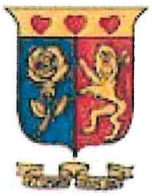

Strathmore University

Institute of Mathematical Sciences

THE PRICING OF LIQUIDITY RISK:

EVIDENCE FROM THE NIGERIAN AND SOUTH AFRICAN STOCK MARKETS

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096002

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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 Research Project contains no material previously published or written by another person except where due reference is made in the Research Project itself.

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This Research Project has been submitted for examination with my approval as the Supervisor.

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LIST OF ABBREVIATIONS

NIG- Nigeria

SA- South Africa

NSE- Nigeria Stock Exchange

JSE- Johannesburg Stock Exchange

FF- Fama and French

SMB- Small minus Big

HML- High minus Low

IML- Illiquid minus Liquid

CMA- Conservative minus Aggressive

RMW- Robust minus Weak

ABSTRACT

This study examines whether an illiquidity premium is priced into the return process of equities. Specifically, the paper uses a liquidity augmented Fama and French (2015) five-factor model to test whether liquidity effects are captured in stock returns. The illiquidity premium is captured using the IML (illiquid minus liquid) factor which represents a compensating premium investors require to hold less liquid stocks as compared to more liquid stocks. The model constructed was tested on the Nigerian and South African stock markets over an analysis horizon of 2013-2018 with a greater focus on the Nigerian Stock exchange as it faces considerable liquidity challenges. Results from the analysis show that liquidity is indeed priced in asset returns with an average annual illiquidity premium of 2.15% for Nigeria and 0.136% for South Africa. The coefficients on the liquidity factor also generally proved significant in explaining asset returns thus confirming the main hypothesis of this study. The presence of an illiquidity premium increases the cost of equity for the aforementioned markets hence certain policies that may be implemented to spur liquidity in these markets include increasing free float requirements for listed companies and improving trading systems to ensure efficiency and quick execution of trades.

Keywords: Liquidity, Asset pricing, Illiquidity premium

JEL Classification: G12, G15

CHAPTER ONE

INTRODUCTION

1.1 Background to the study

Liquidity can be defined as the ability to quickly execute trades in a market at a low cost. Therefore, one of the factors that investors consider when making investment decisions is the degree of an asset's liquidity Xuan (2016). The lack of liquidity for a given asset, therefore, makes the asset less attractive and as such less liquid assets should command a compensating premium (Amihud 1986; Assefa and Mollick, 2014). Stated differently, less liquid assets tend to yield lower utility for investors thus in order to recover the loss in utility, investors would demand a compensating premium on the base returns of the asset, this premium is commonly referred to as the illiquidity premium.

Numerous studies have been conducted on the relationship between asset prices and liquidity, the majority of which focus on developed markets where liquidity issues are less severe. Considering that liquidity concerns are more pronounced in developing markets, greater insights can be obtained by extending the research on liquidity to a developing market`s context. This study, therefore, considers the impact of liquidity on stock returns in Nigeria and South Africa, employing an asset pricing framework.

Asset pricing largely finds its roots from the Capital Asset pricing model (CAPM) of Sharpe (1964) and has evolved over the years with researchers establishing that numerous factors command a significant risk premium thus should be factored in modelling asset returns. Prominent asset pricing models that build on the CAPM are Fama and French (1992) and more recently Fama and French (2015). Even though providing great insights into how asset prices are determined, these models entirely view the price determination process as one that is completely comprised of firm fundamental characteristics, essentially ignoring other factors that attract a compensating risk premium by investors.

variable in explaining asset returns. Such studies include Amihud and Mendelson (1989) who include the bid-ask spread as a significant explanatory variable, Easley et.al (2002) who incorporate microstructure elements through the probability of information (PIN) variable, Hearn et.al (2010) who model returns through size and liquidity effects and lastly Blau and Whitby (2015) who show that liquidity and its volatility are significant explanatory variables in asset returns.

In regards to studies based in Africa, Hearn and Piesse (2009) document that the poor liquidity status of the Nigerian capital market makes it a relatively expensive capital market in terms of cost of equity thus putting it at a competitive disadvantage relative to other Sub-Saharan markets in terms of attracting new listings, a consequence also documented by Chuhan (1992). The illiquidity of the market also transcends to asset prices as investors tend to attach a significant illiquidity premium when valuing assets that trade on the NSE. A key motivation of this study is to, therefore, determine the degree of this illiquidity premium and the effects it has on the stocks quoted on the respective markets.

With the exception of Hearn and Piesse (2009), Hearn (2012) and a few other studies, the majority of studies that examine the effect of liquidity on asset prices focus on developed markets. However, given developing markets tend to be more prone to liquidity concerns, this study solely focuses on empirical tests based on the Nigerian and South African equity markets.

A unique approach taken by this study is to employ a liquidity-augmented Fama & French 5 factor model to establish whether a significant liquidity premium is priced in Nigerian and South African securities, consequently capturing both firm-specific factors and microstructure elements in modelling returns and also contributing to literature regarding liquidity effects in Africa of which is quite scarce.

1.2 Problem statement

In order to ensure the efficiency of markets, market frictions such as transaction costs and costs of obtaining information should ideally be zero. Moreover, investors should be able to execute transactions quickly and easily without undue frictions.

In developing markets, the above is however not the case, studies such as Assefa and Mollick (2014) and Hearn and Piesse (2015) show a significant illiquidity premium priced in the Nigerian and South African stock markets with the former having a higher illiquidity premium. This implies the presence of a high cost of equity in the respective markets thus results in reduced efficiency of both markets.

Even though yielding valuable insights on the presence of an illiquidity premium, the above studies include the subject countries in a panel analysis, therefore, denying country-specific inference regarding liquidity issues and possible implications from a policy perspective (see Ochenge, 2017). This study, therefore, aims to contribute to the available literature on liquidity in developing markets by independently studying the effects of liquidity on the Nigerian and South African stock markets.

1.3 Research Objective

The key objective of this study is to investigate the effect of illiquidity on stock returns in Nigeria and South Africa.

1.4 Research question

Is illiquidity risk priced in the Nigerian and South African stock markets?

1.5 Scope of the Study

This study will be based on the Nigerian and South African stock exchanges. The markets are the best fitting to study as they both have a large number of listed stocks that support the portfolio construction methodology to be employed in this study, avoiding a problem of few stocks per resultant portfolio as documented by Ochenge and Murui (2017). Nigeria also serves as

a suitable market given it faces liquidity challenges as documented by Hearn and Piesse (2010) and Abdullahi and Fakunmoju (2019).

1.6 Justification of the study

Given the importance of liquidity in Capital Markets, it is evident that should emerging markets aim to develop their Capital markets to world standards they have to introduce policies that spur liquidity. Significant benefits and inferences can be obtained from this study that could be beneficial to policymakers, investors, corporate entities and academia.

In regards to regulators, results from this study could aid in developing capital market policy framework[5], more especially for the Nigerian Stock Exchange (NSE) and the Securities Exchange Commission (SEC) as they aim to position the Nigerian capital markets amongst the top globally in the near future. Investors could infer from the results of this study how efficient the Nigerian or South Africa markets are in determining asset prices and whether the illiquidity premium charged on assets is justified and fair. The study can also be useful to firms that aim to reduce their cost of capital through a reduction of the risk premium attached on securities, therefore the study could also create an interesting link between market microstructure and corporate finance. Moreover, the study could also inform an investor`s trading strategies and could also aid the operations of market makers, especially in the presence of significant information based spreads.

[5] For instance, after establishing that liquidity is a significant variable in explaining stock returns and considering causes of the liquidity concerns in Nigeria Abdullahi and Fakunmoju (2019) recommend demutualization of the stocks exchange, transparent structures and adaptive method stabilization in exchange rate policies to increase stock market patronage, minimize transaction costs and mitigate market uncertainties.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

The area of market microstructure has gained significant research momentum over the past few decades with papers such as (Roll, 1984; Amihud, Mendelson, & Lauterbach, 1997; Amihud, 2002; Easley, Hvidkjaer, & O'Hara, 2002; O`Hara, 2003) amongst others, giving ground-breaking insights into the process of how markets work and the impact this has on the price formation process of securities.

2.2 The Linkage between Liquidity and Asset Prices

The absence of liquidity in any market simply means that trade cannot take place, liquidity is, therefore, a necessity for smooth trading. Amihud (1986) writes that liquidity, marketability and trading costs are among the primary attributes of many investment plans and financial instruments pricing given their role in determining investor behaviour and preferences, further reiterating the importance of liquidity in markets. In examining the implications of market microstructure on asset pricing, O`Hara (2003) makes a basic proponent that current asset pricing models do not incorporate the impact of liquidity and the risks inherent in price discovery. The main assertation lies on the basis that symmetric information-based asset pricing models do not work because they assume that the underlying problems[6] of liquidity and price discovery have been solved.

In exploring the effect that liquidity could have on asset prices, O`Hara (2003) proposes a line of thought were liquidity can be considered as a tax or cost borne by investors therefore if these costs are large enough they should negatively affect asset prices because of their effect on net asset returns. In the same vein, reducing these costs through, for instance, the introduction of a more efficient trading mechanism should have immediate positive effects on

[6] The problems being referred to are largely with regards to the assumed risk appetite of investors in most asset pricing models and the limitation of asset pricing models to incorporate the transaction costs of liquididty and the risks associated with price discovery.

asset values. O`Hara (2003) therefore asserts that market microstructure influences these liquidity costs, and so if these effects are large enough, microstructure and liquidity affect asset returns.

In a bid to test the hypothesis developed by Amihud (2002) in an emerging market context, Geert et.al (2007) model illiquidity using the proportion of zero returns liquidity measure and model the study using a bivariate vector autoregressive model (VAR). Results obtained from the study show that the zero returns measure significantly predicts returns, and unexpected liquidity shocks are positively correlated with returns and negatively correlated with dividend yields. Another conclusion from the literature that shows the link between microstructure elements and asset pricing.

Considering more literature that ties microstructure to asset returns, Easley et.al (2002) investigated the role of information-based trading in affecting asset returns based on a premise that in a dynamic market, asset prices are continually adjusting to new information. Such an evolution dictates that the process by which asset prices become informationally efficient cannot be separated from the process generating asset returns. They build a theoretical model that incorporates private information into the price evolution process, and in so doing, affecting the risk of holding the asset. Their results show that information based trading indeed has a large and significant positive effect on asset returns. This led to the conclusion that an information variable and firm size are the predominant factors explaining stock returns.

Amihud (2002) found that both across stocks and over-time, illiquidity has a positive and highly significant effect on expected return. Amihud (2002) used the price impact measure as a proxy for liquidity where the price impact measure can be thought of as the daily price response associated with one dollar of the trading volume. The paper essentially proposes that expected stock excess return also reflects compensation for expected market illiquidity,

and thus an increasing function of expected market illiquidity. The illiquidity effects demonstrated by Amihud (2002) are stronger for small firm stocks[7].

There exists an abundance of more literature that shows the positive relationship between asset returns and liquidity. Amihud and Mendelson (1989) and Eleswarapu (1997) found a significant positive effect of quoted bid-ask spreads on stock returns. Chalmers and Kadlec (1998) also found liquidity, proxied by the amortized effective spread had a positive effect on stock returns.

Hearn and Piesse (2009) tested an augmented CAPM with size and liquidity as additional regressors and found that even though they have weak explanatory power in the South African market, they had much stronger explanatory power in the North African and Sub-Saharan markets, this may be attributed to the greater liquidity concerns in these regions and precisely why this study solely focuses on developing markets. Moreover, they gave general plausibility to the augmented CAPM that accounts for liquidity effects. In a further study based on West African markets that explored the behaviour of the size variable in the augmented CAPM, Hearn and Piesse (2010) obtained evidence of negative beta coefficients on the size variable, therefore, indicating a reversal in the size effect postulated by Fama and French (1992), this shows evidence of extremely heterogeneous universe of stocks more especially in developed as compared to developing markets. The reversed size effect is the opposite of what one would expect and does not provide investors with good hedging opportunities, somehow suggesting that only beta and liquidity effects are the only key variables in explaining asset returns in some developing markets. Hearn and Piesse (2010) conclude that a different valuation method would be needed to price very highly illiquid stocks and firms accurately.

[7] Amihud (2002) explains this by noting that in times of dire liquidity, there is a flight to more liquid stocks thus making larger stocks more attractive. The greater sensitivity of small stocks to illiquidity means that these stocks are subject to greater illiquidity risk which if priced, should result in a higher illiquidity risk premium.

Hearn and Piesse (2010) show a general link between the degree of the bid-ask spread and size of a firm. In that, the bid-ask spread decreases as mean cross-sectional firm size increases. They further note that when illiquidity is modelled in an augmented CAPM the regressors have greater explanatory power as compared to the simple CAPM. The signs on their beta coefficients for the illiquidity factor are negative, as expected. In general, the coefficients on the low and medium illiquidity portfolios are negative, with stocks paying lower returns when the illiquidity variable decreases. The setup employed by Hearn and Piesse (2010) has a drawback in that the model specification results in high collinearity amongst the variables; which is evident as the reported correlation between size and the bid-ask spread range within -50% and -82.25%, casting doubt on the robustness of the model.

2.3 Measuring liquidity

There exist various measures of liquidity being the bid-ask spread (quoted or effective), transaction by transaction market impact or the probability of informed traded (PIN) derived by Easley et. al (1997) and the price impact measure derived by Amihud (2002).

In an aim to understand and consequently model liquidity and its effects, it would be vital to first proxy liquidity using observable variables in the market, Amihud (1986) gives guidance on this by writing that the quoted ask price on securities includes a premium for immediate buying and the bid price similarly reflects a concession required for immediate sale. Therefore, the bid-ask spread would seem a natural measure of liquidity since it is the sum of the buying premium and the selling concession. The disadvantage of this measure, especially in emerging markets is that data with regards to the bid-ask spread is not adequately available for quoted firms.

2.4 Empirical findings on the illiquidity premium and asset returns

Within the last two decades, umpteen volumes of literature on the study between asset returns and liquidity have been availed. One such example is Geert et.al (2007) who study the impact of liquidity on asset returns using

emerging markets, a welcomed diversion from many earlier studies that predominantly focused on the U.S stock market such as (Keim & Stambaugh, 1986; Stoll, 1989), just to mention a few. Geert et.al (2007) allude to a general consensus that liquidity is an important factor in asset pricing. Geert et.al (2007) approach the study on liquidity using the proportion of zero returns as their liquidity proxy and then continue to empirically establish how it has an impact on asset returns of stocks in 18 emerging markets, using the CAPM framework.

Amihud (2002) further contributes to the discussion on liquidity by developing the price impact measure of liquidity and shows its significant effect on security pricing. Easley et.al (2002) show that a variable they constructed to reflect microstructure elements being liquidity and information asymmetry; the probability of Informed trades (PIN), is a highly significant explanatory variable in asset returns[8]. PIN aims to incorporate microstructure elements such as liquidity and the adjusting process by which market makers adjust the bid-ask spread in the presence of informed traders. PIN is developed from the premise that informed traders affect stock returns, more especially through dealer revisions. They test the variable in a Fama and French (1992) setup and find the variable to be statistically significant hence validating the aforementioned hypothesis. This by extension further shows the relevance of microstructure in asset pricing and continues to give validation on why microstructure elements need to be factored into asset pricing.

A study conducted by Hearn and Piesse (2009) in which they utilized an augmented CAPM that captures size and liquidity factors of stocks gives evidence that including these factors increases the explanatory power of both variables and the model in general. Their study was based on stocks traded in the Kenyan, South African, Nigerian and greater Sub-Saharan markets.

[8] Easley, Hvidkjaer, and O'hara (2002) conclude that indeed information does affect asset prices. They note that a difference of 10 percentage points between two stocks leads to a difference in their expected returns of 2.5 percent per year.

Amihud and Mendelson (1989) provide empirical evidence that the bid-ask spread is a statistically significant variable in explaining asset returns by conducting a study based on the U.S stock market. Amihud and Mendelson (1989) made a conclusion that the principal factors affecting asset returns are systematic risk measured by stock beta and stock liquidity as proxied by the bid-ask spread. The results, therefore, showcasing the need to incorporate market microstructure elements in modelling asset returns.

Their study largely focuses on the bid-ask spread due to its informational significance in dealer markets. The key results show that the bid-ask spread is significant in explaining asset returns, however, the study does not attribute this to liquidity or informational significance of the bid-ask spread. The study`s shortfalls are that the factors used in the regression equation being beta, size, bid-ask spread, residual risk are highly collinear with correlation falling in the range of 40-50%. The presence of multicollinearity in the model specification casts doubt on the robustness of the results from the study.

Amihud (2002) using data from the New York stock exchange (NYSE) for a period 1963-1997 found that over time, expected market illiquidity affects the ex-ante stocks excess return. This led to the conclusion that for US stocks, a risk premium constitutes excess returns on assets and acts as compensation for the lower liquidity of stocks relative to that of treasury securities. This study and many others, however, focus on the US market which is arguably the most liquid market in the world hence motivating the need to explore studies that focus on emerging markets.

Hearn and Piesse (2009) show that including a size factor into an augmented CAPM when computing returns of stocks in Nigeria causes a significant jump in R^2 of 15.77% to 90.77%[9]. This shows that considerable improvements are made in explaining the cross-section of stock returns by including the size and

[9] See Hearn and Piesse (2009) for elaborate details.

liquidity factors, which is of particular importance in emerging markets where liquidity is a common issue.

Hearn et.al (2010) conducted a study to test the impact of liquidity on stock returns based on four major African markets; South Africa, Kenya, Egypt and Morocco. They found that illiquidity is both a priced and consistent characteristic in these emerging markets. Their results show that in all four countries, the market risk premium, premiums attributed to the size and liquidity factors are important parameters in pricing asset returns. They find that the premium associated with size has a greater impact on overall explanatory power than the one associated with liquidity.

Hearn and Piesse (2010) also find that when size and liquidity factors are included in an augmented 3 factor CAPM, there is a significant improvement in the explanatory power of the variables on returns of stocks in emerging markets. This improvement, compared to the simple CAPM is at some instances more than 100%. This, therefore, provides further evidence that size and liquidity factors are significant variables in explaining asset returns.

Assefa and Mollick (2014) investigate the relationship between stock returns in African markets and liquidity where they measured liquidity using macro-level variables. Their results, obtained through a fixed-effect model (FEM) and the system generalized method of moments (SGMM) show a positive and significant relationship between stock market returns and illiquidity variables when assessing 16 African countries. They conclude that less liquid markets fully "price in" advances in liquidity.

Assefa and Mollick (2014) further, find evidence that liquidity is indeed a significant explanatory variable in a portfolio of stocks drawn from 16 African markets that are characterized by illiquidity. This means that liquidity is priced only when the degree of illiquidity in a market is high.

Nguyen et.al (2016) employ a price based theory to test the effect of stock market liquidity in the Australian market. They assess the effect of liquidity

on managerial performance, firm profits and other operational issues which are hypothesized to translate to increased firm value. To capture these operational variables Nguyen et.al (2016) use Tobin's Q[10] measure. Even though the study finds a positive relation between stock liquidity and firm value, the study has shortfalls in that it postulates an immediate effect of liquidity on operational variables. Moreover, the study does not account for reverse causality in that high market value firms are chased by investors who spur demand that increases the liquidity of the stock.

In a very recent study based in Nigeria, Abdullahi and Fakunmoju (2019) test the effect of market liquidity measured by stock turnover and trading volume alongside inflation and exchange rates on returns of Nigerian traded stocks. They analyzed all shares traded on the NSE for a twenty-year period (1998-2018) using an auto-regressive distributive lag (ARDL) bound test methodology. All the variables tested were found to be statistically significant, however, a key drawback of the study is that the proxy of liquidity used being turnover, does not factor in the possibility of concentration in the market (i.e where a few stocks make up a significant portion of the exchange`s total market capitalization). A market-wide factor may, therefore, fail to disintegrate the effect of a few firms that dominate the market vis-à-vis the smaller firms.

Kumar and Misra (2019) also contribute to the study of liquidity by testing the effect of the volatility of liquidity in modelling asset returns, an approach that is in spirit similar to Blau and Whitby (2015). Their study was based on the Indian stock market and employed a Fama-McBeth approach to model the behaviour of stock returns. The study, however, does not address the possibility of collinearity between liquidity, proxied using Amihud`s price impact measure and its second moment when both included in a regression set-up, casting doubt on the robustness of results.

[10] The Tobin`s Q measure captures variables such as operating income, a firms leverage and its total assets.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

The methodology employed in this study is an extension of the Fama and French (2015) 5-factor model that is augmented with a liquidity measure of which is greatly inspired by the work of Amihud et.al (2015) and Ochenge and Murui (2017).

The five-factor model postulates that cross-sectional stock excess returns are explained by the market beta, a size factor (SMB), a value factor (HML), a profitability factor (RMW) and an investment factor (CMA).

The 5-factor model is an extension of the Fama and French (1992) 3-factor model which was shown to have weaknesses in capturing all factors that explain stock returns. In particular, the model failed to capture profitability and investment effects. This can be observed in the context of a discounted cash flow framework, profitability and investment factors have an effect on a stock's current price due to their impact on future cash flows, hence these factors implicitly affect asset returns and stock predictability.

3.2 Data and Sampling

This study is focused on the Nigerian and South African stock exchanges. Daily data of 161 stocks listed on the NSE and 271 stocks quoted on the JSE are used in this study. The study includes all securities that are actively traded on the respective bourses over the sample period with stock data being obtained from Datastream for all companies. The risk-free rate was taken to be the 91-day T-bill with monthly data obtained from the Central Bank of Nigeria and the Reserve Bank of South Africa respectively. Lastly, the all-share index of each market was taken as the market proxy with daily data sourced from Datastream.

The period of the analysis is from 2013-2019. The period of analysis was largely chosen based on the availability of stock data, moreover, majority of the

companies currently traded on the NSE were not listed prior to 2013 or had significant missing data prior to this period.

3.3 Measuring liquidity

This study focuses on two measures of liquidity that have been evidenced across numerous literature to be efficient proxies of market liquidity, more especially in a developing market context.

These are the Price impact measure of Amihud (2002) and the proportion of zero returns[11] documented by Lesmond et.al (1999).

3.3.1 Amihud`s Price Impact measure

Amihud (2002) introduced a price impact measure defined as the absolute value of a stock`s daily returns divided by the corresponding value of volumes traded.

$$ILLIQ_{i,d} = \frac{|R_{i,d}|}{P_{id}VO_{id}} \quad (1)$$

Where $ILLIQ_{i,d}$ represents the daily Amihud measure for a particular stock, $R_{i,d}$ is the daily continuously compounded stock return, $VO_{i,d}$ is the daily stock trading volume, and $P_{i,d}$ is the daily price for stock i.

Amihud`s measure has proven to be a widely reliable proxy for liquidity and features in numerous studies including Tsung-wu and Shu-Hwa (2015), Ochenge and Murui (2017) and Kumar and Misra (2019), just to mention a few.

3.3.2 Lesmond`s proportion of Zero returns[12]

The proportion of zero return measure is defined as:

$$ZR_{i,T} = \frac{NZRD_{i,T}}{TD_{i,t}} \quad (2)$$

[11] The zero return measure and the price impact measure are reliable proxies for liquidity and act as a suitable substitute for the bid-ask spread which in most cases requires very fine microstructure data that may not be available.

[12] The intuition behind the proportion of zero returns measure is that if the value of an information signal is sufficient to outweigh the costs associated with transacting, then market participants will elect not to trade, resulting in an observed zero return hence showing illiquidity in the market.

Where ZR is the proportion of zero return days, NZRD denotes the number of zero return days in a trading period and TD is the total number of trading days in a given period. The advantage of this measure is that the data used to construct the measure is easily and widely available for all listed stocks, compared to other finer microstructure data such as the bid-ask spread.

3.4 A Liquidity Augmented Fama and French 5 Factor Model

Numerous studies in the area of liquidity and asset pricing largely use an augmented Fama and French (1992) model to explain the cross-section of stock returns. Even though plausible, and liquidity premiums are found to be statistically significant is such model constructs, a key concern would be the robustness of such models in fully capturing both liquidity and firm fundamental factors that explain stock returns.

The Fama and French (2015) model has proven to be a more robust model in modelling stock returns hence is used in this study. Even though the focus of this study is to ascertain if liquidity is a priced variable in stocks traded on the Nigerian and South African stock exchanges, it is key to incorporate other statistically significant firm-specific variables to completely model the return behaviour of stocks.

As documented by Fama and French (2015), the 5-factor model is directed at capturing the size, value, profitability and investment patterns in average stock returns. The model performs better than the Fama and French (1993) 3-factor model.

The methodology would involve forming mimicking portfolios of sampled securities using daily returns over the sample period as done by Ochenge and Murui (2017). Time-series regressions will then be conducted on the returns of the constructed portfolios using a simple OLS regression approach.

The Fama and French 5 factor model to be used in the analysis is defined as:

$$R_t - R_{Ft} = a + b[R_{Mt} - R_{Ft}] + sSMB_t + hHML + rRMW_t + cCMA_t + \varepsilon \qquad (3)$$

Where R_t is the return on a portfolio for period t, R_{Ft} is the risk-free return, in our case proxied by the returns on a 91-day t-bill, R_M refers to the return on the market portfolio which is proxied by the all-share index, *SMB* represents the size factor of which represents the returns on a diversified portfolio of small stocks minus the return on a diversified portfolio of big stocks , *HML* represents the value factor of which is the difference between the returns on a diversified portfolio of high book to market and a diversified portfolio of low book to market stock portfolios, *RMW* represents the profitability factor of which is the difference between the returns on a diversified portfolio of high profit and a diversified portfolio of low-profit stock portfolios and *CMA* represents the investment factor which is the difference between the returns on a diversified portfolio of low investment and a diversified portfolio of high investment stock portfolios.

The above model (equation 3) will be augmented to capture liquidity effects using the IML factor (illiquid minus liquid stocks) as done in Ochenge and Murui (2017). The main idea behind the factor is to capture a premium from the difference of returns for stocks sensitive to changes in the relative measure of liquidity and those with low sensitivities to the same (less liquid minus highly liquid).

Fama and French (2015) document that by including profitability and investment factors in the regression makes HML a redundant factor. This is because the return exposures of HML are absorbed by the other four factors especially the profitability and investment factors. As a consequence, it will not be included in the analysis of this study.

The final equation will therefore be:

$$R_t - R_{Ft} = a + b[R_{Mt} - R_{Ft}] + sSMB_t + qIML_t + rRMW_t + cCMA_t + \varepsilon_t \quad (4)$$

The main hypothesis is on whether the exposures to the six factors, b, s, r, c and q capture all variation in expected returns hence the intercept a in (equation 4) should be statistically equal to zero for all portfolios.

3.5 Mimicking Portfolios Procedure

The construction of the size, illiquidity, profitability and investment factors is done in a similar fashion to Fama and French (2015). Over the analysis horizon of 2013-2018, in June every year NSE and JSE stocks are first ranked in ascending order of market capitalization, then, using the median value of the market capitalization, the stocks are subdivided into two groups of low market capitalization (LM) and High market capitalization (HM).

The resulting size groups are then further split into two liquidity groups, high liquidity (HL) and low liquidity (LL). The resulting portfolios that form at the intersections of the subgroups are then further split into High and Low profitability and high and low investment categories.

The guiding criteria for creating the subgroups is to rank the stocks in ascending order of the factor of concern, may it be size, illiquidity, profitability or investment. The median value is then used as a cut-off point thus formulating the high and low subgroups[13].

The final step involves forming the risk factors using a risk premium approach. The guiding intuition is that additional risk resulting from small companies, illiquid stocks, less profitable and low investment companies needs to be priced into stock returns. The SMB (small minus big) factor is computed by subtracting equally-weighted average returns of large-sized companies from small-sized company returns, yielding a premium attributed to the "size-effect" of Fama and French (1992). The IML (Illiquid minus liquid) factor which measures the liquidity premium that compensates investors for holding

[13] The 2x2x2x2 sorts described above result in 16 portfolios identified as [HM/HL/HP/HI, HM/HL/HP/LI, HM/HL/LP/HI, HM/HL/HP/HI, HM/LL/HP/HI, HM/LL/HP/LI, HM/LL/LP/HI, HM/LL/LP/LI, LM/HL/HP/HI, LM/HL/HP/LI, LM/HL/LP/HI, LM/LL/HP/HI, LM/LL/HP/LI, LM/LL/LP/HI, LM/LL/LP/LI].

Taking, for instance, HM/HL/HP/HI, the portfolio represents stocks that have high market capitalization, high liquidity, high profitability and high investment.

illiquid stocks is computed by subtracting equally-weighted average returns of high liquidity stocks from those of low liquidity stocks.

The profitability factor (RMW-Robust minus weak) which aims to capture the premium associated with high-profit entities is computed by subtracting equally weighted returns of low profit yielding stocks from the returns of high-profit stocks.

Lastly, the investment factor which captures a premium associated with firms that have high investment expenditure vis-a-vis those with low investment expenditure is obtained by subtracting equally weighted returns of high investing companies from low investment or conservative companies. Appendix 1 shows explicitly how these factors are computed.

CHAPTER FOUR

FINDINGS AND ANALYSIS

4.1 Descriptive statistics

Nigeria

Table 1 shows the summary statistics and correlation of the excess market return and the four factors used in the analysis for the Nigerian market. Focussing on Panel A, the average prevailing excess return is negative thus indicating that the risk-free assets, in our case the 91-day t-bill, outperforms the stock market by 8.58% on an annual basis. This can be seen from figure 1 where the t-bill rate is generally always higher than the return investors earn on a broad-based market index.

Figure 1: Monthly returns on a broad-based index plotted alongside the T-bill rate return- Nigeria

The mean return on the SMB and IML factors are positive as expected, signifying that indeed smaller firms and less liquid companies command a significantly higher premium that should consequently reflect in asset prices. Specifically, small firms earn an excess return of 2.62% per year above larger companies, illiquid companies, on the other hand, earn an excess return of 2.15% per year as compared to their more liquid counterparts.

The excess returns on the profitability factor are however negative. It suggests that less profitable firms marginally outperform more profitable firms with a mean excess return of 0.828% per year. The average mean excess returns on the investment factor are also negative thus signifying that aggressive firms outperform those that are conservative with investment by 1.38% on an annual basis.

Panel B shows the correlations amongst the four factors, results show that the correlations are on average low, ranging between -22 to 24% thus indicating the four factors are approximately orthogonal to each other, meaning each factor is constructed to uniquely explain the variations in asset returns.

In addition to the low correlations, some further inference can be made from Panel B. All the four factors, SMB, IML, RMW and CMA are positively correlated with the excess market return thus implying that smaller, less liquid, more profitable and conservative firms would have greater sensitivity to the market, captured by a higher beta coefficient. This is expected as intuitively stocks with the above characteristics bear higher risk thus must be dully compensated through a higher return.

The liquidity and profitability factors are positively correlated with the size factor, with correlations of 3.4% and 23.6% respectively. This implies that small stocks tend to be more illiquid and also enjoy greater profitability.

The investment factor, on the other hand, is negatively correlated with size thus implying that small firms are aggressive with investment. This is an expected outcome as small firms tend to be keen on growth that can only be achieved through a high investment budget.

Table 1: Summary Statistics and Correlations for Monthly excess market returns, SMB, IML, RMW and CMA (Nigeria)

Panel A: Summary statistics

Variable	Mean	Std. Dev.	Min	Max
Excess market returns	-0.00715	0.010719	-0.02993	0.025551
SMB	0.002183	0.009171	-0.01827	0.024075
IML	0.001793	0.008672	-0.02227	0.027709
RMW	-0.00069	0.009218	-0.01906	0.023501
CMA	-0.00115	0.009153	-0.02126	0.022646

Panel B: Correlations

	Excess market returns	SMB	IML	RMW	CMA
Rm-Rf	1				
SMB	0.0707	1			
IML	0.1827	0.0338	1		
RMW	0.0126	0.2358	0.0031	1	
CMA	0.158	-0.2217	-0.1467	0.1592	1

South Africa

Table 2 shows the summary statistics and correlations of the excess market return and the four factors used in the model construct. The results are quite similar to those obtained from the Nigerian market as the mean excess returns of all the portfolios are also negative. As with the Nigerian market, this indicates that risk-free assets earn a higher return than the return on a broad-based market index which can be seen in figure 2. This can be attributed to high-interest rates payable on t-bills whilst the stock market has recorded depressed returns.

The mean returns on the SMB, IML, RMW and CMA factors differ from those obtained in Nigeria. The SMB and IML factors have a negative mean return thus suggesting that there is no significant size effect or illiquidity premium

charged on stocks. Specifically, the results suggest that large firms outperform small stocks marginally by 0.0126% whereas liquid firms outperform illiquid firms by 0.136% annually. Even though the results slightly deviate from expectations, it can be justified by the fact that majority of companies listed on the JSE are large, well established and arguable very liquid. As such, the size and liquidity effects would not be expected to be significant in this market.

The mean returns on the RWM and CMA factors also differ with those obtained in the Nigerian market, they, however, conform with expectations and indeed show that stocks traded on the Johannesburg stock exchange do command a profitability and investment premium. The premiums are however significantly small with more profitable firms marginally outperforming less profitable firms by 0.027% and conservative firms earning higher returns than firms that invest aggressively by 0.299% on an annual basis.

The correlations on the four factors are low, as with the Nigerian market thus showing that the factors are constructed such that they are independent of each other.

Table 2: Summary Statistics and Correlations for Monthly excess market returns, SMB, IML, RMW and CMA (South Africa)

Panel A: Summary statistics

Variable	Mean	Std. Dev.	Min	Max
Excess market return	-0.004326	0.007535	-0.0263485	0.0144582
SMB	-0.0000105	0.006577	-0.0309775	0.0156077
IML	-0.0001132	0.006994	-0.0226264	0.0178925
RMW	0.0000225	0.006131	-0.0193405	0.0147103
CMA	0.0002493	0.007019	-0.031205	0.0112855

Panel B: Correlations

	Rm_rf	SMB	IML	RMW	CMA
Rm_rf	1				
SMB	0.0447	1			
IML	0.1171	0.1685	1		
RMW	0.0768	0.4962	0.0629	1	
CMA	-0.1042	-0.0001	-0.1528	0.1112	1

Figure 2: Monthly returns on a broad-based index plotted alongside the T-bill rate of return- South Africa

Table 3 and 4 show the mean returns earned by the sixteen portfolios from 2013-2018 for the Nigerian and South African markets respectively. Table 3 shows that all the sixteen Nigerian portfolios yield negative average monthly returns. This result shows a generally weak performance of the stock market vis-a-vis the t-bill market. The same results are observed for all but one portfolio in the South African market.

The expectation would be that the smallest, most illiquid, highly profitable and conservative with investment portfolio would earn the highest return as such a portfolio faces the most severe risk that should be adequately compensated, this, however, is not the case. Portfolio 7 which has these

characteristics ranks 8th in the Nigerian market and last in the South African market in terms of mean excess returns yielded. The portfolio yields an excess return of -10.24% and -8.398% per year for the Nigerian and South African markets respectively.

Table 3: Mean Excess Returns of each portfolio (Nigeria)

Portfolio	Size	Illiquidity	Profitability	Investment	Mean Excess Return
1	Small	Low	Low	Low	-0.0075072
2	Small	Low	Low	High	-0.0081993
3	Small	Low	High	Low	-0.0083468
4	Small	Low	High	High	-0.0087254
5	Small	High	Low	Low	-0.0095462
6	Small	High	Low	High	-0.0037188
7	Small	High	High	Low	-0.0085315
8	Small	High	High	High	-0.0085164
9	Big	Low	Low	Low	-0.0127478
10	Big	Low	Low	High	-0.0128626
11	Big	Low	High	Low	-0.0120892
12	Big	Low	High	High	-0.0085142
13	Big	High	Low	Low	-0.0046854
14	Big	High	Low	High	-0.0098016
15	Big	High	High	Low	-0.0129874
16	Big	High	High	High	-0.0068646

Table 4: Mean Excess Returns of each portfolio (South Africa)

Portfolio	Size	Illiquidity	Profitability	Investment	Mean Excess Return
1	Small	Low	Low	Low	0.0012932
2	Small	Low	Low	High	-0.0055982
3	Small	Low	High	Low	-0.0018429
4	Small	Low	High	High	-0.0061831
5	Small	High	Low	Low	-0.0054048
6	Small	High	Low	High	-0.0037822
7	Small	High	High	Low	-0.0069982
8	Small	High	High	High	-0.0068963
9	Big	Low	Low	Low	-0.0063048
10	Big	Low	Low	High	-0.0062364
11	Big	Low	High	Low	-0.0050052
12	Big	Low	High	High	-0.0050405
13	Big	High	Low	Low	-0.0057281

14	Big	High	Low	High	-0.0036991
15	Big	High	High	Low	-0.0043827
16	Big	High	High	High	-0.0060883

4.2 Liquidity Augmented Fama French 5 Factor model results

The time series of the excess returns for each of the sixteen portfolios are regressed against the excess market return, the SMB, IML, RMW and CMA factors over the period 2013-2018. The regression results from the liquidity augmented Fama and French 5-factor model, displayed in table 5 for the Nigerian market and table 6 for the South African market are discussed below:

First, the intercept term, a, also called Jensen's alpha, is statistically significant in all but two portfolios in both the Nigerian and South African markets. Jensen`s alpha is a measure of how accurately the model explains the variation of asset returns. This result, however, does not disqualify the model in totality, it simply infers that there exist more factors that would best model the return process of stocks traded in the two markets. A possible explanation for this result is the great amount of missing data regarding stocks traded on both exchanges, more especially data relating to the investment and profitability factors.

The degree to which the selected factors explain asset returns can also be observed by the R^2. The R^2 are generally low with values for Nigeria ranging between (6.7% - 60.3%) whereas those for South Africa Ranging between (5.6% - 52.6%). These results are consistent with the significant Jensen`s alphas and call for greater investigation into factors that would better model asset returns.

The above results are however similar to those obtained by Fama and French (2015). Their R^2 were also relatively low ranging between (24%-48%) and all their Jensen`s alphas were also statistically significant (i.e indistinguishable from zero).

A second key result is that market risk, as measured by b, is significant for only five out of the sixteen portfolios in the Nigerian market whereas only one portfolio has a significant beta in the South African market with no clear pattern on the accompanying signs of the beta coefficients, a result that deviates from expectations set out in literature.

The key aim of this study is to observe the impact of liquidity on stock prices, therefore, focusing on the illiquidity factor, IML and it's coefficient, q, liquidity shows to be a significant explanatory variable for nine out of the sixteen portfolios with a range of -.0.044 - 1.574 for Nigeria and still maintains its significance in ten out of sixteen portfolios for the South African market, with the coefficient ranging between -0.250-1.301.

Portfolios that are more liquid (i.e have low illiquidity) have negative IML coefficients that are mostly statistically insignificant. This result conforms with expectations as an illiquidity premium would generally be expected on stocks that face liquidity concerns.

The testable hypothesis highlighted at the beginning of this study is confirmed by our results as portfolios with high illiquidity mostly have positive and statistically significant IML coefficients thus implying that indeed an illiquidity premium is priced into stock returns in both the Nigerian and South African stock markets.

A fourth result is with regards to the coefficient on the profitability factor, r. It is significant for eleven out of the sixteen portfolios for the Nigerian market and ten out of sixteen portfolios for the South African market with the signs positive as expected for most of these portfolios. This shows that indeed higher profit-generating companies would yield greater returns for investors. A conclusion that conforms with the intuition inbuild in the discounted cash flow framework; higher expected future cash flows in terms of dividends, which are a function of profitability, should signal higher expected returns.

Lastly, the coefficients on the investment factor, CMA, are significant for twelve out of the sixteen portfolios for the Nigerian market and eight out of sixteen portfolios for the South African market thus signifying that indeed the amount of money a company commits to investment impacts the returns required on its stock.

Table 5: Liquidity Augmented Fama French 5 –factor model Results (Nig)

Portfolio	Size	Illiquidity	Profitability	Investment	a	b	s	q	r	c	R squared
1	Small	Low	Low	Low	-0.006*	0.297	0.793***	-0.287	-0.815***	1.158***	0.322
2	Small	Low	Low	High	-0.009***	-0.114	-0.165	-0.176	0.010	-0.319***	0.178
3	Small	Low	High	Low	-0.008***	-0.078	-0.006	-0.109	0.107	0.036	0.067
4	Small	Low	High	High	-0.010***	-0.032	0.168	-0.085	0.267*	-0.396***	0.199
5	Small	High	Low	Low	-0.009***	0.036	0.035	0.264**	0.251**	0.202*	0.230
6	Small	High	Low	High	-0.003	0.903***	1.277***	0.633**	-2.174***	-0.696**	0.603
7	Small	High	High	Low	-0.011***	-0.116	0.508**	0.873***	0.385*	1.096***	0.414
8	Small	High	High	High	-0.013***	-0.189	0.242	1.229***	1.187***	-1.053***	0.510
9	Big	Low	Low	Low	-0.013***	-0.206	-0.329	-0.044	-0.954***	0.750***	0.280
10	Big	Low	Low	High	-0.007***	0.417**	-1.394***	-0.548**	0.059	-1.015***	0.429
11	Big	Low	High	Low	-0.009***	0.255	-0.089	-0.421*	0.373*	-0.039	0.111
12	Big	Low	High	High	-0.007***	0.168**	-0.125	0.011	0.171**	-0.148*	0.142
13	Big	High	Low	Low	-0.005*	0.048	-0.881***	1.574***	-0.874***	0.410	0.554
14	Big	High	Low	High	-0.016***	-0.674***	-0.484**	0.926***	-0.284	-0.462**	0.428
15	Big	High	High	Low	-0.007***	0.471***	-1.179***	0.493**	0.745***	0.414**	0.528
16	Big	High	High	High	-0.004	0.228	-0.666***	0.351	-0.018	0.117	0.163

***** p<0.01, ** p<0.05, * p<0.1**

Table 6: Liquidity Augmented Fama French 5 -factor model Results (SA)

Portfolio	Size	Illiquidity	Profitability	Investment	a	b	s	q	r	c	R-squared
1	Small	Low	Low	Low	-0.007***	-0.144	0.691***	-0.306*	-0.564**	0.563***	0.308
2	Small	Low	Low	High	-0.006***	-0.170	0.688***	-0.250	-0.526**	-0.340*	0.181
3	Small	Low	High	Low	-0.001	0.282	0.596**	-0.654***	-0.010	0.641***	0.292
4	Small	Low	High	High	-0.006***	0.108	1.083***	-0.977***	0.043	-1.057***	0.348
5	Small	High	Low	Low	-0.006***	-0.153	0.234	0.150	-0.314*	0.203	0.107
6	Small	High	Low	High	-0.003*	0.168	1.737***	0.810***	-1.264***	-0.226	0.554
7	Small	High	High	Low	-0.006***	0.114	1.674***	1.301***	0.093	0.434	0.526
8	Small	High	High	High	-0.006***	0.074	0.244	0.301	0.881***	-0.563***	0.360
9	Big	Low	Low	Low	-0.005**	0.389*	0.052	-0.808***	-0.590*	0.554**	0.261
10	Big	Low	Low	High	-0.006***	-0.056	0.031	-0.771***	-0.262	-0.735***	0.208
11	Big	Low	High	Low	-0.005***	-0.077	-0.260*	0.046	0.164	0.029	0.064
12	Big	Low	High	High	-0.005***	-0.052	0.065	0.093*	0.083	-0.000	0.142
13	Big	High	Low	Low	-0.006***	-0.048	0.158	0.537*	-0.966***	1.147***	0.277
14	Big	High	Low	High	-0.002	0.294	-0.644*	1.011***	-1.176***	-1.511***	0.519
15	Big	High	High	Low	-0.005***	-0.084	-0.197	0.108	0.526*	0.084	0.056
16	Big	High	High	High	-0.006***	-0.085	-0.258	0.156	0.558**	0.087	0.097

*** p<0.01, ** p<0.05, * p<0.1

4.3 Robustness check: Testing the model using an alternative liquidity measure

In a bid to explore the results that would be obtained through measuring liquidity with an alternative measure to Amihud`s price impact measure, the Lesmond (1999) zero return measure is used with results discussed below.

The results displayed in table 7 and table 8 for the Nigerian and South African markets respectively show that the Jensens alpha are still statistically significant thus still casting doubt on the model specifications. The results on the size, illiquidity, profitability and investment factors are similar to those in tables 5 and 6. A key observation, however, is that this model has lower R^2 thus showing it is a less precise model compared to the initial model that uses the price impact measure to proxy liquidity.

Focussing on the results of the liquidity factor, the zero return measure marginally performs better than the price impact measure as eleven of the sixteen portfolios now have significant liquidity coefficients compared to nine for the Nigerian market whereas results for South Africa remain the same.

Table 7: Liquidity Augmented FF Results: Zero return measure (Nigeria)

Portfolio	Size	Illiquidity	Profitability	Investment	a	b	s	q	r	c	R-squared
1	Small	Low	Low	Low	-0.010***	-0.108	0.565***	-0.370*	-0.722***	0.789***	0.313
2	Small	Low	Low	High	-0.004	0.356	0.849***	-0.577**	-1.387***	-0.484*	0.415
3	Small	Low	High	Low	-0.009***	-0.018	0.153	-1.087***	0.566**	0.701***	0.472
4	Small	Low	High	High	-0.010***	-0.009	0.090	-0.434**	0.668***	-0.685***	0.245
5	Small	High	Low	Low	-0.008***	0.171*	0.228*	-0.056	0	0.275**	0.179
6	Small	High	Low	High	-0.009***	0.023	0.584**	0.617**	-0.152	-0.618**	0.199
7	Small	High	High	Low	-0.012***	-0.420**	0.450*	0.540**	0.195	0.540**	0.287
8	Small	High	High	High	-0.007***	0.212	0.388*	0.628***	0.470*	-0.520**	0.244
9	Big	Low	Low	Low	-0.008***	0.012	-0.296	-0.407**	-0.491**	0.293*	0.217
10	Big	Low	Low	High	-0.015***	-0.262	-1.137***	-1.013***	-0.171	-1.058***	0.369
11	Big	Low	High	Low	-0.006*	0.120	-0.758***	-0.752***	0.943***	0.393	0.343
12	Big	Low	High	High	-0.007***	0.117	-0.159	-0.097	0.231	0.049	0.097
13	Big	High	Low	Low	-0.005	0.221	-0.701**	1.092***	-1.023***	0.978***	0.45
14	Big	High	Low	High	-0.010***	-0.207	-0.785***	-0.024	-0.415*	-0.176	0.315
15	Big	High	High	Low	-0.011***	0.229	-0.333*	0.302	0.17	0.029	0.124
16	Big	High	High	High	-0.007***	-0.023	-0.524***	0.162	0.394**	-0.510***	0.254

*** p<0.01, ** p<0.05, * p<0.1

Table 8: Liquidity Augmented FF Results: Zero return measure (SA)

Portfolio	Size	Illiquidity	Profitability	Investment	a	b	s	q	r	c	R -squared
1	Small	Low	Low	Low	-0.007***	-0.052	0.637***	-0.263**	-0.722***	0.816***	0.472
2	Small	Low	Low	High	-0.002	0.321*	1.236***	-0.633***	-1.722***	-0.695**	0.510
3	Small	Low	High	Low	-0.004*	0.094	0.717***	-1.181***	1.312***	0.690**	0.581
4	Small	Low	High	High	-0.007***	0.185	0.340*	-0.414**	0.766***	-0.455*	0.318
5	Small	High	Low	Low	-0.005***	0.066	0.262*	0.175	-0.398**	0.062	0.116
6	Small	High	Low	High	-0.003*	0.059	1.427***	1.345***	-0.693***	-0.109	0.622
7	Small	High	High	Low	-0.009***	-0.178	2.066***	1.374***	0.077	0.933***	0.715
8	Small	High	High	High	-0.005***	0.028	0.194	0.498***	0.420**	-0.698***	0.369
9	Big	Low	Low	Low	-0.005***	0.107	0.064	-0.248	-0.588***	0.860***	0.286
10	Big	Low	Low	High	-0.007***	-0.173	-0.239	-0.268	-0.051	-1.050***	0.227
11	Big	Low	High	Low	-0.005***	0.043	0.012	-0.058	-0.015	0.436***	0.187
12	Big	Low	High	High	-0.005***	-0.002	0.112**	-0.034	0.061	-0.059	0.162
13	Big	High	Low	Low	-0.006***	0.186	-0.311*	0.483***	-0.599***	0.891***	0.433
14	Big	High	Low	High	-0.007***	0.009	-0.197	0.310**	-0.187	-0.230	0.107
15	Big	High	High	Low	-0.002	0.258	-0.568**	0.619***	-0.027	-0.143	0.239
16	Big	High	High	High	-0.005***	0.096	0.005	0.097	0.447***	-0.161	0.176

*** p<0.01, ** p<0.05, * p<0.1

CHAPTER FIVE

CONCLUSION

This study set out to investigate whether liquidity is a priced variable in explaining the return process of equities. The study approaches this task by augmenting a Fama and French (2015) 5-factor model using a liquidity variable, IML. Mimicking portfolios procedure is used in order to construct sixteen portfolios based on four factors used in the model being; size, illiquidity, profitability and investment. The monthly excess returns of the portfolios serve as the dependent variables and are regressed on five factors to assess the explanatory power of the liquidity augmented 5-factor model in both the Nigerian and South African stock markets for a period spanning 2013-2018.

The results from the analysis showed that an illiquidity premium is indeed priced in both the Nigerian and South African stock markets with the illiquidity premium in Nigeria being 2.15% whereas that in South Africa is about 0.136% per year. This implies that greater liquidity concerns are witnessed in the Nigerian market as compared to the South African market. This is expected as South Africa is the largest and arguably the most liquid market in Africa. The findings of a significant illiquidity premium are consistent with findings by Amihud et.al (2015) and Ochenge and Murui (2017).

The Jensen`s alphas obtained from the regression analysis were statistically significant thus signifying the need to relook into factors that could better explain the return process of stocks traded on the Nigerian and South African stock exchanges, possibly a task for future research. Moreover, the results showed that systematic risk as measured by beta is a statistically insignificant variable in modelling returns, quite an unexpected result. Nonetheless, results from the OLS regressions show that size, liquidity, profitability and investment are generally statistically significant in modelling asset returns, validating the choice of factors.

The coefficient on the liquidity factor proved to be strongly significant in explaining asset returns thus affirming the hypothesis made at the onset of this research. The fact that liquidity risk is indeed priced into asset returns means that regulators and the respective exchanges need to implement policies that aim to spur liquidity in the market. Specifically, the Nigerian stock exchange needs to ensure that the illiquidity premium of 2.15% is reduced as it puts the market at a competitive disadvantage when compared to South Africa. This is because a high illiquidity premium makes the market less attractive as the cost of capital for firms tends to be high.

Possible policy measures include increasing free float requirements for publicly listed firms as well as those that intend to list, reducing transaction costs on trades and also improving the efficiency of trading systems to ensure trades are executed with immediacy. This study, however, does not explore the specific impact of these policies on improving liquidy, an arrear that could possibly be explored in further research.

APPENDICES

Appendix 1: Computing the factors

Factor	Computation
SMB	*[(LM/HL/HP/HI + LM/HL/HP/LI + LM/HL/LP/HI + LM/HL/LP/LI + LM/LL/HP/HI + LM/LL/HP/LI + LM/LL/LP/HI + LM/LL/LP/LI)/8 - (HM/HL/HP/HI + HM/HL/HP/LI + HM/HL/LP/HI + HM/HL/LP/LI + HM/LL/HP/HI + HM/LL/HP/LI + HM/LL/LP/HI + HM/LL/LP/LI) / 8]*
IML	*[(HM/LL/HP/HI+ HM/LL/HP/LI + HM/LL/LP/HI + HM/LL/LP/LI + LM/LL/HP/HI + LM/LL/HP/LI + LM/LL/LP/HI + LM/LL/LP/LI)/8 - (LM/HL/HP/HI + LM/HL/HP/LI + HM/HL/LP/HI + HM/HL/HP/LI + LM/HL/LP/HI + HM/HL/LP/LI + LM/HL/LP/LI + HM/HL/HP/LI) / 8]*
RMW	*[(LM/HL/HP/HI + LM/HL/HP/LI + HM/HL/HP/HI + HM/HL/HP/LI + LM/LL/HP/HI + LM/LL/HP/LI + HM/LL/HP/HI + HM/LL/HP/LI)/8) - (LM/HL/LP/HI + LM/HL/LP/LI + HM/HL/LP/LI + HM/HL/LP/HI + LM/LL/LP/HI + LM/LL/LP/LI + HM/LL/LP/HI + HM/LL/LP/LI) / 8]*
CMA	*[(HM/HL/HP/LI+ LM/HL/HP/LI + HM/HL/LP/LI + LM/HL/LP/LI + HM/LL/HP/LI + LM/LL/HP/LI + HM/LL/LP/LI + LM/LL/LP/LI)/8 - (LM/HL/HP/HI + LM/HL/LP/HI + HM/HL/HP/HI + LM/LL/HP/HI + LM/LL/LP/HI + HM/HL/LP/HI + HM/LL/HP/HI + HM/LL/LP/HI) / 8]*

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