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**STOCK MARKET LIQUIDITY AND ASSET RETURNS:
THE CASE OF THE NSE 20 SHARE INDEX**

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ABSTRACT

This research aims to measure the liquidity levels on a sample of stocks from the Nairobi Securities exchange and also investigate the relationship between returns and liquidity on some of the stocks listed under the NSE 20-share index. The results show that there is a positive relationship between market illiquidity and returns which suggests that the excess returns contain a compensation for illiquidity. The measure of the illiquidity used in the study is the one proposed by Amihud in 2002 which is the average across stocks of the daily ratio of absolute stock return to dollar volume, which is easily obtained from daily stock data for long time series in most stock markets. The model that was used to test for this analysis is the random effects model after running the Hausman test.

1. INTRODUCTION

1.1 Background

One of the cornerstones of traditional asset-pricing theory is the assumption that all assets are liquid and readily tradable by economic agents. In reality, however, many important classes of assets are not readily marketable and agents often cannot buy and sell them immediately (Longstaff, 2009). Additionally, the theoretical framework that traditional asset pricing is built on presumes perfect markets. However, financial markets deviate, to varying degrees, from the perfect-market ideal in which there are no impediments to trade. A large body of empirical work has quantified these deviations using various measures of illiquidity, and has linked illiquidity to expected asset returns (Wang, 2012). The limitations of this traditional approach have become glaringly transparent over the last decade or two in the wake of events where the ability to trade securities and the ability to access capital market financing dried up considerably (V.Acharya, 2006) especially in some emerging markets where difficulties in trading can make institutional investment almost impossible except in a small number of the most liquid stocks (Hearn, 2014) This was clearly witnessed in the recent 2008 financial crisis.

While practitioners would perhaps question the late arrival of these topics into academic focus, academics have traditionally preferred to look at the world through the lens of complete and friction- less markets (V.Acharya, 2006). Therefore there did not seem to be viable need to consider frictions in the market such as liquidity which is a factor that hinders the trading of various commodities. However, frictions in the market can be a great hindrance to trading. For instance, after one purchases an asset selling it immediately can be almost impossible because it assumes the characteristic of temporary irreversibility because it is affected by factors such as illiquidity. Another attribute to the late arrival of the focus on liquidity was the absence of the microstructure data that is required to calculate frictions in the market such as liquidity. However, with the extensive availability of transactions data, there has been a recent surge in interest in pricing models that account for the impact of liquidity on returns (Avramov & Chordia, 2006)

In the classical asset pricing models such as the capital asset pricing model, factors such as market liquidity and the market microstructure were not taken into consideration yet they play such a vital role in asset pricing. So much so that advertisements for various investments, mutual funds and the like stress liquidity considerations no less than risk aspects. Investment consultants and portfolio managers earn their living by tailoring portfolios to accommodate their clients' time horizons and liquidity preferences. But despite their evident importance, liquidity considerations have not received anything like the attention paid to risk in the finance literature (Mendelson, May-June 1986). Also a rational investor who has invested in an illiquid long term asset would tend to request a compensation to account for the illiquidity constraints and also the time value of money because finance theory suggests that liquidity is a priced factor in expected asset returns because investors demand compensation for expected trading difficulty (Paul, 2006). However, such an omission to the asset pricing model would be irrelevant, if the results to the model would correctly reflect the price that reveals. Which nullifies the irrelevance because it has been traditionally and understandably determined that liquidity plays such an important role in asset pricing. Although the evidence shows that liquidity risk plays an important role in explaining asset returns, few studies such as (Amihud & Mendelson, 1986), and the measures in (Amihud, 2002) and (Pástor & Stambaugh, 2003) incorporate a liquidity risk factor into an asset pricing model (Liu, 2006), most of the practitioners have not taken it up.

A security's required return depends on its expected liquidity as well as on the covariance of its own return and liquidity with the market return and liquidity. In addition, a persistent negative shock to a security's liquidity results in low contemporaneous returns and high predicted future returns (Viral V. Acharya, 2005). Also, if liquidity shocks cannot be diversified, the sensitivity of an individual stock to such shocks could induce the market to require a higher average return. Notice that a higher expected return would surely be required for stocks with higher average trading costs, but there might be an additional expected return increment demanded of stocks with higher sensitivities to broad liquidity shocks (Tarun Chordia R. R., 2000)

Liquidity is multifaceted and perhaps also a somewhat loosely employed economic concept (V.Acharya, 2006) because of the diverse dimensions. The dimensions include the depth which is the volume that can be traded, width which is the difference between the fundamental price and the transaction price, immediacy which is the speed of trade execution and resiliency which is

how fast does the price move back to equilibrium after a large liquidity trade. In this research, more focus will be placed on the depth dimension and a liquid market will be considered as one in which buyers and sellers can trade into and out of positions quickly and without having large price effects (O'Hara, August, 2003).

1.2 Background on the NSE 20-share index

The NSE 20-Share Index has been in use since 1964 and measures the performance of twenty blue-chip companies with strong fundamentals and which have consistently returned positive financial results. The Nairobi Securities Exchange Ltd 20 Share Index is a price weight index. The members are selected based on a weighted market performance for a twelve month period as follows: Market Capitalization 40%, Shares Traded 30%, Number of deals 20%, and Turnover 10%. It was established with an aim of providing investors with a comprehensive measure of the performance of the stock market. The general performance of shares traded under the NSE 20 share index has been greatly improving between the interest years as depicted by the general upward trend in the graph below. This may have been as a result of development of the Kenyan economy. The periods of sharp decline are as a result of the election periods which seem to have a negative impact on the share prices

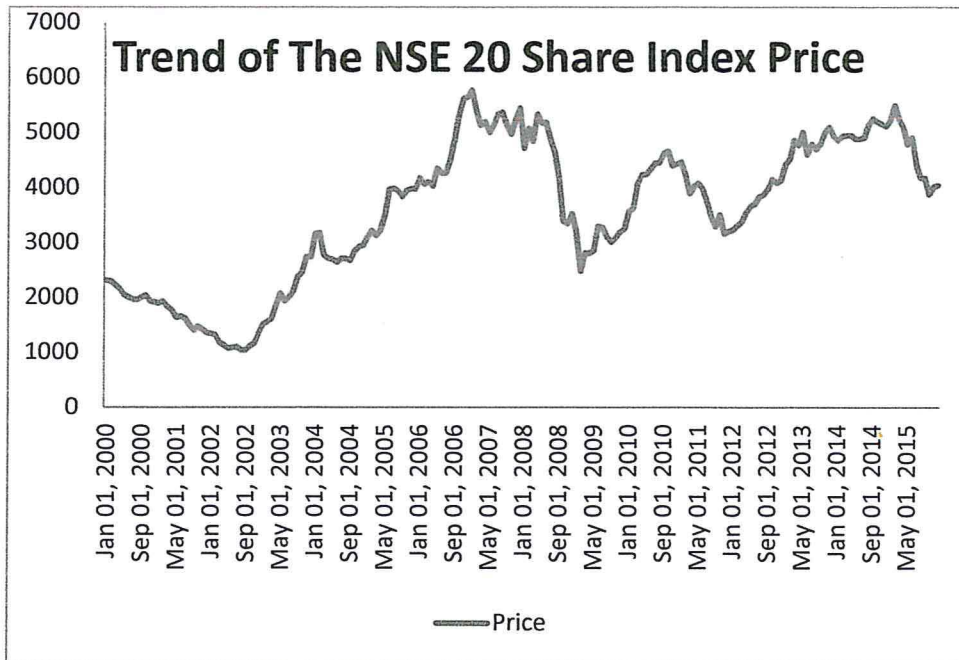


Figure 1; Trend of NSE share price index

Following the Jacque Bera test, it indicates that the data on the prices of the index do not follow a normal distribution. The prices also depict a kurtosis of 1.9545 which again appraises the argument of non-normality since a normal distribution has a kurtosis of 3. This will require for the variables to be normalized because the normal distribution gives more desirable properties. Also, the data set has a central tendency of 3562.144 with a standard deviation of 1289.351.

1.3 Problem statement

Liquidity is a company's lifeblood. The basic function of the stock market is universally accepted to be to provide ready marketability or liquidity to the holdings of securities. This function is held to be so vital and central to the whole purpose of a stock market that the degree of success achieved in its performance is often regarded as the fundamental test of its efficiency (Rohatgi, 1973). We expect our financial system to work in a way that propends to the optimal allocation of resources, contributing to growth and ultimately, overall welfare of the population. (Liquidity and financial markets, 2003). However, there seems to be a more profound lag on the efficiency of the market in achieving these goals. Inefficiencies in the market can be attributed to frictions such as liquidity in the market place.

These inefficiencies greatly affect the way individuals carry out businesses and they also determine whether a particular investor would be willing to carry out business in a certain geographical region. This positively feeds into the asset prices that are arrived at by the asset pricing models. However, the standard asset pricing models by French (1993) and Litner (1964) do not take into account the impact of variables in the market microstructure. Most practitioners use the original models as the benchmark for modeling their asset prices. However this could be misleading because they omit so many important variables in light of recent research done on factors that affect asset returns. Due to the simplification of the model, the explanatory power is also greatly affected. The objective of the findings of the study will be to lead investors to make more informed decisions with regards to market liquidity considerations and at the same time lead to consultants and professionals in the real market to include liquidity in the asset pricing models or use the liquidity asset pricing models developed.

1.4 Research objectives

Measure the liquidity of some of the stocks listed under the NSE 20-share index between 2001 and 2014

Investigate the relationship between returns and liquidity of some of the stocks listed under the NSE 20-share index

1.5 Research questions

How liquid are the sampled stocks listed under NSE 20-share index between 2001 and 2014?

What is the relationship between the liquidity and returns of the sampled stocks listed under the NSE 20-share index?

1.6 Significance of the study

The study is aimed at studying how liquid the Kenyan financial market is and how companies' liquidity in the financial system relates to their returns. The first beneficiary to this study will be the investment managers. Liquidity is a key index or symptom of the health of a given stock market and the associated investment industry (Armitage, 2014). This can be further motivated by the fact that negative market returns decrease stock liquidity, especially during times of tightness in the funding market (Hameed, Kang, & Viswanathan, 2010). With the knowledge of how illiquidity feeds into asset returns they will be in a position to model the effects of liquidity and this will be helpful in forming illiquidity premiums ultimately helping them exploit diversification opportunities in the Kenyan stock market.

The institutional investors and generally investors will also greatly benefit from this study. Institutional investors are often confined to investment in stocks that are liquid, with large market capitalization and stable dividend payouts (Da & Gao, 2010). This will be of help in the sense that investors are aware of their risk appetites and their spending requirements in the present and future and thus they can determine their liquidity requirements. Therefore, they can

be in a position to make their investments in any of the companies listed under the NSE depending on which company best matches their liquidity requirements.

The study will also be beneficiary to the traders. When funding liquidity is tight, traders become reluctant to take on positions, especially "capital intensive" positions in high-margin securities (Pedersen, 2009). In situations when funding liquidity is tight, it ideally has the implication that the market is illiquid. Since the study is testing the liquidity conditions in the Kenyan financial market, the traders will be in a position to make positions based on which of the companies is more liquid based on the historical analysis done. Finally, it will be beneficial to the academicians because it will add value to the already existing body of literature on the topic of interest.

2. LITERATURE REVIEW

2.1 Theoretical literature

Standard mean-variance asset pricing theory centered on the capital asset pricing model (CAPM) first introduced by Sharpe (1964) and Litner (1965) which states that the cross section of expected returns of an asset or portfolio is related to the expected returns on the market portfolio composed of an infinite number of assets and derived from infinite number of market trading participants (Hearn, 2014) and also they are determined solely by systematic risk. Therefore the simplified versions of the classical asset pricing model basically related the returns to an asset to the returns of the market. The representative equation for the model is $E(R_i) = R_f + \beta(R_m - R_f)$. This basically assumed that apart from the risk free rate, the only other factor that affected the returns on an asset is the risk premium and all the portfolios are mean variance efficient following the Markowitz framework on which CAPM was developed. This assumption plus all the other assumptions in the asset pricing models such as costless information are too simplifying since they are not a true reflection of reality. However as simplifying as the classical capital asset pricing model is, it has been very effective in the previous decades because most practitioners have adopted it as a benchmark for asset pricing. Other scholars have also modified it to come up with models with better explanatory powers.

Subsequent work by Fama French however, identifies five common risk factors that affect the returns on stocks and bonds. There are three stock-market factors: an overall market factor and factors related to firm size and book-to-market equity. There are two bond-market factors related to maturity and default risks. Stock returns have shared variation due to the stock-market factors, and they are linked to bond returns through shared variation in the bond-market factors (Fama & French, 1993). This extension of the five factor model gave a better explanatory power compared to the classical capital asset pricing model.

However, inconsistencies between the dictum of the theory and the empirical findings led Ross and Merton to suggest different but more general models of asset pricing (Amihud & Mendelson, 1989). Ross (1976) asserted that asset returns are determined by more factors other than just risk premium therefore coming up with a multifactor model that was building up on the single factor model. In the standard asset pricing theory developed by Ross (1976), expected stock returns are related crosssectionally to returns' sensitivities to state variables with pervasive effects on

investors' overall welfare. A security whose lowest returns tend to accompany unfavorable shifts in that welfare must offer additional compensation to investors for holding the security (Pástor & Stambaugh, 2003). The additional value of this model was that it recognized that asset returns are not only affected by risk but by a multitude of other factors and the risk that is brought forward by these factors need to be compensated for. However much Ross acknowledged the presence of the other factors that affect the asset prices, he did not specify what these other factors are. Also, he made the assumption that only systematic risk affects the returns of an asset. This was in aim to specify the model to carry out relative pricing.

After the modification done by Fama French and Ross, researchers after him realized that even with the additional factors, there was still a gap in the explanatory power of the model. Also, subsequent work by other researchers suggests that cross-sectional differences in average returns are determined not only by the market risk, as prescribed by the CAPM, but also by firm-level market capitalization, book-to-market, and prior returns (Chordia D. A., 2006). In addition, the inability of the traditional CAPM, the three factor augmented CAPM of Fama and French (1993) and the five factor augmented CAPM, seeking to describe the cross section of asset returns with additional size and book-to-market factors, in capturing liquidity effects represents a serious caveat in asset pricing (Liu, 2006)

Therefore, with time, research brought into light the enormous impact that liquidity and market microstructure play when it comes to the formation of asset prices. The relationship between asset returns and liquidity was established. Expected market illiquidity positively affects ex ante stock excess return, suggesting that expected stock excess return partly represents an illiquidity premium. This complements the cross-sectional positive return–illiquidity relationship (Amihud, 2002). This can be explained by the fact illiquidity itself can be viewed as a transaction cost or tax borne by investors that reflects the inter-temporal probability of finding a buyer or seller in a market (Demsetz, 1968) and therefore they require compensation for it. Research after this capitalizes on the fact that there is loop in the classical asset pricing model to fully explain the cross sectional asset returns and they therefore used the classical CAPM as a benchmark but made modifications to it. In the recent years, there has been the rise of capital asset pricing models that take into account the illiquidity premium such as the models by (Amihud, 2002) and (Liu, 2006).

The asset pricing literature traditionally views the liquidity-based transaction cost as simply too small in relation to the expected return on the market. However, the microstructure literature deviates from this view in regarding liquidity to be systematic in nature and thereby an additional state variable with impact on investor overall welfare and utility (Hearn, 2014). Therefore, liquidity was not included in considerations to determinants to asset prices because there was the assumption that the impact that it had was too insignificant and it was considered idiosyncratic. However, in the wake of events such as the stock market crash in 1987, there was the realization that liquidity was actually a factor that could possibly affect assets in the entire portfolio or share index.

2.2 Empirical evidence

In this light studies such as Amihud & Mendelson (1986) , Pástor & Stambaugh (2003), Liu (2006), Chordia, Huh, & Subrahmanyam (2009), Bekaert, Harvey, & Lundblad (2007) and Amihud (2002) find substantial empirical evidence regarding the impact of liquidity on stock prices using a variety of measures such as spreads, depths and volumes. Their analysis as will be described below takes up very different methodologies but yield similar results. However, there are a few research papers such as Spiegel & Wang (2005) and Subrahmanyam (1996) that take a different view on the impact of illiquidity on stock returns.

Amihud & Mendelson (1986) carried out a study to test the relationship between asset returns and a pool of other factors among them being the bid ask spread which is a measure of illiquidity. The objective of the study was to account for the factors that affect the returns of an asset. Their empirical tests follow the methodology developed by Black, Jensen, and Scholes, Fama and MacBeth, and Black and Scholes to test the CAPM, applying a pooled cross-section and time-series estimation.

$$R_p = \beta_0 + \beta_1 S + \beta_1 Sp + \beta_2 R + e$$

Where Sp is the bid ask spread, s is the size and r is the residual risk plus the error resulting from the unaccounted for variables. He used data from 1961 to 1980 from the New York Stock exchange. In the results, he found that there was a positive correlation between the bids and ask spread, the residual risk, the beta but there was a negative correlation between the size and the returns. The study carried out appraises the topic.

Liu (2006) also does analysis on the impact of liquidity on stock returns. The objective of the study was to come up with a new liquidity measure and also investigate whether liquidity is a priced risk and if so whether the liquidity premium is incorporated in the risk premium. Important to carrying out such a study relies heavily on a measure of liquidity. Therefore, he proposes a new liquidity measure for individual stocks. His aim was to capture the multi-dimensionality of liquidity. From previous literature, most of the liquidity measures capture only one of the aspects of liquidity such as the speed, the volume and the volatility but placing more emphasis on the speed. He defines the measure of liquidity as;

$$LMx = \left[\frac{1}{4} \text{Number of zero daily volumes in prior } x \text{ months} + \frac{1}{\frac{x \text{ month turn over}}{\text{deflator}}} \right] * \frac{21x}{NOTD}$$

Where NOTD is the number of trading days. It captures the multifaceted behavior because the number of zero trading day volumes indicates the continuity of trade. Absence of trade shows the degree of liquidity. This consequently leads us to the cost dimension. The zero trading days occur because the transaction costs are high and therefore it also captures this aspect. It also captures the volumes which is represented by $\frac{1}{x \text{ month turn over}}$ which basically represents the trading quantity. Therefore, Liu used the new measure of liquidity to measure the liquidity of the firms in the New York Stock Exchange, The American Stock exchange and National Association of Securities Dealers Automated Quotation System and categorized them into deciles comprising of the most liquid to the least liquid. He later tests the existence of the liquidity premium by checking whether the least liquid outperforms the most liquid which he found to the case. In light with his studies, he later develops a liquidity augmented Capm which takes into account the effect of illiquidity on asset returns in addition to the risk premium

$$E(r_i) - E(r_f) = \left[\beta_{m,i} + \frac{E(LIQ)}{E(MKT)} \beta_{l,i} \right] E(MKT)$$

The results indicate that liquidity is indeed a priced risk and it has an effect on the returns that an asset will give because it takes into account liquidity risk premium.

In addition, (Pástor & Stambaugh, 2003) did a similar study and the results of the research agree with the proposition. The main objective to this study was to find whether liquidity risk has an impact on asset returns. They therefore use a different measure of illiquidity from the ones that

previously been stated and it captured the dimension of order flow. They further used ordinary least squares and regression to analyse their data. They find that stocks' "liquidity betas," their sensitivities to innovations in aggregate liquidity, play a significant role in asset pricing. Stocks with higher liquidity betas exhibit higher expected returns. They used AMEX and NYSE daily data within the month from January 1966 to December 1999. The liquidity measure that was used was constructed and it incorporated the order flows and volume based dimension. The research got results that were theoretically sound.

For Amihud (2002), he carries out a research with an aim of getting the relationship between asset returns and illiquidity with respect to their cross sectional and time series effect. This particular study informs a huge proportion of the methodology that will be used in analysis for this paper. In the measurement of illiquidity, they came up with a different method which uses the volumes for trade. In certain situations, it is a more preferred method because of the availability of data. It does not require a lot of microstructure data like in the calculation liquidity using order flows and the bid ask spreads. To expound on it, the illiquidity measure here is the average across stocks of the daily ratio of absolute stock return to dollar volume, which is easily obtained from daily stock data for long time series in most stock markets.

The ex-ante effect of market illiquidity on stock excess return is described by the model;

$$\frac{E(R_m - R_f)}{\ln AILLIQ} = f_0 + f_1 \ln AILLIQ$$

The results that are found using the three different measures of liquidity that is the bid ask spread, the volumes and order flow formula lead to the same proxy for illiquidity. This is so because all the measures of illiquidity are positively correlated and it therefore does not really impede the research if one was to use a different measure of illiquidity from the other person. Also, using the different methodologies that the different researchers employed there seems to be a general consensus that illiquidity is a priced risk and the investors who invest in illiquid assets should be compensated for it. Also this appraises the positive relationship between illiquidity and asset returns.

However, at odds with the liquidity premium argument, (Subrahmanyam, 1996) find a negative relation between bid-ask spread and expected returns, and (Spiegel & Wang, 2005) do not find a

significant relation between expected returns and empirically motivated measures of illiquidity (Tarun Chordia S.-W. H., 2009). Subrahmanyam (1996) did a research to test the relationship between asset returns and the illiquidity premium. He employed data collected by the Institute for the Study of Securities Markets. The research covers the period from 1984 through 1991. The sample of stocks consists of 1,629 NYSE listed firms for 1984 through 1987 and 1,784 firms for 1988 through 1991. The research used the bid ask spread as the measure of liquidity which they divided by the share prices. Contrary, to the assertions of the previous researchers, the research yielded different results that the asset returns do not have a positive relationship to the illiquidity premium. However, after some further investigation, they conclude that the puzzling relationship can be ascribed to the fact that the share price acts as a proxy for a risk variable not captured by the Fama and French three-factor model.

For Spiegel & Wang (2005), the objective of their study was to disentangle the relationship between idiosyncratic factors effect in determining the asset returns to the effect of liquidity on asset returns. Liquidity for the longest time in the academic arena has been considered an idiosyncratic risk factor and he therefore argues that the effect of liquidity has already been covered in the idiosyncratic factors. He uses a simple methodology of the ordinary least squares to test his hypothesis which he expressed as a simple regression as has been stated below.

$$\alpha_{i,t} = (r_{i,t} - RF_t) - (\beta_{it, MKT}(r_{MKT,t} - r_{f,t}) + (\beta_{it, SMB} SMB_t + \beta_{it, HML} HML_t))$$

This was used to compute the asset returns. The second step of the algorithm runs a Fama-Macbeth type of regression. For each fixed t , the risk adjusted returns for each individual stock are regressed against the set of characteristics (Z_i, t):

$$\alpha_{i,t} = c_t Z_{i,t} + e_{i,t}$$

The characteristics that were taken into consideration are liquidity and idiosyncratic risk. When idiosyncratic risk is run against the asset returns, it depicts a strong correlation. However, when liquidity is included in the model, the explanatory power of the model does not change. This formed the basis of his argument that liquidity has already been included in the idiosyncratic risk factors and should therefore not be considered. In conclusion, when he regressed liquidity and asset returns, he found that less liquid stocks (using cost based measures) exhibit lower returns

The findings of the study assert asset pricing regressions lend support to the notion that our illiquidity measures are priced in the cross-section of returns. This was from testing data from the AMEX and NYSE from 1982 to 2007.

A similar research on the effect of liquidity on asset returns was also carried out by (Bekaert, Harvey, & Lundblad, 2007). Their focus was however mainly focused on emerging markets. They used their main liquidity measure as a transformation of the proportion of zero daily firm returns, averaged over the month. This is almost similar to what was initially proposed by Amihud in 2002 to measure illiquidity. They settled on this measure of illiquidity because it is easy to compute and also because it has a positive relationship with the bid and ask spreads and the other measures of illiquidity. Unlike other methodologies that applied ordinary regressions to get the impact of liquidity on asset returns, the research employed a different approach instead and used the vector auto regression. This was as a result of the assumption that asset returns, the liquidity measure and other potential instruments that affect asset returns follow a restricted vector autoregressive system. The equation stated below is the benchmark vector auto regression model specification

$$x_{i,t} = \mu_{i,t-1} + (A_0 + L_i b_{i,t-1} A_1)(x_{i,t-1} - \mu_{i,t-1}) + (B_0 + L_i b_{i,t-1} B_1)(x_{w,t-1} - \mu_{tw,t-1}) + \sum_{i,t-1}^2 e$$

where, L_i liquidity measure and it can be defined as $\ln(1 - ZR_{i,t})$, where ZR_i is the value-weighted zero return measure for country i in month, define $R_{i,t}$, the value-weighted excess return on country index I , $L_i b_{i,t}$ as the proportion of local market capitalization not subject to foreign ownership restrictions. Their empirical focus was on nineteen emerging markets from January 1993 to December 2003. Their results indicated that the zero measure significantly predicts returns, and unexpected liquidity shocks are positively correlated with returns (Bekaert, Harvey, & Lundblad, 2007)

3. METHODOLOGY

3.1 Research design

The conceptual framework of the research analysis will take the causal design. The research is investigating the presence of a relationship between the illiquidity and asset returns. The choice of the design was due to the fact that the research is aimed at finding out whether illiquidity has an effect on asset prices and whether it causes it to behave in a certain way such has been established by theory that illiquidity should lead to higher returns. Also, the choice was motivated by previous researches done such as Bekaert, Harvey, & Lundblad (2007).

3.2 Population and sampling

The population in this research will be the NSE 20 share index and due to constraints with data, a sample of thirteen companies will be used. The thirteen companies include Standard Chartered Bank, Bamburi Cement, Express Kenya, East African Breweries, East African Cables, Sasini Tea, Kenya Airways, Centum Investment Company, Kenya Power and Lighting Company Limited, Kengen, Kenya Commercial Bank, Equity Bank and Mumias Sugar Company. The data will span from 2001 to 2014.

3.3 Data and methodology

The data that is required includes; the daily asset returns on the thirteen companies listed on the NSE 20 share index, their respective daily trading volumes of the company shares, the number of outstanding shares, the price of the shares and earnings. The data will be sourced from the Bloomberg portal, The Nairobi Securities exchange website, the financial statements of the respective companies and the Capital Markets Authority website.

3.4 Choice of the liquidity measure

Suffice to say, the calculation of liquidity is at the core of this research. Liquidity is a very elusive and broad concept and its multifaceted dimensionality cannot be captured in a single measure. The study focuses on liquidity with respect to its price impact dimension. The empirical tests in this study will be analysed by the measure developed by Amihud in 2002. It is the daily ratio of absolute stock return to its dollar volume, averaged over some period. It can be interpreted as the daily price response associated with one dollar of trading volume, thus serving as a rough measure of price impact.

He abbreviates it as ILLIQ. For a stock i in a year y , Amihud measure is calculated as follows:

$$ILLIQ_{i,y} = \frac{1}{N_{i,y}} \sum_{d=1}^N \frac{|Return_{i,d}|}{Volume_{i,d}}$$

Where, $N_{i,y}$ is the number of days on which the stock is traded in a year and $Return_{i,d}$ is the absolute return of stock I on day d . $Volume_{i,d}$ is the traded volume of stock i on day d . Studies such as Goyenko et al. (2009) show that Amihud liquidity measure is more reliable measure of liquidity using daily data. Also, most of the studies on emerging markets are based on this measure as high frequency data is not available. It has been proved that Amihud measure is highly correlated with the high frequency benchmarks such as bid-ask spreads and depth measures (Syamala, Chauhan, & Wadhwa, 2014).

Other measures such as the bid ask spread could have been employed, however, they require a lot of microstructure data that are not available in many stock markets. And, even when available, the data do not cover very long periods of time (Amihud, 2002).

The result from calculating the Amihud's measure will give daily results for liquidity. Analysis of the results on a day to day basis will be very tedious and cumbersome and therefore an average of the illiquidity figures for the interest years will be calculated. This will give a rough idea of which of the country was most liquid in that period. Therefore;

$$ILLIQ = \frac{\sum_{n=1}^t illiq}{t}$$

;where $illiq$ is the daily illiquidity for the individual countries and t is the total number of days under observation. Since the research is interested in the state of liquidity, the inverse relationship between liquidity and illiquidity will be used in the analysis.

3.4.1 Liquidity in the NSE 20-share index

One of the objectives stipulated for the research is to measure the liquidity of the thirteen stocks that have been listed under the NSE 20-share index. The data required to achieve this is the daily securities returns and the formula. Microsoft Excel will be the aid in data analysis in this section. Using the formula proposed by Amihud, the variables for the illiquidity measures will be generated. However, the point of interest is liquidity. Therefore, the stocks that will have a

higher degree of illiquidity will be perceived as liquid and those with a lower degree of illiquidity will be perceived as liquid.

3.5 Measurement of the control variables

There are many other variables that affect asset returns apart from the interest variable; liquidity such as the book to market equity ratio, the size, the profitability, statistical factors, and macroeconomic variables among others. To account for these additional variables not accounted for by the model, a few variables have been introduced to act as controls and also improve the explanatory power of the model. The choice of additional variables was based some of the factors proposed by the five factor model that was proposed by Fama & French (1993).

The first control variable is the book to market ratio which is the ratio of the book value of a firm's common stock to its market value. The book value in this case, shall be calculated using the accounting approach which is basically the net asset value of a company. The net asset value is simply calculated by total assets minus intangible assets (patents, goodwill) and liabilities. The market value on the other hand is determined by the market capitalization which is the number of outstanding shares times the share price. This data will be calculated from the financial statements of the company.

$$\text{Book to market value} = \frac{\text{book value}}{\text{market value}}$$

The other control variable introduced is the size which will basically refers to the market capitalization. The last variable will be profitability which shall be calculated by the price earnings ratio

$$\text{Price earnings ratio} = \frac{\text{share price}}{\text{earnings per share}}$$

3.6 Empirical model

According to Amihud & Mendelson (1986), he asserted that illiquidity is a systematic risk factor and is compensated for in the risk premium. In order to ascertain the adherence of the thirteen stocks listed under the NSE 20-share index to this proposition, the study examines whether the theoretical implications derived from the model can be confirmed by the empirical test proposed. In an aim to achieve the objective, the theoretical implications of the model are defined which is in turn used to formulate the empirical model and the implications of the theoretical framework give rise to the research hypotheses. Therefore, a simple regression model will be formulated which will have the asset returns as the dependent variable and illiquidity among other factors as the independent variable. The variable of interest from running the regression will be the beta coefficient of illiquidity. If the beta coefficient bears a negative sign then there is a negative relationship between illiquidity and asset returns but if there is a positive sign then there simply exists a positive relationship between the two variables. The beta coefficient will give more information on the extent to which liquidity affects the asset returns.

For model specification purposes, the descriptive statistics of the data that will be used will be very important. This will be in an aim to meet the special needs of the data and match it to the desired model. For instance if the data does not follow a normal distribution as it is in this scenario, logarithms could be used to counter this. Therefore, the data will be exported from Excel and imported into stata where some diagnostic tests shall be carried out on the data to understand the data characteristics and determine whether some modifications have to be done on the data before the analysis can be carried out.

The model pursued in this study was developed mainly from the methodology developed by Black, Jensen and Scholes (1972), Fama and MacBeth (1973) and Black and Scholes (1974). They first formed portfolios by grouping stocks according to their spread and relative risk, and then tested our hypotheses by examining the cross-sectional relation between average excess return, spread and relative risk over time. However, in this study, stocks will not be grouped. The treatment of the data will be as a single unit and instead of using the relative spread, the independent variable will be replaced by illiquidity. Most of the academic research done in this field have applied this methodology to their research projects.

The model that will be used to analyse the data will be as stated below;

$$R_{i,t} = \alpha_1 \text{ILLIQ}_{i,t} + \alpha_2 \text{BM}_{i,t} + \alpha_3 \text{S}_{i,t} + \text{P/E}_{i,t} + e$$

;where R_m is the return on an asset i at time t . Illiq is the proxy for illiquidity, $\alpha_{1,2,3}$ are the coefficients to the factor variables, BM is the book to market ratio, S is the size, and P/E is the price earnings ratio to include the aspect of profitability.

One of the justifications given for the asset returns and illiquidity to be positively correlated is compensation for the investors not being in a position to liquidate their assets. Therefore, if this holds, if the excess returns have a positive relationship with illiquidity, we can therefore infer and conclude the asset returns and illiquidity also have a positive relationship. The government securities rates will be used as proxies for the risk free rates because in traditional finance, they are assumed to be one of the most certain investments to make and thus it is riskless.

Illiquidity, size, price earnings ratio and book to market ratio in this case represents the factor loadings. The results from the Amihud's measure will be used as a proxy for illiquidity for the three indices. α_1 is the coefficient of illiquidity and it will give information with regards the extent to which illiquidity as a factor explains the expected returns on an asset.

Given that the nature of data under analysis is panel, a hausman test shall be carried out to determine whether the analysis shall be done using a random or fixed effects model.

3.7 Formulation of hypothesis

Null Hypothesis (H_0): There is not a positive and statistically significant relation between the average risk premiums and the consumption betas of the assets, that is:

$$H_0 : \alpha_1 = 0,$$

; where α_1 is the slope coefficient of the cross-sectional regression of the average risk premiums on the liquidity betas.

Alternative Hypothesis (H_1): There is a positive and statistically significant relation between the average risk premiums and the consumption

betas of the assets, that is

$$H_1 : \alpha_1 > 0$$

Therefore, in aim to address the second research question, if there is indeed a positive relationship between asset returns and illiquidity, we reject the null. Consequently if there is no positive relationship, we fail to reject the null

The model will be tested for R^2 and adjusted R^2 to test how well the explained variable in this case the asset returns is explained by the independent variables. This will be in an aim to identify the explanatory power of the model.

4. RESULTS AND FINDINGS

This section will indicate the results that were achieved from the data analysis section. The sections will first cover the calculation of illiquidity and later the relationship between liquidity and returns. The second part will present the results from the random effects model and the fixed effects model and further elucidate on the methodology that was used in deciding on the model to be used between the two that are stated above.

4.1 Liquidity of the NSE 20 share index sampled stocks

The first objective of the study was to measure how liquid the sampled stocks under consideration are. The formula that was used was that that was proposed by Amihud in 2002

$$ILLIQ_{i,y} = \frac{1}{N_{i,y}} \sum_{d=1}^N \frac{|Return_{i,d}|}{Volume_{i,d}}$$

However, since the above formula gives an annual figure, and the illiquidity measure is calculated for a period of eight years, the illiquidity values are aggregated to get one value for comparison purposes. This is done for all thirteen companies. The results that are achieved are as stated below;

Mumias Sugar	5.32E-09
Equity Bank	3.62E-07
Kenya Commercial Bank	5.78E-07
Kengen	1.06E-06
Kenya Power & Lighting Company Ltd	1.78E-06
Centum Investment Company	2.54E-06
Kenya Airways	5.35E-06
Sasini Tea	7.06E-06
EA Cables	8.47E-06
East African Breweries	2.77E-05
Express Kenya	3.83E-05
Bamburi Cement	0.000148
Standard Chartered Bank	0.000275

Table 1; Liquidity rank

The analysis is based on liquidity; therefore in the interpretation the inverse relationship between the two was invoked. The most liquid according to this analysis is the Mumias Sugar Company followed by two banks during the period of analysis. In the table, some banks are highly ranked while others are below and therefore from this specific study, it can be seen that there is no direct relationship between the sector in which a company falls under and the liquidity levels.

4.2 Relationship between liquidity and returns of the NSE 20 share index stocks

To answer this question, the regression model has to be decided upon given that it is panel data analysis. Therefore, both the fixed and random effects model shall be run on stata and there after a Hausman test shall be carried out to decide on what model to be used. The model chosen shall be used in the analysis of the relationship between liquidity and returns.

4.2.1 Choice of model

4.2.1.1 The fixed effects model

First, a regression was carried out using the fixed effects model and the results from Stata are as shown below. The overall R squared of the model is 0.7925, with most coefficients being significant. However, the model shows the presence of endogeneity in the model given that the correlation between the error term and the independent variable is -0.6584.

Number of observations	=	104
Number of groups	=	13
Observation per group	=	8
Corr(u_i , x)	=	-0.6584
Wald chi	=	212.11
Prob > chi	=	0.0000
R-squared; within	=	0.6770
between	=	0.8142
Overall	=	0.7925

	Coefficients	Standard error	Z	P > z
Ln Illiquidity	0.1956782	0.053481	3.66	0.000
Ln EPS	0.0335181	0.0055668	6.02	0.000
Ln Size	-.1364761	0.0789491	-1.73	0.087
Ln BMV	0.3684359	0.0702129	5.25	0.000
Cons	-2.326631	1.880139	-1.24	0.219

Table 2; fixed effects regression results

4.2.1.2 Random effects model

A regression was also carried out using the random effects model of panel data. The results from the thirteen sample countries are as indicated below. The overall coefficient of determination is slightly higher when compared to that of the fixed effects model. This model solves for endogeneity since the correlation between the error term and the explanatory variable is zero. The level of significance applied in both models is 0.05 and most of the coefficients from this random effects model are significant apart from the constant.

Number of observations = 104				
Number of groups =13				
Observation per group =8				
Corr(u_i , x) =0(Assumed)				
Wald chi =212.11				
Prob > chi =0.0000				
R-squared; within =0.6765				
between =0.8152				
Overall =0.7935				
	Coefficients	Standard error	Z	P > z
Ln Illiquidity	0.1740122	0.0429596	4.05	0.000

Ln EPS	0.0313639	0.0053683	5.84	0.000
Ln Size	-0.1480019	0.0749118	-1.98	0.048
Ln BMV	0.3163913	0.0602528	5.25	0.000
Cons	-1.441086	1.520753	-0.95	0.343

Table 3; Generalised Least Squares Random effects model regression results

4.2.1.3 Hausman test

Panel data largely gives two model of estimation, the random effects model and the fixed effects model. Both models have been estimated as shown above. To determine however which between the two models shall be used in this analysis, a Hausman test was carried out. This is done by getting the differences in the coefficients generated by the two models as shown and running a regression. The table below also indicates the standard errors that are generated. However, the point of interest is the p value generated which in our case was 0.7563

	Fixed	Random	Difference	S. E
Ln Illiquidity	0.1956782	0.1740122	0.021666	0.0318542
Ln EPS	0.0335181	0.0313639	0.0021542	0.0014731
Ln Size	-0.1364761	-0.1480019	0.0115258	0.0249237
Ln BMV	0.3684359	0.3163913	0.0520445	0.0360479

Table 4; Results from the Hausman test generated from Stata

The null hypothesis of the test is that the random effects model is appropriate while the alternate hypothesis states that the fixed effect model is appropriate. Therefore running the model on stata gives a probability value of 0.7563. The level of significance that is applied is 0.05. Therefore, the probability value is greater than the level of significance and with reference to this; we fail to reject the null hypothesis. Thus, the research findings will be based on the results from the random effects model.

4.2.2 Analysis of the random effects model

The random effects model assumes that the differences across the units are uncorrelated across time. This is important because the errors are uncorrelated with the regressors in the model. This implies that the model is fit in the sense that it will not suffer from problems that arise from endogeneity such as unbiased and inconsistent coefficients.

A probability test is carried out to determine whether the coefficients are significantly different from zero. The probability that is obtained from the test is 0 and the level of significance used is 0.05. Given that the computed value is less than the tabulated value, we fail to reject the null hypothesis. This is an indication that none of the coefficients is zero as evidenced from the results. Thus, each of the variables in the model has an effect on the independent variable and therefore the model can be said to be fit to explain a certain proportion of the returns.

Dealing with panel data gives three different types of R squared. The overall R squared is 79% which basically states that the dependent variables explain 79% of the variation in the independent variables. Different variables affect different companies differently and this is better explained by the R squared within and between. The R squares within explains how much of the independent variables is explained by the dependent variables in the within the different units that are there. For instance, one of the groups that have been analysed is the Centum investments group. Therefore, the R squared within explains to what extent the dependent variable has been explained by the independent variable within the Centum group. The same applies to all the other twelve companies that are under consideration. In this case, the R squared within the company nits is 67%. The R squared between on the other hand explains how much of the variation is explained between the different units. The R squared within considers more of the time series aspect whereas the R squared between captures the panel aspect. Therefore the R squared between of the model is 81% which basically states that the model can explain up to 81% of the variation in the model. We can therefore conclude that the model is a good fit.

4.2.1.4 Relationship between returns and illiquidity

With reference to the second objective, the research was aimed at investigating the relationship between the returns and the liquidity for the thirteen stocks listed on the NSE. The p value from the model is almost zero. The null hypothesis of this p test is that the coefficient of the log of the

illiquidity variable is insignificant. The level of significance that has been used in the model is 5%. The test statistic is less than the level of significance so we therefore reject the null hypothesis. This ultimately implies that the illiquidity variable has a significant impact on returns.

The measure of liquidity that was used was an illiquidity measure because of constraints in data. There exists an inverse relationship liquidity and illiquidity. From the results, from the sign of the coefficient, which is a positive, we can conclude that there exists a positive relationship between illiquidity and returns. These results are consistent with data and the previous literature. This is because investors want to get compensation on them not being in a position to actually liquidate their position. Therefore, since there is a positive relationship between returns and illiquidity, it therefore implies that there is a negative relationship between returns and liquidity. The coefficient of illiquidity is 0.174 which implies that when illiquidity increases by one unit, the returns increase by 0.174 units which shows that there is significant relationship between the returns of an asset and the liquidity levels

4.3 The control variables

4.3.1 Size

The coefficient is significant. This is interpreted from the p value obtained on its coefficient. The null hypothesis states that the coefficient obtained from the model is not significant. The model gives a p value of 0.048. The test statistic obtained is lower than the level of significance and therefore we fail to reject the null that the variable size is an insignificant determinant of the returns. Theoretical knowledge affirms that there is a negative relationship between size of the company and the returns which is basically termed as the size effect. The empirical evidence appraises this school of thought. This is because the coefficient of size bears a negative sign which indicates that there is a negative relationship between size and returns

The coefficient obtained is 0.1480019. This indicates that when size increases by one unit, returns in turn increase by 0.1480019. This is also consistent with the portfolio selection theory which states that when allocating assets to portfolio, the size based selection should only be allocated to a smaller percentage because the effect of size on the returns is smaller as compared to the value aspect. This holds given that the coefficient of the book to market value is 0.3163913.

4.3.2 Book to market value

Book to Market value is also a significant value in the determination of returns because the p value of 0.000 is less than the level of significance for the model. There exists a direct relationship between the book to market value and returns as indicated by the positive sign. The coefficient of the book to market variable is 0.3163913. Therefore, a one unit increase in the book to market value causes a 0.3163913 increase in the returns. As stated earlier, this is in line with the portfolio selection theory which states that more weighting should be allocated to value companies as compared to the rest of the determinants because the effect of value tends to be greater on returns. This is evidenced in the analysis carried out above.

4.3.3 Earnings per share

This variable is also significant based on the relationship between the p values and the test statistic. There exists a direct relationship between the returns and earnings per share as evidenced by the positive sign. Therefore, from the results, if a company's earnings per share increases by one unit, the returns will increase by 0.0313639 units. Theoretically, if the earnings of a company increases, it implies that the returns of that company will also increase which has been proven empirically in this study.

5. Discussion, conclusion and Recommendations

5.1 Liquidity of NSE 20-share index stocks

From the research, the rank on liquidity in descending order is as stated below; Standard Chartered Bank, Bamburi Cement, Express Kenya, East African Breweries, East African Cables, Sasini Tea, Kenya Airways, Centum Investment Company, Kenya Power and Lighting Company Limited, Kengen, Kenya Commercial Bank, Equity Bank and finally the most liquid is Mumias Sugar Company.

Due to constraints in data sharing and data availability in the nascent economies such as Kenya, it posed as a challenge to find previously done empirical work on the sampled companies and therefore there was lack of a benchmark that could be used for comparison purposes. However, there is room for research in determining whether there is a relationship between the sector in which a company falls under and the liquidity levels of that company

5.2 Relationship between liquidity and returns of NSE 20-share index stocks

The results as indicated above show that there is a positive relationship between returns and illiquidity. This is consistent with theoretical literature and some previous empirical work that was carried out by other scholars.

The asset pricing theoretical literature traditionally views the liquidity-based transaction cost as being simply too small in relation to the expected return on the market. Therefore, it was not considered as a significant determinant of the returns of an asset. From the cradle of asset pricing theory that is the capital asset pricing model, the only determinant that was considered was market risk which was systemic. Liquidity however was considered to be more idiosyncratic. However, modifications were made to the traditional CAPM model and multifactor asset pricing models were developed that incorporated more risk factors such as the arbitrage pricing model. For instance, in the analysis by (Liu, 2006), he developed a capital asset pricing model that incorporated liquidity into it. (Liu, 2006) acknowledged the positive relationship between asset returns and liquidity. He held that liquidity played a very pertinent role in the determination of asset prices and this led to the motivation of modifying the capital asset pricing model to incorporate liquidity. The research that has been carried out on the Kenyan market in this study further appraises the fact that liquidity is an important factor in the determination of asset returns

and it should be incorporated in the asset pricing models and in the decision making process by individuals in the market.

From the empirical work carried out (Bekaert, Harvey, & Lundblad), they suggest that local market liquidity is an important driver of expected returns in emerging markets which can be clearly evidenced from the random effects model results which give a coefficient of 0.17. Also the study by (Amihud) tested the hypothesis on the relationship between returns and liquidity and found that returns increase with illiquidity. He states that the increase in returns with respect to liquidity is due to the fact that individuals need to be compensated for not being in a position to liquidate their positions and therefore there is an illiquidity premium that is incorporated into the returns. These results are similar to the results obtained from Kenyan market in this analysis.

However, the results are inconsistent with the research by (Subrahmanyam, 1996) who finds a negative relation between bid-ask spread and expected returns, and (Spiegel & Wang, 2005) who do not find a significant relationship between expected returns and empirically motivated measures of illiquidity. The reason for the differences in results for the (Subrahmanyam, 1996) findings can be ascribed to the fact that the share price acts as a proxy for a risk variable not captured by the Fama and French three-factor model. Also, (Chordia, Huh, & Subrahmanyam, 2009) infer these inconsistencies to the liquidity measures that has been used. For instance, in this study, the liquidity measure that was used is mainly based on volumes while (Subrahmanyam, 1996) used the bid ask spread which was hard to use for the Kenyan market because of the difficulty of getting access to the microstructure data.

5.3 Conclusion

The objective of the research was to determine whether liquidity had any impact on the returns that an asset accrued. Based on the discussion above, it can be concluded that there is a significant and positive relationship between the returns of an asset and illiquidity which is consistent with theory. This implies that the investors are compensated for their inability to liquidate their positions. Therefore liquidity is a priced risk and this is what contributes to the higher returns because investors earn a premium for the liquidity risk.

The research posed several challenges especially data constraints. The Kenyan market is still very young and getting data was a big problem which limited the analysis to 13 companies. Also, when calculating the control variables, the specific data under concern in various circumstances was restated and this led to a dilemma on which variable to use.

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