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Liquidity-Adjusted Capital Asset Pricing Model in Emerging Market: How is Ghana Faring?

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ABSTRACT

Corporate Social Responsibility (CSR) with its many facets of definitions and practices is used to examine the effect of illiquidity risk on expected excess stock returns in Ghana. As a corporate social responsibility, the GSE recently engineered the operation of what it termed the Ghana Alternative Market in 2015 since one of the cardinal pillars of CSR is to drive change towards sustainability focusing on businesses with a high potential for growth. Evidence exists to show that liquidity risk can be measured using the conditional asset pricing model in Ghana. It is realized that systematic liquidity risk is priced in Ghana using the different risk premia. It emerge that though the size of market capitalization in Ghana is small with its small firm size, liquidity risk is priced systematically irrespective of the type of the market. Our evaluation concludes that under different market situation, the Ghanaian economy is more align to the downward market where stocks were priced during the period of the last financial shock. Cross listing of stock and regional market, integration in Sub-Sahara Africa is a policy option managers of the economies within the sub region should focus.

Keywords: Corporate Social Responsibility, Liquidity Risk, Asset Pricing, Emerging Market, sub-Sahara Africa.

I. INTRODUCTION

1.2. International Evidence

Corporate social responsibility is a multifaceted concept that has evolved over the years with many definitions and practices. According to a standard definition, Paul and Siegel(2006), define corporate social responsibility(henceforth CSR) as a set of corporate practices which improve upon social and environmental regulatory standards of the markets in which such corporations operate Whatever the definition is, the core purpose of CSR is to drive change towards sustainability. Originally, it was a concerted effort on the part of business entities to engage in broader social issues in relation to ethical or moral concern (Bowen and Johnson, 1953).Over the years; however, it has metamorphosed into strategic CSR (McWilliams and Siegel). In the modern world, CSR is shifting from the maximization of an investor profit to shareholders welfare. The question that has being engaging the minds of managers as well as the corporate world is whether a change in direction towards corporate engagement in welfare of it entities is the answer to the poor performance of stocks in Sub-Sahara Africa. As an example, the GSE recently engineered the operation of what it termed as the Ghana Alternative Market in 2015 with a focus on businesses with a high potential for growth. The aim is to accommodate these companies at varies stages of their development, including start-ups and existing ones, both small and medium with the aim of grooming them to become bigger in the future (GSE, 2015). An opportunity to examine the nexus between the role of corporate social responsibility and corporate performance is to test the performance of CSR model through the performance of the Ghana stock exchange.

In financial economics, investors as well as market makers play pivotal roles in facilitating and influencing the allocation of resources. This calls for a concerted effort in the study of the equity market in the world.

Amihud and Mendelson (1986) were one of the pioneers to have devoted their time to empirically study the traditional capital asset pricing model (CAPM), which shows the relationship between liquidity and asset pricing. As a follow up to the study by Amihud and Mendelson (1986), a number of studies examine the role of liquidity in asset pricing by using different proxies for liquidity. Acharya and Pedersen (2005) for instance present a theoretical model that decomposes liquidity risk into tripartite groups for analytical purposes. Brennan and Subrahmanyam (1996) find a positive relationship between stock returns and the variable component of the bid-ask spread. Lesmond et al (1999) introduce the ratio of zero daily returns as a proxy for trading costs. Amihud (2002) uses the ratio of absolute returns scaled by the dollar trading volume to capture the price impact. Liu (2006) develops a measure that considers both stock turnover and zero trading volume to capture multiple liquidity dimensions. Datar et al. (1998) document a negative relationship between stock returns and share turnover.

Most of the studies mentioned so far done in the US with very little work in Sub-Sahara Africa. In the light of this, the study of the stock market in Sub-Saharan Africa (SSA) has become imperative. Sub-Saharan Africa (SSA) markets are the only ones that have not attracted the needed study, though not surprising since these markets were established not long ago. It is dominated with volatile but substantial returns which is crowded with different degrees of liquidity cost.(Wheeler, 1984; Mosley et al., 1995) document that Africa's past problems were largely a function of structural and international factors and, as such, they are likely to continue. The exchanges are small relative to their own economies with market capitalization in Nigeria being only 8 per cent of GNP, while Kenya, Ghana and Zimbabwe's capitalizations are 25-35 per cent (Sally, 2013).As a result of these shortcomings, majority of these markets do not make it to the regional equity market indices and are therefore excluded from the Global Emerging Market (GEM) portfolio funds.

1.2. Ghana Evidence

The Ghana stock exchange which was incorporated in 1989 commenced trading in 1990 as a public company limited by guarantee with a charge to facilitate the trading of securities in a fair and transparent manner. It is important to emphasis that though the market is partially G30 compliant, regulation is weak with trades and prices often being agreed informally and the market institutions merely being used to announce pre-agreed details (Akotey, 2008). It was adjudged as the world's best performing market at the end of 2004 with a year return of 144% in US dollar terms compared with a 30% return by Morgan Stanley Capital International Global Index (Databank Group, 2004).With the exception of Cape Verde with a positive sign for size, Ghana and other 11 SSA countries have price, volatility, traded volume and market capitalization being negatively associated with illiquidity(Bruce Hearn,2013).(Amihud andMendelson, 1986, Brennan and Subrahmanyam, 1996, Amihud ,2002) document that the (i)expected excess returns increases with the level of illiquidity and with the (ii) covariance of asset returns and illiquidity, and (iii)with market returns and market illiquidity. This indicates that beyond the traditional market CAPM-COV[1] model, the LCAPM unearth additional three factors which influence pricing of assets. That is, expected returns increases with the covariance between asset illiquidity and market illiquidity denoted as COV[2]; covariance of the asset returns and market illiquidity denoted as COV[3] and finally covariance between asset illiquidity with market returns denoted as COV[4].

To the best of our knowledge, our study is the first to empirically carry out such a research using covariance in testing Liquidity-adjusted capital asset pricing model (LCAPM) in Sub-Sahara Africa using data from the Ghana Stock Exchange. We contribute to the body of literature by using the Acharya and Pedersen LCAPM to know how functional the model works in Ghana with respect to returns to the investors. Secondly, this study will verify the extent to which the price impact factor influences investment behavior in Ghana. Third, this paper examines the illiquidity risk factors and its characteristics effects or otherwise on the stock market in Ghana.

The rest of this paper is organized as follows; in section 2, we discuss hypothetical scenarios. Section 3 looks at the methodology and the research design. Section 4 discusses data and report summary statistics for the market and section 5 serves as the conclusion of the study.

II. METHODS AND MATERIAL

2. Data and Research Methodology

2.1. Data

The data for this research is for a period of ten years (10) of trading obtained from the Ghana Stock Exchange (GSE) situated in the Cedi House in Accra. The daily trading was originally three (3) days but it now runs for five working days from Monday to Friday between 10:00am-11:00am involving a number of equities. The opening and closing prices, the year high and low, closing bid and offer prices, etcetera were all obtained from the GSE data stock. It was observed that, some of the stocks seldom trade on the market. Not to present misleading data and information, all stocks must be traded throughout the period under review. For instance, a stock must trade for 2 days a work in order to be considered for evaluation. Any stock that is traded after closing time is also excluded to prevent bias in the outcome of our results. At the end of the evaluation, we were left with 35 equities in the data to deal with.

2.2. Hypothesis

For the purpose of the study, certain fundamental ground rules must be set as a guide for moving forward. The following hypothesis is stated:

1. The covariance between asset illiquidity and market illiquidity is positively correlated with illiquidity risk. Investors normally require compensation for holding an asset that becomes illiquid when the market is illiquid.
2. The covariance between asset returns and market illiquidity is negatively related to stock returns. Investors are willing to accept lower returns on an asset with high market illiquidity.
3. The covariance between asset illiquidity and market returns is negatively related to stock returns. This reflects assets with a high liquidity when the market is down. We intend to verify the combine systematic effect of the individual liquidity risks on a market-wide basis in the Ghanaian market. To this end, our stated next hypothesis is that
4. The aggregated liquidity risk is priced in Ghana. In addition, we want to find out how persistent liquidity in the region is by using the GSE a reference point. To this end, our next hypothesis states that
5. To invest in smaller market is risky than in bigger markets.
   Sub-Saharan African region is said to have small markets compare with other regions such as US, Asia, and Europe. Consensus has not being reached on the riskier market(s) to invest.

3. Research Design

3.1. Measurement of Liquidity

Many scholars in their research to find out the effect of risk on returns adopted different approaches to the measurement of liquidity. Bruce Hearn (2013) who studied the West African terrain use three different ways in measuring illiquidity such as the bid-ask price of Jones (2002), the daily zero ratio of Lesmond (1999) and the illiquidity measure of Liu (2006).these measurements are in line with the Kyle price impact factor (1985).Following Kyle (1985) price factor,Amihud(2002) develop an illiquidity ration which is the subject of our discussion as follows

$$ILLIQ_{i,t} = \frac{1}{D_{i,t}} \sum_{d=1}^{D_{i,t}} \frac{|R_{i,t,d}|}{V_{i,t,d}} \qquad \text{.....(1)}$$

Where $R_{i,t,d}$ denotes absolute stock return of *i* on day *d* and month *t*.$V_{i,t,d}$ is the volume of trading for stock i on day d and of month *t*, and $D_{i,t}$ is the sum of trading days for stock i and month *t*. The Amihud illiquidity measurement is premise on everyday trading on the stock market and it is measured on data from daily trading activities of returns on volume ratio. It is anticipated that a higher ratio of the Amihud illiquidity measure is assumed to be preceded by a lower liquidity. This means that investors will prefer to be compensated (normally called risk premium) for holding such securities in period of insecurity.

3.2. The Conditional LCAPM

The traditional CAPM is a costless model and therefore does not have any cost factor associated with it. However, recent studies reveal that factoring cost such as the a round trip for market makers, Administrative cost in the discharge of their work as well as the time spent in looking for a buyer or seller of a security all constitute cost in the market. Due to this, we select the Liquidity–adjusted capital asset model (LCAPM) of Acharya and Pedersen (2005) as the foundation of our model for this study. One fundamental difference

between the traditional CAPM and the LCAPM is the introduction of liquidity cost in the LCAPM as against a cost free CAPM. According to Acharya and Pedersen (2005), the standard CAPM holds for expected net returns (that is net of the relative illiquidity cost): $E_t(r^i_{t+1} - c^i_{t+1})$ .Consequence to this, the conventional version of the LCAPM is given as;

$$(R_{i,t} - R_f) = E_{t-1}(C_{i,t}) + \varphi_{t-1}Cov_{t-1}(R_{i,t}, R_{m,t}) + \varphi_{t-1}Cov_{t-1}(C_{i,t}, C_{m,t}) - \varphi_{t-1}Cov_{t-1}(R_{i,t}, C_{m,t}) - \varphi_{t-1}Cov_{t-1}(R_{m,t}, C_{i,t}) \quad \ldots\ldots\ldots\ldots\ldots\ldots (2)$$

Where $R_{i,t}$is the gross return for stock *i* at month *t*, R_f denotes gross risk-free rate, and $C_{i,t}$ represents the trading cost for stock i at month *t*.

The unconditional LCAPM is arrived by assuming conditional variance shown below:

$$E(c^i_t - r^f_t) = E(c^i_t) + \lambda\beta^{1i} + \lambda\beta^{2i} - \lambda\beta^{3i} - \lambda\beta^{4i} \quad \ldots\ldots\ldots\ldots\ldots\ldots (3)$$

Each of the betas in Equation 3 is then interpreted as follows;

$$\beta^{1i} = \frac{cov\left(r^i_t, r^M_t - E_{t-1}(r^M_t)\right)}{var(r^M_t - E_{t-1}(r^M_t) - (c^M_t - E_{t-1}(c^M_t))} \quad \ldots\ldots..\ldots\ldots (4)$$

$$\beta^{2i} = \frac{COV(c^i_t - E_{t-1}(c^i_t),\ c^M_t - E_{t-1}(c^M_t))}{var(r^M_t - E_{t-1}(r^M_t) - [c^M_t - E_{t-1}(c^M_t)]} \quad \ldots\ldots\ldots\ldots (5)$$

$$\beta^{3i=} \frac{COV(r^i_t, c^M_t - E_{t-1}(c^M_t))}{var(r^M_t - E_{t-1}(r^M_t) - [c^M_t - E_{t-1}(c^M_t)]} \quad \ldots\ldots\ldots\ldots\ldots (6)$$

$$\beta^{4i=} \frac{COV(c^i_t - E_{t-1}(c^i_t), r^M_t - E_{t-1}(r^M_t))}{var(r^M_t - E_{t-1}(r^M_t) - [c^M_t - E_{t-1}(c^M_t)]} \quad \ldots\ldots\ldots\ldots\ldots (7)$$

Where r^i_t is the return of stocks *i* at month *t*, r^M_t is the market return at month t, c^i_t is the liquidity cost for stock *i* at month *t*, and c^M_t is the market aggregate liquidity cost at month *t*.

In the light of the LCAPM propounded by Acharya and Pedersen, three additional risk factors are added to the traditional CAPM risk factor $covt(r^i_{t+1}, r^M_{t+1})$ to indicate that when dealing with the causes of asset pricing, the incorporation of the new factors is of paramount importance. Commonality which is the name for the first illiquidity risk factors which shows the relations between illiquidity of the asset in question and the corresponding market illiquidity is given as covt(, c^i_{t+1}, r^M_{t+1}).In this situation, prospective investor require returns that is higher enough to compensate them for an asset whose illiquidity keeps on shooting up with its corresponding market illiquidity. The second is the covariance between the asset returns and market illiquidity given as (r^i_{t+1}, c^M_{t+1}); this is seen as a form of hedging against market illiquidity. Investors are prepared to take lower returns for asset with high market illiquidity.

Lastly, we have covariance between asset illiquidity and market returns denoted as(c^i_{t+1}, r^M_{t+1}) .In a situation of this nature, investors require lower expected returns for holding an asset with sensitivity to market returns as a hedge against periods of market meltdown.

The combine net effect of the covariance (Cov^5) is giving as

$$Cov^5 = Cov^2 - Cov^3 - Cov^4 \quad \ldots\ldots\ldots\ldots\ldots (8)$$

The LCAPM aggregated liquidity risk then becomes,

$$\mathrm{E}\,(r^i_t - r^f_t) = E(c^i_t) + \lambda^1 Cov^1 + \lambda^5 Cov^5 \quad \ldots\ldots\ldots (9)$$

lastly, aggregate systematic risk is

$$Cov^6 = Cov^1 + Cov^2 - Cov^3 - Cov^4 \quad \ldots. (10)$$

The LCAPM will then become:

$$\mathrm{E}(r^i_t - r^f_t) = E(c^i_t) + \lambda^1 Cov^1 + \lambda^6 Cov^6 \quad \ldots\ldots\ldots (11)$$

The Amihud Illiquidity ratio then becomes;

$$C^i_t = \alpha_0 + \alpha_1 c^i_{t-1} + \alpha_2 c^i_{t-2} + \ldots + \alpha_x c^i_{t-x} \quad \ldots\ldots\ldots (12)$$

$$r^i_{t+1} - r^f_{t+1} = \alpha_t + \lambda_1\mu^i_t + \lambda_2 Cov^1_t + \varphi_1 HLM_t + \varphi_2 SMB_t + \varphi_3 MOM_t \quad \ldots\ldots\ldots (13)$$

$$r^i_{t+1} - r^f_{t+1} = \alpha_t + \lambda_1\mu^i_t + \lambda_2 Cov^1_t + \lambda_2 Cov^2_t + \varphi_1 HLM_t + \varphi_2 SMB_t + \varphi_3 MOM_t \ldots (14)$$

$$r^i_{t+1} - r^f_{t+1} = \alpha_t + \lambda_1\mu^i_t + \lambda_2 Cov^1_t + \lambda_3 Cov^3_t + \varphi_1 HLM_t + \varphi_2 SMB_t + \varphi_3 MOM_t \quad \ldots\ldots\ldots (15)$$

$$r^i_{t+1} - r^f_{t+1} = \alpha_t + \lambda_1\mu^i_t + \lambda_2 Cov^1_t + \lambda_3 Cov^4_t + \varphi_1 HLM_t + \varphi_2 SMB_t + \varphi_3 MOM_t \quad \ldots\ldots\ldots (16)$$

$$r^i_{t+1} - r^f_{t+1} = \alpha_t + \lambda_1\mu^i_t + \lambda_2 Cov^1_t + \lambda_3 Cov^5_t + \varphi_1 HLM_t + \varphi_2 SMB_t + \varphi_3 MOM_t \quad . (17)$$

$$r^i_{t+1} - r^f_{t+1} = \alpha_t + \lambda_1\mu_t + \lambda_2 Cov^6_t + \varphi_1 HLM_t + \varphi_2 SMB_t + \varphi_3 MOM_t \quad \ldots. (18)$$

$$r_{t+1}^{i} - r_{t+1}^{f} = \alpha_t + \lambda_1 \mu_t + \lambda_2 Cov_t^1 + \lambda_3 Cov_t^2 + \lambda_4 Cov_t^3 + \lambda_5 Cov_t^4 + \varphi_1 HLM_t + \varphi_2 SMB_t + \varphi_3 MOM_t \quad \ldots\ldots\ldots\ldots (19)$$

Where r_{t+1}^{i} - r_{t+1}^{f} stock excess returns at month $t+1$, $Cov_t^1 to\ Cov_t^6$ are the covariance that are specified in equations (4) to (19).the *HML,SMB* and the *MOM* are the three Fama-French illiquidity factors which are used in the model as the control variables for the prediction of the excess returns.*HLM* is the ratio of the *High* minus *Low*, the *SMB* is the size of the market capitalization at month t and the momentum(*MOM*)propounded by Cahart(1997) denote 12 months cumulative returns with a month lag period. From the analysis, equation 13 to 16 will show an indication the bearings of the individual liquidity risk associated with the market.

III. RESULTS AND DISCUSSION

Table 1 : *Sample Coverage*

This table reports the sample population for the years within which this analysis is carried out, the number of firms per year, the average monthly return and the sum of the market capitalization.

Yr.	N	Mean	Median	Sum
2006	21	0.45	0.04	333.51
2007	21	0.47	0.04	384.19
2008	21	0.56	0.03	460.34
2009	24	0.66	0.03	530.01
2010	25	0.76	0.05	644.05
2011	30	0.69	0.03	640.17
2012	29	0.73	0.03	705.92
2013	32	0.72	0.04	662.64
2014	35	0.75	0.05	757.54
2015	35	0.85	0.05	948.35

Table 2 gives the ratio of the illiquidity covariance for the 10 portfolios form for the country by which the four covariance $covt\left(r_{t+1}^{i}, r_{t+1}^{M}\right)$,$(covt(r_{t+1}^{i}, c_{t+1}^{i})$,$covt(c_{t+1}^{i}, r_{t+1}^{M})$ and $(covt(r_{t+1}^{i}, c_{t+1}^{M})$ were estimated.

Table 2 Summary of Covariance

This table is the overall summary of the portfolio covariance calculated with respect to the individual liquidity stocks and their respective market returns.

	COV 1	**COV 2**	**COV 3**	**COV 4**	**COV 5**	**COV 6**
1	0.007869	2.427137	-0.28738	-0.0131	2.727616	2.735486
2	0.015948	1.639172	-0.76103	-0.02427	2.424472	2.44042
3	0.043958	1.178101	-0.34685	-0.02068	1.545623	1.58958
4	41.99649	0.774122	-3.31722	-0.10541	4.196754	46.19324
5	0.015814	1.087246	-0.72335	-0.02187	1.832464	1.848278
6	0.004623	3.695274	-0.16461	-0.00803	3.867921	3.872544

7	0.011107	0.814284	-0.29785	-0.01006	1.122195	1.133303
8	0.015887	1.643141	-0.67821	-0.02178	2.343131	2.359018
9	0.009531	0.395656	-0.30762	-0.01033	0.713605	0.723136
10	0.014383	0.823058	-0.41503	-0.01278	1.250863	1.265246

4.0. Empirical Analysis

4.1. Estimation LCAPM

We intend in this study to investigate the dynamics of the conditional LCAPM by using the simple time series regression analysis over the conventional Fama-French cross sectional analysis because Petersen (2009) indicates that the Fama-Macbeth (1973) analysis is inherently skewed towards cross-sectional correlation without accounting for serial correlation.As a result, we use a time series analysis technique for the work.

From table 3, we run the alternative influence of each of the covariance to find out their contribution to the total effect on liquidity .We first look at the effect of cov2 which is the covariance between asset illiquidity and market illiquidity giving as $COVt(C_t^i, C_t^M)$ which indicates that investors require compensation for holding assets that becomes illiquid in the period of market illiquidity.

Table 3: Effects of covariance on returns

This table reports the time series regression build for model number 1 to 7 and discuss the equations from 13 to 19.

Variables	1	2	3	4	5	6	7
COV1	0.001***	0.004***	0.000***	0.000***	0.003***		0.006***
	(0.036)	(0.036)	(0.038)	(0.037)	(0.036)		(0.037)
COV2		0.699					0.728
		(-0.006)					(0.003)
COV3			0.051**				0.990
			(0.067)				(0.000)
COV4				0.005***			0.159*
				(3.005)			(3.082)
COV5					0.368		
					(-0.012)		
COV6						0.029**	
						(0.08)	
HLM	0.469	0.511	0.742	0.600	0.530	0.799	0.690
	(-1.545)	(-1.553)	(-0.476)	(0.458)	(-1.357)	(0.933)	(0.520)
SMB	0.515	0.666	0.760	0.358	0.798	0.683	0.582
	(-3.796)	(-2.926)	(-1.203)	(2.349)	(-1.596)	(-4.63)	(2.12)
MOM	0.084*	0.237	0.152*	0.053**	0.099*	0.832	0.565

(0.099)	(0.133)	(0.059)	(0.052)	(0.158)	(-0.023)	(0.034)

* means statistical significance at 1%, **means statistical significance at 5%, *** means statistical significance at 10%.

From table 3, Cov^2 does not carry any significant value and thus is not worth analysing and hence lead to a total rejection of hypothesis one 1 which indicates that liquidity at the firms level and the market levels are positively related. We then look at the introduction of Cov^3 and it effect on the traditional CAPM. We see that Cov^3 which is the covariance between asset returns and market illiquidity is significant at 5% level when regress against the control variables such as the *HLM, SMB* and the *MOM*.In the Ghanaian situation, investors are prepare to accept lower returns for their investment in such a period when the market is unfavourable with the cost of doing business being high. This support hypothesis 2 and confirms Acharya and Pedersen(2005)assertion that in the event of an asset sensitivity to market illiquidity, investors are willing to accept lower returns for a market which is illiquid. However, the traditional Cov^1 is more significant at 1% level vis -avez Cov^3 in equation 15.In table 3, the regress Cov^4 is highly significant at the 1% level. Here, investors are willing to accept lower returns for assets in hand during periods of market downturn when investor confidence is down with portfolio investors unwilling to commit more resources into the market. In situations of this nature, investors look for alternative ways of investing other than the stock market such as depositing their portfolios in call accounts and hedging it against the Ghanaian market. Now that we have dealt with the individual covariances, we turn our attention to the effect of the net covariance and the systematic covariance to know the effect of the two on the market. From the table 3, we see the net Cov^5 not having any significant effect on the market; however, the combine effect of Cov^6 is significant at the 5% level indicating that systematic illiquidity risk is priced in the Ghanaian market.

4.2. Market Size

Small market size is sometimes synonymous to markets in SSA not because we are prone to establishing market of that nature but this may be due to the lack of ability to attract large investment into the region due to the perception of external investors of mismanagement on the part of managers of the economies. Most of the stocks in Sub-Sahara Africa exhibit some level of difference with regards to the characteristics of the stock returns to cost in question. Is it more advantageous to invest in smaller market size or in a more conventional way a bigger firm? It is revealing to note that sensitivity of stock returns to liquidity is largely a matter of size. For instance, it is empirically proven by Amihud, (2002) and Pastor and Stambaugh (2003) that smaller stocks are more sensitive to liquidity risk. This go to confirm the assertion that illiquidity effect is stronger when dealing with firms with smaller market capitalization such as those in the Sub-Sahara Africa. However, others researchers defer in opinion on this issues. For instance, Fabre and Frino (2004) find that commonality in liquidity is mainly a large firm phenomenon. This led us to find out the authenticity of the two assertions. To do this, we sort our data into three different groups with a 30: 40:30 size ratios base on their market capitalization concurrently for each month. We then set out to find out the results of the analysis. We find the Cov^3 and Cov^4 to be at the 5**% a**nd 1% level of significance respectively. This shows that the effect of both remain unchanged from table 3 and consistent between asset returns and market illiquidity as well as asset illiquidity and market returns though cov4 is highly significant. This indicates that at the individual levels, investors are sensitive to the market situation and are willing to accept lower returns with high market illiquidity as well as trade with a high liquid asset when the market is down respectively. We however shift our focus and concentrate on the net Cov^5 and the aggregated systematic risk Cov^6 to find out the combine effect of these two on liquidity. From table 4, net Cov^5 is not significant for all the market sizes in the Ghanaian case whiles interestingly, the combine systematic liquidity risk is significant at 5%. It can be concluded that the total effect is that liquidity is priced in Ghana irrespective of the market we operate in either small or big. This goes to confirm hypothesis 4 which states that the combine liquidity risk is priced in Ghana.

This table reports the time series regression build for model number 1 to 7 and discuss the equations from 13 to 19.
Table 4 (large)

Variables	1	2	3	4	5	6	7
Panel A							
COV1	0.001***	0.004***	0.001***	0.000***	0.003***		0.006***
	(0.036)	(0.036)	(0.038)	(0.037)	(0.036)		(0.037)
COV2		0.680					0.003
		(-0.007)					(0.413)
COV3			0.050**				0.001
			(0.067)				(0.021)
COV4				0.004***			0.157*
				(2.989)			(3.064)
C0V5					0.356		
					(0.012)	0.031**	
COV6						(0.027)	
						2.965	
HLM	0.486	0.525	0.761	0.597		0.766	0.684
	(-0.509)	(-1.524)	(-0.444)	(0.463)		(1.1)	(0.532)
SMB	0.552	0.697	0.797	0.357		0.743	0.575
	(-9.306)	(-7.013)	(-2.71)	(6.213)		(-9.906)	(5.646)
MOM	0.087*	0.232	0.154*	0.050**		0.846	0.564
	(0.099)	(0.135)	(0.059)	(0.052)		(-0.021)	(0.034)

* means statistical significance at 1%, **means statistical significance at 5%, *** means statistical significance at 10%.

Table 4 (medium)

variables	1	2	3	4	5	6	7
Panel B							
COV1	0.001***	0.004***	0.000***	0.000***	0.003***		0.001***
	(0.036)	(0.036)	(0.038)	(0.037)	(0.036)		(0.037)
COV2		0.701					0.126*
		(-0.006)					(0.007)
COV3			0.051**				0.980
			(0.066)				(-0.001)
COV4				0.005***			0.069*
				(3.001)			(3.37)
C0V5					0.371		
					(-0.012)		
COV6						0.029**	
						(0.028)	
HLM	0.460	0.504	0.737	0.606	0.524	0.804	0.695
	-1.585	-1.589	-0.49	0.459	-1.386	(0.913)	(0.52)

SMB	0.503	0.653	0.755	0.373	0.783	0.684	0.594
	-2.08	-1.625	-6.585	1.224	-9.145	-2.468	1.099
MOM	0.084*	0.238	0.151*	0.053**	0.100*	0.828	0.568
	(0.099)	(0.133)	(0.059)	(0.052)	(0.158)	(-0.023)	(0.034)

* means statistical significance at 1%, **means statistical significance at 5%, *** means statistical significance at 10%.

Table 4(small)

variables	1	2	3	4	5	6	7
Panel C							
COV1	0.001***	0.004***	0.001***	0.000***	0.003***		0.006***
	(0.036)	(0.036)	(0.038)	(0.037)	(0.036)		(0.037)
COV2		0.686					0.723
		(-0.006)					(0.003)
COV3			0.050**				0.988
			(0.067)				(0.001)
COV4				0.004***			0.157*
				(2.997)			(3.075)
C0V5					0.360		
					(-0.012)		
COV6						0.030**	
						(0.027)	
HLM	0.086*	0.234	0.154*	0.051**	0.098*	0.777	0.684
	(0.099)	(0.135)	(0.059)	(0.052)	(0.159)	(1.043)	(0.531)
SMB	0.542	0.689	0.787	0.353	0.816	0.722	0.573
	(-4.073)	(-3.084)	(-1.212)	(2.684)	(-1.641)	(-4.593)	(2.437)
MOM	0.481	0.521	0.757	0.595	0.538	0.840	0.563
	(-1.515)	(-1.528)	(-0.451)	(0.464)	(-1.336)	(-0.022)	(0.04)

* means statistical significance at 1%, **means statistical significance at 5%, *** means statistical significance at 10%.

4.3. Illiquidity Shock under Different Market conditions.

Pricing of asset has assumed a dimension of importance in the dynamics of equity trading especially when the market is confronted with different market situations such as market shocks as happened recently in 2008. In such occurrences, asset pricing may not exhibit the same or similar tendencies in the course of time (Anthinisz and Putnins, 2014, Pastor and Stambaugh, 2004). It is documented by Brennan et al. (2011) that during market downturn, price factors command more return premiums as illiquidity is incorporated into the equation.

Drawing inspiration from the above, we decided to test the liquidity risk in Sub-Saharan Africa with respect to stock returns in Ghana and see the reaction of the market to shocks under different market situations with it resultant outcome. Easley,Hvidjaer, and O'Hara(2010) reveal that the analytical illiquidity premium factor pioneered by Amihud(2002) was significant during the period between 1963-1983 but not in the sample period between 1984-2002. Following this revelation, we in turn followed Easley,Hvidjaer, and O'Hara(2010) and divided our stocks into upward and down(meltdown) periods. The upward period spans from the year 2006 to 2008 and we term it the period when the world economy was booming with its positive ripple effect on Sub-Sahara Africa and the downturn

period from 2009 to 2015 also showing the financial tsunami the world economy underwent during the period of total collapse of the world stock market.

The resultant findings are interesting and revealing in the Ghanaian case. The Ghanaian stock market enjoyed one of its strongest growths from the inception of stock trading on the Ghanaian market till the world financial crisis in 2008. During the world financial crisis in March, 2008, it suffered severely under the crunch as many investors were hedging their investment against the weaker markets including that of Ghana. The resultant outcome is the one that is reported in table 5 of our analysis. For the purpose of space, we tend to concentrate on the net cov5 and the systematic cov6 for our analysis of the two market situations. Equation 1 in both the downward market looks at the cov5 whiles equation 2 in both market concentrate on cov6. For equation 1,net liquidity risk is significant at 10% only in the up market but show no sign for cov6 the market-wide liquidity risk(systematic liquidity risk).In the case of equation 2,the net cov5 do not show signs of significance whiles the market-wide liquidity cov6 is significant at the 5% level. The results indicates that cov6 is more significant when run against all the control variables and we can conclude that liquidity risk is priced more in the down market in the Ghanaian than in the up market. The finding is also consistent with the findings of both table 3 and table 4 in our analysis.

This table reports of the risk in different market situations for equation 8. Cov1, cov5 and cov6 are the market net liquidity covariance and systematic liquidity covariance respectively.

Table 5 (Down and Up Markets)

	DOWN MARKET		UP MARKET	
Variables	1	2	1	2
COV1	0.023**		0.055**	
	(0.039)		(0.039)	
COV5	0.760		0.142*	
	(-0.005)		(0.033)	
COV6		0.052**		0.395
		(0.03)		(0.011)
size/smb	0.486	0.888	0.783	0.462
	(1.476)	(-4.564)	(-1.929)	(9.429)
Mom	0.185*	0.974	0.071*	0.586
	(0.139)	(0.003)	(0.271)	(0.06)
HLM	0.373	0.968	0.600	0.209
	(-2.493)	(0.162)	(-2.049)	(7.042)

4.4. Alternative Proxies of Liquidity

To understand and validate our variable in explaining liquidity, we use another alternative proxy to authenticate our findings since different scholars use different measures of liquidity to investigate the relations between liquidity and excess returns. Brennan and Subrahmanyam(1996) use transaction cost as a measure of liquidity with Datar and Radcliffe(1998) using trading volume turnover as a proxy for the measurement of liquidity. The Amihud illiquidity ratio relies on the assumption that the percentage of the non-trading days is relatively low. However, when studying the West African terrain, Hearn and Piesse (2011) document that the greatest degree of illiquidity in the region can be seen in the BRVM and Ghana with Ghana having a percentage of daily zero returns of 77% for the entire market. Having this in mind, we use the Lesmond et al (1999) zero- return measurement as our proxy for this study. The zero return ratio explain and addresses the inherent concern of the Amihud ratio since it is able to capture the zero trading days in the Ghana situation.

Table 6 present the estimation of the regression on the zero return proxy. we report only the net liquidity Cov^5 and the systematic liquidity Cov^6.The overall outcome from the analysis indicates that the net liquidity$y$ Cov^5 and the systematic liquidity Cov^6 are positively but significant at 10% and 5% respectively. In using the Lesmond et al (1999) zero model, the magnitude of significance remain significant and same for Cov^6 as compare with table 4 and 5. This go to confirm the results obtain for the analysis and reiterate the fact that systematic liquidity risk is priced in Ghana.

This table reports of the zero returns proxy. Cov1, cov5 and cov6 are the market net liquidity covariance and the systematic liquidity covariance respectively.

Table 6 : Results for zero returns

Variables	Expected Sign	Zero Returns	
		1	2
$\boldsymbol{Cov_1}$		0.47 (1.78)	
$\boldsymbol{Cov_5}$		0.15* (-0.32)	
$\boldsymbol{Cov_6}$			0.03** (-0.30)
Size		0.32 (1.03)	0.11* (1.40)
HLM		0.55 (0.26)	0.45 (0.30)
MOM		0.32 (0.14)	0.21 (0.17)

* means statistical significance at 1%, **means statistical significance at 5%, *** means statistical significance at 10%.

IV. CONCLUSION

Our findings prove that illiquidity risk is always present in stock returns in the emerging Ghanaian market. A lot of lessons can learnt and policies deduce for the good of Ghana and Sub-Sahara Africa in general.

Most of the emerging markets in the region have smaller market capitalization as compare to the Group of 7 countries (G7) and other major economic superpowers. It is therefore important to integrate these emerging markets in Sub-Saharan Africa. The US market has a major influence in Sub-Sahara and hence any market downturn has a direct effect on the emerging markets on the sub-region

There should be a conscious effort on the part of managers of the economy to invest more in the stock market to make it more attractive and efficient in the area of better bond market, well establish electronic trading with the needed personal, logistics to make it work.

Managers of the economy should create the needed environmental space in terms of lower interest rest, lower inflation, a private public partnership and the needed infrastructural development for new entrance as incentive which will go a long way in increasing the investment in the country.

It is our considered opinion that integrating the various regional blocks as far as stock market is concern is the way to go in this modern technological world. This will bring the mobilization of the needed funds to execute the regional integration objectives as oppose to the fragmented smaller markets existing now.

There should be the promulgation of policies that will drive away the fear of potential investors into the Ghanaian market. Policies that will eliminate the bottlenecks for free mobilization of capital and fully adopting international best practices should be encouraged. All and sundry in the country should make conscious effort for political stability a hallmark , rule of law, transparency and less bureaucracy as a bedrock in Ghana.

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