main objective of the study was to examine the effect of cross-listing on stock liquidity drivers and stock liquidity of cross-listed firms within East Africa.

1.3.2 Specific objectives

The study sought to address the following objectives:

1. To evaluate the effect of cross-listing in different East Africa markets on stock liquidity of cross-listed firms in East Africa.
2. To determine the effect of cross-listing on association between stock liquidity drivers and stock liquidity of cross-listed firms.
3. To investigate the perception of the management of companies listed in the East Africa Exchanges on effect of cross-listing.

1.4 Research Questions

1. What is the effect of cross-listing in different East Africa markets on stock liquidity of cross-listed firms within East Africa?
2. What is the effect of cross-listing on association between stock liquidity drivers and stock liquidity of cross listed firms within East Africa?
3. How do managers of companies listed in the East Africa exchanges perceive cross-listing?

1.5 Scope of the Study

This study was carried out on nine cross listed firms in East Africa. This included eight cross-listed firms whose primary market is Nairobi Securities exchange and have cross-listed in USE, RSE and DSE markets and one company whose primary listing is RSE that has cross-listed in NSE. These firms are Kenya Commercial Bank, Nation Media Group, Centum, Kenya Airways, Uchumi Supermarkets, East Africa Breweries Limited, Jubilee Holdings, Equity Bank and Bank of Kigali from Rwanda. The period of analysis was based on the cross-listing event date. The short run analysis was on 20 days before and 20 days after the event while the long run analysis was on 60 days before and 60 days after the event.

1.6 Significance of the Study

Various market participants and stakeholders will benefit from this study including:

1.6.1 Listed firms

The non-cross listed firms could use the findings of this study to make informed decisions on whether to cross-list. The cross-listed firms could use the results to understand how cross-listing has impacted on them. More specifically, the study will be useful to managers and shareholders of firms already cross listed in East Africa and also those that wish to cross list to know whether cross border listing affected the liquidity of their stock and if that effect helped the firm achieve its liquidity goals.

1.6.2 Market regulators

The findings of the study could be used by this regulators to come up with better policies that will encourage cross-listing and other activities that will enhance trade of securities in the region. Besides, the study will provided useful information to the stock exchange regulators that could

enable them formulate policies that could lead to a more conducive investment atmosphere for both investors and listed firms.

1.6.3 Academicians

Researchers can also benefit from the study by getting more information on the whole area of cross-listing in East Africa and will serve as a reference for further research. The study will bridge the knowledge gap on effect of cross border listing on the liquidity of stock and will be useful to future researchers as it formed part of their empirical literature on cross border listing.

1.6.4 Investors

Investors are likely to make informed decisions on whether to invest in cross-listed firms or in firms listed in primary bourses only. Existing investors may also benefit by identifying the best time to trade. Previous studies have indicated that the decision making of investors is based on asset returns, risk involved and liquidity power. This study will help them to understand if investing in cross listed firms is beneficial in terms of stock liquidity.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter expounds on some theories that form the basis for the research. The theories considered for the research included information disclosure theory, liquidity theory and the behavioral finance theory. Research work regarding cross-listing and stock liquidity as well as stock liquidity drivers as done by other researchers is also reviewed. The chapter outlines the research gaps as well and concludes with a conceptual framework that illustrates the relationship between the variables.

2.2 Theoretical Framework

The theoretical framework of cross-listing is enormous with various theories being analyzed in studies involving cross-listing. This research was based on three theories that are major in cross-listing studies. These theories are the information disclosure theory, liquidity theory and behavioral finance theory. The information disclosure theory will be applied to explain some of the reasons that lead to firms cross-listing and benefits accrued from cross-listing. Liquidity theory gave insights on how cross-listing influences stock liquidity especially in capital markets that are yet to develop fully. Behavioral Finance theory, on the other hand, was used to expound on the behavioral aspects of company management that influence their cross-listing decisions.

2.2.1 Liquidity theory

This theory as originated by Amihud and Mendelson, (1986) looked at the benefits that can accrue to firms located in capital markets with poor liquidity after cross-listing in exchanges with superior liquidity. Stock liquidity is one factor that cannot be ignored while pricing assets and therefore strategies that enhance liquidity of stocks including cross-listing should be encouraged. Liquidity theory stipulates that cross-listing is an important strategy that decreases the illiquidity risk premium translating to increased firm share value. Additionally,cross-listing enhances competition among investors leading to a reduction in the trading costs as measured by the bid-ask spreads and consequently promotes trading in the primary market. Kadlec and McConnell (1994) contributed to the Amihud and Mendelson's,(1986) theory empirically. They noted that liquidity factor partly explained the share value after firms cross listed on the NYSE. Further, firms that listed in foreign exchanges experienced higher returns and significantly reduced their bid-ask spreads which was

an indication of improved stock liquidity. This was in agreement with the report of Amihud and Mendelson's,(1986).

Foerster and Karolyi, (1999) developed a model that affirmed the liquidity theory by Amihud and Mendelson's,(1986).The model was based on non-US firms cross-listed on the US and controlled for differences that could arise in shareholder base. Findings showed that firms that cross-listed in NYSE experienced a positive change in their stock liquidity due to the reduction in trading costs and the reduced frequency in zero returns. Additionally, firms experience positive valuation effects and abnormal returns in days close to the listing. Similarly, Baruch,Andrew and Lemmon,(2006) developed a theoretical model that tried to describe the trading volume differences in the case of stocks that were internationally cross-listed. An equilibrium was derived from the model predicting that there was an association between volume distribution across competing exchanges and asset returns. There was strong support for this prediction even after country factors,firm-specific factors and issue-specific factors were controlled.

This theory is relevant to the study as it shows how cross-listing influences stock liquidity especially for firms in capital markets that are yet to develop fully. The theory gives a theoretical prediction that firms located in capital markets with poor liquidity can benefit from cross-listing in exchanges with superior liquidity.

2.2.2 Behavioral Finance Theory

Behavioral Finance theory was first explored by Tversky and Kahneman,(1992). The theory looks at the personality aspect of market participants by focusing on the sociological and psychological issues that influenced the decision-making process. At one given time a market participant makes a decision and strives to avoid the regret of making a wrong decision (Ritter, 2003). According to Tversky and Kahneman,(1992) in the prospect theory which was part of behavioral finance, market participants in most cases tend to compute losses and gains differently and will base their decisions on what they calculate to be the gains rather than what they perceive to be the losses. There are two significant components of behavioral finance namely the decision-making process and cognitive biases (Ritter, 2003). Conservatism, heuristics, overconfidence and disposition effect are characterized to be the cognitive biases. Decision making process by market participants is informed by four underlying aspects that include the financial cognitive dissonance, overconfidence, prospect theory and regret theory (Ricciardi & Simon, 2000).

Human beings are known for tending to over-rely on their abilities to predict the future outcomes while making decisions as a result of overconfidence. Market participants tend to associate themselves with good performance while distancing themselves from those decisions that earn losses (Agathe, 2012). Human beings are also known to find reasons for justifying their decisions and reviewing their values to reduce internal conflicts. This is explained by the financial cognitive dissonance aspect. In regards to the regret theory, market participants who are in the process of making a decision currently will first re-evaluate the past turn of events or situation before they proceed to commit According to Bell,(1982) regret is the emotion caused when an individual makes comparisons between a foregone state and a given outcome or state of events. However, there are critics of the prospect theory who argue that fundamental and technical strategies are vital in informing the final decision of investors in as much as investor behavior plays a role as well. Shankar and Kallarackal,(2016) explained that the action of any rational participant is governed by moods and emotions which can in turn determine stock market returns and liquidity.

From the various studies, it is evident that the participant's emotions and behavior play a massive role in capital markets. Behavioral finance theory is relevant to this study because it can be used to explain the reason behind decisions by managers in regards to the adoption of various strategies such as cross-listing. Managers will support or be against the cross-listing choices depending on how they perceive cross-listing. When they are convinced that there are benefits that will accrue to the firm they will make decisions that will support it and when the perception on cross-listing is that it is non-beneficial, they will distance themselves from this strategy and will not make decisions supporting it.

2.3 Empirical review

The empirical review focused on stock liquidity and its measurement, relationship between cross-listing and stock liquidity and the drivers of stock liquidity. Review of the literature was done from a global perspective, regional perspective and Kenya perspective.

2.3.1 Stock liquidity

Liquidity is considered to be one of the fundamental aspects of stock market development. An essential characteristic of a capital market that is known to be efficient is constant liquidity, which signifies that investors can enter and exit the market easily (Tuladhar,1996). Stock liquidity is

defined as the ability to trade large quantities of the stock at low cost and with less price impact (Menyah & Paudyal,2000)

Three aspects of liquidity can be investigated including the depth, resiliency and width (Sarr and Lybek,2012).According to Von,(2004), the width aspect also referred to as tightness is the capability to acquire and to dispose an asset at about the same time and price. Tightness is measured using the different types of the spread including the bid-ask spread that represents the price that must be paid by trader for there to be trade. A low bid-ask spread is considered desirable as it indicates higher stock liquidity (Sarr & Lybek, 2012). Amihud and Mendelson,(1986) took initiative and conducted a study on the width aspect of liquidity for the first time. They formed portfolios in accordance to the Fama & MacBeth,(1973) procedure and used the bid/ask spread as a natural measure of the width aspect of liquidity. Market depth on the other hand is the ability to sustain large stock orders with minimal impact on stock price (Corwin & Schultz, 2012). Fernandes and Barros,(2014) seeked to provide a forecasting model for market depth. The results showed that for Brazilian stocks, when trade volume increased, the imbalance necessary to move prices also increased, however less than proportionally. This meant that unpredicted shocks in the price increased market depth which was an indication of a lower probability of informed trading to some extent.

There are three main categories of measures of liquidity according to Sarr and Lybek,(2002).The measures include those based on transaction costs, volume-based measures and price impact measures.

Transaction cost measures are widely used in assessing the width aspect of stock or market liquidity. Transanction costs compose of array of payments incurred by an trader while executing a trade but previous researchers concentrate on the bid-ask spreads as the major transaction costs (Ametefe, Devaney & Marcato,2016).As a consequence, the bid-ask spread is considered to be the best transaction cost measure of liquidity as it compares spreads across various firms that have different market structures with the aim of collecting liquidity information(Amihud,2005).While determining the association between investor protection and stock liquidity for cross-listed firms ,Chung,(2006) confirmed that the spread is among the best measures of liquidity. Also, Lesmond,(2005) strongly supported that the bid-ask quote has demonstrated by far to be the best

indicator of overall liquidity and is the most used measure while assessing liquidity based on transaction costs .

However, the major limitation of using the bid-ask spread to assess liquidity is the fact that the bid and ask prices are not always provided in price lists for all stock for all time periods. This is majorly the case for thinly traded asset and especially for stocks trading in emerging markets (Lesmond, 2005).To cater for this limitation, scholars over the years have proposed robust models that can use the high prices, low prices, closing prices and opening prices in markets where bid and ask prices are not available to compute this spread (Corwin & Schultz, 2012). One of this models is the high-low estimator that was proposed by Corwin & Schultz (2012) as an improvement of the Roll estimator. The high low estimator of the spread considers the low and high prices and has been proven to be a more robust and accurate estimator in comparison to other estimators.

Volume-based measures category distinguishes liquid markets by the relative and absolute amounts of transactions with an aim of understanding the depth aspect of a market or stock. Trading volume as measured by the total number of traded shares over a given time interval is considered to be the simplest measure in the volume based category (Ametefe et al., 2016). Further, Amihud (2005) maintained that trading volume tries to assess the depth dimension of liquidity and liquid stocks are associated with a higher trading volume. Trading volume has been cited to be a widely used volume based measure of liquidity since it is widely available but a major limitation is that price volatility that has been proven to be negatively related to liquidity also has an impact on volume (Waweru,2014).

Turnover ratio is the second volume related measure generally computed by dividing the total number of stocks traded with the sum of outstanding shares. Amihud and Mendelson (1986) found that there was a negative correlation between turnover ratio and illiquidity costs. Additionally, they found that in cases where the turnover ratio was low, market makers tended to mitigate the risk of holding the asset by charging a higher transaction cost. This means that a high turnover ratio indicates more liquidity of the stock and market. This was supported by Lo and Wang (2000) who concluded that the turnover ratio is a representation of the outstanding volume transaction times for a given asset within a specified time period and the higher the ratio, the higher the liquidity.

One of the major reasons why the ratio is a popular volume related measure is the fact that it is easily computed. Computation is easy for securities that are traded on exchanges as data on

transaction volumes and estimation of existing stocks is adequately covered. Additionally, the turnover measure is considered to be a good measure due to the fact that it is easy to develop and makes different stocks comparable (Lesmond, 2005).However, it also faced by some limitations. One limitation is the fact that it does not cater for the trading cost that changes across stocks despite the fact that it captures trading frequency. Moreover, he reported that turnover is downward biased for low liquidity markets as a result of the reduced trading volume that affects turnover explicitly. Also, calculating the ratio for assets traded over-the-counter may pose a challenge as a result of lack of data (Dennis & Strickland, 2003).The turnover measure may not be a viable liquidity measure in the case of the frontier and emerging markets, that are considered to be low liquidity markets while assessing liquidity in the home market as well as across markets. Kenya is one of the frontier and emerging markets and hence turnover measure may not be the best measure.

Price impact measures category intends to separate liquidity from other factors that may have an impact like prevailing market conditions and new information in the market that drives movements in price. Measuring liquidity is more accurate for securities with no information asymmetry among investors as compared to where some investors have some key information that is not in the hands of all investors (Bernstein,1987).The liquidity ratio (LR) better known as the Amivest measure of liquidity is one of the best price impact measures of liquidity. The ratio is computed by comparing the traded volume to the absolute one percentage positive or negative price change during a given period.

Amivest measure is associated with a unit change in stock price and draws its conclusions based on the assumption that a high ratio indicates more depth (Amihud et al., 1997). One of its advantages is the fact that the ratio captures the fact that large amounts can be traded in a liquid stock without necessarily having significant changes in the prices of stock (Nielsson ,2009). However, a principal disadvantage is that the amivest estimator of liquidity is undefined for those days with zero returns. Zero return days often occur in the emerging and frontier market including Kenya and it is for this reason that the Amivest's estimator is not the best measure of stock liquidity in NSE.

According to Yan and Tang, (2006), the probability of information-based trading (PIN) is another price impact measure of liquidity. PIN is arrived at by computing the trading percentage that is based on information that is not available to the public of the observed trading. A higher value of

PIN indicates a high level of information asymmetry, and hence signifying less liquidity. The primary assumption made while using this measurement is that rationally informed traders are expected to buy if they have information concerning some good news and sell if they are informed about some forthcoming lousy event. In cases where there is no information about any good or bad event, the percentage of uninformed sellers and buyers remain the same (Easley et al., 2002). PIN is considered as one of the best indicators especially in emerging markets that are faced with information asymmetries. However, the major limitation of measuring liquidity using PIN is the fact that it is difficult to find information regarding the orders by informed and uninformed buyers and sellers since this information is not publicly available. This makes it difficult to use it as a measure of liquidity in the Kenyan context.

Having assessed the various advantages and disadvantages of the different measures of liquidity, the bid-ask spread emerges as a better measure of liquidity in the Kenyan context.This is because Kenya is categorized to be among the frontier and emerging markets and hence the amivest measure, turnover ratio and free float measures are not suitable. In addition, PIN measure requires information that is not publicly available. This study will therefore measure liquidity using the bid-ask spread as computed in the high-low estimator.

2.3.2 Bid ask spread

Due to the huge importance of liquidity, majority of the organized bourses aim at maintaining high liquidity levels by engaging market makers. Market makers provide the needed liquidity through facilitating the buying and selling of stocks by investors. Their compensation for providing liquidity is the bid-ask spread and is a result of them buying at a low bid price and selling at a higher ask price (Amihud & Mendelson, 1986).The bid-ask spread is known to be a better measure of liquidity as it incorporates trading cost(Corwin & Schultz, 2012). Additionally, it compares spreads across various firms that have different market structures with the aim of collecting liquidity information making it a better measure (Amihud, 2005).The size of the spread indicates the trading costs associated with a given security and hence the ease with which market participants can trade a security. If the computed spread is zero, the stock is said to be a frictionless asset implying that trading costs are non-existent. A security with a small spread better known as a tight spread is considered to be highly liquid while a stock with a wide spread is less liquid.

According to Ali and Boadu (2016), there are various statistical models used to measure the bid-ask spread and can be separated into two main categories. The first category is composed of models that are developed on the basis of the serial covariance of the bid and ask prices while the second category models are based on high and low prices. The main model that is based on bid and ask quotes is the Roll (1984) estimator. It considers the unobservable fundamental value of the stock on day *t* and the mean-zero, serially uncorrelated public information shock on day *t* as well as the last observed trade price on day *t* in deriving the estimator. However, it is faced by a major limitation in cases where the sample serial covariance is positive because in this case the effective spread is undefined. Other spread estimators include the Lesmond, Ogden, and Trzcinka (1999) estimator, Huang and Stoll (1994), and the Glosten and Harris,(1988)estimator.

Sójka (2017) compared the various spread models that are computed using bid and ask prices as well as those based on high and low prices with an aim of determining the best measure in emerging markets as well as developed markets. The findings indicated that for emerging markets sample liquidity is best measured by Amihud illiquidity measure (2002) where bid and ask prices are given and the high-low spread estimator developed by Corwin and Schultz (2012) while using the high and low prices. The LOT (Lesmond, Ogden, and Trzcinka 1999) estimator and the Roll spread estimator (1984) were found to underperform other high-low measures.

This research will therefore use the Corwin and Schultz (2012) spread estimator in computing the bid-ask spread since Kenya is an emerging market and the high and low prices are readily available as compared to the bid and ask prices.

2.3.3 Cross-listing and stock liquidity

The effect of cross-listing on stock liquidity has been studied widely with mixed empirical evidence arising from this studies. Contributions have been made with some empirical studies reporting that there is significant improvement in stock liquidity as a result of cross listing while other studies report no significant increase in liquidity after cross-listing event.

Several studies examine whether the destination market matters in improving the stock liquidity. Foerster and Karolyi (1999) reported that cross listing stocks in countries with developed capital markets and those that have powerful anti-insider trading protection are more liquid as compared to stocks that cross list in emerging markets. Further, using turnover ratio as the stock liquidity

proxy to determine the impact of cross-listing on non-US firms cross-listed in US,Michael et al. (2008) found that the stock liquidity in the home market was high in the year when the firm cross-listed in US and became higher as compared to levels prior to cross listing in the following years as a result of the cross-listing. This meant that cross listing stocks in developed markets such as US led to more stock liquidity as compared to cross listing in emerging markets.

This findings were strongly supported by Silva and Chávez (2008) who documented a notable increase in stock liquidity for a sample of foreign listings on NYSE. This increase was exhibited by the increased trading volume and decreased effective spreads for the cross listed stocks. In addition, Mathij's and van (2009) in an analysis of cross listings from different countries on eight major stock exchanges affirmed that the destination market matters and cross listing in a more developed market improved stock liquidity for most of the stocks.On the contary, Berkman and Nguyen (2010) disagreed with Silva and Chávez (2008).Using probability of informed trading, the bid-ask spread and the price impact measures of liquidity the study on effect of foreign listings in US indicated that cross-listing in US did not result in domestic liquidity improvements for stocks whose home markets were developed markets but there was some improvement, though weak, for stock in emerging markets that cross-listed in US.

Other studies examine whether the signaling effect of investor's protection and reduced market segmentation which are benefits that arise from cross listing have an impact on liquidity. Abdallah et al. (2011) sought to examine the liquidity effects arising from cross-listings in both the unregulated and regulated exchanges in US and UK on a sample of 500 cross listed firms using trade volume measure.They found that there was an increase in trade volume. This increase signified more liquidity power and was as a result of the signal effect that investors were protected and market segmentation.

This findings strongly supported the bonding hypothesis that affirms that cross listed firms can improve their stock liquidity through reducing the cost of capital if they cross-list in a country that has good governance and strong rule of law. Countries with stronger rule of law provide greater investor protection and this eventually leads to improved stock liquidity (Vaaler & Schrage, 2007). Further, Bris et al. (2007) in a study on effect of cross listing in US supported that cross-listing reduces market segmentation by making a firm's stocks available to market participants who would in other circumstances find it disadvantageous to hold the stocks as a result of investment

barriers. Subsequently, investors can easily invest in stocks leading to a lower cost of capital and improved stock liquidity.

In contrast, Doidge, Karolyi and Stulz (2004), questioned the market segmentation theory in a study on effect of cross listing in US. Although the findings of the study indicated significant liquidity around US cross-listings as other studies the results were interpreted differently. The conclusion showed that the improvement in stock liquidity was as a result of the ability of the firm to maximize on the available growth opportunities and was not related to the market segmentation between the home market and the US market. Additionally, Dodd and Louca (2012) conducted a test on whether the level of market segmentation determined the improvement in liquidity around the cross listing event in major stock exchanges. The findings indicated that segmentation could only explain improved stock liquidity for cross-listings in US but not for British cross-listings.

Other studies have explored whether amendments of law governing cross-listing have an effect on stock liquidity. A study by Hauser et al.(2011) on Israel firms that were also listed in US exchanges concluded that positive amendment of the law governing cross-listing can lead to a positive effect on the number of firms cross-listing. This was after the Israeli government published an amendment law that exempted Israeli firms already listed in USA from additional reporting while listing in Israeli. The amendment was found to be effective because more than 30 firm's dual-listed in Israeli after the amendment. The results further indicated that there was a significant increase in stock liquidity as trade volume of the dual listed companies had grown by about 123% with 42% volume being on the Israel Exchange.

In Africa, regional cross-listing has been found to improve the depth aspect of liquidity. Adelegan (2008) examined the effect of the regional cross-listing of stocks on depth of stock markets in Sub-Saharan Africa by applying the event study methodology. The findings showed that regional cross-listing improved the depth of the stock market through deepening it. Moreover, the performance of stock bourses in countries with regional cross listings was found to be better than the performance of countries without regional cross-listing. On the contrary, Dabengwa (2017) in a study focusing on effect of JSE companies cross- listing on other sub Saharan African Exchanges disagreed with Adelegan (2009).He measured liquidity through liquidity ratios and found no evidence to indicate that there are liquidity benefits for JSE listed companies as a result of cross listing on other exchanges in sub Saharan Africa. He further contends that JSE listed companies

should rather consider cross listing for qualitative reasons rather for any quantitative reasons. This contradicting findings could have been as a result of the different liquidity measures applied.

In East Africa, cross-listing has been found to boost the firm's stock liquidity. Areba (2013) conducted a study whose main concern was to explore if cross listing leads to an increase in share price and subsequently an increase in the volume of shares that are traded. The study adopted a descriptive research design on four Kenyan companies that were cross-listed in other security exchange markets in East Africa. Using volumes of traded stocks as the measure of liquidity, he found out that cross-listing explained 62.2% of the variance on share liquidity among the cross-listed companies in Kenya and there existed a moderate positive correlation between the price of cross-listed shares and the volume of the stock that was traded at the securities market. He further explained that the positive impact on the stock liquidity was as a result of the willingness of more and more investors to purchase as others sell their shares with an aim of making profit by selling at high prices.

These findings were strongly supported by Makau, Onyuma and Okumu (2015) in a study on the impact of cross-border listing on stock liquidity with an evidence from East African community. Volume traded and stock turnover rate were used as the liquidity measures with the averages for both the pre- and post- cross-listing trading volume and turnover rate being calculated and later taken through a five percent level paired t test to test for their significance. There were mixed results from the findings although their general conclusions indicated that cross-listing can boost the firm's stock liquidity with the liquidity proxy determining the direction of the effect that is a positive or negative direction. The mixed findings from the study however raised a question on the fitness of turnover rate as a measure of liquidity.

On the other hand, Wanjiru (2013) did a study on cross-listed firms from NSE by use of an analytical regression model and the application of an event study design. The results indicated an increase in the volumes of shares traded and an increase in market capitalization of the cross listed firms as well as an improvement in the market capitalization of the exchanges where the firms had cross listed. However, he concluded that the results did not show a significant relationship between cross listing and liquidity despite the increase in trade volume. This was contrary to Areba (2013) and Makau, Onyuma and Okumu (2015).

Overall, the existing empirical evidence suggests that cross-listing is more beneficial for stocks from developed markets that cross-list in more developed markets especially the US. These stocks experience improvements in the liquidity of their domestic markets. However, this is not usually the case for stocks from emerging markets that cross-list in developed markets as they end up experiencing either no change or deterioration in liquidity.

2.3.4 Drivers of stock liquidity

This section discusses prior literature on drivers of bid ask spread a measure of stock liquidity.The drivers of bid ask spread a proxy of stock liquidity include the size of a firm as measured by market capitalization, share price and the achieved trade volume. The three variables are considered to be the key drivers of stock liquidity (Bogdan, Bareša & Ivanović, 2012)

2.3.4.1 Trade volume

Tinic and West (1972) developed the first model that revealed the relationship between volume and spread. The main idea behind their model was that a higher trading volume is associated with smaller disparities and discontinuities in the inflow of buy and sell orders which are used in computing the bid-ask spread. The model found a negative relationship between bid-ask spread and trade volume. This was in line with the inventory theory that predicted a negative relationship between volume and spread. Further, the inventory theory stipulates that this negative relationship is as a result of dealers holding less volume per given transaction.

Later on, Copeland and Galai (1983) proposed a more robust model that linked trading volume to bid-ask spread. Unlike the Tinic and West (1972) model, this model predicted that the impact of trading volume on bid-ask spread can be either negative or positive depending on the probability of information available to the next trader. Trading volume will exert a positive effect on bid-ask spread assuming that the number of transactions is held constant and next traders have available information that is associated with the size of the transaction. On the other hand, a negative relationship will arise when traders have no information concerning size of transaction and the size of the transaction remains the same.

A more recent model by Johnson (2008) contradicted the findings of Copeland and Galai (1983) and Tinic and West (1972). The model argued that there is no real effect of volume on liquidity as measured by the bid-ask spread. He went further to expound that the lack of relationship was

because trade volume responds proportionally to trade agents demand and supply whereas liquidity responds non-proportionally to demand and supply of stock. The difference in findings could be as a result of the time gap. On the other hand, Narayan, Mishra and Narayan (2015) developed a model that contradicted the findings of Johnson (2008).The model acknowledges that there is a statistically significant effect of volume on spread which was consistent to the work of Copeland and Galai (1983). The difference in results could be explained by the difference in sample size, methodology and difference in time periods for the studies.

Existing empirical evidence has mixed findings with some studies supporting and others contradicting the various models. Lee, Mucklow, and Ready (1993) strongly supported the model by Tinic and West (1972) who found a negative correlation between spread and trading volume. The negative relationship was as a result of spreads widening and depths decreasing in response to an abnormally high trading volume. Similary, Chabchitrchaidol and Panyanukul (2005) revealed that there existed a negative relationship between trading volume and bid-ask spread in the Thai bond market. This negative relationship could be explained by the high degree of liquidity arising from a high level of demand for trades and the narrow spread between bid and offer prices in Thai market at that time. On the other hand, Easley and O'Hara (1992) indicated that trading volume plays a significant role in the establishment of the spread providing empirical evidence that was consistent with the Johnson (2008) model.

2.3.4.2 Share price

Demsetz (1968), pioneered the work on share price as a determinants of spread. He posited that a positive relationship exists between spread and price because spread would increase in proportion to the increase in price so as to equate to the cost of transacting per dollar exchanged. The equalization of the cost of transacting to the spread should happen otherwise those submitting limit orders will profit by minimizing the spreads on those securities with larger spreads. This findings were supported by Copeland and Galai (1983) who developed a model examining the behavior of the bid-ask spread where the transaction involved dealing with liquidity investors and informed investors. The findings indicated that the bid-ask spread which was measured in dollar terms was an increasing function of stock prices.

In the same vein, Tinic and West (1972) and Benston and Hagerman (1974) conducted different studies previously on stock price and bid-ask spreads in over the counter markets in Singapore.

Both studies supported that higher priced stocks had wider bid-ask dollar spreads. Additionally, Benston and Hagerman (1974) further noted that stock price was the most critical determinant of bid-ask spreads when evaluating their t-ratios. While investigating the intraday patterns of the percentage bid-ask spreads for stocks listed on the NYSE and ASX, McInish and Wood (1992) reported that higher priced stocks had narrower percentage spreads which was in line with theory.

Similary, Harris (1994) did a study that provided initial empirical evidence for stocks listed on the American Stock Exchange (AMEX) and NYSE. The findings indicated that dollar spread increased with stock price levels while an inverse relationship was found for percentage spread and stock price levels. The research further showed that high priced stocks were observed to have narrower spreads as compared to low priced stocks after controlling for the effects of price discreteness. This was in line with theory that stipulated a positive relationship for dollar spreads and a negative relationship percentage spreads.

Hsieh (2008) in a study on stock price as a determinant of bid-ask spread on firms listed in the TSEC reported similar findings indicating that stock price and percentage spread were negatively related after implementing changes in the minimum tick size structure. Besides, their results suggested that the negative relationship between stock price and percentage spread was robust to market microstructure changes. These findings were similar to those of Chung (2011) who examined the Korean Stock Exchange varying tick size structure and market quality. The results showed a negative relationship between stock price and the percentage spread in Korea.

On the contrary, McInish and Wood (1992) and Stoll (1978) posited that there is an inverse relationship between price and spread .This is attributed to the resulting economies of scale in trading. When prices are high, the dollar value of transaction rises and the result of this is that dealers required bid-ask price be reduced to cover their costs.

2.3.4.3 Market capitalization

The Stock Market Capitalization is the total worth of stock of listed companies in capital markets and is a measurement of firm size .Additionally, it indicates the value of a firm through reflecting the number of outstanding stocks multiplied by the current stock price (Yasmin &Yusuf ,2009). A negative relationship is expected between size of firm as measured by market capitalization and

2.4 Research Gap

The empirical review demonstrates that there are various studies conducted on cross-listing and stock liquidity in different markets in the world. From studies done (Abdallah et al.,2011; Berkman and Nguyen,2010) cross-listing is more beneficial for stocks from developed markets that cross-list in more developed markets especially the US as compared to emerging markets that cross-list in developed markets as they end up experiencing either no change or deterioration in liquidity.

However, from the overview of studies done on the effect of cross-listing in emerging and African markets, there is no consistency in findings. No general conclusion can be made in the emerging and African markets because researchers have different outcomes. The possible explanation of this is the uniqueness of this markets due to the different levels of integration into the global economy (Kahuthu,2017). Based on the varying views in emerging markets a research gap exists to explore further the effect of cross-listing on stock liquidity in the emerging markets including the East Africa market. Studies carried out in Kenya had conflicting findings inspite of the fact that they all measured liquidity from the depth aspect by looking at the trade volume. Areba (2013) found a moderate positive correlation between the price of cross-listed shares and the volume of the share that was traded at the securities market. This was the same sentiments by Makau, Onyuma, and Okumu (2015) reported that effects on liquidity were not statistically significant in most cases but their general conclusion was that cross-listing could boost the firm's stock liquidity.

On the contrary, Makanga and Gateri (2014) and Wanjiru (2013) found no significant difference in liquidity before and after cross-listing and reported that cross-listing in the East African Securities exchanges did not improve the liquidity of the cross-listed securities significantly. The conflicting findings could be as a result of different time periods and the different methodology used by the researchers. This studies focused on the depth aspect of liquidity as measured by trading volume and the turnover rate while failing to consider the trading cost aspect proxied by the bid-ask spread. This creates a gap in the literature. There is also an existing gap in regards to how the management of listed companies in East Africa perceive cross-listing and comparison of the effect of cross-listing in different markets where the development of the markets is considered to be different with some markets being more developed than others.

2.5 The Conceptual Framework for the drivers of stock liquidity

The conceptual framework was developed after reviewing previous work as done by Chordia et al (2000) and Michael et al. (2008). The dependent variable is the stock liquidity while the independent variables are the trade volume, daily share price and size of the firm as measured by market capitalization.Trade volume, market capitalization and share prices are considered to be drivers of the bid-ask spread (Zhang, Rusell & Tsay, 2007). Cross-listing is a moderating variable similar to the study by Michael et al. (2008).

Independent variable **Control variable** **Dependent variable**

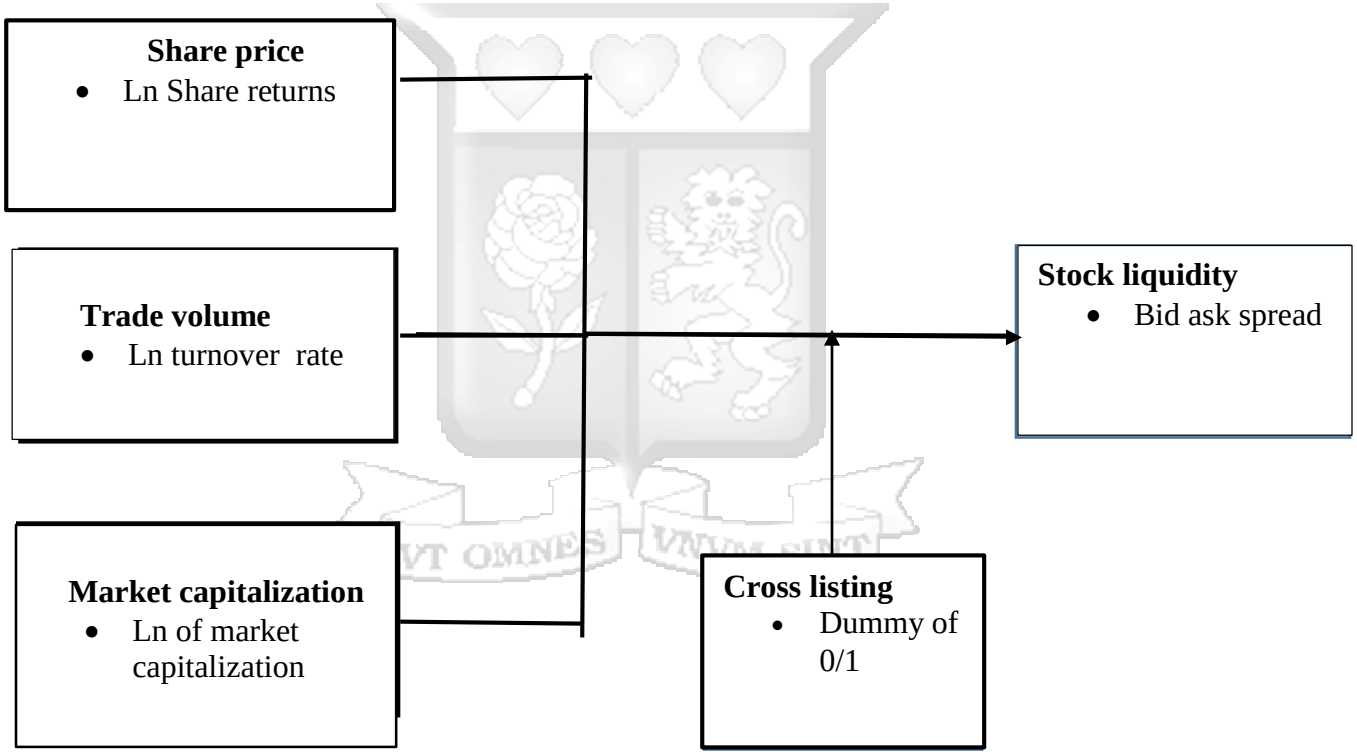

Figure 2 1:Conceptual framework

2.5.1 Stock liquidity

Stock liquidity is defined as the ability to trade large quantities of the stock at a minimum cost and with less price impact (Menyah & Paudyal,2000). This study measured liquidity from the cost tightness aspect by computing the bid-ask spreads. According to Amihud and Mendelson (1986) and Chun (2006),bid-ask spread is one of the best measures of liquidity. The Bid-ask spread was computed using the high and low estimator that uses the high and low prices provided in price lists as computed by (Corwin & Schultz, 2012).

2.5.2 Stock price

Stock price is considered to be an explanatory variable of the bid-ask spread. Stock prices are considered to be non- stationary and hence they were converted to stock returns for analysis. To cater for the non-stationarity issue, the natural log of returns were computed and used in the regression analysis similar to Hseih,(2008).

2.5.3 Market capitalization

The natural log of market capitalization was the measure used as proposed by Bogdan, Bareša & Ivanović, (2012). Market capitalization was calculated by multiplying a company's shares outstanding by the current market price of one share.

2.5.4 Trade volume

The trading volume was measured through the natural log of the aggregate turnover rate as proposed by(Smidt, 1990).The turnover rate was computed by dividing the total number of shares traded by the total number of shares outstanding(chun 2006)

2.5.5 Cross-listing

Cross listing variable was measured as a dummy with the value 0 representing value before cross-listing and value of 1 for the daily observations after cross-listing.This was similar to the study done by Sarr & Lybek, (2012).

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

According to Sapsford & Jupp, (2006), research methodology informs the style of research. This chapter expounds on the research philosophy, research design, target population and sampling, how the data was collected, and analyzed, research validity and considerations that were made to ensure the proposed study was conducted in an ethical manner.

3.2 Research Philosophy

The study adopted positivism approach to research. Positivist research aims at explaining and predicting phenomenon and uses logical approaches to seek objectivity (Carson, Gilmore, Perry, & Gronhaug, 2001).The philosophy emphasizes that researchers should be detached from the study and use statistical and mathematical procedures so as to make inferences from the study. The positivist approach was appropriate for this study as it uses secondary data to determine relationship between variables. The use of secondary quantitative data allowed the researcher to be objective and indifferent when conducting the study by being impartial to the subject of the research (Saunders, Lewis, & Thornhill, 2009)

3.3 Research Design

Rajendra (2008) described research design as organization of conditions and the linkage in collection of data and analysis while using procedures that aim at ensuring the purpose of the research is relevant. This study used the mixed method research design which entailed conducting a quantitative research first and then building up on the findings with qualitative research. Event study approach was used to identify the eighteen cross-listing events and the effect they had on stock liquidity. Event study methodology is advantageous because it is a simple and uncomplicated method that is considered to be the best measure while assessing a particular event. However, the method is faced by some disadvantages including the fact that some unforeseen events could have an effect on the stock besides the event at hand leading to misleading findings.Additionally, it is not easy to determine the ideal estimation and event periods (Kothari&Warner, 2007). Qualitative aspects were used to investigate the perception of management of listed companies in regards to cross-listing.

3.4 Population and Sampling

The target population consisted of all companies that are listed in the NSE, DSE, USE, RSE and on other EAC stock exchanges. According to CMA (2018), ten companies are listed in NSE, DSE, USE, RSE and other EAC exchanges (Appendix 1). All the ten companies formed the target population for the study. Due to the small size of cross-listed firms in East Africa, a census study was carried out covering all companies that have cross-listed except for Umeme limited. Umeme was excluded from the study due to lack of sufficient data. In the case of objective 3, finance managers of listed companies in East Africa formed part of the target population. The target population comprised of 94 listed firms as at 2019 as shown in table 3.1 below.

The sample size comprised of 35 firms which was arrived at through the Yamane, (1973) formula. Stratified random sampling was then used to identify the composition of the sample. The strata's were based on the sectors of listing including investment, manufacturing and allied, telecommunication &technology, agricultural, automobiles and accessories, banking, commercial services, Industrials and allied, Banks, Finance & Investments, construction and allied, insurance and energy and petroleum. Proportional allocation, a stratified sampling technique, was used to identify the number of companies to be included from each sector.

From the proportional allocation, the sample consisted of 1 firm from investment, 3 from manufacturing and allied, 2 from telecommunication &technology, 2 from agricultural,1 from automobiles and accessories,7 from banking, 7 from commercial services, 2 from Industrials and allied,3 from Banks, Finance & Investments, 2 from construction and allied, 3 from energy and petroleum and 2 from Insurance. Random sampling was then done using excel to identify the specific companies included in the sample from the various sectors.

Table 3. 1: Target population

Company category	Kenya	Uganda	Rwanda	Tanzania	Total
Primarily listed firms (2019)	62	9	4	22	97
Suspended firms(primarily listed)	(3)	-	-	-	(3)
Total (Target population)	59	9	4	22	94
Sample	21	5	2	7	35

Source: NSE, USE, RSE, DSE (2019)

3.5 Data Collection

The study incorporated both secondary and primary data. Secondary data helped in achieving the first two objectives and was collected from the NSE, USE, RSE and DSE database. The data collected included data on daily closing stock prices, daily high and low prices closing values to be used in computation of the bid-ask spread and trading volume. The data was obtained from the daily price list at NSE and RSE. Since stock prices are considered to be non- stationary, they were converted to stock returns. Investigation was done on both the short run and long run effect of cross-listing. The event period to investigate the short term impact was 40 days consisting of 20 trading days prior to cross listing and 20 days after cross listing. To evaluate the long term impact, a 120 day period consisting of 60 days before cross-listing and 60 trading days post cross-listing was evaluated. This event periods were in accordance to a study done by Kwok, (2014).

To achieve objective 3, primary data was collected from 35 finance managers or CFOs of listed companies, both cross-listed and non-cross listed, from listed firms in East Africa. The finance managers and CFOs were targeted because the expectation is that they are majorly consulted in listing and cross listing decisions. Data collected from these managers included their views on cross-listing and stock liquidity, motives for cross-listing and what factors hinder cross-listing. Questionnaires were issued to collect this data since they are considered authoritative and a good form of data collection (Kothari 2004). However, some limitations of questionnaires are that it may lack objectivity and sometimes there may be some incomplete questionnaires (Kothari, 2004).

The questionnaires were administered using a drop and pick method for the Kenyan firms and through a survey monkey generated email for the firms in Uganda, Rwanda and Tanzania. This method was considered to be effective as it gave the respondents ample time to fill in the questionnaire. To ensure that there was a high response rate, reminders were done through emails after one week. All the questionnaires were to be collected after a period of one to three weeks.

3.6 Data Analysis

Saunders, Lewis and Thornhill (2009) described data analysis as the application of statistical tools in a systematic way with the aim of processing data into meaningful information. The primary and secondary data obtained was cleaned, coded, sorted and classified before further analysis. The first objective of the study aimed at evaluating the influence of cross-listing events on the stock liquidity. Further, the objective compared the effect of cross-listing in the different East Africa markets. To achieve this objective, liquidity was measured by the bid-ask spread, and hence the bid-ask spreads for the pre-cross listing and post-cross listing were computed. The event study was done for both the short run and long run periods. In the case of the short run, 20 days before and 20 days after cross-listing were analyzed which was in line with the study done by Kwek, (2014).In the case of the long run, a 120 day period was analyzed. This periods were based on the conclusion by (Kothari &Warner, 2007) who highlighted that the event period range on an excellent event study is 21 to 121 days for daily reviews. This periods were deemed sufficient as liquidity effects were expected to have been felt by then.

Computation of the spread was done using the high-low estimator. The high-low estimator that was proposed by Corwin, & Schultz (2012) was an improvement of the Roll estimator. The high low estimator of the spread is the most recent estimator and considers the low and high prices. It has been proven to be a more robust and accurate estimator in comparison to other estimators that are used in markets where the bid and ask prices are not readily available (Corwin & Schultz, 2012).The major assumption made by this estimator is that the highest transaction price is buyer initiated while the lowest transaction price is seller initiated. Additionally, the estimator is based on the insight that the sum of the daily price ranges for two consecutive single days is considered to reflect twice the bid-ask spread, while the price range for two consecutive days reflects one bid-ask spread

The bid ask spread was computed using the following steps:

- $\beta_t = E[[\sum\{\ln\{high\ price_t | low\ price_t\}\}^2]]$
- $\gamma_t = \{\ln\{high\ price_{t-1} | low\ price_{t-1}\}\}$
- $\alpha_t = \frac{\sqrt{2\beta_t} - \sqrt{\beta_t}}{3-2\sqrt{2}} - \frac{\gamma_t}{3-2\sqrt{2}}$

Hence: $Spread = {2(e^{\alpha} - 1)}/{1 + e^{\alpha}}$

Where:

1. e is the mathematical constant (e basis) of x;
2. α represents the difference between the adjustments in prices of a single day and a 2 day period,
3. β used in computing α represents the daily high and low price adjustments to the high price and is the expectation of the sum of the price ranges for two consecutive single days.
4. γ_t represents the maximum range of the high-to-low ratio for a two day period.

The bid ask spreads for pre-cross listing and post-cross listing were then compared using a test of equality of means across the eighteen cross listing events to determine whether they were significantly different from each other..

The second objective of the study sought to determine the effect of cross-listing on association between stock liquidity drivers and stock liquidity. For the purpose of fulfilling the second objective the study used a panel regression model. First, stock returns were computed from stock prices. Stock prices are considered to be non- stationary and hence the need to convert them to stock returns. The bid-ask spread as computed in objective one ,natural log of market capitalization and natural log of turnover rate were computed using data collected from the bourse price lists. Six regression model were used to establish the association between bid-ask spread, a measure of stock liquidity and three determinants of bid-ask spread namely trading volume, market capitalization and stock returns before and after cross listing . The regression model was considered advantageous because it's considered to be empirically robust and (Hsiao, 2002) The equation to be used in the analysis was:

$BS\ it = a + \beta 1Yit + \beta 2TVit + \beta 3\text{MCit} + \text{dummy}^{\text{cross-list}} + \cup \text{it}$

Where:

$BS\ it$ = Bid-Ask spread

$\beta 1Yit$ =Stock returns

$\beta 2TVit$ =Trading volume

β3MCit=Market capitalization

dummy $^{cross-list}$ =dummy variable for cross listing event

U it =Error term

To achieve the third objective that aimed at assessing the perception of managers of listed firms in regards to cross-listing, data collected using questionnaires was checked to ensure that the questionnaires were filled adequately and corrected for errors. The data was then analyzed using SPSS to generate descriptive statistics output that was used in making conclusions. The descriptive statistics output was used to investigate the feeling of participants on what hinders firms from cross-listing. Also, the research aimed at finding out the motives behind cross-listing for firms that are cross-listed and if improved stock liquidity is a benefit accruing from cross-listing. According to Cooper and Schindler, (2014) descriptive statistics are important and are used to provide a summary for a given sample.

Diagnostics Tests

Brooks,(2008) highlighted that financial data could be challenging to deal with majorly because it violates the underlying assumptions of linear regression. When these assumptions are violated, the regression results may be invalid as a result of changing the mean or the variance of the explanatory variables. The tests to be carried out include the unit root test to determine whether the variables in the study were stationary. Stationarity is an essential aspect for the results to be generalized over time. A series is considered stationary if it has constant variance, mean, and auto covariance. A test for multi-collinearity was also done. Multi-collinearity is evident when two independent variables show perfect correlation. It was measured using the variable inflation factor (VIF) and correlation matrix. If the VIF is more than 10 and two independent variables show perfect collinearity, multi-collinearity is said to exist (Gujarati & Porter, 1999). The multi-collinearity problem, if any, should be solved by dropping one of the collinear variables (Brooks, 2008). In addition the Hausman test was done so as to identify whether to use the fixed effect or random effects for the panel regression.

3.6.1 Operationalization of Variables

This section describes how the stock price, trade volume, market capitalization and stock liquidity variables were measured.

3.6.1.1 Stock liquidity

Stock liquidity is defined as the ability to trade large quantities of the stock at a minimum cost and with less price impact (Menyah & Paudyal,2000). There are three ways to assess liquidity including the depth, resiliency and width. Resiliency aspect evaluates the response of the stock to liquidity shocks, depth aspect is measured through the trading volume and turnover while the width aspect that considers the cost tightness to assess liquidity. This cost tightness is measured through the spreads including the bid-ask spread (Sarr & Lybek, 2012). This study measured liquidity from the cost tightness aspect by computing the bid-ask spreads. According to Amihud and Mendelson (1986) and Chun (2006),bid-ask spread is one of the best measures of liquidity. The Bid-ask spread were computed using the high and low estimator that uses the high and low prices provided in price lists.

3.6.1.2 Stock returns

Stock price is considered to be an explanatory variable of the bid-ask spread. The dollar bid-ask spread is expected to be positively related to stock prices while the percentage bid-ask spread is negatively related to stock prices (Hseih, 2008). Stock prices are considered to be non- stationary and hence they were converted to stock returns for analysis. The daily return of a given stock i was computed as the change in prices on a given day. For this study, share returns were calculated using the formula.

$$R_{it} = \frac{P_{it} - P_{it-1}}{P_{it-1}}$$

Where R it is the daily return of stock at time t, Pit is the price of the stock i on day t and Pit-1 is the price of stock i on day t-1.The natural log of returns were used in the regression analysis.

3.6.1.3 Trade volume and market capitalization.

Trade volume is one of the drivers of bid-ask spread (Zhang, Rusell & Tsay, 2007).The trading volume was measured through the natural log of the aggregate turnover rate as proposed by(Smidt, 2006).The turnover rate was computed by dividing the total number of shares traded by the total number of shares outstanding.

$$\mathrm{TRit} = \frac{\mathrm{TVit}}{\mathrm{OSit}}$$

Where TRit stands for the turnover rate of stock i on day t, TVit represents the traded volume for stock i on day t and OSit is the number of outstanding shares for stock i on day t. The natural log of market capitalization was used in the equation. Market capitalisation was calculated by multiplying a company's shares outstanding by the current market price of one share.

3.7 Research Quality

According to Lakonishok and Shapiro (1986), internal and external validity and reliability of data are very important in any given research. Validity checks whether the tests used to meet the stipulated objectives by measuring what they are supposed to measure (Kothari, 2004). This study ensured that the data collected was analyzed thoroughly to give accurate findings and ensure internal validity. Besides, the relationship between variables was explained because of enhancing internal reliability (Kothari, 2004)

3.8 Ethical Considerations

Ethical standards were met throughout the research process. This was achieved by ensuring that there was a high level of confidentiality with the primary data collection and ensuring the findings given were a true representation of the data analyzed. Participation by respondents was on a voluntary basis and the identities of the respondents were kept confidential. Plagiarism was avoided and acknowledgment was done for all scholars whose work has been used in the research. Additionally, permission was sought from Strathmore University to carry out the research study.

CHAPTER FOUR
PRESENTATION OF RESEARCH FINDINGS

4.1 Introduction

The results of the data analysis and research findings of the study are presented in this chapter. The chapter organization is on the basis of the specific objectives of the study. Section 4.2 presents the general information of the study. Section 4.3 covers the first objective; aimed at assessing the effect of cross listing on stock liquidity in the short run and long run using test of equality of means. Additionally, the section discusses the effect of cross-listing in the different East Africa markets. Section 4.4 covers the diagnostic tests as 4.5 covers the descriptive statistics. Section 4.6 discusses the second objective which examined the relationship between stock liquidity drivers and stock liquidity using panel regression .Section 4.7 looks at the perception of market participants on effect of cross listing, section 4.8 compares the primary data analysis with the secondary data findings and finally section 4.9 presents the chapter summary.

4.2 Data and final sample

This study used secondary data for nine out of the ten cross-listed firms within East Africa. The cross-listed firms included in the sample were Kenya Commercial Bank, Nation Media Group, Centum, Kenya Airways, Uchumi Supermarkets, East Africa Breweries Limited, Jubilee Holdings, Equity Bank and Bank of Kigali from Rwanda. Umeme limited a cross-listed firm whose primary exchange is USE was exempted from the research because of lack of sufficient data for pre cross-listing days. The study was done on seventeen cross-listing events by the nine firms since some of the nine firms have cross-listed in more than one bourse. The secondary data collected included the high and low daily prices, closing daily share prices and trade volume for sixty days before cross-listing and sixty days after cross-listing for each of the seventeen cross-listing events.

On the other hand, the primary data used to achieve objective 3 was collected through the use of questionnaires which were distributed to 35 finance managers and CFOs of listed firms across East Africa. Twenty four questionnaires out of the thirty five that were issued were fully filled and returned representing a response rate of 68% which was adequate for analysis. According to Saunders, Lewis, & Thorn hill, (2009), a 50% response is considered sufficient for data analysis. The sample representation per sector is shown in table 4.1 on the next page.

Table 4. 1: Sample representation

Sector	Country	Number of firms	Proportion
Manufacturing and allied	Kenya	3	9%
Telecommunication &technology	Kenya	1	2%
Agricultural	Kenya	2	6%
Automobiles & accessories	Kenya	1	2%
Banking	Kenya	4	12%
Commercial services	Kenya	3	9%
Construction and allied	Kenya	2	6%
Investment	Kenya	1	2%
Insurance	Kenya	2	6%
Energy & petroleum	Kenya	2	6%
Banking	Rwanda	1	2%
Telecommunication	Rwanda	1	2%
Industrials and allied	Tanzania	2	6%
Banks, Finance & Investments	Tanzania	3	9%
Commercial services	Tanzania	2	6%
Banking	Uganda	2	6%
Commercial	Uganda	2	6%
Energy & petroleum	Uganda	1	2%
TOTAL		**35**	**100%**

Source: Researcher 2019

4.3 The effect of cross-listing on stock liquidity

The first objective of the study sought to establish the effect of cross-listing event on stock liquidity of cross-listed firms in East Africa both in the short run and in the long run. The bid ask spreads for 20 days before the event and 20 days after the event were computed for analysis of this effect. Additionally, bid ask spread for 60 days before and 60 days after cross-listing were computed for the analysis of the effect in the long run. Levene test was conducted to test if the pre and post cross listing bid-ask spreads had equal variances. This was because the independent t-test used to compare the pre cross-listing and post cross-listing means requires that there is homogeneity of variance. A test of equality of mean across series was then done with an aim of determining whether the means of the spread before cross listing and after cross-listing were significantly different from each other.

4.3.1 Short run effect of cross-listing on stock liquidity

The levene test was first conducted to check if there was homogeneity of variances which is necessary when conducting the independent t test. A 5% level of significance was used in determining whether there was homogeneity of variance in the series. If the p-value were less than 0.05 then the variances of the series were not equal. Alternatively, if the p value was greater than 0.05 then there was homogeneity of the series variances. The test of equality of means was then done for the computed bid-ask spreads for 20 days before cross listing and 20 days after cross-listing to check if the spreads were significantly different from each other. Test of equality probability values were used to determine the level of significance. A predetermined 5% level of significance was used for decision making on whether the pre-cross listing means were significantly different from the post-cross listing means. If the p-value(s) was less than 5% then the means were significantly different from each other. Alternatively, if the p value was greater than 5% then there was lack of significant difference between the means. The result of the short run effect of cross-listing on stock liquidity across the seventeen cross-listing events in East Africa is presented in the table 4.2. on the next page.

Table 4.2: The test of equality of mean in the short run across the seventeen cross listing events

Company	Bourse of cross-listing	Pre-cross listing spread mean	Post cross-listing spread mean	Levene test probability	T test Probability
EABL	USE	0.0323	0.034	0.194	0.768
EABL	DSE	0.085	0.069	0.626	0.282
KQ	USE	0.088	0.066	0.259	0.087
KQ	DSE	0.077	0.143	0.065	0.032
Jubilee	USE	0.047	0.022	0.056	0.014
Jubilee	DSE	0.044	0.065	0.064	0.232
KCB	USE	0.201	0.158	0.053	0.079
KCB	RSE	0.050	0.145	0.213	0.000
Equity	USE	0.050	0.157	0.052	0.000
Centum	USE	0.159	0.112	0.247	0.017
Nation media	RSE	0.090	0.051	0.439	0.003
Nation media	USE	0.075	0.065	0.211	0.455
Nation media	DSE	0.040	0.049	0.794	0.046
Uchumi	RSE	0.077	0.120	0.360	0.027
Uchumi	USE	0.123	0.096	0.163	0.134
Uchumi	DSE	0.162	0.128	0.263	0.195
Bank of Kigali	NSE	0.050	0.006	0.061	0.000

Source: Researcher 2019

Column one of the table shows the names of the companies that have cross-listed while the second column indicates the stock exchange in which the firm listed in column one cross-listed its stock in. The third column shows the means of the bid-ask spread for the pre-cross-listing days while the fourth column shows the means of the bid-ask spread for the post-cross-listing day's spreads. Additionally, the fifth column shows the levene test p values used to test for homogeneity of variance. The last column shows the t statistic p-value corresponding to each cross-listing event.

The p-values of the levene test were all greater than 0.05 for all companies implying that there was homogeneity of variance between the pre-cross listing spreads and the post-cross listing spreads for all firms in the short run and hence the means could be compared using the test of equality of means. In some cases, the bid ask spread means were statistically different from each other while in other cases that there was no statistical significant difference.

The category that exhibited statistical difference in the pre and post cross-listing means comprised of nine out of the seventeen cross-listings (52%).The cross-listings in this category included KCB cross-listing in RSE, where the P-value for the test of equality was 0.000 implying that there was strong evidence that pre cross-listing spreads statistically differed from post cross listing spreads. The pre cross-listing spread mean of 0.050 increased to 0.145 after cross-listing indicating that the KCB stock became less liquid. Equity cross-listing in USE exhibited similar implications as those of KCB in RSE. The P-value for the test of equality was 0.000 implying that there was strong evidence that pre cross-listing spreads statistically differed from post cross listing spreads. The pre cross-listing spread mean of 0.050 increased to 0.158 after cross-listing indicating that the Equity stock became less liquid since a higher bid-ask spread is considered undesirable.

In the case of Centum, the P-value for the test of equality was 0.018 implying that the pre cross-listing spreads statistically differed from post cross listing spreads. The pre cross-listing spread mean of 0.160 decreased to 0.112 after cross-listing implying that the centum stock became more liquid after cross-listing. In connection to the Nation media cross-listing in RSE, the P-value for the test of equality was 0.003 implying that the pre cross-listing spreads statistically differed from post cross listing mean spreads. The pre cross-listing spread mean of 0.090 decreased to 0.051 after cross-listing implying that the Nation media stock became more liquid after cross-listing in RSE. In regards to KQ cross-listing in DSE, the pre and post cross-listing spreads are significantly different from each other as indicated by the P-Value for the test of equality of 0.033. There was

an increase in the mean from 0.077 to 0.143 implying that the KQ stock became less liquid after cross-listing in DSE.

Similarly, the p-value for the test of equality of spread means of Jubilee holding cross-listing in USE was 0.015.This indicated evidence that the pre-cross- listing spreads were statistically different from the post cross-listing spreads. The spread mean reduced from 0.048 to 0.022 indicating that cross-listing led to an improvement in the stock liquidity of Jubilee holdings. The P-value for the test of equality for the NMG cross-listing in DSE was 0.046 implying that the pre-cross listing mean spreads were statistically different from the post cross-listing spreads. A look at the means shows that there was no change on the stock liquidity of NMG because there was a very minute increase in the mean spread from 0.040 in pre-cross listing period to 0.050. In the case of Uchumi's cross-listing in RSE, the P-value for the test of equality was 0.027 implying that the pre cross-listing spreads statistically differed from post cross listing spreads. The pre cross-listing spread mean of 0.077 increased to 0.121 after cross-listing implying that the Uchumi stock became less liquid after cross-listing in RSE. In the case of Bank of Kigali cross-listing to NSE, the p-value for the test of equality was 0.000 indicating a strong evidence that the pre cross-listing spreads statistically differed from post cross listing spreads. The pre-cross listing spread mean of 0.050 reduced to 0.007 indicating that there was an improvement in stock liquidity in BOK stock after cross-listing in NSE.

On the other hand, the category that exhibited no statistical significant difference in means comprised of eight out of the seventeen cross-listing events (48%).This included the EABL cross-listing in USE where the P-Value for the test of equality was 0.769.This implied that there was no evidence of statistical significant difference in the pre and post cross-listing bid-ask spread means. In the case of KQ cross-listing in USE the P-Value for the test of equality is 0.088 which implies that there was no statistical significant difference in the pre and post cross listing means as well at 5% level. This was also the case for the EABL cross-listing in DSE, where the P-Value for the test of equality of series was 0.282 implying that there was no statistical significance difference in the pre and post spread means. In the case of Jubilee holding cross-listing in DSE, the p value of 0.232 implied that there was no statistical difference in the pre-cross listing spread and the post-cross listing mean spread. The P-value for the test of equality for the KCB cross-listing in USE was

0.079 implying that the pre-cross listing mean spreads are not statistically different from the post cross-listing spreads.

Similarly, the p-value for the test of equality for the cross-listing of Nation media to USE is 0.455 indicating that there was no statistical difference in the pre-cross listing spread and the post-cross listing mean spread. In connection to the Uchumi cross-listing in USE, the P-value for the test of equality was 0.134 implying that the pre cross-listing spreads were not statistically different from post cross listing mean spreads. This was similar to the p-value for the test of equality for the cross-listing of Uchumi to DSE of 0.195 that indicated that there was no statistical difference in the pre-cross listing spread and the post-cross listing mean spread.

In conclusion, the pre-cross listing bid ask spread means were statistically different from the post-cross listing spread means for majority of the cross-listings (52%) in the short run. The 52% comprised of 4 cross-listings (24%) that showed significant improvements in liquidity and 5 cross listings (28%) that showed significant deterioration in stock liquidity. On the other hand, 48% of cross-listings did not show evidence that the pre and post cross-listing means were statistically different in the short run. The implication was that cross-listing resulted to significant changes on stock liquidity as measured by bid ask spread for majority of the cross-listings in the short run. However, there were more cross-listings exhibiting significant deterioration as compared to those exhibiting significant improvements in stock liquidity.

4.3.2 Long run effect of cross-listing on stock liquidity

Similar to the short run analysis, the levene test was first conducted to check if there was homogeneity of variances which is necessary when conducting the independent t test. The test of equality of means was then done on the computed bid ask spreads for 60 days before cross listing and 60 days after cross-listing to check if the spreads were significantly different from each other. The result of the long run effect of cross-listing on stock liquidity across the seventeen cross-listing events in East Africa is presented in the table 4.3. in the next page.

Table 4.3: The test of equality of mean in the long run across the seventeen cross listing events

Company	Bourse of cross-listing	Pre-cross listing bid - ask spread Mean	Post cross-listing bid-ask spread mean	Levene test probability	T test Probability
EABL	USE	0.032	0.038	0.518	0.117
EABL	DSE	0.076	0.084	0.713	0.330
KQ	USE	0.080	0.064	0.912	0.030
KQ	DSE	0.074	0.096	0.104	0.100
Jubilee	USE	0.037	0.034	0.282	0.674
Jubilee	DSE	0.045	0.066	0.063	0.028
KCB	USE	0.186	0.177	0.242	0.584
KCB	RSE	0.117	0.131	0.051	0.297
Equity	USE	0.147	0.110	0.000	0.086
Centum	USE	0.134	0.129	0.193	0.677
Nation media	RSE	0.074	0.066	0.614	0.362
Nation media	USE	0.073	0.071	0.926	0.839
Nation media	DSE	0.064	0.049	0.054	0.020
Uchumi	RSE	0.060	0.108	0.257	0.000
Uchumi	USE	0.083	0.110	0.360	0.011
Uchumi	DSE	0.122	0.169	0.370	0.000
Bank of Kigali	NSE	0.038	0.005	0.000	0.000

Source: Researcher 2019

Column one of the table shows the names of the companies that have cross-listed while the second column indicates the stock exchange in which the firm listed in column one listed its stock in. The third column shows the means of the bid-ask spread for the pre-cross-listing days while the fourth column shows the means of the bid-ask spread for the post-cross-listing day's in the long run. Additionally, the fifth column shows the levene test p values used to test for homogeneity of variance in the series. The last column shows the t statistic p-value corresponding to each cross-listing event.

The p-values of the levene test were all greater than 0.05 for all companies except for BOK and Equity bank. This implied that there was homogeneity of variance between the pre-cross listing spreads and the post-cross listing spreads except for BOK and Equity. Heterogeneity of variance increases the Type 1 error rate but the error is reduced when dealing with large group sizes and using equal number of observations in each group. Since the size of the group is sixty which is greater than 30 for both Equity and BOK, the probability of type 1 error is reduced and hence the spread means could be compared despite the heterogeneity in variance. Just like in the short run, the bid ask spread means were statistically different from each other in some cases and exhibited no statistical significant difference in other cases.

The category that exhibited statistical difference in the pre and post cross-listing means comprised of seven out of the seventeen cross-listings (41%).This cross-listings included the KQ listing in USE that had a p-value for the test of equality of 0.030 which implied that there was a statistical significant difference in the pre and post cross-listing means. There was a decrease in the bid-ask spread means from 0.080 to 0.064 indicating that the stock liquidity of KQ improved since the lower the bid ask spread the higher the stock liquidity. In the case of Jubilee holding cross-listing in DSE, the p value of 0.028 implied that there was statistical difference in the pre-cross listing spread and the post-cross listing mean spread. There was an increase in the means from 0.045 to 0.066 which was an indication that the stock liquidity deteriorated after cross-listing since the spread increased. Unlike the RSE and USE cross-listing, the DSE of NMG cross-listing exhibited a P-value for the test of equality of 0.020 signifying that the pre cross-listing means were statistically different from the post cross-listing means. A look at the means shows that there was a decrease in the means from 0.064 in pre-cross listing period to 0.049 implying an improvement on stock liquidity.

In the case of Uchumi's cross-listing in RSE, the P-value for the test of equality is 0.000 implying that there was strong evidence that the pre cross-listing spreads statistically differed from post cross listing spreads. The pre cross-listing spread mean of 0.060 increased to 0.108 after cross-listing implying that the Uchumi's stock became less liquid after cross-listing in RSE. The impact was similar in the case of Uchumi's cross-listing in USE. The P-value for the test of equality was 0.011 implying that the pre cross-listing spreads were statistically different from post cross listing mean spreads. The pre cross-listing spread mean of 0.083 increased to 0.110 after cross-listing implying that the Uchumi stock became less liquid in the long run after cross-listing in USE.

The cross-listing to DSE by Uchumi was no different from that of RSE and USE. The p-value for the test of equality for the DSE cross-listing was 0.000 indicating that there was statistical difference in the pre-cross listing spread and the post-cross listing mean spread. The pre-cross listing spread mean of 0.122 increased to 0.169 indicating that there was a downturn in stock liquidity in Uchumi stock after cross-listing in DSE. In the case of Bank of Kigali cross-listing to NSE, the p-value for the test of equality was 0.000 indicating a strong evidence that the pre cross-listing spreads statistically differed from post cross listing spreads. The pre-cross listing spread mean of 0.038 reduced to 0.005 indicating that there was an improvement in stock liquidity in BOK stock after cross-listing in NSE in the long run.

On the other hand, the category that exhibited no statistical significant difference in means comprised of ten out of the seventeen cross-listing events in the long run (59%).The P-Value for the test of equality for EABL cross-listing in USE was 0.117 which implied that there was no statistical significant difference in the pre and post cross-listing bid-ask spread means .In regards to KQ cross-listing in DSE, the pre and post cross-listing spreads were not significantly different from each other as indicated by the P-Value for the test of equality of 0.100. This was the same case for EABL cross-listing in DSE where the P-Value for the test of equality of series in the long run was 0.330 implying that there was no statistical significance difference in the spread means. Similarly, the P-Value for the test of equality of spread means of Jubilee holding cross-listing in USE was 0.674.This indicated evidence that the pre-cross- listing spreads were not statistically different from the post cross-listing spreads. This was an indication that cross-listing did not lead to an improvement in the stock liquidity of Jubilee holdings in the long run. The P-value for the test of equality for the KCB cross-listing in USE is 0.584 implying that the pre-cross listing mean

spreads are not statistically different from the post cross-listing spreads. This was an indication that cross-listing event had no effect on stock liquidity of KCB in the long run.

In the case of KCB cross-listing in RSE, the P-value for the test of equality is 0.297 implying that there no evidence that pre cross-listing spreads statistically differ from post cross listing spreads. Equity cross-listing in USE exhibited a P-value for the test of equality of 0.086 implying that there was no evidence that pre cross-listing spreads statistically differed from post cross listing spreads as well.In the case of Centum, the P-value for the test of equality was 0.677 implying that the pre cross-listing spreads were not statistically different from post cross listing spreads. Cross-listing event had no impact on the stock liquidity of Centum. Nation media cross-listing in RSE had a P-value for the test of equality of 0.362 implying that the pre cross-listing spreads were not statistically different from post cross listing mean spreads in the long run. This was the same case for Nation Media cross-listing in USE, where the p-value for the test of equality of series was 0.839 indicating that there was no statistical difference in the pre-cross listing spread and the post-cross listing mean spread indicating that there was no effect on NMG stock liquidity in the long run as a result of cross-listing.

In conclusion, the pre-cross listing bid ask spread means were not statistically different from the post-cross listing spread means for majority of the cross-listings at 59%.The other 41% of cross-listings showed evidence that the pre and post spread means were statistically different from each other in the long run. The 41% of firms comprised of 3 cross-listings (18%) that exhibited significant improvements in stock liquidity and 4 cross-listings (23%) that exhibited significant deterioration in stock liquidity. This implied that cross-listing did not result to significant changes on stock liquidity as measured by bid ask spread for majority of the cross-listings in the long run.

4.3.3 Effect of cross-listing in the different East Africa markets.

The first objective additionally aimed at comparing if there was any difference on the effect of cross listing on stock liquidity in the various markets. This was achieved through comparing the effect in the different markets. The symbol (-) was used to denote that a firm had not cross-listed in that specific market. The table 4.4 below summarizes the effect of cross-listing in the various market in the short run while table 4.5 summarizes the effect in the various markets in the long run.

Table 4.4: Short run effect on liquidity in the various markets

Firm	Cross-listing in USE	Cross-listing in DSE	Cross-listing in RSE	Cross-listing in NSE
EABL	No significant difference	No significant difference	-	-
KQ	No significant difference	Decline	-	-
Jubilee	Improvement	No significant difference	-	-
KCB	No significant difference	-	Decline	-
NMG	No significant difference	No significant difference	Improvement	-
Uchumi	No significant difference	No significant difference	Decline	-
Centum	Improvement	-	-	-
Equity	Decline	-	-	-
BOK	-	-	-	Improvement

Source: Researcher 2019

According to the findings, no market was conclusively found to be better to cross-list in with an aim of improving stock liquidity in the short run. However the USE bourse had more significant improvements as compared to the DSE and RSE bourses. Two firms that explored the USE market had significant improvements on stock liquidity in the short run but the biggest percentage experienced no significant difference on pre cross-listing and post cross-listing liquidity. None of the DSE cross-listing led to a significant improvement while there was one significant improvement in RSE. The BOK cross listing to NSE led to significant improvement as well.

Table 4.5: Long run effect on stock liquidity in the various markets

Firm	Effect in USE	Effect in DSE	Effect in RSE
EABL	No significant difference	No significant difference	-
KQ	Improvement	Decline	-

Jubilee	No significant difference	Decline	-
KCB	No significant difference	-	No significant difference
NMG	No significant difference	Improvement	No significant difference
Uchumi	Decline	Decline	Decline
Centum	No significant difference	-	-
Equity	No significant difference	-	-
BOK	-	-	Improvement

Source: Researcher 2019

As per the findings, none of the markets seems more favourable for cross-listing with an aim of achieving improvement in stock liquidity in the long run. There was one improvement for cross-listings in Uganda in the long run, one improvement in the DSE market and on BOK in NSE market. None of the cross-listings in RSE market improved the stock liquidity in the long run.

In conclusion, the NSE market improved the stock liquidity of BOK both in the short and long run. This could be explained from the fact that NSE is considered to be the most developed market in East Africa and hence cross-listing from a less developed market to a more developed market could explain the improved liquidity. Additionally, a higher percentage of the cross-listings in the USE showed improvement in liquidity as compared to the cross-listings in the DSE and RSE markets in the short run. However, no market seemed more favourable to cross-list with an aim of improving stock liquidity in the long run.

4.4: Diagnostic tests

The tests conducted before running the regression included unit root test, multi-collinearity tests, normality tests and hausman test to determine whether to use the fixed effects or random effects panel model.

4.4.1: Unit root test

The unit root test was conducted to determine whether the variables in the study were stationary. Stationarity of variables was crucial to ensure that there was no spurious relationship from the analysis. This is where there is an indication of a relationship between variables when it actually doesn't exist. Additionally, the data generating process of non-stationary variables cannot be generalized over time (Gujarati, 2003). To check whether the variables are stationary, a unit root test was done at 5% significance level. The null hypothesis was Ho=Existence of unit root while H1 = Nonexistence of unit root on the data. According to Appendix III, the p-value for all variables is 0.000, which is less than 0.05 implying that we fail to accept the null hypothesis of unit root and hence conclude that the data for all variables is stationary.

4.4.2: Multi-collinearity test

Multi-collinearity occurs when the independent variables are highly correlated with each other. A small degree of correlation is acceptable and one of the variables is dropped in cases where two variables show perfect correlation (Brooks, 2014). The multi-collinearity tests involved generating a correlation matrix as well as Variance Inflation Factor (VIF) that sought to evaluate the relationship between the variables with an aim of finding out if there were two independent variables that showed perfect correlation. VIF that is less than ten and correlation that is less than 1 from the correlation matrix implies that there is no multi-collinearity (Dao&Pham, 2014). From the test, as shown in Appendix IV, there were no independent variables that exhibited perfect correlation with the highest values being 0.7 from the matrix and 7 from VIF hence none of the variables was dropped since there was no multi-collinearity.

4.4.3: Normality test

Normality of error terms is required while running a regression analysis (Brooks, 2012). Symmetrical distribution should be zero but it is not well defined on what should be done in case there is evidence of non-normality. However, for large data, where n is greater than 30 or 40, the assumption of normality is of little consequence (Ghasemi & Zahediasl, 2012). The Beta-Jarque test, was used to test for normality. From the analysis as shown in Appendix V, the residuals were found to be non-normally distributed as indicated by the Jarque Bera p value statistic of 0.000. Despite the non-normality no action was taken since the observations were greater than 500.

4.4.4: Hausman Test

The Hausman test is run in panel analysis as it helps to decide on whether to use the fixed effects or random effects estimation method. Fixed effects regression is considered advantageous as it controls for omitted variables that differ between cases but are constant over time. Additionally, fixed effects is expected to give unvarying results. On the other hand, use of random effects is considered more appropriate if some omitted variables are constant over time but vary between cases or are fixed between cases but vary over time (Gujarati, 2003).A hausam test was run to decide between fixed or random effects for both the short run and long run analysis. The null hypothesis was that the preferred model is random effects vs. the alternative that the fixed effects model is was preferred. The outcome is presented in the table 4.6 below for the short run and table 4.7 for the long run.

Table 4.6: Correlated Random Effects -Hausman Test for the short run analysis

Test: cross-section random effects			
Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
	0.000	4.000	1.000

From the table above, the Prob. of 1.0000 is greater than 0.05 (i.e. insignificant) hence we accept the null hypothesis of random effects for the short run analysis. Use of random effects means that individual effects are accounted for and this individual specific effects are uncorrelated with the independent variables. Additionally, unobserved heterogeneity has been controlled for when it is constant over time and not correlated with independent variables.

Table 4.7: Correlated Random Effects- Hausman Test for the long run

Test: cross-section random effects			
Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
	0.000	4.000	1.000

As indicated in the table above, just like the short run, the probability is 1.000 which is greater than 0.05 (i.e. insignificant) hence we accept the null hypothesis of random effects for the long run

analysis. The implication was that the random effects panel regression model was used for both the short run and long run analysis.

4.5: Descriptive statistics of the secondary data

Table 4.8 below presents the descriptive statistics of the bid ask spread, stock return, market capitalization, trade volume and cross-listing dummy variables.

Table 4.8 :Secondary data descriptive Statistics

	N	Min	Max	Mean	Median	Deviation	Skewness	Kurtosis
Stock liquidity	2040	0	0.796	0.087	0.0647	0.074	2.134	13.547
Market Capitalization	2040	0	0.200	0.129	0.138	0.042	-1.875	6.415
Trade Volume	2040	0	0.163	0.098	0.103	0.035	-1.306	4.755
Stock Return	2040	-2.2109	0.142	-0.000	0.000	0.052	-4.345	335.600
Cross-listing	2040	0	1	0.5	0.5	0.5	-0.002	1.000

The results indicate that the minimum value of the bid ask spread that is the measure of liquidity is 0 while the maximum value is 0.796.The minimum spread of 0 was an indication that the stock was highly liquid since a spread of 0 is considered to be most desirable(Corwin&Schultz,2012). The mean of 0.087 show that on average cross-listed firms in East Africa had a relatively high spread around the cross-listing event (given a scale of 0 to 1) indicating low liquidity for majority of the stocks. Market capitalization ranged from a minimum of 0 as a result of days when there was no trade for a stock to 0.200.On average, the daily log of market capitalization was 0.129.Trade volume on the other hand ranged from 0 to 0.1634 with the mean volume being 0.098.This meant that on conversion, the average daily trade volume for a stock was 7,413 shares. The cross-listing variable had a minimum of 0 and a mean of 0.5.This was because cross-listing was measured using a dummy variable of 0's and 1's .The minimum stock return was -2.21 with a maximum of 0.142.This was an indication that the stock returns for the cross-listed firms were generally low. This was further confirmed by the negative average returns of -0.002.

4.6: The association between liquidity drivers and stock liquidity

The second objective of the study sought to establish the effect of cross-listing on association between liquidity drivers and stock liquidity both in the short run and in the long run. This liquidity drivers are stock return, market capitalization and trade volume. The bid ask spreads for 20 days before the event and 20 days after the event were computed for analysis of the effect in the short run. Additionally, bid ask spread for 60 days before and 60 days after cross-listing were computed for the analysis of the effect in the long run. The log returns, natural log of market capitalization and the log of turnover rate were also computed for each day. Cross listing dummy with a value of 0 before cross-listing and 1 after cross-listing was used to represent the cross-listing dummy.

Panel data analysis was adopted because the data had both time series and cross sectional components. Panel data analysis has been considered to be advantageous because it deals with the unobserved heterogeneity problem that causes endogeneity issue and thus improving the efficiency of econometric estimates. Additionally, using panel analysis minimizes the possibility of collinearity among independent variables as a result of increased data points that increases the degrees of freedom (Gujarati, 2003).

4.6.1 Regression output for association between stock liquidity drivers and liquidity

The null hypothesis for the panel regression was that the effect of cross-listing on association between stock return, market capitalization, trade volume and bid ask spreads is not statistically significant at 5% level of significance. The alternative hypothesis on the other hand is that the effect of cross-listing on association between cross-listing, stock return, market capitalization, trade volume and bid ask spreads is statistically significant at 5%.Six regression models were run to find out this effect. The regression models were on the association before cross-listing in the short run, association after cross-listing in the short run, association before cross-listing in the long run, association after cross-listing in the long run and joint regressions for the short and long run. The regression output results were presented in table 4.9, 4.10 and 4.11 for the short run analysis and table, 4.12, 4.13 and 4.14 for the long run analysis.

Table 4.9: Association of variables for the pre cross-listing period in the short run

Variable	Coefficient	Std.Error	T-Statistic	Prob.
Constant	0.051484	0.015	3.305	0.001
Stock return	-0.093716	0.142	-0.656	0.511
Trade volume	1.518468	0.465	3.265	0.001
Market capitalization	-0.903245	0.346	-2.607	0.009

Prob (F-statistic) =0.0025, Adjusted R=29%, N=340

The results above show that stock return showed no statistically significant relationship with spread as indicated by the p-value of 0.511 in the short run pre-cross listing period. The p value of trade volume was 0.001 with a coefficient of 1.518. This meant that there was a positive significant relationship between trade volume and spread. Additionally, market capitalization, had a p value is 0.009 implying that market capitalization had a significant association with bid ask spreads. The coefficient relating to market capitalization is -0.903 which implied that market capitalization did affect stock bid ask spread negatively in the short run.

Table 4.10: Association of variables for the post cross-listing period in the short run

Variable	Coefficient	Std.Error	T-Statistic	Prob.
Constant	0.042	0.012	3.379	0.000
Stock return	-0.200	0.169	-1.179	0.238
Trade volume	1.867	0.379	4.919	0.000
Market capitalization	-1.067	0.297	-3.583	0.000

Prob (F-statistic) =0.0000, Adjusted R=35%, N=340

The results above for the short run post cross-listing period indicated that stock return had no statistically significant relationship with spread as indicated by the p-value of 0.511. Trade volume had a positive significant relationship as shown by the p value of 0.000 and the positive coefficient. Additionally, market capitalization had a negative significant relationship with spread. The association in the post cross-listing period were similar to those of the pre-cross listing analysis.

This implied that cross-listing did not have an impact on the association between the liquidity drivers and stock liquidity in the short run.

Table 4.11: Association of variables for combined periods in the short run

Variable	Coefficient	Std.Error	T-Statistic	Prob.
Constant	0.010	0.002	4.320	0.022
Stock return	0.095	0.087	1.091	0.275
Trade volume	0.808	0.140	5.737	0.000
Market capitalization	-0.487	0.103	-3.548	0.003
Cross-listing	0.024	0.035	0.684	0.493

Prob (F-statistic) =0.0000, Adjusted R=39.89%, N=680

The above regression model combined both the pre-cross listing and post cross-listing data for the short run and included the cross-listing dummy. From the above results, the p-value of the cross-listing was 0.493 which is greater than 0.05.This means that cross-listing did not exhibit a statistically significant relationship with stock liquidity as measured by spread in the short run. The p-value of stock return is 0.275 which is greater than 0.05 meaning that stock return has no statistical significant relationship with bid ask spreads in the short run. The p value of trade volume is 0.000 which is less than 0.05 implying that trade volume has a significant association with stock liquidity. The coefficient of trade volume is 0.808 which means that trade volume does affect stock bid ask spread positively in the short run. In the case of market capitalization, the p value is 0.0036 implying that the relationship between market capitalization and bid ask spreads is significant. The coefficient relating to market capitalization is -0.487 which means that market capitalization does affect stock bid ask spread negatively in the short run.

In conclusion, bid ask spread had a positive significant relationship with trade volume, no statistical significant relationship with stock returns and cross listing and a negative relationship with market capitalization in the short run. Further, cross-listing had no effect on the association between the liquidity variables and liquidity since the association remained the same in the pre-cross listing model as well as the post cross-listing model.

Table 4.12: Association of variables for pre cross-listing period in the long run

Variable	Coefficient	Std.Error	T-Statistic	Prob.
Constant	0.0429	0.010	3.669	0.000
Stock return	-0.268	0.026	-10.008	0.430
Trade volume	1.575	0.324	4.854	0.000
Market capitalization	-0.857	0.243	-3.524	0.000

Prob (F-statistic) =0.0000, Adjusted R=41%, N=1020

From the above results, the p-value of stock return was 0.430 which is greater than 0.05. This means stock return did not exhibit a statistically significant relationship with bid ask spreads in the long run. The p value of trade volume was 0.000 meaning that trade volume had a significant relationship with bid ask spreads. The coefficient of trade volume was 1.339 indicating that trade volume did have a positive relationship with bid ask spread in the long run. In the case of market capitalization, the p value was 0.000 implying that market capitalization had a significant relationship with bid ask spreads in the long run. The coefficient relating to market capitalization was -0.734 which meant that the relationship was negative.

Table 4.13: Association of variables for post cross-listing period in the long run

Variable	Coefficient	Std.Error	T-Statistic	Prob.
Constant	0.054	0.009	5.593	0.000
Stock return	-0.150	0.089	-1.688	0.011
Trade volume	1.458	0.282	5.156	0.000
Market capitalization	-0.836	0.215	-3.883	0.000

Prob (F-statistic) =0.0000, Adjusted R=35%, N=1020

The results from table 4.13 show that the p-value of stock return was 0.011 which was greater than 0.05. This meant that stock return did not exhibit a statistically significant relationship with bid ask spreads in the long run. On the contrary, the p value of trade volume was 0.000 with a coefficient of 1.458 indicating that trade volume had a positive significant relationship with bid

ask spreads in the long run post cross-listing period. Further, market capitalization, had a p value is 0.000 and a coefficient of -0.836 implying that market capitalization had a negative significant relationship with bid ask spreads in the long run. The results from the association of variables in the post cross-listing period was similar to the results of association in the pre-cross listing period. This implied that cross-listing had no effect on the association between the stock liquidity drivers and stock liquidity in the long run.

Table 4.14: Association of variables for combined periods in the long run

Variable	Coefficient	Std.Error	T-Statistic	Prob.
Constant	0.047	0.008	5.593	0.000
Stock return	-0.267	0.024	-10.770	0.300
Trade volume	1.339	0.235	5.687	0.000
Market capitalization	-0.734	0.176	-4.168	0.000
Cross- listing	0.005	0.002	2.020	0.066

Prob (F-statistic) =0.0000, Adjusted R=37%, N=2040

The output in table 4.14 above was based on regression model that combined both the pre-cross listing and post cross-listing data for the long run and included the cross-listing dummy. From the results, the p-value of cross-listing was 0.066 which is greater than 0.05. This meant that cross-listing did not show a statistically significant relationship with bid-ask spread in the long run. The p-value of stock return was 0.300 indicating that stock return did not exhibit a statistically significant relationship with bid ask spread in the long run. The p value of trade volume was 0.000 meaning that trade volume had a significant relationship with bid ask spreads. The coefficient of trade volume was 1.339 suggesting that a positive relationship exists. Similarly, in the case of market capitalization, the p value of 0.0000 implied that market capitalization had a significant relationship with bid ask spreads. The coefficient relating to market capitalization was -0.734 which meant that market capitalization had a negative relationship with stock bid ask spread in the long run.

In conclusion, bid ask spread was not affected by cross-listing and stock return as exhibited by the non-significant relationship. A positive relationship was observed between trade volume and spread and negative relationship between market capitalization and spread in the long run. The short run and long run regression models had similar findings for all variables and this indicated that the associations were not affected by cross-listing.

4.7 Perception of the management of companies listed in East Africa on cross-listing

The third objective of the study sought to investigate the perception of management of East Africa listed firms on cross-listing strategy. This was done through offering questionnaires to 35 senior finance managers and CFOs in listed firms across East Africa. The study targeted 35 respondents out of which 24 were filled and returned. This represented a response rate of 68%.

4.7.1 Background Information of the Respondents

The study sought to find out the gender of participants and the number of years the respondent's had worked in the company in the background information. Majority of the respondents were male (56%) as compared to female respondents (44 %).The result of the work duration response are shown on the figure 4.1 below.

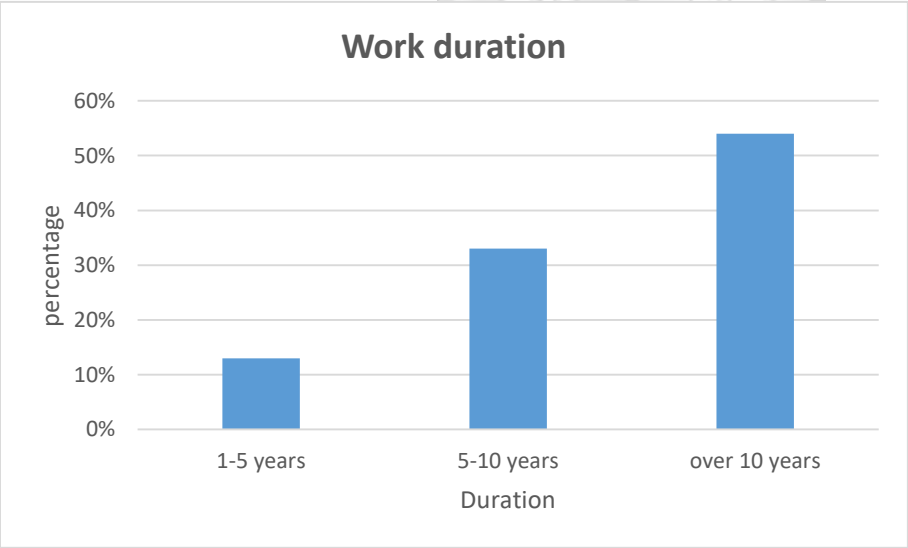

Figure 4.1: Work duration in the company

The results showed that 13% of the respondents had worked in the company for between 1 and 5 year, 33% for between 5 and 10 years and 54% for over 10 years. Majority of the respondents had worked in the firm's for more than 5 years and were therefore in a position to respond objectively since they had a better understanding of the firm's listing and cross-listing strategies.

4.7.2 Factors that motivate firm's to cross list

This section sought to determine the factors that motivate firms to cross-list in East Africa. A Likert scale of 1-5 was used to assess the factors with a value of 1 being assigned to indicate strongly disagree, 2 for disagree, 3 for moderately agree, 4 for agree and 5 for strongly agree.

The findings obtained are presented by Table 4.13 below.

Table 4.15: Factors that motivate firm's to cross list in East Africa

Factor	Mean	Deviation	Rank
Desire to reduce the firm's cost of capital	3.24	1.34	9
The need to exploit growth opportunities	4.68	0.98	2
To facilitate raising of capital funds at a lower cost	3.21	1.12	10
Risk diversification	4.00	1.08	4
To increase the shareholder base	4.40	0.93	3
Improvement of stock liquidity	3.72	0.87	8
Need to signal better future prospects	5.48	0.57	1
Desire to increase the firm market value	3.96	1.30	6
To improve stock prices	3.96	0.73	5
To offer better protection for investors	3.80	0.96	7

The factors motivating firms to cross-list were ranked in accordance to the means. Factors with a mean higher than 4 were considered to be motivating factors while those with a mean of 3 were motivating factors but to a moderate extent. From the results, respondent's felt that firms majorly

cross list to signal better future prospects to investors as indicated by the high mean of 5.48. It was also evident that the need to exploit growth opportunities is a major priority of firms since it ranked second with a mean of 4.68. Additionally, the need to increase the shareholder base and desire to improve stock prices were reported as motivating factors.

On the other hand the desire to increase market value, need to improve stock prices, risk diversification, the need to increase the firm market value, objective of offering better protection for investors and improvement of stock liquidity were considered to be motivating factors but only to a moderate extent. This findings implied that East Africa firms are mainly motivated to cross-list for qualitative reasons and quantitative reasons only motivate cross-listings to a moderate extent.

4.7.3 Factors that hinder firms from cross listing

This section sought to determine the factors that hinder listed firms to cross-list in East Africa. A Likert scale of 1-5 was used to assess the factors with a value of 1 being assigned to indicate strongly disagree, 2 for disagree, 3 for moderately agree, 4 for agree and 5 for strongly agree. The findings obtained are presented by Table 4.14 below.

Table 4.16: Factors that hinder firms from cross list in East Africa

Factor	Mean	Deviation	Rank
Political environment of foreign exchanges	3.84	1.19	2
Strict reporting requirements during and after cross listing	4.04	0.72	1
Number of companies in the same industry that have cross-listed	2.48	1.20	6
Size of the firm	3.56	0.98	3
Tax regulations in the foreign country	2.56	1.13	5
Industry of the firm	2.60	1.30	4
Economic growth of the home country	2.56	1.33	5

The factors that hinder firms from cross-listing were also investigated and ranked in accordance to the means. From the results, respondent's felt that firms are majorly hindered from cross listing due to strict reporting requirements during and after cross listing as indicated by the mean of 4.04. It was also evident that the political environment of foreign exchanges could be a major hindrance of firms cross-listing since it ranked second with a mean of 3.84. Size of the firm came in third as a hindering factor to cross-list with a mean of 3.56 indicating that small firms are more likely not to cross-list .On the other hand, the economic growth of the home country, tax regulations in East Africa countries, the number of cross-listed companies in the same industry and the industry of the firm were not considered to be hindrances' of cross listing with the means being less than 3 for each of them. This findings indicate that regulators should come up with favourable policies on reporting requirements so as to encourage cross-listing. Additionally, governments should aim at ensuring there is political stability in the various countries so as to encourage cross-listings.

4.7.4: Effect of cross-listing on stock liquidity

This section sought to determine the perception of respondent's on effect of cross-listing on stock liquidity. A Likert scale of 1-5 was used to assess some facts on stock liquidity with a value of 1 being assigned to indicate strongly disagree, 2 for disagree, 3 for moderately agree, 4 for agree and 5 for strongly agree. The findings obtained are presented by Table 4.15 below.

Table 4.17: Effect of cross-listing on stock liquidity

Statement	Mean	Deviation	Rank
Trading volume of a firm improves	2.12	1.06	2
The effect will only be felt for a short period of time	3.21	0.78	1
Cost of trading a stock is minimized	2.02	0.72	3

The results showed that respondent's felt that the effect of cross-listing was felt in the short run but only to a moderate extent as indicated by the mean of 3.21. Additionally, majority of the participants felt that cross listing did not improve the trading volume of a firm nor minimizes the cost of trading stock as indicated by the means of 2.12 and 2.02 respectively which are less than 3 This findings were an indication that majority of the respondents felt that cross-listing does not improve a firms stock liquidity.

4.8 Comparison of primary data and secondary data findings

The findings from the primary data and the secondary data agree. The findings of the secondary data from the regression outputs showed that cross-listing had no effect on the association between stock liquidity drivers and stock liquidity and cross-listing had no significant relationship with stock liquidity. Additionally, from the findings of the first objective, most of the firms showed significant deterioration in stock liquidity in the short run as compared to the improvements. In the long run majority of the firms did not show evidence that the pre and post cross-listing means were statistically different implying that there were no changes on stock liquidity. This findings were supported by results of primary data analysis where majority of the respondents were of the opinion that cross listing did not improve the trading volume of a firm nor minimize the cost of trading stock.

4.9 Chapter summary

This chapter present the study findings based on three objectives which were, the effect of cross-listing on stock liquidity of firms, relationship between cross listing, trade volume, stock return, market capitalization and stock liquidity and perception of management on cross-listing. The findings of the study established that cross-listing had no effect in majority of the East Africa cross-listed firms both in the short run and long run and no bourse was found to be the best in terms of improved stock liquidity after cross-listing. The findings of the second objective indicated that stock liquidity has no significant relationship with cross-listing and stock return, a negative relationship with market capitalization and positive relationship with trade volume in the short run and long run. In the third objective, the respondent's perceived that the main factor that motivates firms to cross list is signaling of better future prospects to investors while the one that majorly hinders cross-listing is strict reporting requirements during and after cross listing.

CHAPTER FIVE

SUMMARY OF FINDINGS

5.1 Introduction

This chapter presents the summary, discussions, conclusions and recommendations from the study. Discussion of the findings based on the objectives is given in section 5.2, conclusions are given in section 5.3, recommendations in 5.4, areas for further studies in 5.5 and limitations of the study are in section 5.6.

5.2 Discussion of the Findings

The general objective of the study was to access the effect of cross-listing on stock liquidity of cross-listed firms in East Africa Exchanges. The study focused on the width aspect of liquidity as measured by bid-ask spread since previous studies had focused on the depth aspect of liquidity as measured by trading volume and turnover rate. The sample consisted of 17 cross-listing events by 8cross-listed companies listed in East Africa in the short run and long run. On the other hand, the questionnaire data was from 35 listed firms in East Africa. Below are discussions on the study's findings in comparison with previous studies empirical results.

5.2.1 Effect of cross-listing on stock liquidity

The first objective sought to assess the effect of cross-listing on stock liquidity as measured by bid-ask spreads. The independent t test was used to compare the pre and post cross-listing means and from the findings, the pre-cross listing bid ask spread means were statistically different from the post-cross listing spread means for majority of the cross-listings in the short run. Some firm's stock liquidity improved while other firm's liquidity deteriorated. In the long run the pre-cross listing bid ask spread means were not statistically different from the post-cross listing spread means for majority of the cross-listings. Bank of Kigali was the only firm that improved its stock liquidity both in the short run and the long run. The BOK improvement was in line with liquidity theory by Amihud and Mendelson, (1986) that predicted that firms from capital markets with poor liquidity can benefit from cross-listing in more developed exchanges.

The findings were similar to Wanjiru (2013) who concluded that majority of East Africa cross listed firms did not show a significant relationship between cross listing and liquidity for majority of the firms despite the increase in trade volume. The findings were also similar to Makau, Onyuma

and Okumu (2015) who recommended that East Africa managers should cross-list for other reasons other than improving stock liquidity because the liquidity changes were not statistically significant. Additionally, this findings were in agreement with Makanga & Gateri, (2014) who concluded that there was no significant difference in liquidity before and after cross-listing for most of the cross-listings, which was a sharp contrast to the expected results. Similarly, Berkman and Nguyen,(2010) found that cross-listing was not associated with improvements in domestic liquidity as measured by bid-ask spread, price impact, turnover and the probability of informed trading.

On the contrary this findings contradicted the findings of Areba (2013) who reported a strong positive effect of cross-listing on stock liquidity as measured by trade volume .However, the study only involved four cross-listing events from NSE to other East Africa Exchanges. Stock improvements in the long run were fewer than those in the short run. This contradicted the findings by Michael et al. (2008) who reported that the stock liquidity in the home market was high in the year when the firm cross-listed in US and became higher in the following years as a result of the cross-listing.

From the findings of this study it can be deduced that the foreign market matters and cross-listing to NSE by other East Africa firms improves stock liquidity. However, there is a minimal chance for NSE listed firms to obtain a significant improvement on stock liquidity after cross listing in other East Africa Exchanges because this exchanges are less developed as compared to NSE. This is in agreement with Mathij's and van (2009) who affirmed that the destination market matters and cross listing in a more developed market improved stock liquidity for most of the stocks.

5.2.2: The association between liquidity drivers and stock liquidity

The second objective of the study sought to establish the effect of cross-listing on association between stock return, market capitalization, trade volume and stock liquidity both in the short run and in the long run. The bid ask spreads for the short run and long run were computed in addition to the log returns, natural log of market capitalization and the log of trade volume for each day. Cross listing dummy with a value of 0 before cross-listing and 1 after cross-listing was used to represent the cross-listing dummy in the combined regression. The findings stipulated that bid ask spreads had no statistically significant relationship with cross-listing, strong positive relationship

with trade volume, a negative significant relationship with market capitalization and no significant relationship with stock return in both the short run and long run.

The fact that there was no statistical significant relationship between cross-listing and stock liquidity in the short and long run was contrary to the findings of Silva and Chávez, (2008) who reported some improvement on firm stock liquidity as a result of cross-listing. Also, this contradicted the findings of Bris et al. (2007) who argued that cross-listing reduces the cost of capital leading to improved stock liquidity. Further, the finding that volume has a positive association with spread confirm the findings of (Narayan et al., 2015; Copeland and Galai,1983) who acknowledged that there is a statistically significant positive effect of volume on spread. On the contrary, the findings refute those of Johnson,(2008) model who reported no real effect of volume on spread. Additionally, the study findings corroborates with Bogdan, Bareša & Ivanović, (2012) who found a negative relationship between size of the firm as measured by market capitalization and bid-ask spread.

The finding that stock return had no significant relationship with bid ask spreads both in the short run and long run was in agreement with Adisetiawan,(2008) who found that stock prices had no significant effect on bid ask spread .In the same vein, Johnson,(2008) agreed that stock returns are not statistically significant in explaining the bid ask spread of cross listed firms. However, this finding was contrary to that of Boadu, (2016) who concluded that returns on the lowest liquid stocks are on average higher per year and per month than the most liquid stocks leading to an inverse relationship between the two. Similarly, the findings contradict results of Hsieh,(2008) who found a statistically significant negative relationship between stock return and stock liquidity. Additionally, Copeland and Galai (1983) indicated that the stock liquidity was an increasing function of stock prices as measured by stock return. It can be deduced that investors who are more concerned about the bid ask spreads of a stock should care about the trade volume as the movement of trade volume could indicate the movement of the spreads

5.2.3 Perception of the management of companies listed in East Africa on cross-listing

The third objective of the study sought to investigate the perception of management of East Africa listed firms on factors that motivate cross-listing strategy, factors that hinder cross-listing and their view on cross-listing and stock liquidity. Most respondents argued that listed firms are majorly motivated to cross list so as to signal better future prospects to investors, exploit growth

opportunities and to increase the shareholder base. Improvement of stock prices, and risk diversification were considered to be motivating factors as well but only to a moderate extent. On the contrary, the need to raise capital funds at a lower cost, need to reduce the firm's cost of capital, offering better protection for investors, improvement of stock liquidity and the need to increase the firm market value were not perceived as major motivators of cross-listing firms.

This findings confirms the findings of Makanga & Gateri, (2014) who argued that firms cross-list with an objective of increasing the investor base due to media awareness, explore growth opportunities as an aftermath of expansion and to gesticulates better prospects. The fact that signaling better future prospects to investors is a major motivator was in line with the findings of Abdallah et al. (2011).They reported an improvement in liquidity power which was as a result of the signal effect that investors were protected and market segmentation.

The finding that improved stock liquidity is not a major motivating factor can be explained by the findings of this study under the first objective where there was no significant improvement on stock liquidity for majority of firms after cross-listing.On the other hand, strict reporting requirements during and after cross listing, the political environment of foreign exchanges and size of the firm were considered to be the main factors preventing firms from cross-listing which was in agreement with Mageto (2010) and Doidge (2007).It can therefore be concluded that listed companies in East Africa majorly cross listing for qualitative reasons rather than for quantitative reasons and firms interested in quantitative reasons including stock returns and stock liquidity should consider adopting other strategies other than cross-listing. On the contrary, the finding that strict reporting requirement was a major hindering factor was not in line with the information disclosure theory by Fuerst (1998) that argues that firms prefer to cross-list in exchanges with high disclosure requirements so as to signal better prospects to investors.

5.3 Conclusion

It is evident from the study that cross-listings in East Africa had no significant changes on stock liquidity in most of the firms with some firms exhibiting small improvements and others showing deterioration on liquidity. Cross-listing in NSE by BOK exhibited a positive effect both in the short run and long run. However, none of the East Africa markets was conclusively found to improve stock liquidity for firms primarily listed in NSE. However, there were more positive effects for cross-listings in USE as compared to DSE and RSE. Managers of listed firms expressed that cross-

listing is majorly motivated by qualitative factors and not quantitative factors with only a few perceiving that cross-listing improves stock liquidity.

5.4 Recommendations

5.4.1 Recommendation for policy

The USE, DSE and RSE market regulators should encourage the listed firms in this bourses to cross-list in NSE since it is a more developed market in East Africa with an aim of improving stock liquidity. The NSE regulators should encourage listed firms that are interested in improving stock liquidity to cross-list in more developed markets outside East Africa. Additionally, policy makers should develop appropriate and complementary strategies that will encourage further integration of EAC stock markets and remove legal and regulatory barriers. This will enhance easy access of regional capital markets by firms, and therefore they will not necessarily consider cross-listing. The introduction of policy measures that focus on shareholder protection and access to information is key as this may encourage investors to invest in East Africa firms and will facilitate market integration.

5.4.2 Recommendation for listed firms

East Africa listed firms that aim at improving stock liquidity should consider cross-listing in more developed exchanges. Cross-listing in East Africa Exchanges will benefit firms that are interested in qualitative reasons such as signaling better prospects and increasing the investor base. Further,listed firms should strategize on how to improve their stock returns, improve stock liquidity and minimize risk since this are the key considerations that investors are interested in while making the investment decisions.

5.4.3 Recommendation for investors

Investors who are keen about the liquidity power of stocks will not really benefit from investing in East Africa cross-listed companies and hence should consider looking at whether other strategies taken by firms improve the stock liquidity before making the investment decision. Additionally, investors should first consider what their objectives of investing are and then find the firms that adopt strategies to achieve this objectives so that they can gain from their investment.

5.4.4 Recommendation for academicians

This study contributes further to the existing body of knowledge as far as cross-listing and stock liquidity as measured by bid-ask spread is concerned. It further combines existing literature on the relationship between stock liquidity drivers and stock liquidity and thus provides literature for future researchers in this area. Research should be done further on the effect of cross-listing on other factors besides stock liquidity to find out what are the actual benefits of cross-listing in East Africa.

5.5 Areas of further research

This study focused on the corwin-Schultz (2012) estimator in estimating the bid ask spread since the bid and ask quotes were not available in East Africa Bourses. Future studies could use other estimators to measure the bid-ask spreads and see if they obtain the same findings as those of this study. Additionally, other measures of stock liquidity including the price impact measures should be used to assess the effect of cross-listing on stock liquidity. The study looked at the effect of cross listing on stock liquidity without paying to other factors that may be affected by cross listing thus future researchers can look at the effect on other variables such as risk and return.

5.6 Limitations of the study

The event study had a sample period of 20 days before and after cross-listing in the short run and 60 days pre and post cross listing in the long run. There is a possibility that there were other events which occurred and had an impact on the variables besides cross-listing especially in the long run. The pre-cross listing data for Umeme limited was not sufficient since the firm cross-listed in less than 20 days after the first trade occurred hence this study focused on Bank of Kigali as the only cross-listed company in East Africa whose primary listing is not the Nairobi Securities Exchange. The focus of the research was the East Africa markets and hence the findings cannot be used to conclusively make recommendations on other markets. Further studies can be explored to find out if the findings will be similar.

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APPENDIX I: Questionnaire

To whom it may concern.

Dear sir/madam,

RE: REQUEST FOR PARTICIPATION AS A RESPONDENT IN MY ACADEMIC RESEARCH STUDY.

I am a Master of Commerce finance student at Strathmore University conducting a research titled "*Effect of cross listing on stock liquidity in East Africa*". This is in partial fulfillment of the requirements of my Master's Program.

The study aims at generating important findings for investors, academicians, listed firms and the East Africa security exchanges. Listed firms will greatly benefit given that the findings will shed more light on effect of cross listing on liquidity and the benefits and challenges of adopting this strategy.

Please spare three minutes of your time to participate.I promise to be ethical by ensuring confidentiality of your responses and using the data for the sole purpose of this research. A full report of this study can be made available to you at your request. I would be grateful if you could spare some time to fill this questionnaire.In case of any query kindly contact me via puritynyakweya@gmail.com.

Thank you.

SECTION A: BACKGROUND INFORMATION

1. Name of company (optional)…….

2. How long have you worked in the company?
   a. Less than 1 year ( )
   b. Between 1 and 5 years ( )
   c. Between 5 and 10 years ( )
   d. Over 10 years ( )

SECTION B: QUESTIONS RELATED TO GENERAL CROSS LISTING

1. Please indicate the extent to which you believe the following factors motivate firm's to cross list. Where 1=strongly disagree,2=Disagree, 3=Moderately agree, 4=Agree, 5=Strongly agree

Factor	1	2	3	4	5
To reduce the firm's cost of capital					
The need to exploit growth opportunities					
To facilitate raising of capital funds at a lower cost					
To offer better protection for investors					
To increase the shareholder base					
Improvement of stock liquidity					
Need to signal better future prospects					
To increase the firm market value					
To improve stock prices					
Risk diversification					

Please indicate any other factor that may motivate firms to cross listing.

……

2. To what extent do you believe the following factors hinder firms from cross listing?

Factor	1	2	3	4	5
Political environment of foreign exchanges					

Strict reporting requirements during and after cross listing					
Number of companies in the same industry that have cross-listed					
Size of the firm					
Tax regulations in the foreign country					
Industry of the firm					
Economic growth of the home country					

Please indicate any other factor that may hinder firms from cross listing.

……

SECTION C: QUESTIONS RELATED TO CROSS LISTING AND STOCK LIQUIDITY

Kindly indicate to what extent you agree with the following statements regarding the effect of cross listing on stock liquidity.

Statement	1	2	3	4	5
Cross listing improves the trading volume of a firm					
The effect of cross listing on stock liquidity will only be felt for a short period of time and afterwards the stock becomes illiquid.					
Cross listing minimizes the cost of trading a stock.					

Any other comment in regards to cross listing and stock liquidity

……

……

……

……

Thank you for your time.

APPENDIX II: Cross listed firms in East Africa

Company name	Primary listing	Date of cross listing	Bourse of cross listing
EABL	NSE	27th March 2001	USE
Kenya Airways	NSE	28th March 2002	USE
Kenya Airways	NSE	1st October 2004	DSE
EABL	NSE	29th June 2005	DSE
Jubilee Insurance Holdings	NSE	14th February 2006	USE
Jubilee Insurance Holdings	NSE	27th June 2006	DSE
KCB	NSE	29th Nov. 2008	USE
KCB	NSE	8th June 2009	RSE
Equity Bank Ltd	NSE	18th June 2009	USE
Centum Investments	NSE	11th February 2010	USE
Nation Media Group	NSE	2nd November 2010	RSE
Nation Media Group	NSE	19th October 2010	USE
Nation Media Group	NSE	21st February 2011	DSE
Umeme Limited	USE	14th December 2012	NSE
Uchumi supermarket	NSE	14th October 2013	RSE
Uchumi supermarket	NSE	13th November 2013	USE
Uchumi supermarket	NSE	15th August 2014	DSE
Bank of Kigali	RSE	30th November 2018	NSE

APPENDIX III:Unit root test

	Stock liquidity		Stock return		Trade volume		Market capitalization	
	Stat	P value	Stat	P value	Stat	P value	Stat	p-value
Levin,Lin & Chu t*	-8.27	0.0000	-4.238	0.0000	-10.64	0.0000	-10.59	0.0000
ADF - Fisher Chi-square	146.22	0.0000	260.80	0.0000	182.75	0.0000	178.89	0.0000

APPENDIX IV: Multi- collinearity tests

Correlation Matrix

	stock liquidity	stock return	market capitalization	trade volume	cross-listing
stock liquidity	1.00000	0.03819	0.44985	0.47441	0.04799
stock return	0.38193	1.00000	0.00013	0.00369	(0.03367)
market capitalization	0.44985	0.00013	1.00000	0.76773	(0.08821)
trade volume	0.47441	0.00369	0.76773	1.00000	(0.09047)
cross-listing	0.04799	(0.03367)	(0.08821)	(0.09047)	1.00000

Check using VIF

Variable	Tolerance	VIF
Trade volume	0.128	7.836
Market capitalization	0.317	4.563
Stock return	0.620	3.249
Cross-listing	0.278	1.521

APPENDIX V: Normality test