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Liquidity and Return in Frontier Equity Markets

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ABSTRACT

The extent to which the liquidity has an impact on stock return continues to be an eagerly researched topic. The effect on liquidity on the return of stocks has been a greatly debated subject on the capital market theory. The thesis looks at the impact of liquidity on the stock indices return of eight frontier markets. The paper uses two methods to estimate the regression namely, unbalanced dynamic panel Generalised Method of Moments and Fixed Effect Model. An analysis on factors affecting liquidity was done and turnover ratio, Amivest ratio and Amihud ratio were used as a measure for liquidity. The correlation between stock return and the liquidity measure was mixed; with turnover ratio having a negative correlation. Amivest ratio has positive relationship consistent with the risk premium and was found to be significant. However, the correlation on the Amihud ratio was not consistent with the liquidity premium as it was found to be positive. Although negatively correlated to return, the turnover ratio was found to be insignificant.

Keywords: Dynamic panel data model; GMM estimation; Fixed effect model; Amivest ratio; Amihud ratio

DECLARATION

I, Mushaathama Motepe declare that this research report is my own work except as indicated in the references and acknowledgements. It is submitted in partial fulfilment of the requirements for the degree of Master of Management in Finance and Investment at the University of the Witwatersrand, Johannesburg.

It has not been submitted before for any degree or examination in this or any other university.

Mushaathama Motepe

Signed at ……Sandton… On the …20… day of …June… 2017

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1. INTRODUCTION

1.1. BACKGROUND

Research revealed that liquidity plays a significant role in asset pricing and ensuring that markets are efficient (Goyenko, Holden, & Trzcinka, 2008). One of the accepted definitions of liquidity refers to the ease with which one can buy and sell stocks. However, according to Baker (1996), “there is no single unambiguous, theoretically correct or universally accepted definition of liquidity”. There are five characteristics of a liquid markets: tightness, immediacy, depth, breadth, and resiliency. Tightness has to do with transaction costs (order processing costs, taxes associated with trades and implicit execution costs). Sarr and Lybek (2002) state that when examining liquidity, one must consider transaction cost, timely settlement and ease of selling the stock. A stock is therefore considered liquid if the transaction cost is low. Immediacy relates to execution of the trade considering not only the speed of the trade but also how efficiently the trades are done, cleared and settled. Depth relates to how well the market endures large trades without it having a large impact on the price of the stock. In contrast, breadth indicates the quantity and volume of trades and their impact on prices. Resiliency refers to how quickly the market can correct after a temporary incorrect price. Liquidity exists if resiliency is high.

Over the past few decades, the desire to develop stock markets in frontier countries has increased remarkably. With the development of the stock markets in frontier countries, the potential issue is the accuracy stock prices. Are the markets efficient, that is, is the stock price fully reflective of all publicly available information? Yartey and Adjasi (2007) analysed stock markets in Africa and found that although there is growth with about 19 stock markets in 2007, they still present an issue of liquidity. Most of the equity markets in Africa are small and illiquid. That is, the number of stocks (or company listing) that are traded in the exchanges is few and the frequency of trades done is minimal in these exchanges compared to the developed countries.

Sarr and Lybek (2002) identified several factors potentially affecting the liquidity of assets and markets, drawing from macrostructure and the microstructure. All the listed factors have an impact on the transaction cost that forms part of liquidity.

For the macrostructure, Sarr and Lybek (2002) consider three elements, the first being vulnerability which relates to internal and external vulnerabilities. Internal vulnerability includes fiscal imbalances and public debt policies while the external vulnerabilities are the current account imbalances and capital controls. According to the findings of Choi and Cook (2006) in a study of Japan's deflationary period, the second macrostructure element that can impact the market liquidity is monetary policy. The structure of the legislation that talks to bankruptcy and cross-border transactions is considered as the third element.

Microstructure elements are product designs which have an impact on the unit of liquidity. When assets are held for a long period of time owing to client preferences or the design of the asset, this reduces the frequency of trades and therefore negatively affects the liquidity of the asset. Market participants is another microstructure reflecting the types of issuers, policies of issuing, types of participants/buyers, their heterogeneity, and prudential regulation affecting behaviour. A study by Iskandrani and Haddad (2012) documents that the type of trading used in a market significantly influences liquidity. With an electronic trading system (the third microstructure factor), the volume of trades tends to increase, increasing liquidity as well. This relates to deals with the market structure (which refers to periodic trading, dealer markets, electronic trading), trading system (the appropriate licensing to the dealers and brokers, any capital requirements) and trading rules (limit orders, short selling, tick size). The increase in liquidity resulted in 60% abnormal return and this was due to the price correction caused by the increase in number of trades.

At the microstructure level, clearing and settlement of transactions also have an impact on liquidity. If the exchange has proper systems which allow for settlement at a low cost, this will reduce the liquidity premium when pricing the asset. Any risk or cost implication of the payment system and clearing and settlement of financial instruments (risk, cost and convenience) are considered.

Another factor that has an impact on the liquidity of stocks and the stock market is the regulatory and accounting framework. This has to do with the type of regulation governing the exchange. Moreover, the accounting treatment of stocks will have an impact on how attractive the purchase of stocks is for investors. If not favourable to the investor, the frequency of trades will be low and therefore result in a high liquidity premium. The valuation of the stocks (is it historical cost or fair value accounting), the tax treatment of the assets (is withholding tax and capital gains tax applicable) will also have an impact.

The bid-ask spread, which is an important aspect of transaction cost, is considered to be one way of measuring liquidity. Volume, which can be associated with the breadth, is also considered when looking at the bid-ask spread. If the spread is high, this implies that the volumes are low and the stock is therefore not very liquid. Low market movement or trading due to high transaction cost has an impact on the breadth and resiliency (Sarr & Lybek, 2002). In addition, Amihud and Mendelson (1986a) found that there is significant relationship between the bid-ask spread and the risk adjusted stock return. According to Banz (1981), there is a negative relationship between the size of the firm and the spread. Therefore, when the size of the firm is small, it is important to test the significance of the firm size on the return of the stock (Banz, 1981; Reinganum, 1981). Harris (1990) introduced immediacy to the three dimensions (tightness, resiliency and depth) proposed by Kyle (1985). When determining if liquidity is present in the market, it is better to examine it by looking at a period with no information changes. That is, periods when the price of the stock should be “stable” (Bernstein, 1987). The identification of whether the movement in the market prices is due to new information or not can be difficult. Hasbrouck and Schwartz (1988) state that the market efficiency should be differentiated between the short-term and long-term changes.

There are approximately 68 measures used in the literature to calculate liquidity. This indicates a lack of agreement on the best method (Aitken & Winn, 1997). The bid-ask spread, although widely used as a measure of liquidity, has some shortcomings; it is unable to explain the costs sustained by transactions larger than

that presented by the best quotes (Rouetbi & Mamoghli, 2014). Anand and Martell (2001) argue that for large trades entered into by institutions the bid ask spread would not be an appropriate measure. Another shortcoming is that it does not take into account the market maker's reaction to new information. Information asymmetric theory states that large transactions are correlated with high price fluctuations. Easley and O'hara (1987) mention that informed traders will quickly trade on private information and uninformed traders and market makers will view large transactions as evidence that there is new information that is about to come out. This agrees with French and Roll (1986), who contend that large transactions are associated with large price movements. However, there are normally significant changes in the market when volume transactions are done and it is critical to identify the impact of the large transactions on the price change. In a liquid market, volume transactions should have minimal impact on the price and if the market is not liquid or it is thin, then prices are correlated to large size transactions (Gabrielsen, Marzo, & Zagaglia, 2011). According to Blume, Easley and O'hara (1994), the size of trades done is correlated with the quality and quantity of information.

Investors need to be compensated for illiquidity due to the higher transaction cost that is associated with it. Therefore, it is expected that an illiquid asset should offer a higher rate of return. Amihud and Mendelson (1986b) mention that investors with assets which have a longer holding period tend to require higher spreads which results in the net return increasing with the holding period. Information, as already mentioned above, also pays an important role in asset pricing; information can be seen in the frequency of transactions. Considering the low frequency of trades in frontier markets, it is important to consider liquidity. This thesis explores a potential illiquidity measure that can be used in determining the illiquidity premium that is present in the frontier stock market.

1.2. PROBLEM STATEMENT

It has been found that the return of the stock is inversely proportional to its liquidity (Amihud & Mendelson, 1986b). The reason for this is that investors require to be compensated for the lack of liquidity or difficulty in transacting the stock, therefore resulting in a higher required return. Since many stock markets in frontier countries have a problem of low trading, this leads to the question of whether the stocks are priced correctly (reflective of the available information) and the lack of proper systems also adds on extra cost to each trade (Yartey & Adjasi, 2007). The aim of this thesis is to determine if illiquidity of the stock is priced in the stock prices of frontier stock markets. Once that is determined, the thesis will show the relationship between return and liquidity in frontier stock markets. The research questions below will be answered in order to meet the aim of this thesis.

1.3. OBJECTIVES

Liquidity can be measured using many different methods. The study will determine the most applicable method to measure liquidity in the frontier stock market. With the presence of liquidity in frontier stock markets the paper seeks to

a. To establish if liquidity is priced in the frontier stock markets.
b. Determine the relationship between liquidity and stock return given other explanatory variables.

1.4. RESEARCH QUESTIONS

The below questions will be addressed in this research paper.

a. Is liquidity priced in frontier stock markets?
b. What is the relationship between liquidity and the stock return in the frontier stock market?

1.5. SIGNIFICANCE OF THE STUDY

African stock markets are considered to be immature (due to lack of regulation, system issues, etc.) compared to their counterparts in more developed countries. However, with each development of the stock market, African companies have seen an increase in their growth due to increased financing. The low liquidity places an issue for investors in terms of the return offered for the assets. Pástor and Stambaugh (2003) indicate that investor would need an additional return for holding assets which are illiquid. This study investigates if liquidity is priced, that African stock market offers the investor a premium for the illiquidity of the market if present. Assefa and Mollick (2014) did a similar research on African stock markets but used turnover, volume traded as the liquidity measures. In this paper, we will also consider annual data but the liquidity measures will be turnover ratio, Amivest and Amihud and the thesis will look at frontier markets.

2. RELATED LITERATURE

Fama and French (1993) first included liquidity as a variable of determining asset prices in the three-factor model. Pástor and Stambaugh (2003) allude that investors would need an additional return for holding illiquid assets. Most papers have found that the risk of illiquidity is priced into the return of the stock, therefore resulting in a liquidity risk premium (Acharya & Pedersen, 2005; Sadka, 2006). However, this is not always the case. Piqueira's (2005) study found that there was no liquidity risk premium.

If there is no noise in the market or volatility, informed traders would not be willing to enter into a transaction of exchanging securities (Milgrom & Stokey, 1982). However, the only way for liquidity to be in the market, there has to be an increase in trading activity. Otherwise, the prices of the securities will be stale. In order to avoid this, uninformed traders are required (Black, 1986). These traders will trade in the absence of any change in the market or presence of market changing information as if there was material information. People who trade on private information can make illiquidity cost to increase for those uninformed investors. Consequently, this will make the rate of return to be higher for stocks that are illiquid after adjusting for the Fama and French risk factors (Brennan & Subrahmanyam, 1996).

Fama (1970) states that if the price of the stock incorporates all available information, it means that successive prices are independent. A study done found the presence of random walk on the South African All Share Index and found that the other African markets (Botswana, Egypt, Kenya, Mauritius, Nigeria and Zimbabwe) that were tested where found to not exhibit the random walk using the multiple variance ratio tests (Smith, Jefferis, & Ryoo, 2002). A subsequent paper found that Egypt, Morocco and Nigeria demonstrated weak form efficiency using the GARCH approach (Jefferis & Smith, 2005). From Jefferis and Smith (2005) paper, it is found that the size, technology advances, free access for foreign trades will improve the efficiency (frequency of trades, symmetry of information etc.) of the market. A similar study is done on the same countries and the presence of random walk is not found using a battery of tests (Alagidede & Panagiotidis, 2009).

The rejection of the presence of random walk does not mean that the market is not efficient as efficiency is a joint hypothesis of independency and identical distribution. In the study, no evidence was found to reject weak form efficiency (Alagidede & Panagiotidis, 2009). African stock returns are non-linearly. However, weak form efficiency cannot be rejected looking at the North African markets (Alagidede, 2007). African data is found to have leptokurtosis, volatility clustering and leverage effect. Moreover, when using fractional integration techniques, it was found that some African markets present evidence of long memory showing less than perfect arbitrage (Alagidede, 2011).

There are different measures of liquidity which have been researched in the past. Trading volume, being one of them, refers to the number of assets that were traded at a certain point in time. The pitfall with this type of measurement is that the volume traded can be double counted. In order to avoid this problem, Datar, Naik, and Radcliffe (1998) use the ratio between trading volume and market capitalisation. It was found that the following elements can used to determine liquidity; trading volume, number of stocks traded, the size of the firm, bid and ask-spread (Demsetz, 1968). Another form of measurement is the conventional liquidity ratio. This ratio looks at the quantity of traded volume which can bring a price change of one percent. If the ratio is large, this represents a liquid asset showing that the large trades have a little impact on the change of the asset price. The shortcoming of this type of measurement is that it only considers volume and price but does not consider transaction costs and the issue time for the trade to happen. Demsetz (1968) found that an increase in trading activity resulted in the decline in the cost of transaction when looking at the New York Stock Exchange (NYSE). An increase in liquidity results in an increase in cost due to the strengthening of corporate governance (Bhide, 1993). Tinic (1972) also states that as liquidity increases, so do the costs (brokerage commissions, transfer taxes etc.). However, it was found that the rise was lower for stock exchanges which would have continuous and heavy traffic of trading activities. Martin (1975) considered an index that associates volume traded to the prices. Nevertheless, it does not look at whether the asset is liquid but whether the market is liquid. A high ratio shows that the price distribution relative to the

traded volume is high and therefore the market is considered illiquid and better calculated on a daily basis.

Datar et al. (1998) describe the turnover rate as the number of times the outstanding volume of assets changes hands. The trading volume can be volatile and this must be considered when calculating so that the volatility can be smoothed. In order to do this, Hui and Heubel (1984) introduced the Hui Heubel Liquidity Ratio (L_{HH}) which considers the liquidity of an asset and not that of the market. The lower the L_{HH} ratio, the more liquid are the assets. In order to compute market liquidity using this ratio, one must apply appropriate aggregation techniques. Since it calculates using the volume of trades over five days, the index has the shortcoming of being unable to detect any anomalies because asset prices can correct rapidly to liquidity problems. The other problem with this index is the variables that are used to calculate the ratio because high quality prices might not be available and using the bid ask-spread might not accurately reflect the volatility in the market as the spread normally remains quite stable. Roll (1984) came up with a measure of effective bid ask spread based on serial covariance of daily price changes.

Amihud (2002) came up with another liquidity measure that concentrates on the traded volume called the illiquidity index. It is similar to the liquidity ratio; one of the advantages is that information for its calculation is readily available. It considers the impact of the conditions in the market on the return of the asset. The result found by Amihud (2002) is that the illiquidity measure is statistically significant for NYSE stocks between 1964 and 1997. The two advantages of this measure of liquidity are that computation of the impact on price is easy as it takes the absolute value of the daily returns-to-volume ratio. In addition, there is a strong correlation to the asset return. The illiquidity is denoted as ILLIQ and it looks at how many trades it takes to cause a one unit change in the price. Pástor and Stambaugh (2003) considered the impact that order flows have on the brief change in prices and through that came up with a Gamma measure of liquidity using regression. The paper looks at whether the liquidity is included in the price of an asset. The Amivest liquidity ratio is computed by taking the volume of the asset for a given month and dividing that by the

percentage of change to the stock's price in the same month (Amihud, Mendelson, & Lauterbach, 1997; Amihud, 2002) . It is also considered as the volume of trading associated with a 1% change in the price of a security.

Another method used to measure liquidity is the zero return method (Lesmond, Ogden & Trzcinka, 1999a). The zero return looks at days where there were zero returns in order to determine the presence of liquidity. Zero return refers to when informed trader will not enter into a trade as they do not see the benefit of the trades because the cost (being the transaction cost) is greater than the benefit (return). Therefore, a security can result in many zero returns which means less price movement if at the point of trading it is found that the transaction cost is higher than the value of the information. A security would still have a zero return (due to high transaction cost) even if it had positive volume days because they would have no information. An alternative zero return measure was used which only considers trading days with zero returns if they also had a positive volume at the same time (Lesmond et al., 1999a).

Liu (2006) investigates the presence of excess return by considering liquidity in the CAPM and Fama French three-factor model. Liquidity is then measured by looking at the speed at which trades settle and two factors are considered, namely, zero daily trades and turnover. The two factors take into account the cross-section of stock returns which the other two methods do not consider. The illiquid stock carried a liquidity premium. This resulted in a greater excess return compared to using CAPM and Fama French three-factor model (Liu, 2006).

A different method has also been used to measure liquidity in emerging markets which was the transformation of the zero daily firm return which was averaged over a month. This measure was found to be positively correlated to the bid-ask spread and negatively correlated with the equity market turnover (Bekaert, Harvey, & Lundblad, 2007). Lesmond, Ogden and Trzcinka (1999b) indicate that if the transaction cost is

greater than the information signal value, then investors will not trade, thereby resulting in a return of zero.

Most papers looked at liquidity by considering a single stock and not the aggregate market liquidity (Chordia, Roll, & Subrahmanyam, 2001). These papers found that liquidity and trading activity are influenced by many factors. It has been stated that a cross-section looks at the impact of stock returns and interest rate on the liquidity would be of interest to find out. Another paper also looked at the relationship between asset pricing and aggregate liquidity (measured using transaction cost such as spread and turnover); instead of cross-sectional, it looked at it on a time series bases and found that “high turnover ratio predicts low stock returns” (Jones, 2002). This paper will consider both a cross-sectional view as well as time series similar to (Assefa & Mollick, 2014).

Return of equity stock in emerging markets was found to be positively correlated to market liquidity using both cross-sectional and time series analysis. The liquidity was measured using turnover ratio, trading value and turnover-volatility multiple (Jun, Marathe, & Shawky, 2003). It is stated that during portfolio allocation strategy, financial participants must factor in liquidity (Jun et al., 2003).

Considering the African market, Allen, Otchere and Senbet (2011) indicate that the African markets are considered illiquid and with this problem, the markets still managed to perform well with an annual return of 25% during the period 1999 to 2008. Jun et al. (2003) found that there was a positive correlation between liquidity and return measured using the turnover ratio. This investigation was done on 27 emerging markets. Assefa and Mollick (2014) concluded from their research that there is a positive relationship between return and illiquidity in African markets. The positive correlation was also found in the temporal variation of liquidity proxies and return; and inverse relationship with volatility (Huberman & Halka, 2001).

The best asset pricing model, according to Hong and Stein (2007), should have trading volume. This indicates that high trading volume is positively related with high stock prices. A study by Gervais, Kaniel and Mingelgrin (2001) also indicates that trading volume and returns are positively correlated. A size- and liquidity-augmented capital asset pricing model (CAPM) should be used for emerging market pricing tests (Hearn, Piesse, & Strange, 2010; Hearn & Piesse, 2010). Hearn et al. (2010) found that the premium accredited to the size and illiquidity factors were significant in the asset pricing of return. Jun et al. (2003) found that there was a positive relationship between the stock return in an emerging market and aggregated market liquidity using the turnover ratio. From the literature, one can see that the relationship between liquidity and return does exist. However, the paper will concentrate on frontier equity markets.

Frontiers market can be identified by looking at the specific countries GDP per capita and market capitalization of the stock. Frontier markets are starting to attract the attention of international investors in developed markets (De Groot, Pang, & Swinkels, 2012).The stock return offered by frontier markets is better than developed markets. Most stocks in developed and emerging markets are subjected to variation due to the strong connection with the international market. Most stocks in the frontier markets have lower correlation with international market. Therefore, stocks are best for portfolio diversification (Minović & Živković, 2010). The markets are illiquid hence the importance of investing and measuring the liquidity in the frontier market. The low liquidity of the frontier market hinders the level of investment by institutional investors (Minović & Živković, 2010). Marshall, Nguyen and Visaltanachoti (2013) investigated liquidity proxies which best measure the actual cost of trading in frontier markets. The transaction cost benchmark can be derived from the quoted spread, effective spread and price impact. The proxies under investigation are Gibbs, Amihud, and FHT.

The investigation methodology used involves using correlation analysis and root mean square errors which measure the level at which liquidity proxies represents the liquidity benchmark. Different individuals use the results of the research. The

correlation results will be best useful to asset pricing researchers who are interested in knowing the impact of liquidity on stock return, and the root mean square errors will be of great interest to researchers who are looking for reputable proxy in market efficiency (Goyenko, Holden, & Trzcinka, 2009).

Gibbs and Amihud were found to have the greatest correlations with the liquidity benchmarks. Gibbs and Amihud proxy are best suited for researchers who are interested in movements in liquidity of frontier markets, and FHT proxy was found to be closest to the spread benchmarks in size (De Groot et al., 2012). The Amihud will be used in this thesis.

De Groot et al. (2012) investigate the return of individual stock in the frontier market instead of using the frontier market as a whole. The results from the analyses of the stock are evaluated based on investment strategies employed by portfolio managers while trading stocks from frontier market. The results show that portfolios in frontier market based on value and momentum have between 5% and 15% excess return per annum. Investors who seek value and momentum effect on stock in the frontier market need to also consider the transaction cost involved in the trades because of the illiquidity of the market.

Lesmond (2005) states that due to a lack of trades or low frequency of trades, the Amihud and Mendelson (1986b) measure of liquidity cannot be applied in frontier stock markets. Minović and Živković (2010) investigated the impact of illiquidity and liquidity risk on expected asset return in frontier markets in the case of Serbian market. The hypothesis was tested using Liquidity-adjusted capital asset pricing model (LCAMP) developed by Acharya and Pedersen, (2005). However, the normal CAMP does not suit frontier markets because it is more suitable for liquid markets and does not address some characteristic experienced by frontier markets. Acharya and Pedersen (2005) developed an adjusted CAMP called LCAMP. The selection of an appropriate liquidity model is important as it will provide better estimation of the market efficiency (Lesmond, 2005). The paper later concludes that illiquidity is an important factor in driving expected returns in the Serbian market/frontier market.

From all of the liquidity indices, the common pitfalls are that it is difficult to differentiate between temporary illiquidity and persistent illiquidity which develop because of the introduction of information. In addition, liquidity indices do not consider the impact on the asset price of an unexpected order (Gabrielsen et al., 2011). Marsh and Rock (1986) mention that indices exaggerate the impact of prices changes to large volumes of trades. Even with the above-mentioned shortcomings volume based liquidity is still a useful measuring tool for liquidity. Amihud, Hameed, Kang, and Zhang (2015) concluded that illiquidity return premium is present (significant) and positive.

In determining whether there is liquidity in frontier markets, the thesis will consider whether investors are compensated for illiquidity in the market or not. The premium on the returns of illiquid asset is generally considered as premium that compensates the investors for the transaction cost and/or price impact. Amihud and Mendelson (2015) introduced the IML factor in determining illiquidity premium. Chan and Faff (2005) added the liquidity variable on the three-factor model of Fama and French (1993) considering portfolios and not individual stocks.

Hearn and Piesse (2015) include firm size and liquidity on the three factor pricing model in determining the asset price in African stock markets. In determining the significant measure of liquidity, Hearn and Piesse (2015) found that three liquidity measures could be used for the study. Their study uses two liquidity measures, namely, (Liu, 2006), turnover which is also the relative volume traded scaled by the number of trading days in the month of measurement, and Amihud (2002) which is the price impact measure.

3. METHODOLOGY

3.1. INTRODUCTION

This section explains the methodology used in order to answer the research questions. The study adopted a quantitative research paper.

3.2. POPULATION AND SAMPLING

The population is based on frontier markets as defined by MSCI database. The eight (8) countries selected are in different continents, namely, America (Argentina), Europe (Croatia, Estonia, Slovenia), Middle East (Jordan, Lebanon) and Asia (Pakistan). A short summary of each country is available in the appendix.

Table 1

Country	Founded	Market capitalization				Number of Listed domestic companies		Turnover ratio (%)	
		$ millions		% of GDP					
		2000	2015	2000	2015	2000	2015	2000	2015
Argentina	1854	45 839.3	56 134.6	16.1	9.6	122	93	19.95	4.81
Croatia	1991	2 744.6	-	12.6	-	63	186	6.89	-
Estonia	1996	-	-	-		20	-	-	-
Jordan	1999	-	25 452.4	-	67.8	163	228	-	13.97
Lebanon	1920	1 554.3	-	9.0	-	12	10	7.49	-
Pakistan	1947	6 624.6	-	9.0	-	723	-	467.95	-
Slovenia	1989	3 099.7	6 035.0	15.2	14.1	239	294	20.61	6.04
Sri Lanka	1985	1 074.1	20 804.1	6.6	25.3	149	46	12.44	8.62

Sourced: www.bloomberg.com (year founded) and www.worldbank.org (market capitalisation and number of listed companies)

3.3. DATA COLLECTION

The data will be collected over a period of 13 years (2000-2015) from Bloomberg, MSCI website, World Bank (www.worldbank.org) and International Financial Statistics (IFS) of the International Monetary Fund (IMF). Although annual data can affect the measurement of liquidity as prices tend to adjust with time resulting in the appearance of liquidity, owing to the lack of consistent data in the frontier markets we can only apply annual data (Assefa & Mollick, 2014). The stock market indexes for each country will be used as it will be representative of the main stocks in that exchange, the closing value of the stocks will be applied when calculating the log return. The explanatory variables were decided on using theoretical information. The independent variables were decided on by using the five-factor model which is found to be consistent with the APT literature (Bilson, Brailsford, & Hooper, 2001; Cho, Eun, & Senbet, 1986; Trzcinka, 1986). Macroeconomic factors are considered as weak variables in determining stock market returns. Researchers have found that macroeconomic variables can be used as independent variables to determine stock returns (Burmeister & Wall, 1986; Diacogiamnis, Tsiritakis, & Manolas, 2001; Muradoglu, Taskin, & Bigan, 2000; Ross, 1976). The APT literature states that the macroeconomic variables can be used as a proxy for pervasive risk factors.

Since the frontier markets might not be that well-integrated into the world markets, using global factors only to determine the return can make the results to appear as though they are insignificant. With the five-factor model, it will consist of one (1) global risk factor (which would be the return on the MSCI country market index (Assefa & Mollick, 2014; Bilson et al., 2001). The other four factors will be based local factors proxied by macroeconomic variables (exchange rate, inflation, economic growth, trade openness etc.).

The return will be calculated based on the below equation:

$$R_{it} = \alpha_i + \beta_i MSCI_{it} + \delta_i GPD_{it} + \emptyset_{it} CPI_{it} + \gamma_i L_{it} + \lambda_i REER_{it} + \lambda_i XM_{it} \ \varepsilon_{it}$$

where:

R_{it} : is the return of the *i*'th country at time *t*,

$MSCI_{it}$: is the returns of the MSCI frontier market index of the country *i* at time *t*

GDP_{it}: is the percentage change in GDP of the country *i* at time *t*

CPI_{it}: is the inflation rate measurement of the country *i* at time *t*

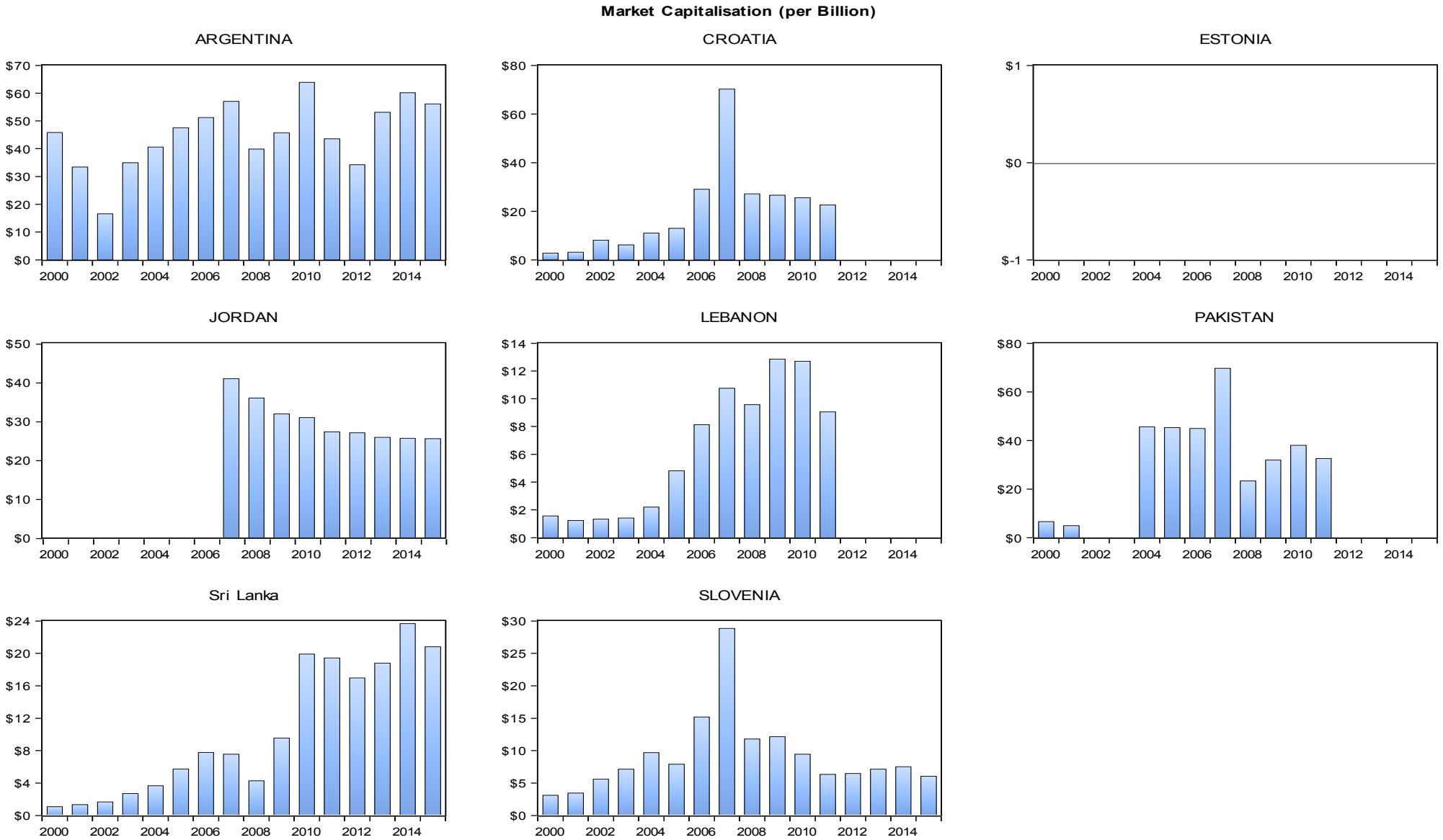
L_{it}: is the liquidity measure of the country *i* at time *t*

REER_{it}: is the real effective exchange rate of the country *i* at time *t*

XM_{it}: is the measure of trade openness (export less imports divided by the GDP) of the country *i* at time *t*

ε_{it}: is the idiosyncratic error term of *i* at time *t*

Figure 1


Market Capitalisation (per Billion)
ARGENTINA
$70
$60
$50
$40
$30
$20
$10
$0
2000
2002
2004
2006
2008
2010
2012
2014
CROATIA
$80
$60
$40
$20
$0
ESTONIA
$1
$0
$-1
JORDAN
$50
$40
$30
$20
$10
$0
LEBANON
$14
$12
$10
$8
$6
$4
$2
$0
PAKISTAN
$80
$60
$40
$20
$0
Sri Lanka
$24
$20
$16
$12
$8
$4
$0
SLOVENIA
$30
$25
$20
$15
$10
$5
$0

The macroeconomic factors are GDP growth rates that measure the growth of the economy, that is, it indicates whether the economy is healthy or not. The other variables to be used are consumer price index (CPI) which will be used as a proxy for inflation. The MSCI frontier market index can be used to determine the strength of the global integration of the markets (Bilson, et al., 2001). MSCI world index is a measure of the global equity market. However, since we are dealing with frontier markets, just including the MSCI world index would not be sufficient (Harvey, 1995). Trade openness is determined by considering the sum of exports and imports to the GDP of the country (Rajan & Zingales, 2003). It was found that the greater the level of de facto trade openness, the greater the degree of information efficiency in emerging markets (Lim & Kim, 2011). Basu and Morey (2005) found that the stock returns show a zero serial correlation when a country opens itself on the trade front and a non-zero serial correlation when the country had closed trade.

$$Trade\ Openness = \frac{Exports + Imports}{GDP}$$

The exchange rate was determined using real effective exchange rate (REER). It is used to determine the individual country's value relative to the other major currencies in the index and it is adjusted for inflation. Furthermore, REER used is calculated against 172 trading partners. The inverse relationship that is present between REER and trade openness shows us whether a country is competitive in their exports or not (Assefa & Mollick, 2014). The trade openness will be measured by taking the sum of exports and imports and dividing it by the GDP amount (Lim & Kim, 2011).

Although the bid-ask spread is the most used method to calculate liquidity, we cannot use this method due to the absence of data. There are different measures of liquidity and a different method can be used depending on the stock and the market it is in (Acharya & Pedersen, 2005; Chordia, Subrahmanyam, & Anshuman, 2001; Hasbrouck & Seppi, 2001; Huberman & Halka, 2001). To determine our liquidity, we will use three different methods.

a. Turnover: it has been greatly used as a measure of liquidity (Dahlquist & Robertsson, 2001; Rouwenhorst, 1999). The expected annual stock return was found to have an inverse relationship with previous year's turnover (Jones, 2002). In addition, Jones (2002) also found that the turnover ratio is found to be superior to dividend yield which is a traditional predictor variable of liquidity. However, this measurement just like all other proxies can include variables which are unrelated to liquidity.

$$Turnover_t = \frac{Stocks\ traded_t}{Market\ capitalisation_t}$$

b. Amihud and Amivest: they are considered more as proxies for (low frequency) price impact; they have been used as a measure of illiquidity although they do not have full theoretical standing (Amihud, 2002). These two proxies including the Gibbs proxy for liquidity were found to show the largest correlation with liquidity when considering frontier markets (Marshall et al., 2013). If the market capitalisation is high then the Amihud ratio will be low and the Amivest ratio will the high.

$$Amihud = \frac{|r_t|}{volume_t}$$

$$Amivest = \frac{volume_t}{|r_t|}$$

Transformation of the two variables above will be done in order to bring all the variables into the same scale and also to remove the skewness to the right of the variables (Emerson & Stoto, 1983; Emerson, 1983; Tukey, 1960). For Amivest, a log of the value will be done and for Amihud the values were multipled by a million in order to bring them to scale.

3.4. STATISTICAL METHOD

For this thesis, the trade-based method has been used as it is difficult to obtain data for the order-based method. Therefore, liquidity measurements as mentioned by (Amihud & Mendelson, 1986b) will not be applicable in the analysis of frontier stock markets. The choice of the method is important as there is no correlation between the two categories (Aitken & Comerton-Forde, 2003). Owing to the nature of the dataset (considering both time series and cross sectional data), the panel data technique will be used to estimate the regression model over the 13 years. It is a statistical method that is used widely in econometrics when this type of data needs to be collected. This will be similar to how Assefa and Mollick, (2014) analysed their data when looking at liquidity in African stock markets.

In the linear model, some of the observations will be missing owing to the unavailability of data in frontier markets. The unbalanced panel will be appropriate for this. Ordinary least square is not suitable in cases where there will be numerous missing observations as this can result in inconsistences as some of the country-specific effects can be correlated to the independent variable. This will violate the assumption of exogeneity of the independent variables (Yartey, 2008). Dynamic panels' data estimator can be used in Generalised Method of Moments (GMM) methodology that optimally exploits the linear moment restrictions implied by the dynamic panel data model (Arellano & Bond, 1991; Holtz-Eakin, Newey, & Rosen, 1988). This GMM instrumental variable estimator is equivalent to an efficient three-stage least squares estimator. Arellano and Bond (1991) proposed two estimators—one step and two step estimators—with the two step being the optimal estimator.

All these variables will be applied in a multi-factor model determining their impact on stock prices/returns. The assumption that is applied when using GMM estimate is that the variables are exogenous (Hansen, 1982). The Hansen J test can be used to test whether the variables are over-identified. The fixed effect model will also be used and the results compared to the GMM model. The results for the fixed effect model will be presented with robust standard errors.

3.5. EMPIRICAL TESTS RESULTS

Table 2

Descriptive statistics

Variable	Observations	Mean	Median	Maximum	Minimum	Std. Dev.	Skewness
RETURN	121	5.384	4.225	84.125	-116.3	36.653	-0.643
MSCI	116	3.583	2.849	104.431	-140.2	41.173	-0.661
REER	128	104.762	101.045	234.480	67.830	19.429	4.213
INFLATION	128	5.521	4.200	26.700	-3.7	5.390	1.697
GDP	126	3.613	4.000	10.400	-14.7	4.219	-1.289
TURNOVER	128	23.865	6.985	467.949	0.000	66.214	4.544
AMIVEST	78	7.825	8.260	11.070	4.570	1.537	-0.600
AMIHUD	78	1.652	0.005	26.768	8.49E-06	5.227	4.004
TRADEOPENNESS	128	87.167	85.830	170.428	21.852	41.804	0.033
MARKETCAP (%GDP)	128	23.280	14.976	238.673	0.000	33.658	3.383

Table 2 displays the descriptive statistics for the variables used in the study and also included the market capitalisation. The mean value of the country indices return and MSCI frontier index is 5.38% and 3.58% respectively with a negative skewness. This indicates that most of the firms are “clustered” on the left side of the distribution. The difference in mean for the MSCI frontier index and the country index return is noticeable indicating at 1.80%. The country with the highest mean is Pakistan with an index return of 16.02% with Sri Lanka having the highest MSCI frontier index mean at 7.08%. The minimum and maximum REER was from Argentina at 67.8 and 234.4 respectively. This shows that in 2016 (REER: 67.8), the value of the currency of Argentina was lower than that of the 172 currencies it was compared too, but in 2001 (REER: 234.4) the currencies was higher. An increase in REER indicates that the local currency is depreciating relative to the foreign currencies (Tahir, Haji, Dk Hajah Norulazidah Binti Pg, & Ali, 2014). The maximum inflation rate was 26.7% in 2015 for Argentina and the minimum inflation rate was -3.7% for Lebanon. This was the lowest that the country had ever been. This has been mostly due to the increase refugees from Syrian immigrating into Lebanon of which most of them are unskilled. This has resulted in a decrease in the GDP output, a weakening of the Euro and lower international commodity prices (especially oil) has resulted in inflation sharply decelerating to -3.7% (http://www.worldbank.org). The lowest GDP growth rate was from Estonia (2009: -14.7%). This was after the 2008 financial crises which resulted in an increase in unemployment rate. Trade openness was the lowest in 2001 for Argentina at 21.8% and the highest at Estonia in 2012 at 170.4%. For Argentina, this is the same year where the REER was the highest which is consistent with the paper that states that there is an inverse relationship between REER and trade openness and that these two should be looked at together when one is considering the competitiveness of the country (Assefa & Mollick, 2014). The measures for liquidity; turnover, Amivest and Amihud have a mean of 23.8, 7.8 and 1.6 respectively. Jordan had the largest market capitalisation per GDP at 238.6%. A high value of the Amivest ratio means that a big order trade can be done with minimal impact on the price.

Table 3

Correlation Matrix

CORRELATION	RETURN	MSCI	TURNOVER	AMIVEST	AMIHUD	MARKETCAP (%GDP)
RETURN	1.000					
MSCI	0.918	1.000				
TURNOVER	-0.155	-0.175	1.000			
AMIVEST	0.117	0.027	-0.033	1.000		
AMIHUD	0.021	0.085	-0.054	-0.610	1.000	
MARKETCAP (%GDP)	0.015	-0.003	0.695	-0.165	0.107	1.000

In the stock market liquidity premium theory, we analyse the factors that affect the liquidity of the stock market and then select turnover ratio, Amihud and Amivest liquidity ratio to measure stock liquidity. The correlation between return and turnover is negative which is consistent with the liquidity premium. The same relationship was found when looking at NYSE stocks over the period 1964 - 1997 (Amihud, 2002). Turnover is also found to be negatively correlated illiquidity costs (Amihud & Mendelson, 1986a). The Amivest ratio shows a positive correlation with stock return. The application of Amivest can be found in literature (Amihud et al., 1997; Brown, Rhee, & Zhang, 2008; Chang, Hsu, Huang, & Rhee, 1999). The turnover ratio and Amivest relation are consistent with the liquidity premium. The correlation of the Amihud ratio is positive. This is inconsistent with the liquidity premium theory, although it is positive, it is insignificant. However, other papers have found the positive relationship with stock returns (Amihud, 2002). Amivest and Amihud are inversely correlated as Amihud is a reciprocal of Amivest. The MSCI frontier return is significantly positively correlated to the return of the stock. Although the market capitalisation positively correlated to return (as market capitalisation of the stock

increases so those return), it is not significant. However, it is found to be significantly positively correlated to turnover, which means that as the market capitalisation per GDP increases so will the turnover ratio which agrees with the theory.

Table 4

Fixed effect model of stock returns

	1	2	3
MSCI	0.80937***	0.83620***	0.84181***
	(0.04657)	(0.07476)	(0.07411)
INFLATION	-0.38292	-0.03604	0.03807
	(0.33268)	(0.43352)	(0.46333)
GDP	-0.22383	-0.50974**	-0.57754**
	(0.34989)	(0.23854)	(0.22938)
REER	-0.12769***	-0.08149	-0.06868
	(0.04739)	(0.07989)	(0.08200)
TRADEOPENNESS	-0.02437*	0.06578	0.10831
	(0.01291)	(0.07779)	(0.10042)
TURNOVER	-0.00638		
	(0.00599)		
AMIHUD		-0.16815	
		(0.13805)	
AMIVEST			2.63327**
			(1.32033)
R-Squared within N	-0.22560	0.03172	0.04048
	114	74	74

Notes: The dependent variable is the real return of the index stock return using annual data from 2000-2015. The robust standard errors are in parentheses. When p<0.1* , p<0.05**, p<0.01***. The R Squared within is basically omitting the explained variance from the fixed effect model. The R Squared within is calculated by first finding the regression of the model using the full model but without fixed effect model and then estimating the equation using the full model with the fixed effect method applied (calculation in the appendices in Table C).

The return of the MSCI frontier index is found to be significant for all the liquidity measures. Table 4 shows the fixed effect results for the different liquidity measure; 1 Turnover ratio, 2 Amihud ratio and 3 Amivest ratio. Although inflation indicating that as inflation increases we would expect the stock returns to decrease, it is not a significant value (Asprem, 1989). It was found that the cause of the negative effect on returns is due to “money demand and counter-cyclical money supply (Kaul, 1987).

GDP is found to be significant when Amihud and Amivest ratios are used to measure liquidity at a significance level of 5%. The GDP growth rate has a negative effect on the stock return. REER and trade openness both have a negative effect on the stock return and they are found to only be significant when liquidity is measured using the turnover ratio. The REER is in line with goods market theory for export-oriented economy as it would be expected that when the local currency appreciates the market should be experiencing a fall. From the different measures of liquidity, the only liquidity measure found to be significant is the Amivest with a positive effect on the stock return as it is consistent with the liquidity premium theory.

In conclusion, the MSCI return for each of the frontier markets, liquidity and GDP growth rate can be used to explain stock return. Whereas other literature would that MSCI world index returns, the discount rate, and liquidity factors were the ones that greatly explain the stock return (Assefa & Mollick, 2014).

Table 5

GMM Dynamic model of stock returns

	1	2	3
MSCI	0.58681***	0.61562***	0.55596***
	(0.06974)	(0.05534)	(0.07966)
INFLATION	0.62067***	0.71983**	0.87516***
	(0.21963)	(0.33355)	(0.25248)
GDP	-2.47844***	-2.73619***	-2.34028***
	(0.23196)	(0.32472)	(0.22480)
REER	1.55113**	1.58569**	1.68092**
	(0.69055)	(0.70603)	(0.78488)
TRADEOPENNESS	0.90426***	1.02241***	1.00281***
	(0.18445)	(0.14815)	(0.20219)
TURNOVER	0.37034		
	(0.34551)		
AMIHUD		-1.14558**	
		(0.46382)	
AMIVEST			-3.45199
			(2.81149)
m1	-2.02693	-1.15836	-2.00465
	(0.04270)**	(0.24670)	(0.04500)**
m2	0.37817	0.24195	0.29388
	(0.70530)	(0.80880)	(0.76890)
Hansen-J	5.51837	2.36707	6.09826
	(0.06334)	(0.30620)	(0.04740)
No of Instrument	8	8	8

Notes: The dependent variable is the real return of the index stock return using annual data from 2000-2015. The robust standard errors are in parentheses for all the coefficients and the p-values in parentheses for m1, m2 and Hansen J. When p<0.1*, p<0.05**, p<0.01***

The GMM was determined by differencing the cross-section for a fixed period and then using the Arellano-Bond 1-step weighting on the model (Doornik, Arellano, & Bond, 2002). For the coefficient covariance method, the white period was used. For the serial correlation, the null hypothesis is that there is no serial correlation in the residuals. There is no second order autocorrelation for all the three equations. By considering the Hansen J statistics, it is found that the over-identification restrictions are valid, and therefore the model can be used.

In the GMM model, it is also found that the MSCI frontier stock return is highly significant at 1%. This is similar to the fixed effect model. The liquidity measure which is found to be significant when using the GMM model is used is the Amihud ratio. The Amihud ratio is significant at the 5% significance level. Amihud has a negative effect on the stock return indicating that as Amihud ratio increases, we would expect the return to decrease. This is similar to other literatures who found that there was a significant and negative relationship between Amihud as a measure of illiquidity and stock return (Yahyazadehfar & Khoramdin, 2008). Other papers found that the illiquidity measure was significant but with a positive relationship (Amihud, 2002). The turnover ratio which is one of the most widely used measures of liquidity was been found to be insignificant.

The GDP growth rate is significant at the 1% level with the standard errors acceptable. In the African stock market, it has been found that the GDP growth rate is positive but insignificant owing to the large standard errors (Assefa & Mollick, 2014). The negative effect means that as the county's GDP increases, we expect the return to decrease. Therefore, there is for premium when the country's GDP. The return to decrease is for premium when the country's GDP strengthens. A positive relation was found between economic growth (measured as GDP) and stock market (Beck & Levine, 2004).

REER is positive which means that when the local currency appreciates, you expect the return to also increase. This is different from the fixed effect model results and from other papers (Assefa & Mollick, 2014). Inflation also has a positive significant impact on the stock return. Therefore, as inflation increases so will the stock return in order to compensate investors for the inflation they earn an inflation premium. However, it was previously found that the return and liquidity had a negative relation (Beck & Levine, 2004; Feldstein, 1978). Trade openness has a negative effect on the stock return and is significant. For the look at African stock markets, it was found to be negative as well but insignificant (Assefa & Mollick, 2014).

In summary, the GMM model shows that the stock return can be explained by all the variable but with liquidity it is only impacted by the Amihud ratio. The difference in significance for the Amihud ratio and the Amivest ratio can be observed depending on the estimation method used, that is, fixed effect or GMM. However, the two estimators of liquidity were found to be negatively correlated with each other. The fixed effect model can be biased downward especially when T is not large and concentrates more on casual changes in the variables. It can be noted that GMM is considered to be more robust.

4. RECOMMENDATION

The thesis looked at the relationship between return and liquidity by taking the unbalanced panel data of return in frontier markets. This was done so we can determine the dynamic panel data model of the stock market return using GMM and the fixed effect model to find if illiquidity of frontier market is priced into the return of the stocks.

By means of applying data from eight frontier markets from 2000 to 2015, the results revealed that the stock return of the indices is significantly impacted by liquidity. The measures of liquidity used are turnover, Amivest and Amihud.

Under the fixed effect model, the stock return was impacted by MSCI frontier stock return, liquidity (Amivest) and GDP growth. For the GMM model, all the variables are significant in determining stock return except for Turnover ratio and Amivest. The turnover ratio reflects as insignificant in both methods of estimating the regression which contradicts what other papers have as it is the most used method of determining liquidity, especially in illiquid areas (Amihud, 2002; Assefa & Mollick, 2014).

For future papers, one can use the Fama and French method to determine the variables to value the return of the stock for each country. This will assist in countries with a lack of data and it would be considering more of the microstructure variables instead of macrostructure.

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APPENDICES

Table A

Indices used in the return calculation

Country	Index
Argentina	MERVAL
Croatia	CRO
Estonia	OMX
Jordan	JOSMGNFF
Lebanon	BLOM
Pakistan	KSE
Slovenia	SBITOP
Sri Lanka	CSEALL

Table B

Country	Description and history
Argentina	Argentina is a country situated South of America. it is among countries with the largest economies in Latin America. It was once one of the wealthiest countries owing to suffering from repeated economic crises, hyperflation, current account and fiscal deficits etc. during the 20th century. In 2014, the population was 43 million. The country had a Gross Domestic Product (GDP) of more than US $550 million as at 2012. The country is rich in natural resources, and the population is literate, export of their agricultural products and a diversified industrial base. Agricultural and livestock industries as well as natural resources are huge contributors to the GDP of the Argentina's economy.
Croatia	Croatia is a country situated in south Eastern Europe. It is classified as an emerging and developing economy according to IMF, while MSCI sees it as a frontier market. The World Bank recognises it as a high-income economy. The country has a population of 4.5 million as at 2009. It was once the richest Yugoslav republics before the Berlin Wall was destroyed and the civil was that happened around 1991-1995. This resulted in fewer investments in the country. However, there has been a gradual increase since 2000. An increase in the GDP has been owing to an increase in tourism due to improve transportation system (road construction) and the credit boom that was due to privatised banks.
Estonia	Estonia is situated in Eastern Europe, bordering the Baltic Sea and Gulf of Finland. The economy is market-based and it has one of the highest per capital income levels in Central Europe and the Baltic region. The economy of the country is built by telecommunication and electronic sectors as well as having strong trade ties with Finland, Sweden and Germany. The country has a shortage of

skilled and unskilled labour even with the relaxation of immigration laws. The country has experienced the most rapid growth in Europe during the current years.

Jordan

Jordan is situated in the Middle East. It is considered a small underdeveloped economy that is largely dependent on foreign assistance. The country is considered as one of the most open economy in the Arab world. It has had a standing friendship with the United States and at the same time gets along with Israel. The economy is greatly driven by service provision, such as construction and civil engineering, trade, wholesale and retail, transportation and logistics, publishing, IT & telecommunication etc. Since the area is primarily a desert, agricultural activities are very limited. It also has a shortage of energy supply and it is crucial for the country to start find alternative methods of energy supply so that this does not make their macroeconomy vulnerable. The economy of Jordan has slowed down in 2015 owing to Syria and Iraq crises; this is considered as the largest shock for the country's economy.

Lebanon

Lebanon is situated in the west of the Asian continent and it shares borders with Syria, Israel and Mediterranean Sea. The Lebanon economy is mostly driver by tourism, agricultural activities and financial sector. Owing to the reduced speed in the privatization rate, this has resulted in an increase of government debt. The population was 4.2 million as at 2010. The population is mostly self-employment as entrepreneurship is greatly practised. In 2010, the growth of the country's economy was the most rapid making it the 18th fastest growing country. This growth was mainly owing to the financial sector and presence of strong regulatory organisations which are independent of political association. Because of the increase number of Syrians who have taken refuge in Lebanon (almost a quarter of Lebanon population), this has resulted in a

strain on the public finances, service delivery and the environment and a reduced GDP growth rate and this is regardless of the assistances from the Central Bank to stimulate the economy.

Pakistan

Pakistan is situated in the crossroads of South Asia, Central Asia, China and Middle East. As of 2010, Pakistan was the 27th largest economy in the world. The economy of the country is mostly driven by agriculture, textiles, mining, and IT industries. The catalyst of the economic growth has been the privatisation of industry and services which has resulted in an increase in employment. Although Pakistan has a large reserve of natural resources (e.g. oil, coal, iron ore, copper, salt and gold), it has an issue of infrastructure and funding for the exploration of those natural reserves has been delayed. It was been said that the current exploration only make up 20% - 30% of the country's deposits. The problem with border areas and security all over the country has had an impact on the development of Pakistan. Governance in Pakistan has increase which will reflect positively on the economic growth of the country. The growing concern with Pakistan is the ability to provide acceptable services and jobs to the working age population.

Slovenia

Slovenia is situated in South Central Europe, Julian Alps between Austria and Croatia. It is the first to adopt the euro as its currency upon entry into the EU. The country has one of the highest per capita GDPs in Central Europe even after being impacted by the 2008/9 global financial crisis. The population is literate and the country as brilliant infrastructures. It was the first country in the World Bank to move from borrower to being a donor to other countries in 2004. However, owing to the delay in the privatisation in the state-owned and the banking sectors which are heavily indebted this has brought the country in an area where it would not be able to continue as a donor. Owing to the indebtedness of the

banks, the European Commission in 2013 granted it the authorisation to recapitalise ailing lenders and transferring their non-performing assets into a “bad bank”.

Sri Lanka

Sri Lanka is an island country in the Indian Ocean on the southern coast of India. Because of its location, it is best suited as a link between West Asia and South East Asia. It is a popular to tourist with its landscape, beaches and tropical forest. The economy is greatly controlled by agricultural production, tourism, textile, apparel, and tea exports. It was previously driven by rural-based agriculture. To reflect this change in the drivers of the economy, in 2015, the service sector contributed 62.4% to GDP and 28.9% from manufacturing with only 8.7% owing to agriculture. The population of Sri Lanka as of 2009 was 20 million of which 82% of the population is literate. It is considered as one of the most literate developing countries. It is regarded as a low middle-income country with a per capita income of $3,924 in 2015. It is trying to move to the upper middle-income countries by concentrating on the long-term strategic and structural development challenges. The areas to invest time in are attracting investment, human capital and bringing into alignment public spending and policy.

Sourced: EconomyWatch.com, www.cia.gov and www.worldbank.org

Table C

R Squared within = 1-(SSR(full model)/SSR(fixed effects only)

	1	2	3
Full Model	15 256.79	15 256.79	15 256.79
Per Fixed Effect Model	18 698.65	14 772.82	14 639.20
R Squared within	-0.2256	0.0317	0.0405

As per the Fixed Effect models in Table 4

Table D: Fixed Effect Regression using Amihud as a measure of liquidity

Dependent Variable: RETURN
Method: Panel Least Squares
Date: 03/28/17 Time: 22:56
Sample: 2000 2015
Periods included: 16
Cross-sections included: 8
Total panel (unbalanced) observations: 74
White period standard errors & covariance (no d.f. correction)
WARNING: estimated coefficient covariance matrix is of reduced rank

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	7.302615	14.50435	0.503478	0.6165
MSCI	0.836200	0.074764	11.18448	0.0000
INFLATION	-0.036035	0.433524	-0.083120	0.9340
GDP	-0.509743	0.238535	-2.136970	0.0367
REER	-0.081494	0.079891	-1.020061	0.3118
TRADEOPENNESS	0.065779	0.077788	0.845629	0.4011
AMIHUD	-0.168152	0.138053	-1.218027	0.2280

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.858438	Mean dependent var	1.829980
Adjusted R-squared	0.827766	S.D. dependent var	37.80915
S.E. of regression	15.69120	Akaike info criterion	8.512735
Sum squared resid	14772.82	Schwarz criterion	8.948639
Log likelihood	-300.9712	Hannan-Quinn criter.	8.686622
F-statistic	27.98789	Durbin-Watson stat	2.596686
Prob(F-statistic)	0.000000		

Table E: Fixed Effect Regression using Amivest as a measure of liquidity

Dependent Variable: RETURN
Method: Panel Least Squares
Date: 03/28/17 Time: 22:58
Sample: 2000 2015
Periods included: 16
Cross-sections included: 8
Total panel (unbalanced) observations: 74
White period standard errors & covariance (no d.f. correction)
WARNING: estimated coefficient covariance matrix is of reduced rank

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-18.78590	25.88878	-0.725639	0.4709
MSCI	0.841807	0.074113	11.35843	0.0000
INFLATION	0.038067	0.463328	0.082159	0.9348
GDP	-0.577539	0.229382	-2.517809	0.0145
REER	-0.068676	0.081997	-0.837541	0.4056
TRADEOPENNESS	0.108314	0.100417	1.078648	0.2851
AMIVEST	2.633272	1.320325	1.994412	0.0507

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.859718	Mean dependent var	1.829980
Adjusted R-squared	0.829324	S.D. dependent var	37.80915
S.E. of regression	15.62007	Akaike info criterion	8.503648
Sum squared resid	14639.20	Schwarz criterion	8.939552
Log likelihood	-300.6350	Hannan-Quinn criter.	8.677536
F-statistic	28.28548	Durbin-Watson stat	2.570777
Prob(F-statistic)	0.000000		

Table F: Fixed Effect Regression using Turnover as a measure of liquidity

Dependent Variable: RETURN
Method: Panel Least Squares
Date: 03/28/17 Time: 22:55
Sample: 2000 2015
Periods included: 16
Cross-sections included: 8
Total panel (unbalanced) observations: 114
White period standard errors & covariance (no d.f. correction)
WARNING: estimated coefficient covariance matrix is of reduced rank

Variable	Coefficient	Std. Error	t-Statistic	Prob.
MSCI	0.809365	0.046568	17.38024	0.0000
INFLATION	-0.382915	0.332681	-1.150997	0.2525
GDP	-0.223834	0.349894	-0.639720	0.5238
REER	-0.127686	0.047385	-2.694666	0.0083
TRADEOPENNESS	-0.024371	0.012907	-1.888241	0.0619
TURNOVER	-0.006382	0.005985	-1.066224	0.2889
C	22.63101	7.964998	2.841308	0.0054

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.876175	Mean dependent var	6.306607
Adjusted R-squared	0.860078	S.D. dependent var	36.55624
S.E. of regression	13.67430	Akaike info criterion	8.183499
Sum squared resid	18698.65	Schwarz criterion	8.519524
Log likelihood	-452.4595	Hannan-Quinn criter.	8.319873
F-statistic	54.43005	Durbin-Watson stat	2.327708
Prob(F-statistic)	0.000000		

Table G: GMM Regression using Turnover as a measure of liquidity

Dependent Variable: RETURN
Method: Panel Generalized Method of Moments
Transformation: First Differences
Date: 03/29/17 Time: 00:48
Sample (adjusted): 2001 2015
Periods included: 15
Cross-sections included: 8
Total panel (unbalanced) observations: 66
Difference specification instrument weighting matrix
White period standard errors & covariance (d.f. corrected)
WARNING: estimated coefficient covariance matrix is of reduced rank
Instrument specification: MSCI GDP INFLATION AMIVEST AMIHUD TURNOVER REER TRADEOPENNESS @LEV(@SYSPER)
Constant added to instrument list

Variable	Coefficient	Std. Error	t-Statistic	Prob.
MSCI	0.586812	0.069736	8.414798	0.0000
GDP	-2.478440	0.231960	-10.68477	0.0000
INFLATION	0.620665	0.219632	2.825931	0.0070
TRADEOPENNESS	0.904255	0.184448	4.902501	0.0000
REER	1.551133	0.690549	2.246232	0.0296
TURNOVER	0.370344	0.345509	1.071880	0.2895
@LEV(@ISPERIOD("2001"))	-32.24734	6.380626	-5.053946	0.0000
@LEV(@ISPERIOD("2002"))	164.8419	94.24427	1.749092	0.0871
@LEV(@ISPERIOD("2003"))	106.5656	14.66737	7.265487	0.0000
@LEV(@ISPERIOD("2004"))	-42.21780	4.137457	-10.20380	0.0000
@LEV(@ISPERIOD("2005"))	-2.536538	3.976686	-0.637852	0.5268
@LEV(@ISPERIOD("2006"))	15.13832	4.371362	3.463067	0.0012
@LEV(@ISPERIOD("2007"))	1.827258	12.44656	0.146808	0.8839
@LEV(@ISPERIOD("2008"))	-71.54205	18.47663	-3.872029	0.0003
@LEV(@ISPERIOD("2009"))	46.38241	7.958778	5.827831	0.0000
@LEV(@ISPERIOD("2010"))	2.856710	6.688852	0.427085	0.6714
@LEV(@ISPERIOD("2011"))	-15.61847	5.491037	-2.844357	0.0067
@LEV(@ISPERIOD("2012"))	13.06385	7.249051	1.802146	0.0782
@LEV(@ISPERIOD("2013"))	1.061328	4.517833	0.234920	0.8153
@LEV(@ISPERIOD("2014"))	2.258574	5.891125	0.383386	0.7032
@LEV(@ISPERIOD("2015"))	-17.30140	5.440713	-3.179988	0.0027

Effects Specification

Cross-section fixed (first differences)
Period fixed (dummy variables)

Mean dependent var	-2.651364	S.D. dependent var	54.18585
S.E. of regression	17.55582	Sum squared resid	13869.31
J-statistic	5.518368	Instrument rank	23
Prob(J-statistic)	0.063343		

Arellano-Bond Serial Correlation Test

Equation: TURNOVERGMM

Date: 03/29/17 Time: 00:50

Sample: 2000 2015

Included observations: 66

Test order	m-Statistic	rho	SE(rho)	Prob.
AR(1)	-2.026925	-4349.347251	2145.786372	0.0427
AR(2)	0.378169	736.580210	1947.756138	0.7053

Table H: GMM Regression using Amihud as a measure of liquidity

Dependent Variable: RETURN
Method: Panel Generalized Method of Moments
Transformation: First Differences
Date: 03/29/17 Time: 00:52
Sample (adjusted): 2001 2015
Periods included: 15
Cross-sections included: 8
Total panel (unbalanced) observations: 66
Difference specification instrument weighting matrix
White period standard errors & covariance (d.f. corrected)
WARNING: estimated coefficient covariance matrix is of reduced rank
Instrument specification: MSCI GDP INFLATION AMIVEST AMIHUD TURNOVER REER TRADEOPENNESS @LEV(@SYSPER)
Constant added to instrument list

Variable	Coefficient	Std. Error	t-Statistic	Prob.
MSCI	0.615619	0.055343	11.12363	0.0000
GDP	-2.736189	0.324718	-8.426348	0.0000
INFLATION	0.719834	0.333546	2.158127	0.0363
TRADEOPENNESS	1.022411	0.148148	6.901298	0.0000
REER	1.585691	0.706031	2.245923	0.0297
AMIHUD	-1.145577	0.463816	-2.469895	0.0174
@LEV(@ISPERIOD("2001"))	-33.52666	6.431914	-5.212548	0.0000
@LEV(@ISPERIOD("2002"))	159.4262	90.06046	1.770213	0.0835
@LEV(@ISPERIOD("2003"))	109.2681	11.77843	9.276962	0.0000
@LEV(@ISPERIOD("2004"))	-42.57137	4.185203	-10.17188	0.0000
@LEV(@ISPERIOD("2005"))	-1.400771	5.519519	-0.253785	0.8008
@LEV(@ISPERIOD("2006"))	17.84520	3.354717	5.319437	0.0000
@LEV(@ISPERIOD("2007"))	-6.089762	11.16474	-0.545446	0.5881
@LEV(@ISPERIOD("2008"))	-67.06590	17.68781	-3.791646	0.0004
@LEV(@ISPERIOD("2009"))	37.43999	8.098691	4.622968	0.0000
@LEV(@ISPERIOD("2010"))	1.466112	7.454802	0.196667	0.8450
@LEV(@ISPERIOD("2011"))	-11.09882	4.666275	-2.378519	0.0217
@LEV(@ISPERIOD("2012"))	6.229489	6.729298	0.925727	0.3595
@LEV(@ISPERIOD("2013"))	0.758274	4.491575	0.168821	0.8667
@LEV(@ISPERIOD("2014"))	3.366372	6.156966	0.546758	0.5872
@LEV(@ISPERIOD("2015"))	-16.48277	5.361207	-3.074452	0.0036

Effects Specification

Cross-section fixed (first differences)
Period fixed (dummy variables)

Mean dependent var	-2.651364	S.D. dependent var	54.18585
S.E. of regression	16.48685	Sum squared resid	12231.73
J-statistic	2.367069	Instrument rank	23
Prob(J-statistic)	0.306195		

Arellano-Bond Serial Correlation Test
Equation: AMIHUDGMM
Date: 03/29/17 Time: 00:53
Sample: 2000 2015
Included observations: 66

Test order	m-Statistic	rho	SE(rho)	Prob.
AR(2)	0.241950	370.941027	1533.128924	0.8088

Table I: GMM Regression using Amivest as a measure of liquidity

Dependent Variable: RETURN
Method: Panel Generalized Method of Moments
Transformation: First Differences
Date: 03/29/17 Time: 00:57
Sample (adjusted): 2001 2015
Periods included: 15
Cross-sections included: 8
Total panel (unbalanced) observations: 66
Difference specification instrument weighting matrix
White period standard errors & covariance (d.f. corrected)
WARNING: estimated coefficient covariance matrix is of reduced rank
Instrument specification: MSCI GDP INFLATION AMIVEST AMIHUD TURNOVER REER TRADEOPENNESS @LEV(@SYSPER)
Constant added to instrument list

Variable	Coefficient	Std. Error	t-Statistic	Prob.
MSCI	0.555964	0.079660	6.979216	0.0000
GDP	-2.340284	0.224799	-10.41057	0.0000
INFLATION	0.875158	0.252478	3.466276	0.0012
TRADEOPENNESS	1.002809	0.202194	4.959635	0.0000
REER	1.680919	0.784877	2.141635	0.0377
AMIVEST	-3.451990	2.811486	-1.227817	0.2259
@LEV(@ISPERIOD("2001"))	-32.82617	7.151666	-4.590003	0.0000
@LEV(@ISPERIOD("2002"))	167.7370	101.5613	1.651583	0.1056
@LEV(@ISPERIOD("2003"))	112.3610	13.79556	8.144721	0.0000
@LEV(@ISPERIOD("2004"))	-39.20508	3.318202	-11.81516	0.0000
@LEV(@ISPERIOD("2005"))	-3.534378	4.848008	-0.729037	0.4698
@LEV(@ISPERIOD("2006"))	12.65116	4.915851	2.573544	0.0134
@LEV(@ISPERIOD("2007"))	4.799035	12.55559	0.382223	0.7041
@LEV(@ISPERIOD("2008"))	-76.99413	22.28440	-3.455069	0.0012
@LEV(@ISPERIOD("2009"))	53.37187	7.767817	6.870898	0.0000
@LEV(@ISPERIOD("2010"))	-1.282895	6.597403	-0.194455	0.8467
@LEV(@ISPERIOD("2011"))	-18.80158	4.379580	-4.293009	0.0001
@LEV(@ISPERIOD("2012"))	13.36468	7.875604	1.696972	0.0966
@LEV(@ISPERIOD("2013"))	1.241281	4.034851	0.307640	0.7598
@LEV(@ISPERIOD("2014"))	1.660806	6.875108	0.241568	0.8102
@LEV(@ISPERIOD("2015"))	-17.26475	6.105322	-2.827820	0.0070

Effects Specification

Cross-section fixed (first differences)
Period fixed (dummy variables)

Mean dependent var	-2.651364	S.D. dependent var	54.18585
S.E. of regression	17.52405	Sum squared resid	13819.16
J-statistic	6.098261	Instrument rank	23
Prob(J-statistic)	0.047400		

Arellano-Bond Serial Correlation Test

Equation: AMIVESTGMM

Date: 03/29/17 Time: 00:58

Sample: 2000 2015

Included observations: 66

Test order	m-Statistic	rho	SE(rho)	Prob.
AR(1)	-2.004649	-4138.037463	2064.220565	0.0450
AR(2)	0.293877	549.688832	1870.472671	0.7689