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Illiquidity and Stock Returns in a Dollarized Economy: Evidence from Zimbabwe

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Abstract: **One of the biggest challenges that most African securities markets such as Zimbabwe face is illiquidity. This paper investigates the extent to which illiquidity affects stock returns on the Zimbabwe Stock Exchange. We used a cross sectional regression model and regressed illiquidity on stock returns for 28 listed companies on the Zimbabwe Stock Exchange for the period 2010-2013. The study found out that stock returns decline as illiquidity increases and there was a significant negative relationship between these two variables. The study also found the Amihud measure is an able measure of illiquidity on a developing market such as Zimbabwe as most stocks have higher values of ILLIQ of the Amihud measure of illiquidity.**
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1. INTRODUCTION

Liquidity is considered to be the lifeblood of any financial market and its satisfactory endowment is critical for the smooth operation of an economy (Nikolaou, 2009). It is an imperative factor during investment decisions and is of interest to portfolio managers and risk management practitioners.

According to the liquidity premium theory, liquidity should be priced, thus companies that are considered to be more illiquid are supposed to have higher returns than more liquid companies (Placeholder) . Illiquidity is known to affect stock prices and subsequently the returns earned on the stocks by investors .However, when the economy is characterised by high levels of illiquidity as is the case in Zimbabwe, it will be difficult for investors to make appropriate investment decisions

Since dollarization of in 2009, the Zimbabwean economy has been plagued by illiquidity which has affected the operations of various sectors of the economy including the equities market. The tight liquidity situation has consequently affected the level of activity on the local bourse .The stock market has been facing challenges of de-listings as the listed counters are being affected by the prevailing liquidity crunch, which is an indication that the market is characterised by illiquidity and some are opting for voluntary delisting so as to raise capital outside the exchange where there are limited regulations. According to Zimbabwe Stock Exchange, as of 31 December 2013, eleven counters had delisted due to liquidity challenges that resulted in business companies failing to raise money on the local bourse or attracting new investors to inject fresh cash.

Therefore, it is against this background that this study primarily seeks to measure the extent of illiquidity of the Zimbabwean listed counters on the ZSE and test the cross sectional effects of illiquidity on the share returns of the listed counters. Secondarily, the study aims at measuring the depth of illiquidity on the ZSE listed counters, investigating the relationship between Amihud illiquidity measure and stock returns on the Zimbabwe stock exchange and investigating whether ILLIQ the Amihud measure of illiquidity measure correctly measures illiquidity in developing countries like Zimbabwe.

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2. REVIEW OF LITERATURE

In this section we reviewed literature relating to the relationship which exists between illiquidity and stock returns.

Illiquidity measures:

Various literature has reviewed different measures of illiquidity and most have concluded that there is no single measure which can capture illiquidity [Pastor & Stambaugh 2003, Armitage et al 2012, Eleswarapu 1997]. We reviewed various measures of illiquidity.

Bid-ask Spread:

The bid-ask spread covers many aspects of liquidity because it is basically driven by many of the important determinants of illiquidity. Private information about the order flow relates to the situation where an agent has private information about future large orders that are likely to affect the price of the stock. Trading on such private information should be profitable. The bid-ask spread is the spread between the price that a stock can be sold for (the bid price) and the price it costs to purchase it (the ask price) through a market maker (Amihud and Mendelson (1986) and Eleswarapu (1997) and Chalmers and Kadlec (1998). This spread is a result of the fact that the dealer wants to be compensated for the processing costs (direct transaction costs), the inventory risk and the risk of dealing with informed counterparts.

Amihud's ILLIQ-measure:

Liquidity is a term which is used to describe the ability to sell large quantities of an asset immediately after purchase without changing the price, thus an appealing measure of illiquidity would be a measure which shows the sensitivity of prices to the traded volume. Amihud (2002) proposed such a measure and it is now being referred to as the Amihud ILLIQ-measure. He introduced a measure for measuring illiquidity by providing a model and according to this model, if the turnover of the stock is low or during a specified period if trading days are low, as a result, the stock will be having low liquidity.

Amihud measure is believed to be appropriate for markets that don't have major infrastructure for investment market and developed market such as Zimbabwe. Data of this measure is derived using returns and trading volume and this illiquidity measure is easy to calculate for study and investigations. The inverse measure of liquidity in this model has been defined as the ratio of absolute returns, daily trading volume on the same day. Stocks with high Amihud illiquidity have large price changes for the small size of the transaction (Saeidi &Dadar, 2010).

The turnover rate:

Rune & Dalgaard (2009) mentioned that a widely used proxy for liquidity is the turnover rate of a stock and defined it as the number of shares which are traded over a period divided by the number of shares outstanding during that period. This measure is regarded as an intuitive measure, as it states how many times the outstanding equity changed hands during a period.

Block trades:

Rune & Dalgaard (2009) in his study of relationship between liquidity and stock returns on the Danish Stock Market mentioned that price impact has been investigated in studies by examining block trades stock transactions in which a large portion of the shares in the company is traded. The studies analyse the price reaction to large block trades. The price reaction gives an indication of how liquid the stock.

IPOs:

According to Rune & Dalgaard (2009), when there are records of share transactions prior to an initial public offering (IPO), an illiquidity discount can be estimated. The illiquidity discount can be estimated by comparing the stock price in these pre-IPO transactions with the IPO stock price. The argument is that before the IPO, the stocks can be considered illiquid and after the IPO, the stocks can be considered liquid. Thus, higher expected future liquidity should result in a higher IPO price than pre-IPO price. The percentage difference between the prices is therefore argued to be an illiquidity discount.

Illiquidity and returns:

Theories of asset pricing suggest that the expected return of an asset is increasing in its risk, because risk-averse investors require compensation for bearing more risk. Since investors are also averse to the costs of illiquidity and would want to be

compensated for bearing them, asset returns are therefore increasing in illiquidity thus asset prices should depend on two asset characteristics: risk and liquidity.

Generally, the sources of illiquidity comprise exogenous transaction costs, demand pressure, inventory risk, asymmetric information and search frictions (Mendelson, Amihud, & Pedersen, 2005). All these sources of illiquidity impose costs to the holder of the assets. These costs of illiquidity should be reflected in the asset prices, as the investors should require a compensation for holding them. Also, as the various sources of illiquidity are time-varying, so is liquidity. Thus, if investors are risk-averse they should require a compensation for holding assets with the risk attached to them that liquidity can decrease unexpectedly. (Placeholder7)

Amihud and Mendelson (1986a) pioneered the role of liquidity in asset pricing where they presented and tested the hypothesis that investors require returns on securities measured net of transaction costs using the methodology of Fama and MacBeth (1973) for cross- sectional regressions. They applied this methodology for estimating the cross-sectional relationship between return, market risk and spread for portfolios of stocks. Through their empirical tests on the NYSE stocks over the 1961-80 period using bid-ask spread as a proxy for illiquidity costs, they found a significant positive relationship between stock returns and spreads and that returns of high spread stocks are less spread sensitive than the returns of low spread stocks. They further developed a model in (1986b) which shows how liquidity affects asset prices which characterizes assets by their transaction costs and investors by their investment horizons.

Amihud (2002) further tested the cross sectional relationship between illiquidity and stock returns, and incorporated time series effects using again the Fama &McBeth (1973) methodology for the NYSE stocks, covering the period 1964-1997. The researchers found that across the NYSE stocks during that period, ILLIQ the illiquidity factor, had a positive and highly significant effect on expected return.

However, Eleswarapu et al. (1993) looked at the liquidity relationship using the same measures as Amihud and Mendelson (1986), but with an updated time period (1961-1990), and found that the relationship between liquidity and stock returns was only significant in January (Keene 2004). Chen and Kan (1996) found that the Amihud and Mendelson (1986) findings were specific to the methodology they employed, and that a different methodological approach to the same data would result in no return-spread relationship (Marshall, 2006). Eleswarapu (1996) suggested that the NYSE quoted spreads do not reflect the actual cost of transacting since many of the transactions occur inside the quotes (Tapia, et al. 1998). Research by Brennan and Subrahmanyam (1996) refuted the findings of Eleswarapu and Reinganum (1993) nonetheless established some support for the Amihud and Mendelson (1986) study. Further, Eleswarapu (1997) undertook a study using NASDAQ stocks and found supporting evidence for the positive return-spread relationship.

Given the above evidences, illiquidity has been found to have a positive relationship with returns [e.g. Eleswarapu (1997), Brennan and Subrahmanyam (1996), Acharya & Pedersen (2005), Amihud (2002) and Datar et al (1998)]. However, some authors rejected the positive illiquidity-return relationship empirically found by Amihud(1986) [e.g Eleswarapu et al. (1993), Chen and Kan (1996), (Marshall, 2006)] and some of the arguments put forth by these authors included that that the relationship between liquidity and stock returns was only significant in January (Keene 2004), Amihud and Mendelson (1986) findings were specific to the methodology they employed and also that Chen and Kan (1996), and that a different methodological approach to the same data would result in no return-spread relationship (Marshall, 2006).

3. RESEARCH METHOD

3.1 Cross Section Regression:

A cross section regression analysis was used to investigate the Return-Illiquidity relationship. The target population was all the sixty four stocks listed on the Zimbabwe Stock Exchange (ZSE) from the period January 2010- December 2013. The sample included only those stocks which were not suspended and those which were not delisted during this period. From the sixty four counters twenty eight were specifically sampled for the study. Purposive sampling method was used to select the twenty eight counters. This method is used when one wants to access a particular subset of items with curtained defined characteristics. When taking the sample, the items which do not fit a particular profile or condition are rejected. Purposive sampling starts with a purpose in mind and the sample is thus selected to include items of interest and exclude those which do not suit the purpose. This sample was chosen based on the following characteristics of the stock:

- The counter must have valid observations of daily return and trading value for at least 60 days of the year so that the illiquidity estimate is more reliable. This is because there is existence of thin trading on our local bourse thus a stock may go for a week without a trade happening.

- The stock has data on market capitalization at the end of the previous year.
- The stock should have at least a year end price of greater than 10 cents. This is because most stocks had a year-end price of 10c and above.

3.2 Model Specification:

Logarithmic daily continuously compounded returns were calculated from stock prices data using the following formula:

$$R_t = ln(\frac{P_t}{P_{t-1}}) \quad (1)$$

Where:

R_t is the log return of stock i, at time t

P_t is the price of stock i, at time t

P_{t-1} is the price of stock i, at time t-1

Secondly market capitalization was calculated as logarithms of daily market capitalisation. Amihud illiquidity measure was also calculated using the following formula:

$$ILLIQ = \frac{|R_{iyd}|}{VOLD_{iyd}} \quad (2)$$

Where:

R_{iyd} is the return on stock i on day d of year y

$VOLD_{iyd}$ is the respective daily volume in dollars.

$ILLIQ$ is an illiquidity measure and is defined as the daily ratio of absolute stock return to its dollar volume, averaged over some period.

Thirdly, monthly illiquidity was calculated as follows: $ILLIQ_{im} = \frac{1}{D_{im}} \sum_{t=1}^{D_{im}} \frac{|R_{imd}|}{VOLD_{imd}}$ (3)

Where:

$ILLIQ_{imy}$ is the number of days for which data is available for stock i in month m

The annual average illiquidity was calculated as follows : $ILLIQ_{iy} = \frac{1}{D_{iy}} \sum_{t=1}^{D_{iy}} \frac{|R_{iyd}|}{VOLD_{iyd}}$ (4)

Where:

D_{iy} is the number of days for which data is available for stock i in year y. This measure is multiplied by 10^6.

A cross section model was estimated for each month $m = 1,2, \dots 12$ in year $y = 1,2,3,4$ where monthly returns will be a function of stock characteristics.

Since average illiquidity varies considerably over the years ILLIQ will be replaced in the estimation of the cross section model by its mean adjusted value calculated as follows:

Firstly the average market illiquidity across stocks in each year is calculated as:

$$AILLIQ_y = \frac{1}{N_y} \sum_{t=1}^{N_y} ILLIQ_{iy} \quad (5)$$

Where:

N_y is the number of stocks in year y. This was calculated in order to use it in the calculation of mean adjusted values.

Mean adjusted values were calculated using the following formula: $ILLIQMA_{iy} = \frac{ILLIQ_{iy}}{AILLIQ_y}$ (6)

The values of $ILLIQ_{iy}$ and $ILLIQMA_{iy}$ were then used in the estimation of cross sectional model.

3.3 Control variables:

In this study, the following were used as control variable:

***$Size_{iy}$*:**

This is the market value of stock i at end of year y. This is represented as LnCap in the model. Size can also be used as proxy for illiquidity. $Size_{iy}$ may also be a proxy for liquidity.

***$Beta_{iy}$*:**

This is a measure of risk. At the end of each year y; stocks were ranked by their size (capitalization) and divided into equal portfolios. Next, the portfolio return $R_{pty}$was calculated as the equally- weighted average of stock returns in portfolio p on day t in year y.

Then the market model was estimated for each portfolio p, where $p = 1,2$ ...

$$R_{pty} = a_{py} + BETA_{py}.RM_{ty} + e_{pty} \quad (7)$$

Where:

RM_{ty} is the equally-weighted market return and $Beta_{py}$ is the slope coefficient, estimated by the Scholes and Williams (1977) method. The beta assigned to stock i was the beta of the portfolio in which stock i was included. Fama and French (1992), who used similar methodology, suggested that the precision of the estimated portfolio beta makes up for the fact that not all stocks in the $Size$ portfolio have the same beta. Beta is used as a control for the market or systematic risk.

$SDRET_{iy}$

This is the other measure of risk which measures stock total risk. It is the standard deviation of the daily return on stock i in year y (multiplied by 10^2). This is included since some investors' portfolios may be constrained and not well diversified. Also, **SDRETiy** is included in the model since **ILLIQiy** may be construed as a measure of the stock's risk, given that its numerator is the absolute return (which is related to **SDRETiy**)

Dividend Yield:

Calculated as the sum of the dividends during year y divided by the end-of-year price (following Brennan et al., 1998). This variable should have a positive effect on stock return if investors require to be compensated for the higher tax rate on dividends compared to the tax on capital gains. However, DIVYLD may have a negative effect on return across stocks if it is negatively correlated with an unobserved risk factor, that is, stocks with higher dividend are less risky. The coefficient of DIVYLD may also be negative following Redding's (1997) suggestion that large investors prefer companies with high liquidity and also prefer receiving dividends. Dividend yield is also included because it has been documented as an important determinant of stock returns in the US.

Past stock returns R60Riy:

The return on stock i for the last 60 days of year y, and **R60YRiy**, the return on stock i over the rest of the period, between the beginning of the year and 60 days before its end. Previous stock returns are included to control for possible momentum effects.

In each year, the annual mean, standard deviation, skewness and kurtosis across stocks were calculated for stocks admitted to the sample, and the correlations between the variables were calculated in each year across stocks.

3.4 Assumptions:

Normality, Linearity and Multicollinearity tests were carried out to check the assumptions of the model.

4. EMPIRICAL RESULTS

***4.1* Test for Normality:**

The Jacques-Bera test for normality was used on each return series for each stock return. The test statistic is

$$JB = [\widehat{S^2} + \frac{1}{4}(\widehat{K} - 3)^2]\frac{1}{6}(n - k) \quad (8)$$

Where:

$\widehat{S}$ is the sample skewness

$\widehat{K}$ is sample kurtosis

n is the sample size

k is the number of estimated coefficients used to create the series

The chi-square distribution with two degrees of freedom 5% is 5.99 thus if the Jacque-Bera test of any variable is less than the chi-square then the distribution is normal. The null hypothesis in this test is data follow normal distribution. Initially the data set was non-normal and to comply with the normality assumption, the researchers applied natural logarithms to the data set to make it normal. The null hypothesis was that the data is normal, while the null hypothesis was that the data is non normal. According to the results presented we accepted the null hypothesis that the residuals are normally distributed because the skewness of all the variables is lying close to zero while the kurtosis is lying within 1-3 showing that the data is normal.

4.2 Test for Linearity:

Linearity is another major assumption in regression model, and the study tested for this property using the Normal P Plot as well as the scatter plot graphs from the SPSS output. In the Normal P Plot, we will be hoping that points would lie reasonably on a straight diagonal line from bottom left to the top right and this would suggest no deviations from the normality and linearity assumption. In the scatter plot of the standardised residuals there would be hope that the residuals would be roughly rectangularly distributed with most scores concentrated in the centre and deviation from a centralised rectangle would suggest violation of the linearity, homoscedasticity and independence of residuals assumptions. In terms of outliers, these are checked using the scatter plot and outliers would have a standardised residual of more than 3.3 or less than 3.3.

Figure 1 shows that there is a linear relationship between the dependent variable (monthly returns) and independent variables as shown by the standardized residual plot graph below. Most of the points lay almost on the line indicating the presence of normality as well as linearity.

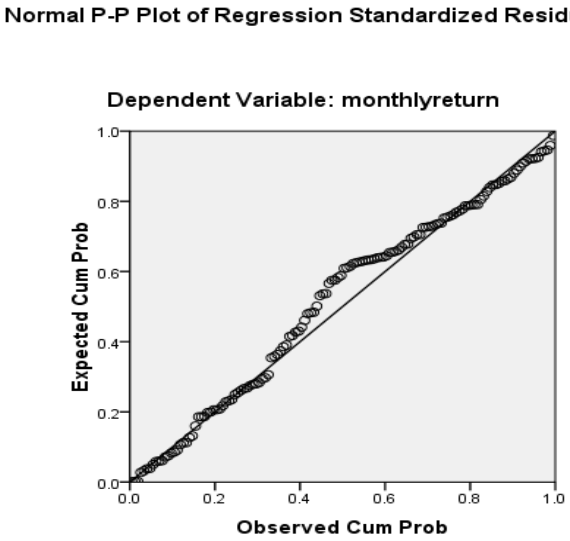

Fig I: Linearity of explanatory variables

4.3 Test for multicollinearity:

Here there is need to check that there is at least some relationship between the independent variables and the dependent variable and this should be above 0.3 preferably. There is also need to check that the correlation between variables is not too high, and according to Tabachnick & Fidell (2001) if this situation is found one of the variables has to be omitted or form a composite variable from the highly correlated variables. If correlation is below 0.7 they have to be retained. If there are evidences of multicollinearity in the correlation matrix this can be picked by collinearity diagnostics measured by tolerance and Variance Inflation Factor.

It picks up the problem of multicollinearity which may be evident in the correlation matrix. Tolerance indicates much of the variability of a specified independent not being explained by other independent variables. If it is very small (0, 10) this indicates that multiple correlation with other variables is high suggesting a possibility of multi collinearity. Variance Inflation Factor (VIF) is the inverse of tolerance and if VIF values are above 10, this indicates multicollinearity.

The relationship between the independent variables and the dependent variable was also checked. If correlation is below 0.7 they have to be retained. Collinearity diagnostics measured by tolerance and Variance Inflation Factor were also calculated to pick up any evidences of multicollinearity. A very small tolerance value of (0,10) indicates that multiple correlation with other variables is high suggesting a possibility of multi collinearity and a Variance Inflation Factor (VIF) value of above 10 indicates multicollinearity. Results obtained in this study are shown in the tables below:

TABLE I : COEFFICIENTS OF EXPLANATORY VARIABLES WHEN ILLIQ IS USED IN THE MODEL

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.	95% Confidence Interval for B		Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
1	(Constant)	10.648	1.392		7.647	.000	7.894	13.402		
	Illiq	-.022	.006	-.230	-3.483	.001	-.034	-.009	.924	1.082
	R60Y	.061	.303	.013	.201	.841	-.538	.659	.971	1.030
	R60YR	-.032	.343	-.006	-.093	.926	-.710	.646	.922	1.085
	Stdreturn	.142	.032	.300	4.434	.000	.078	.205	.877	1.141
	Lncap	-.146	.020	-.526	-7.198	.000	-.186	-.106	.753	1.329
	Dividendyeild	-.128	1.822	-.014	-.211	.833	-5.615	13.360	.876	1.141
	Betta	-.595	.091	-.496	-6.575	.000	-.775	-.416	.708	1.413

a. Dependent Variable: monthly return

As shown in the Table I , the tolerance values of all the variables are above 0.10 indicating absence of possibilities of multicollinearity and the values of VIF are less than 10 and a VIF of 1 is well below the cut-off of 10 hence the absence of multicollinearity. In summary there is no multicollinearity among the variables entered into the model hence all the variables can be used in the estimation of our model for both cases of ILLIQ inclusion and ILLQMA inclusion in the mo

4.5 The Cross Sectional Relationship between illiquidity and stock returns:

4.5.1 Do Returns increase in Illiquidity?

Following Amihud (2002) to estimate the following Fama-McBeth (1973) type cross sectional regression model for each month during the sample period where monthly stock return, R_{imy} is a function of illiquidity and a set of control variables,$\sum X_{ji,y-1}$

$$R_{imy} = K_{0my} + \sum_{j=1}^{j} K_{jmy} X_{ji,y-1} + U_{imy} \quad (9)$$

Where

R_{imy} is return on stock $\boldsymbol{i}$ in month m of year **y** and $X_{ji,y-1}$ is characteristic j of stock $\boldsymbol{i}$ estimated from data in year $y-1$.

K_{jmy} coefficient measures effects of stock characteristics on expected return and

U_{imy} are the residuals.

In order to test whether returns increase in illiquidity, firstly the model for calculating betta the measure of risk was estimated and this is given as follows:

$$R_{pty} = a_{py} + \beta_{py} RM_{ty} + e_{pty} \quad (10)$$

The following model was obtained after regressing portfolio returns against market returns:

$$R_{pty} = 0.086 + 12.642RM_{ty} + e_{pty} \quad (11)$$

From the regression equation (11), unit increase in market return would cause a 12.64 change in the return of a portfolio. The results obtained showed a statistically significant correlation between market return and portfolio returns with a relatively fair correlation of 0.62 as shown in the table in Appendix 1.

4.5.2 Validation of the Main Regression Model:

Having estimated the values of beta the risk variable, the cross sectional regression model given as follows was estimated:

$$R_{imy} = K_{0my} + \sum_{j=1}^{j} K_{jmy} X_{ji,y-1} + U_{imy} \quad (12)$$

This was estimated under the null hypothesis that returns increase in illiquidity while the alternative hypothesis was that returns do not increase in illiquidity.

The model after estimation was then given as follows:

$$R_{imy} = 10.648 - 0.022ILLIQ + 0.142StdReturn - 0.146LnCap - 0.595\ Beta \quad (13)$$

The effect of the constant on the dependent variable is that a unit increase in the constant would cause a change in returns of 10.648. The coefficient of ILLIQ is negative and this means that the illiquidity measure has a negative effect on stock returns. A unit increase in illiquidity would cause a 2% decline in returns.

The standard deviation of returns showed a positive relationship with returns meaning a unit increase in standard returns would cause a 14% increase in returns. Size being measured by ln cap had a negative effect on returns meaning increasing size by a unit would cause a decline in returns of 15%.

Lastly beta the measure of market risk showed a negative effect on returns meaning that a unit change in market risk would cause returns to move in the opposite direction by approximately 60%.

4.5.3 *Relationships between explanatory variables and dependent variable:*

The results obtained (shown in Appendix 2) means that market has the greatest explanatory power as compared to other explanatory variables. Illiquidity measure does not have a huge impact on returns and this might reflect that investors do not worry about liquidity but focus more on riskiness of the market in the context of the Zimbabwe Stock Exchange.

Furthermore, there is a significant negative relationship between *illiq*, the illiquidity measure and stock returns. Although the relationship is significant, it is however weak, meaning that it does not really explain changes in stock returns on the ZSE. This means a unit change in illiq would cause a 2% decrease in returns. Most researchers concluded on a positive relationship between measures of illiquidity and stock returns and found that the Amihud measure of illiquidity and expected return are strongly related [Amihud (2002), Brennan & Subrahmanyam (1996) and Xiaoxia Lou & Tao Shu (2014)] . However Langeroodi et al (2014) concluded that there isn't a significant relationship between Amihud measure of illiquidity and returns, while Brennan et al found that dollar volume has a significant negative relationship on cross section of stock returns. He found that stock returns were decreasing in turnover making it consistent with a negative relationship between illiquidity and stock returns. However, the results obtained in this study are consistent with other studies carried out by Yahyazadehfar, Khoramdin (2008), Change et al (2010) who found a significant negative relationship between Amihud measure and returns.

Ln cap which is size was found to have a significant negative relationship with returns meaning that a unit increase in size would cause a 15% change in returns. The results are consistent with those of Brennan et al who found size to negatively affect returns as well as Banz (1981), Reinganum (1981), Fama and French (1992). Amihud (2002) also found a significant negative relationship between stock returns and ln cap. The negative coefficient is probably due to ln cap being a proxy for the reciprocal of expected return according to Berk (1995).

Results also show that there is non-significant negative relationship between dividend yield and return. A unit increase in dividend yield would cause a 13% decrease in returns. Dividend was also found to be negatively related to returns in the study by Redding (1997) who suggested that large investors prefer companies with high liquidity and also prefer receiving dividends DIVYLD may also have a negative effect on return across stocks if it is negatively correlated with an unobserved risk factor, that is, stocks with higher dividend are less risky.

There is a significant negative relationship between beta and returns meaning that a unit increase in beta values would cause a 60% fall in returns. This is in contrast to the results obtained in Amihud (2002) where he found a significant positive relationship. Risk and illiquidity should be positively related according to theory and Stoll (1978) proposed that stock illiquidity is positively related to the stock‘s risk since the bid-ask spread by a risk averse market is increasing in stock’s risk. Constantinides (1986) also proposed that the stock variance positively affects the return that investors require on the stock since it imposes higher trading costs on them due to the need to engage more frequently in portfolio rebalancing.

R- Squared of the model was 0.624 with an adjusted R -Square of 0.607 meaning that the variables in the model explain 62% of the variations in stock returns. The R square vale helps to determine the strength and direction of the relationship between dependent variables and the independent variables. Thus the variables input in the model showed a sufficient explanatory power on the model.

Thus a 1% increase in the variables would cause a 62% change in monthly returns. The standard error is the measure of dispersion around the regression line and in this case it was 0.3799949 meaning that the equation is a perfect estimator. In terms of making a unique contribution to the dependent variable considering the standardised coefficients,LnCap made the largest unique contribution to the dependent of -0.526, followed by betta the measure of risk, standard return, illiq, R60Y and R60YR in that order. However only four of the variables were statistically significant while dividend yield, R60Y and R60YR failed to make a statistically significant unique contribution to the dependent variable. The results on R -Square and ANOVA table are given as follows:

TABLE II : SUMMARY RESULTS FOR THE MODEL WHICH INCLUDES ILLIQ

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.790[a]	.624	.607	.3799949	.69	23.721	1	129	.000	1.844

a. Predictors: (Constant), betta, R60Y, R60YR, illiq, stdreturn, dividendyeild, lncap

This test is used to measure serial correlation residuals whereby autocorrelation within the regression output is tested. This value usually lies between 1.5 and 2.5 and this shows that the variables are independent and not tied to the others through autocorrelation. The result shown in the model summary above shows a Durbin Watson result of 1.844 and this represents a good level of independence between the variables, thus the variables which are captured by the model are not affected by autocorrelation.

4.5.4 Inclusion of ILLIQMA in the model:

Since average illiquidity varies considerably over the years, ILLIQ was replaced in the estimation of the cross section model by its mean adjusted value called ILLIQMA. Thus replacing the illiquidity measure ILLIQ by it mean adjusted measure ILLIQMA resulted in the following regression model.

R_{imy}=11.125 -0.024ILLIQMA +0.145StdReturn -0.152LnCap –0.631Betta (14)

The replacement was due to the fact that average illiquidity varies considerably over the years. The results are shown in Appendix 3 :

The results shows that there is a non-significant positive relationship between R60Y and returns. A unit increase in R60Y would cause an approximately 8% change in returns. There is a non-significant negative relationship which means that a unit increase in the R60YR value would cause an approximately 4% change in returns. The results show that there exists a positive relationship between the two variable meaning that a unit increase in total risk denoted by standard return would cause a 15% change in returns.

The results show that there is a significant negative 15% relationship between lncap and returns meaning that a unit change in lncap would cause a decrease in returns. These results are consistent with those obtained in Brennan et al who found size to negatively affect returns as well as Banz (1981), Reinganum (1981), Fama and French (199).

There is a non-significant relationship between dividend yield and monthly returns. A unit change in dividend yield would cause a 73% change in monthly returns.

There is a significant negative relationship between betta the market risk and monthly returns which shows that a unit change in market risk would cause a 63% decrease in stock returns

The results also show that there is a significant negative relationship between mean adjusted value and stock returns meaning that unit change in illqma would cause a 2% change in returns. Although the relationship is significant there is a weak relationship. This is in contrast with results obtained in Amihud (2002).

4.5.5 Model Fitness after replacing ILLIQ with ILLQMA:

The R -Square value was 0.651 with an adjusted R- Square of 0.32 this means that only 65%of the variations in stock returns is caused by the variables included in the study. The standard error was 0. 3677705 meaning the equation is perfect estimator. Each of the variables made the following unique contributions to the dependent variable staring from the independent with greatest contribution, LnCap, Betta the measure of risk, standard return, illiqma, dividend yield, R60Y and R60YR in that order. Three variables had no statistically significant contribution to the dependent variable monthly return and these were dividend yield, R60Y and R60YR as their sig values were greater than 0.05. The results obtained are shown below:

TABLE III: MODEL SUMMARY FOR REGRESSION MODEL AFTER REPLACING ILLIQ WITH ILLIQMA

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.807[a]	.651	.32	.3677705	.27	9.718	1	128	.00	1.804

a. Predictors: (Constant), illiqma, dividendyeild, R60Y, lncap, R60YR, stdreturn, betta

b. Dependent Variable: monthly return

The results shown above shows that including ILLIQMA in the model which takes into account variations in illiquidity across stocks helps to better explain variations in stock returns than using ILLIQ which is a 3% change. They also show a Durbin Watson result of 1.804 and this represents a quite reasonable level of independence between the variables as it is in the 1.5-2.5 range, thus the variables which are captured by the model are not affected by autocorrelation.

Table IV ANOVA[b] Table

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	88.859	7	12.694	14.989	.000[a]
	Residual	111.794	132	.847		
	Total	200.653	139			

a. Predictors: (Constant), illiqma, dividendyeild, R60Y, lncap, R60YR, stdreturn, betta

b. Dependent Variable: monthlyreturn

The ANOVA table above shows results obtained of sum of squares, the degrees of freedom, the mean square, the F-test and significance value. The significance value shows whether the means during the test were relatively the same or they were significantly different from one another. Thus a significant value of less than 0.05 would mean that there is a statistically significant difference between the means. In the table below the significance value is less than 0.05 that is it is 0.000 and this shows that there is a statistically significant difference between the means. The test statistic in this study the F- statistic is 14.989. The sum of squares of the regression between each observation and the overall mean is 88.859 corresponding to 7 degrees of freedom.

TABLE IV: RESULTS FOR MODEL AFTER REPLACING ILLIQ WITH ILLIQMA

ANOVA[b]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	88.859	7	12.694	14.989	.000[a]
	Residual	111.794	132	.847		
	Total	200.653	139			

a. Predictors: (Constant), illiqma, dividendyeild, R60Y, lncap, R60YR, stdreturn, betta

b. Dependent Variable: monthlyreturn

The explanatory power of the variable was further reduced when illiqma replaced illiq. R- Square became 0.442 with an adjusted R -Square of 0.426 meaning only 43% of model is being explained by the variables as shown above. The model with illiq provides more explanatory power as it has a high R- Square than that with illiqma. To conclude the research found a significant negative relationship between illiquidity and stock returns on the ZSE since both Illiq and Illiqma coefficients in the models are negative indicating a negative relationship. This means that an increase in illiquidity will lead to a decrease in stock returns. This was in line with the studies carried out by Chen &Khan (1996), Eleswarapu (1993), Marshall (2006). Also Guy and Birchwood found a bnegative relationship between illiquidity and stock returns on the Trinidad and Tobago Stock Exchange. Another researcher who found a negative relationship was Nasir Akram (2014) on the Pakistan Stock exchange and Yahyazadehfar, Khoramdin (2008), as well as Change et al (2010)

What Is The Depth Of Illiquidity Of The ZSE Listed Stocks?

Average stock illiquidity for the period 2009-2013:

Average illiquidity for the stocks admitted to the sample for the period 2009-2013 was calculated by averaging the yearly illiquidity values for each stock. A stock with the least value of illiq is considered the most liquid stock and a stock with the greatest value of illiq is considered the most illiquid stock. Significant daily price changes and low levels of turnover lead to high values of the measure of illiquidity. Constant turnover levels but greater price changes cause higher values of ILLIQ, while low levels of price change and higher values of turnover will lead to lower values of this measure. The table below shows stocks ranked according to their level of liquidity with the highly liquid stock being Hippo and the most illiquid stock being Boarder. These results are shown below:

TABLE V: RESULTS FOR TOP 5 MOST LIQUID AND TOP 5 MOST ILLIQUID STOCKS ON THE ZSE

Top 5 most liquid stocks		Top 5 most illiquid stocks	
Counter	**ILLIQ value**	**Counter**	**ILLIQ value**
HIPPO	0.18364869	TA.HOLDS	153.176433
DAIRIBOARD	0.183805086	AFRE	136.4630324
OK ZIM	0.290927916	BOARDER	60.71579216
NATFOODS	0.316573763	BINDURA	49.86119222
DELTA	0.327782779	RIOZIM	42.02320864

The measure of Amihud was found to be able to measure extent of illiquidity as the values of illiquidity shown in the table above are in line with those obtained by other researchers in the developed markets. This means that the Amihud measure can be applied in any market regardless of being developed or undeveloped, due to the easy availability of the data required for its calculation. The results obtained were in line with those obtained by Vladimir BENIĆ* et al (2008) where the illiquidity values ranged from 18.0517 to 0, 8102 with maximum value being 18.0517, minimum value of 0.8102 and mean of 5.0828. In the case of Zimbabwe the results obtained were as follows a maximum value of 60.71579216, minimum value of 0.18364869 and a mean of 19,1859524. The average illiquidity is very high showing that the Zimbabwean local bourse is very illiquid therefore there is need to adopt strategies which can improve liquidity of stocks on the ZSE and these include

What Is The Relationship Between Amihud Measure And Stock Returns On The ZSE?

The relationship between the Amihud measure ILLIQ and stock returns was tested under the hypothesis that there is a significant relationship between Amihud measure of illiquidity and stock returns:

The following regression model was used to test the hypothesis:

$R_{imy} = K_{0my} + \beta_1$ ILLIQ + β_2 LnCap + β_3 Stdreturn + β_4 DivYeild + β_5 R60Y+ β_6 R60YR + β_7 Betta + U_{imy}

TABLE VI: RESULTS FOR THE COEFFICIENTS OF EXPLANATORY VARIABLES

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95% Confidence Interval for B		Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
1	(Constant)	10.648	1.392		7.647	.000	7.894	13.402		
	Illiq	-.022	.006	-.230	-3.483	.001	-.034	-.009	.924	1.082
	R60Y	.061	.303	.013	.201	.841	-.538	.659	.971	1.030
	R60YR	-.032	.343	-.006	-.093	.926	-.710	.646	.922	1.085
	Stdreturn	.142	.032	.300	4.434	.000	.078	.205	.877	1.141
	Lncap	-.146	.020	-.526	-7.198	.000	-.186	-.106	.753	1.329
	dividendyeild	-11.128	52.822	-.014	-.211	.833	-115.615	93.360	.876	1.141
	Betta	-.595	.091	-.496	-6.575	.000	-.775	-.416	.708	1.413

a. Dependent Variable: monthlyreturn

As shown in table above, the coefficient of ln cap is found to be significant, thus the null hypothesis that there is a significant relationship between Amihud measure and stock returns is confirmed. However, the results show that there is significant negative relationship between ILLIQ and stock returns since the correlation coefficient of both ILLIQ and LnCap are negative**.**

The same results are obtained when ILLIQ is replaced with ILLIQMA in the regression model. The results obtained in this study are consistent with those found by the researchers Yahyazadehfar, Khoramdin (2008), Change et al (2010) who expressed a significant negative relationship between Amihud measure of illiquidity and stock returns. However Langeroodi et al (2014) expressed a non-significant relationship between Amihud measure of illiquidity and stock returns on the Croatian Stock Exchange.

5. CONCLUSIONS, AND POLICY RECOMMENDATIONS

The conclusion on the illiquidity- return relationship is that returns do not increase in illiquidity but rather the two variables move in opposite directions. This means that if illiquidity increases then the returns are likely to decrease and if illiquidity decreases returns on stocks are likely to increase. This might suggest that investors in Zimbabwe are risk averse and do not wish to hold illiquid assets but rather prefer liquid assets which provide a better return. Another reason might be because of the broader market conditions where smaller capitalisation stocks have business challenges and their capital base will be low so they tend to not be able to absorb shocks in the system. The other reason is that the market has been moving down and is distressed following the broader market conditions hence investors tend to avoid lower market capitalisation stocks.

We also concluded that Amihud illiquidity measure can be reliably applied to developing markets like Zimbabwe. We conclude that our local bourse is illiquid as most stocks' illiquidity values were above 1 as compared to markets like German where illiquidity values were found to be below 1 in absolute values.

Lastly the research showed that there is a significant relationship between Amihud measure of illiquidity and stock returns meaning an increase in Amihud measure would cause a decline in returns and a decrease in Amihud measure would result in an increase in returns. However the relationship is weak. This is because higher market capitalised stocks tend to be liquid hence stocks with lower market capitalisation tend to be illiquid. The results obtained are consistent with those found by the researchers Yahyazadehfar, Khoramdin (2008), Change et al (2010) who expressed a significant negative relationship between Amihud measure of illiquidity and stock returns. However Langeroodi et al (2014) expressed a non-significant relationship between Amihud measure of illiquidity and stock returns on the Croatian Stock Exchange.

The other reason for negative illiquidity-return relationship is due to the inconsistent policies in particular the monetary policy where investors have no autonomy in money supply so velocity is low It is of paramount importance that companies be encouraged to list on the ZSE so as to facilitate liquidity in the market.

Lastly, any country which seeks to attain greater economic development should not underscore the importance of capital market liquidity. This can only be achieved through collective efforts of all industry such as the regulators, the investors, the listed companies themselves and the investment banking firms. If all stakeholders play their roles in the acceptable manner, capital market liquidity can be achieved. When this is achieved, the stock exchange stands to benefit because market capitalization is more likely to go up. The listed companies as well as the investors benefit greatly from a more liquid market. This would be a win-win game compared to where the market is illiquid and the investors stand to lose because they own shares but cannot sell them if they need money. Portfolio managers should invest in liquid assets and they should employ buy and hold for illiquid stocks and create value type portfolios with a medium-long term focus as liquidity might improve in the long run.

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APPENDIX - A

Appendix 1: Table of correlations

		PORTFOLIO RETURN	MARKET RETURN
Pearson Correlation	PORTFOLIO RETURN	1.000	.620
	MARKET RETURN	.620	1.000
Sig. (1-tailed)	PORTFOLIO RETURN	.	.000
	MARKET RETURN	.000	.

Appendix 2:

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95% Confidence Interval for B		Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
1	(Constant)	10.648	1.392		7.647	.000	7.894	13.402		
	Illiq	-.022	.006	-.230	-3.483	.001	-.034	-.009	.924	1.082
	R60Y	.061	.303	.013	.201	.841	-.538	.659	.971	1.030
	R60YR	-.032	.343	-.006	-.093	.926	-.710	.646	.922	1.085
	Stdreturn	.142	.032	.300	4.434	.000	.078	.205	.877	1.141
	Lncap	-.146	.020	-.526	-7.198	.000	-.186	-.106	.753	1.329
	Dividend yeild	-.128	52.822	-.014	-.211	.833	-5.615	13.360	.876	1.141
	Betta	-.595	.091	-.496	-6.575	.000	-.775	-.416	.708	1.413

a. Dependent Variable: monthly return

Results obtained for the regression model after replacing ILLIQ with ILLIQMA:

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.	95% Confidence Interval for B		Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
1	(Constant)	11.125	1.414		7.869	.000	8.329	13.922		
	R60Y	.079	.310	.017	.254	.800	-.534	.692	.972	1.029
	R60YR	-.035	.353	-.007	-.098	.922	-.732	.663	.913	1.095
	Stdreturn	.145	.033	.308	4.388	.000	.080	.211	.855	1.170
	Lncap	-.152	.021	-.548	-7.369	.000	-.193	-.111	.763	1.311
	Dividendyeild	-.728	1.088	-.020	-.291	.772	-2.719	5.263	.877	1.140
	Betta	-.631	.092	-.526	-6.885	.000	-.813	-.450	.724	1.381
	Illiqma	-.024	.010	-.157	-2.305	.023	-.044	-.003	.914	1.094

a. Dependent Variable: monthly return

Model summary for estimating beta:

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.818[a]	.670	.649	.3591806	2.325

a. Predictors: (Constant), MARKET RETURN

b. Dependent Variable: PORTFOLIO RETURN

R- Square of the model was 0.670 implying that about 67% of the variation in portfolio returns is being explained by the market returns leaving the other 33% to other factors. Thus a 1% increase in the market return would cause a 67% change in portfolio return The adjusted R- Square of 0.649 which is almost 65% is even closer to 67% implying a perfect relationship between the two variables. The standard error was 0.359 meaning that the equation is a perfect estimator.

ANOVA Results Obtained From Estimation of Beta

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	19.299	1	19.299	86.292	.000[a]
	Residual	30.864	138	.224		
	Total	50.163	139			

a. Predictors: (Constant), MARKET RETURN

b. Dependent Variable: PORTFOLIO RETURN

The model was found to be statistically significant as shown by a high F-statistic value of 19.299.in the ANOVA table above. The F- statistic was 86.292 and the degrees of freedom for the regression was 1 with a sum of squares of 19.299.

Tolerance was 1 which is above 0.10 showing no signs of multicollinearity, and Variance Inflation Factor was 1 which is way below 10 showing the absence of multicollinearity.