Global Research Review in Business and Economics [GRRBE]

ISSN (Online) 2454-3217, ISSN (Print) 2395-4671
| Open-Access | Volume 8, Issue 02,
Pages 01-17 ||2022||

Impact of incorporating the liquidity to the three-factor asset pricing model: Evidence from Sri Lankan finance sector companies

[1]J.M.A. Silva, [2]T.C.Ediriwickrama
[1, 2]*Department of Finance, University of Colombo, Sri Lanka.*

ABSTRACT

Liquidity and stock returns have become a popular research field in developed as well as developing economies. As a result, the current study's major aim is to investigate the impact of liquidity on traditional asset pricing models when assessing stock returns utilizing data from financial sector companies listed on the Colombo Stock Exchange (CSE). The sample of the study comprised 63 listed companies classified under the financial sector according to the Global Industry Classification Standard (GICS) in CSE during the period of 2015 March to 2020 March. This includes secondary data abstracted from annual reports of the companies and the CSE data library. This study mainly employs the Weighted Least Squares (WLS) analysis to examine the research objectives. Furthermore, this study utilizes the two different liquidity proxies, namely bid-ask spread (Amihud and Mendelson,1986a[1]) and stock turnover ratio (Lesmond, 2005[2]). The correlation and regression study results reveal that bid-ask spread and stock turnover are positively and significantly associated with stock returns of the financial sector in Sri Lanka. Moreover, the results showed the influence of bid-ask spread and stock turnover on stock returns differs between three sub-sectors (Banks, Insurance, and Diversified finance). Furthermore, the study revealed that in the Sri Lankan context, the stock returns predicted by the liquidity incorporated three-factor model is more sensible than the conventional three-factor model (Fama and French, 1993[3]). These results may have far-reaching ramifications for both academia and business. Further, this research will provide insight into several ways how liquidity can be built up and structured to enhance the firm's stock returns.

KEYWORDS: stock returns, asset pricing models, liquidity, Sri Lanka

I. INTRODUCTION

In the present economy stock market plays a vital role by promoting sustainable economic development. Liquidity is the bloodline of the stock market and one of the crucial characters of the stock market. Because the presence of liquidity provides easiness to the market. Chordia, Sarkar, and Subrahmanyam (2005[4]) proved this fact by suggesting that liquid markets are more efficient than less liquid markets. Liquidity by definition is the ability to exchange securities at a value near to their current market value in a specific period. This is one of the concerns of the stakeholders such as portfolio managers, regulators, stock brokering companies, and professionals in risk management because it determines the amount of the stock returns. Liquidity at the macro and micro levels plays an important role. Macro-level liquidity includes the money supply of the economy and money circulating among the economic decision-makers. Whereas micro-level liquidity refers to conditions of trading. It is a significant cause of market friction and has impacts on asset prices in the first order (Amihud and Mendelson, 1989[5]).

Diverse features in liquidity are neglected in conventional models of asset pricing except for a few studies such as Acharya and Pedersen (2005[6]); Lee (2011[7]); Miralles-Quiros, Miralles-Quiros, and Oliveira (2017[8]) because the financial markets are assumed to be frictionless markets with a zero-transaction cost. Though it is neglected in conventional asset pricing models, liquidity can be identified as critical for investments. The reason for this is that it plays a significant part in portfolio diversity and hence impacts the performance of the investment portfolio (Lesmond, Schill, and Zhou, 2004[9]). Investing in illiquidity stocks is very risky therefore needs an additional return. This was empirically proved by Amihud and Mendelson (1986a[1]) as a concept. While Brennan and Subrahmanyam (1996[10]) and Amihud (2002[11]) discovered that liquidity is the primary cause of varying cross-sectional asset returns.

According to Kang and Zhang (2014[12]), liquidity risk is particularly relevant in emerging economies. Emerging markets' limited liquidity and infrequent trading features raise liquidity risk, despite their high return potential for attracting investors. Lack of liquidity is one of the inherent problems in the majority of emerging equity markets, and there is no exception in Colombo Stock Exchange[1] (CSE) (Samarakoon,1999[13]). Moreover, since liquidity is multidimensional, current interventions consistently demonstrate a limited ability to completely capture the risks of liquidity. Due to that, there are contradictory opinions on finding the ideal liquidity factor which captures all the features of the liquidity. However, the objective of this study is not to give an in-depth analysis of liquidity[2].

Most of the research has been conducted in this area but only using the evidence from the United States (US) stock markets or using the developed stock markets. However, there appears to be a dearth of published evidence in this area in developing markets. Since Sri Lanka is considered a developing market, makes this area is more considerable in a Sri Lankan context. Even though Hearn (2010[14]) researched to find the importance of liquidity using three South Asian developing nations (Pakistan, Bangladesh, and Sri Lanka), he was unable to find the importance of liquidity in the Sri Lankan context. Hence the objective of this research is to find the impact of incorporating liquidity into the standard asset pricing models. We use Fama and French's (1992[15], 1993[3]) three-factor model along with two popular liquidity proxies which are bid-ask spread (Amihud and Mendelson (1986a[1])) and stock turnover ratio (Lesmond (2005[2])) for the above purpose in combination as well as separately.

Further previous research in the Sri Lankan context has considered a limited number of proxies even though liquidity is a multifaceted concept (Kyle (1985[19]); Sarr and Lybek (2002[20])). For example, Ediriwickrama and Azeez (2017[21]) had considered only Amihud's (2002[11]) illiquidity measure. Moreover, traditional asset pricing studies exclude the financial services sector[3] from the sample since its financial reporting and capital structure is heavily different from other sectors. However, our focus in this study is to extensively review the liquidity's impact on the prices of financial sector companies. In addition, this study is expected to obtain the results concerning three sub-samples categorized under the financial sector in CSE which are the banking sector, insurance sector, and diversified financial sector. The rest of the research paper is arranged in the following order. The second section examines the literature on conventional asset pricing models, liquidity, liquidity measurements, liquidity, stock returns, and liquidity adjusted asset pricing models. The third section explains the research methodology including sampling technique, conceptual framework, and variable selection. Section four describes the results of weighted least square regression analysis for three subsamples and the entire sample. The last section concludes the paper.

2. LITERATURE REVIEW

2.1 Standard Asset Pricing Models

To measure the connection between risk and anticipated returns for assets Sharpe (1964[22]), Lintner (1965[23]), Mossin (1966[24]), and Black (1972[25]) came up with a standard model called the capital asset pricing model (CAPM). Though, several studies criticized that model with market risk cannot capture the stock returns, this is the most often used asset pricing model in finance, having a linear arrangement and just one risk (market risk) which is measured by market beta. Further with the introduction of two more factors to the CAPM to reflect the size and value of the firms by Fama and French (1993[3]), the three-factor model of asset pricing emerged. Even though Fama and French (1993[3]) included size and value in the asset pricing model, they were initially identified by Banz (1981[26]) and Rosenberg, Reid, and Lanstein (1985[27]) respectively. Short-term momentum in stock prices which was initially recognized by Jegadeesh and Titman (1993[28]) was entered into the asset pricing model as the fourth factor by Carhart (1997[29]). Further, Fama and French (2015[30]) expanded their three-factor model by including two new factors which are investment and profitability.

[1] Colombo Stock Exchange is the only stock market in Sri Lanka. It was established in 1985. The CSE has 285 companies representing 20 industry groups according to the GICS and the market capitalization is Rs 2,961 billion as of the end of 2020. There are 647,584 stakeholders and from that, there are 10,515 foreign investors (CSE Annual Report, 2020). Investors can trade through brokerage companies by using an electronic trading platform known as a Central Depository System (CDS) account.

[2] For this purpose, please refer to Kumar and Misra (2015[16]); So and Wang (2014[17]), and Holden, Jacobson, and Subrahmanyam (2014[18]).

[3] This study considers only 63 public listed companies classified under the financial sector according to the Global Industry Classification Standards (GICS) in CSE.

2.2 Liquidity and its measures

As per O'Hara (2004[31]), "liquidity is difficult to describe, but it's easy to feel". Kyle (1985[19]) noted that liquidity has multi-dimensional properties which are tightness, depth, and resiliency which cannot be captured by a single measure. As a consequence, Baker (1996[32]) came to the conclusion that there is no unique, explicit, theoretically acceptable, or globally recognized definition to "liquidity" which captures all of its properties. Whereas Sarr and Lybek (2002[20]) agreed with Baker (1996[32]) saying that there is no widely agreed measure to assess the extent of liquidity of the market due to market-specific factors and peculiarities.

Some of the earliest scholars to look at the relationship between liquidity and stock returns were Amihud and Mendelson (1986a[1]). Since that time, the liquidity impact has been studied by looking at the liquidity levels of stocks, which are assessed by the bid-ask spread, trading volume, and trading frequency. Later, academics' attention has moved to the fluctuation of a stock's inherent liquidity characteristics. A risk-based justification, for example, posits that investors are unwilling to take risks and so seek extra profit for liquidity fluctuations (Chordia et. al., 2001[33]).

Saar and Lybek (2002[20]) have grouped liquidity indicators into four groups based on their ability to catch certain attributes. Those four groups consist of transaction cost measures, volume-based measures (breadth and depth), equilibrium price-based measures (resilience), and market-impact measures (resilience and speed of price discovery). Whereas Holden, Jacobson, and Subrahmanyam (2014[18]) talked about liquidity in three aspects, namely trading quantity (volume), trading speed (time), trading costs.

But, Liu (2006[34]), introduced another factor to the above three factors which is the price effect. Trading cost includes spread of bid-ask, (Amihud and Mendelson,1986a[1]), relative spread (Amihud and Mendelson,1986b[35]), and amortized spread (Chalmers and Kadlec, 1998[36]) and Lee's (1993[37]) effective spread. Trading quantity includes trading volume proposed by Brennan, Chordia, and Subrahmanyam (1998[38]) and Datar, Naik, and Radcliffe (1998[39]); Lesmond (2005[2]) suggested turnover rate. To capture the trading speed Liu (2006[34]) introduced a new zero trading day metric, whereas the measures introduced by Amihud (2002[11]) and Pastor and Stambaugh (2003[40]) capture the price effect in the liquidity. In this paper, we consider only bid-ask spread (BAS) and stock turnover ratio (ST).

2.2.1 Bid-Ask Spread (BAS)

Amihud and Mendelson (1986a[1]) found a positive link with the stock returns in New York Stock Exchange (NYSE). This means assets with higher spreads generate a higher anticipated stock return. However, with similar data, Chen and Kan (1989[41]) were not able to find a significant relationship. But Eleswarapu and Reinganum (1993[42]), found a significant link between the bid-ask spread and stock returns using the same data from the NYSE.

2.2.2 Stock Turnover Ratio (ST)

This is one of the most popular liquidity measures, which can be stated as a ratio of the volume of daily trading shares to the number of total shares outstanding. The theoretical motivation to utilize this liquidity measure dates back to the era of Demsetz (1968[43]) and Glosten and Milgrom (1985[44]). Where, Demsetz (1968[43]) revealed that the price of closeness would be lower for stocks with high exchanging frequency, as frequent interchange can lower the cost. Alternatively, Glosten and Milgrom (1985[44]), found that large traded volumes stocks have lower levels of asymmetry of information to the degree that prices disclose information. Datar, Naik, and Radcliffe (1998[39]) interpreted trading quantity can be captured by utilizing turnover ratio as a measure of measuring liquidity. After adjusting for business size, book-to-market ratio, and company beta, their analysis found that liquidity had a substantial role in predicting cross-sectional volatility in stock returns. Conversely, Lee and Swaminathan (2000[45]) contended, the turnover ratio maybe not be an ideal liquidity proxy since the connection between turnover and anticipated stock return is dependent on how stocks have fared in the past.

2.3 Liquidity adjusted Capital Asset Pricing Models

According to Amihud and Mendelson (1991[46]), financial analysts see liquidity as a force for impacting equity prices when making investment portfolios. According to Ibbotson, Chen, Kim, and Hu (2013[47]), liquidity should be given similar weight with other conventional asset price indicators. Acharya and Pedersen (2005[6]) took the pioneering effort and constructed a Liquidity incorporated Capital Asset Pricing Model (LCAPM) to evaluate the effect of liquidity on stock returns. Acharya and Pedersen (2005[6]) proposed an asset pricing model that takes into account the economic significance of the risk of liquidity. The analysis discovers that the CAPM adjusted for liquidity (LCAPM) demonstrates the results better than the standard CAPM.

The results achieved by Papvassilliou (2013[48]); Li, Sun, and Wang (2014[49]); and Butt and Virk (2015[50]) using the Greece, Japan, and Finnish markets, support the validity of using liquidity in measuring stock returns. Moreover, they claimed that LCAPM outperforms Capital Asset Pricing Models (CAPM).

In emerging markets, liquidity is extremely essential. Economic expansion and stock market liquidity are two main drivers of equity market expansion (Calderon-Rossell (1990[51]); Yartey (2008[52])). Using the eighteen evolving markets, Bekaert, Harvey, and Lundblad (2007[53]) discovered evidence of considerable liquidity impacts on asset returns. Using the data from four African equity markets, Hearn and Piesse (2009[54]) evaluated the three-factor CAPM with a liquidity component. This research found proof of the significant impacts of liquidity on stock returns. Hearn (2010[14]) tried to find the importance of Liquidity incorporated Capital Asset Pricing Models (LCAPM) in South Asian developing markets. For that researcher used the evidence from Pakistan, Bangladesh, and Sri Lanka equity markets. But he was unable to find the importance regarding the Sri Lankan stock market. Ediriwickrama and Azeez (2017[21]) conducted a study incorporating Amihud's (2002[11]) liquidity measure to the Carthart (1997[29]) model using the IPO stocks and has been concluded that both the models provide almost equal explanatory power in the Sri Lankan context. However, it is limited to one liquidity measure and considered only the Initial Public Offering (IPO) stocks. There is a dearth of research on liquidity's impact on asset pricing variables in financial sector companies.

3. DATA AND METHODOLOGY

3.1 Population and Sample

The population of this study is 63 firms belonging to the financial sector out of the 285 entities listed in CSE. The entire population is taken as the sample of the study. The sample period is from March 2015 to March 2020. This sample is comprised of 12 banks, 10 insurance firms, and 41 diversified finance companies.

3.2 Data

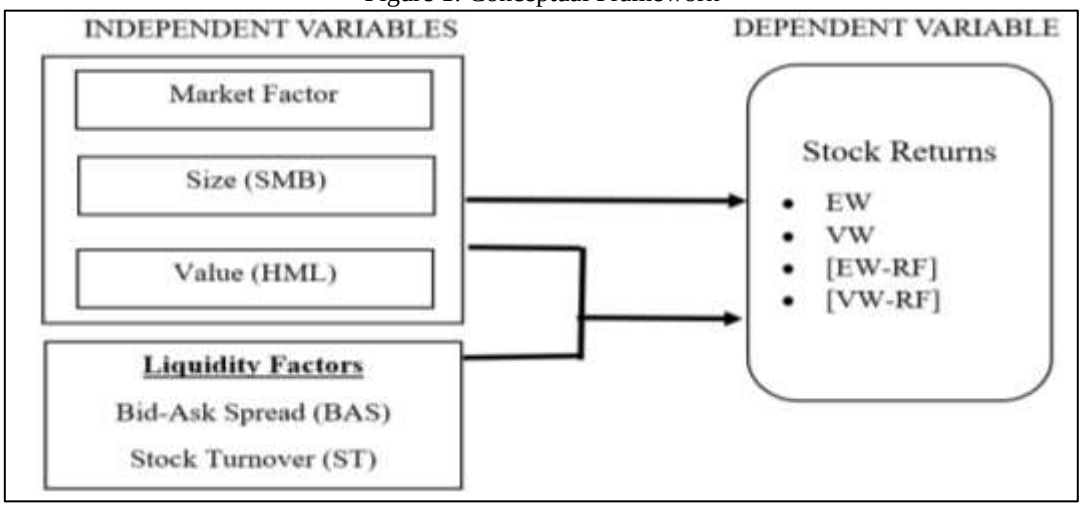
This analysis relied on secondary data, in which monthly stock prices were taken from the CSE data library and adjusted for business events such as stock splits and bonus issues, etc... The All Share Price Index (ASPI), is considered as the market index in this research and it is obtained from the data library of CSE. Data to compute BAS and ST are also obtained from the CSE data library. Further, this study used the annual reports of individual companies to obtain the data to construct factors such as size factor (market capitalization) and value factor (book value of equity to construct the book-to-market ratio-BTM). Further, this study considered the risk-free rate of 364-days Treasury bill rate issued by the Central Bank of Sri Lanka (CBSL).

3.3 Conceptual Framework

The conceptual framework of the study is given below

.

Figure 1: Conceptual Framework



Source: Constructed by the authors

We use equally-weighted average returns (EW), value-weighted average returns (VW), equally-weighted excess returns (EW-RF), and value-weighted excess returns (VW-RF) of each portfolio[4] as the explained variables for the study with five explanatory variables, which are three original variables as suggested in Fama and French's (1993[3]) three-factor model that constitutes market premium (RM-RF), size (SMB), and value (HML). This study was further elaborated to measure the impact of liquidity on the Fama and French (1993[3]) three-factor model with two commonly accepted liquidity variables which are bid-ask spread (BAS) by Amihud and Mendelson (1986a[1]) and stock turnover ratio (ST) by Lesmond (2005[2]).

3.4 Operationalization

Variables in the conceptual framework are operationalized as in the table below.

Table 1: Operationalization of Variables

Dependent Variables		
Variable	**Measurement**	**Source**
Equally weighted average returns	$EW_{t,p} = \frac{1}{n}\sum_{i=1}^{n} \ln \frac{p_{t,i}}{p_{t-1,i}}$	
Value weighted average returns	$VW_{t,p} = \sum_{i=1}^{n} W_i * \ln \frac{P_{t,i}}{P_{t-1,i}}$	
Equally weighted excess returns	$EWER_{t,p} = EW_{t,p} - RF_t$	
Value weighted excess returns	$VWER_{t,p} = VW_{t,p} - RF_t$	
Independent Variables		
Market Factor	$RM_{t,p} = \ln \frac{ASPI_t}{ASPI_{t-1}} - RF_t = RM_t - RF_t$	Sharpe (1964); Lintner (1965)
Size Factor (SMB)	$SMB_t = [(SL + SM + SH)/3] - [(BL + BM + BH)/3]$	Fama and French (1992, 1993)
Value Factor (HML)	$HML_t = [(SH + BH)/2] - [(SL + BL)/2]$	Fama and French (1992, 1993)
Bid-Ask Spread (BAS)	(Ask Price – Bid Price) / Ask Price	Amihud and Mendelson (1986b)
Stock Turnover Rate (ST)	Number of shares traded / Number of shares outstanding	Lesmond (2005)

Source: Constructed by authors

Note: EWtp = equally weighted average returns for period t and portfolio p, VWtp = value weighted average returns for period t and portfolio p, EWERtp = equally weighted excess returns for period t and portfolio p, VWERtp = value weighted excess returns for period t and portfolio p, RFt = 364 day government treasury bill rate which represents risk free rate for period t, RMtp = natural logarithm of monthly All Share Price Index change, SMBt = size factor for period t (small minus big in market capitalization), HMLt = value factor for period t (high minus low in book to market ratio), Pti = closing price of the current month, Pt-1i = closing price of the previous month, Wi = weight of the individual stock according to market capitalization in the portfolio, ASPIt = closing value of the All Share Price Index (ASPI) in the current month, ASPIt-1 = closing value of the ASPI in the previous month, SL = return of the portfolio of small in market capitalization and low in book to market ratio, SM = return of the portfolio of small in market capitalization and medium in book to market ratio, SH = return of the portfolio of small in market capitalization and high in book to market ratio, BL = return of the portfolio of big in market capitalization and low in book to market ratio, BM = return of the portfolio of big in market capitalization and medium in book to market ratio, BH = return of the portfolio of big in market capitalization and high in book to market ratio.

Six stock portfolios (SL, SM, SH, BL, BM, BH) which were used to build SMB and HML factors are constructed as follows.

[4] Four portfolios will be constructed in the study for a full sample of financial sectors firms, banks, insurance firms, and diversified financial companies.

Table 2: Construction of SMB and HML Factors

Type		Book to Market Ratio		
		Low-30%	Medium-40%	High-30%
Size	Small- 50%	*SL*	*SM*	*SH*
	Big-50%	*BL*	*BM*	*BH*

Source: Constructed by authors

3.5 Method of Analysis

Weighted least square regression analysis will be conducted for all four samples (full sample and three sub-samples for banks, insurance firms, and diversified finance companies). Panel A of the table below shows regression equations for the original three-factor model. Panel B and C list regression equations that augment the three-factor model using bid-ask spread (BAS) and stock turnover rate (ST) as liquidity proxies separately. Finally, panel D shows equations of the three-factor model augmented with both BAS and ST.

Table 3: Weighted Least Square Regression Models

Equation	Equation No.
Panel A: Original Three Factor Model (Fama and French, 1993)	
$EW_t = \alpha + \beta_1 (RM_t\text{-}RF_t) + \beta_2 (SMB_t) + \beta_3 (HML_t) + \varepsilon_t$	01
$VW_t = \alpha + \beta_1 (RM_t\text{-}RF_t) + \beta_2 (SMB_t) + \beta_3 (HML_t) + \varepsilon_t$	02
$EWER_t = \alpha + \beta_1 (RM_t\text{-}RF_t) + \beta_2 (SMB_t) + \beta_3 (HML_t) + \varepsilon_t$	03
$VWER_t = \alpha + \beta_1 (RM_t\text{-}RF_t) + \beta_2 (SMB_t) + \beta_3 (HML_t) + \varepsilon_t$	04
Panel B: Augmented Three Factor Model with Bid-Ask Spread	
$EW_t = \alpha + \beta_1 (RM_t\text{-}RF_t) + \beta_2 (SMB_t) + \beta_3 (HML_t) + \beta_4 (BAS_t) + \varepsilon_t$	05
$VW_t = \alpha + \beta_1 (RM_t\text{-}RF_t) + \beta_2 (SMB_t) + \beta_3 (HML_t) + \beta_4 (BAS_t) + \varepsilon_t$	06
$EWER_t = \alpha + \beta_1 (RM_t\text{-}RF_t) + \beta_2 (SMB_t) + \beta_3 (HML_t) + \beta_4 (BAS_t) + \varepsilon_t$	07
$VWER_t = \alpha + \beta_1 (RM_t\text{-}RF_t) + \beta_2 (SMB_t) + \beta_3 (HML_t) + \beta_4 (BAS_t) + \varepsilon_t$	08
Panel C: Augmented Three Factor Model with Stock Turnover Rate	
$EW_t = \alpha + \beta_1 (RM_t\text{-}RF_t) + \beta_2 (SMB_t) + \beta_3 (HML_t) + \beta_4 (ST_t) + \varepsilon_t$	09
$VW_t = \alpha + \beta_1 (RM_t\text{-}RF_t) + \beta_2 (SMB_t) + \beta_3 (HML_t) + \beta_4 (ST_t) + \varepsilon_t$	10
$EWER_t = \alpha + \beta_1 (RM_t\text{-}RF_t) + \beta_2 (SMB_t) + \beta_3 (HML_t) + \beta_4 (ST_t) + \varepsilon_t$	11
$VWER_t = \alpha + \beta_1 (RM_t\text{-}RF_t) + \beta_2 (SMB_t) + \beta_3 (HML_t) + \beta_4 (ST_t) + \varepsilon_t$	12
Panel C: Augmented Three-Factor Model with both Bid-Ask Spread and Stock Turnover Rate	
$EW_t = \alpha + \beta_1 (RM_t\text{-}RF_t) + \beta_2 (SMB_t) + \beta_3 (HML_t) + \beta_4 (BAS_t) + \beta_5 (ST_t) + \varepsilon_t$	13
$VW_t = \alpha + \beta_1 (RM_t\text{-}RF_t) + \beta_2 (SMB_t) + \beta_3 (HML_t) + \beta_4 (BAS_t) + \beta_5 (ST_t) + \varepsilon_t$	14
$EWER_t = \alpha + \beta_1 (RM_t\text{-}RF_t) + \beta_2 (SMB_t) + \beta_3 (HML_t) + \beta_4 (BAS_t) + \beta_5 (ST_t) + \varepsilon_t$	15
$VWER_t = \alpha + \beta_1 (RM_t\text{-}RF_t) + \beta_2 (SMB_t) + \beta_3 (HML_t) + \beta_4 (BAS_t) + \beta_5 (ST_t) + \varepsilon_t$	16

Source: Constructed by authors

The stationarity of every variable is tested using the augmented Dickey-Fuller (1979[55]) (ADF) test. ADF test is performed for all three exogenous regressors namely constant, constant and linear trend and neither with constant and trend to see whether any unit root concerns existed. The variance inflation factor (VIF) is used to detect the multicollinearity of the time series regressions performed. Breusch Godfrey Serial Correlation Lagrange Multiplier (BGSCLM) test is used to detect serial correlations between error terms of the time-series regressions. The Breusch Pagan Godfrey Heteroscedasticity test (BPGH) was used to determine if the variance of the error term is constant and finite for all values of explanatory variables in linear regressions. Jarque-Bera test is performed to check the normality of residuals.

According to Bali, Engle, and Murray (2015[56]), the values utilized in time series regressions frequently display serial correlation, heteroscedasticity, or both. In this instance, the standard errors, p-values, and t-statistics used to test a null hypothesis might be incorrect. To account for these difficulties in a time series analysis, empirical asset pricing researchers commonly used an approach devised by Newey and West (1987[57]) that modifies the standard errors of estimated values to account for the influence of serial correlation and heteroscedasticity. As a result, Newey and West's (1987[57]) technique is employed in all the time series regressions in this study.

4. ANALYSIS AND DISCUSSION

4.1 Descriptive Statistics

Descriptive statistics for the full sample as well as three sub-samples are shown in table 4. According to the study by Fama and French (2012[58]) found that per month market risk premium varies from -0.12 percent (Japan) to 0.86 percent (Asia pacific) with a global factor of 0.44 percent. Whereas India reports a monthly average market risk premium of 0.29 percent (Agarwalla et. al., 2014[59]). Even though Abeysekara and Nimal (2017[60]) found an average market risk premium of 1.17 percent with a standard deviation of 7.58 percent from evidence from the CSE. For the study period of 2015 March to 2020 March, this study revealed a negative mean of 0.21(-0.21) percent and a standard deviation of 4.8 percent. Furthermore, this suggests that investing in a risk-free financial instrument (i.e., government treasury bills/bonds) is more beneficial in Sri Lanka than investing in a riskier asset such as stocks. Similar to Fama and French (2012[58]) mean and median of size factor (SMB_t) of the current study records the value closer to zero percent ranging from -8.2 percent to 13.5 percent. And these findings are similarly in line with the findings of Agarwalla et. al., (2014[59]) which recorded a per month average size factor of -0.06 percent in India. The mean value factor (HML_t) of this study records 1.3 percent. These results are not consistent with the findings of Fama and French (2012) which documented a per month average value factor varied between 0.33 percent (North America) to 0.62 (Asia Pacific).

Table 4: Descriptive Statistics

	EW	VW	EWER	VWER	RM-RF	SMB	HML	ST	BAS
Panel A: Full Sample (All Financial Sector Companies Listed in CSE)									
Mean	-0.011	-0.009	-0.002	-0.002	-0.002	0.003	-0.013	0.011	-0.002
Median	-0.015	-0.006	-0.011	-0.012	-0.011	-0.002	-0.003	0.009	-0.011
Maximum	0.133	0.167	0.185	0.155	0.121	0.135	0.142	0.045	0.185
Minimum	-0.226	-0.192	-0.155	-0.185	-0.115	-0.082	-0.170	0.001	-0.155
Std. Dev.	0.053	0.061	0.066	0.075	0.048	0.044	0.059	0.008	0.066
Panel B: Banks									
Mean	-0.016	-0.014	-0.004	-0.004	-0.002	0.004	0.002	0.000	0.001
Median	-0.019	-0.006	-0.013	-0.006	-0.011	0.002	0.008	0.000	0.001
Maximum	0.214	0.239	0.206	0.239	0.121	0.123	0.158	0.016	0.054
Minimum	-0.284	-0.313	-0.262	-0.286	-0.115	-0.155	-0.109	-0.017	-0.015
Std. Dev.	0.062	0.065	0.081	0.083	0.048	0.041	0.039	0.007	0.009
Panel C: Insurance Companies									
Mean	-0.000	-0.000	-0.001	-0.001	-0.002	-0.005	0.000	-0.000	0.002
Median	0.000	0.006	-0.001	-0.002	-0.011	-0.005	0.005	-0.000	-0.001
Maximum	0.123	0.121	0.123	0.266	0.121	0.123	0.258	0.065	0.103
Minimum	-0.150	-0.274	-0.137	-0.171	-0.115	-0.108	-0.182	-0.057	-0.085
Std. Dev.	0.052	0.062	0.068	0.081	0.048	0.045	0.074	0.019	0.036
Panel D: Diversified Finance Companies									
Mean	-0.002	-0.002	-0.002	-0.003	-0.002	-0.014	-0.029	0.015	0.002
Median	-0.006	-0.004	-0.004	0.000	-0.011	-0.016	-0.012	0.009	0.001
Maximum	0.232	0.151	0.234	0.196	0.121	0.179	0.121	0.066	0.104
Minimum	-0.153	-0.270	-0.158	-0.173	-0.115	-0.191	-0.240	0.001	-0.084
Std. Dev.	0.077	0.067	0.077	0.077	0.048	0.057	0.076	0.016	0.030
Observations	60	60	60	60	60	60	60	60	60

Source: Constructed by authors

Note: EW= Equally-weighted average returns, VW= Value-weighted average returns, EWER=Equally-weighted excess returns, VWER=Value-weighted excess returns, RM-RF= Market risk premium, SMB = Market capitalization sorted returns (size Factor), HML = Book to market ratio sorted returns (value factor), ST = Lesmond's (2005) stock turnover ratio, BAS= Amihud, and Mendelson (1986a) bid-ask spread

4.2 Correlation Analysis

This section presents the Pearson's bivariate correlation coefficients for all four dependent variables and all five independent variables including two liquidity factors for all four samples. All the dependent variables in this study which are raw returns (EWt and VWt) and excess returns (EWERt and VWERt) have a positive relationship with the market risk premium (RMt-RFt). It demonstrates that either an increase in the All Share

Price Index (ASPI) or a drop in the risk-free rate led to an increase in the stock returns of financial sector firms. Size factor (SMBt) returns show a mixed relationship with the various dependent variables of the study. It shows a positive correlation with equally-weighted average returns (EWt) and equally-weighted excess returns (EWERt), showing that small-capitalization firms earn fewer returns than large-capitalization firms. But this contrasts with the findings of Fama and French (1993[3]). However, the study shows a negative relationship between value-weighted average returns (VWt) and value-weighted excess returns (VWERt) confirming that small-capitalization firms can earn higher risk-free returns than large-capitalization firms (Fama and French, 1993[3]).

Whereas value factor (HMLt) shows a positive correlation with equally-weighted average returns (EW_t), value-weighted average returns (VWt), and equally-weighted excess returns (EWERt) indicating the tendency of low-priced stocks (value stocks) to outperform the high-priced stocks (growth stocks) in Sri Lankan stock market (Fama and French, 1993[3]). Even though this study shows a positive relationship for the above three dependent variables in line with the Fama and French (1993[3]) findings, value-weighted excess returns (VWERt) show completely contradictory results by reporting a negative correlation.

Furthermore, the results of the correlation analysis provide preliminary evidence on the first objective of identifying the relationship between liquidity and the expected returns on stocks. In line with Brown et al. (2009[61]), this study shows a positive correlation of stock turnover ratio (STt) with all the dependent variables except market risk premium in the full sample. This implies that higher turnover resulted in higher trading speed means more liquidity and then eventually resulted in a higher return (Brown et al., (2009[61]). But this is in contrast with most of the findings in developed markets which found a negative relationship (Hu (1997[62]); Lesmond (2005[2]); Chordia, Roll, and Subrahmanyam (2000[63]); Nguyen et. al., (2007[64]); Chan and Faff (2005[65])) which found mixed evidence on different dependent variables. Bid-ask spread (BASt) also shows a positive correlation with all the dependent variables demonstrating that higher/lower bid-ask spread (BASt) higher/lower stock returns in financial sector firms in Sri Lanka. This is in line with the findings of Amihud and Mendelson (1986a[1]), Eleswarapu and Reinganum (1993[42]), and Chalmers and Kadlec (1998[36]) which found stocks with higher spreads are less likely to trade with lower returns (clientele effect).

Table 5: Correlation Analysis

Variables	**EWt**	**VWt**	**EWERt**	**VWERt**	**RMt-RFt**	**SMBt**	**HMLt**	**STt**	**BASt**
Panel A: Full Sample (All Financial Sector Companies Listed in CSE)									
EWt	1.000								
VWt	0.902	1.000							
EWERt	0.722	0.641	1.000						
VWERt	0.651	0.705	0.894	1.000					
RMt-RFt	0.617	0.646	0.823	0.899	1.000				
SMBt	0.011	-0.146	0.068	-0.119	-0.023	1.000			
HMLt	0.226	0.046	0.077	-0.038	-0.023	-0.006	1.000		
STt	0.234	0.183	0.065	0.015	-0.010	0.103	0.066	1.000	
BASt	0.722	0.741	1.000	0.894	0.823	0.068	0.077	0.064	1.000
Panel B: Banks									
EWt	1.000								
VWt	0.963	1.000							
EWERt	0.779	0.737	1.000						
VWERt	0.767	0.768	0.967	1.000					
RMt-RFt	0.688	0.654	0.906	0.877	1.000				
SMBt	-0.454	-0.563	-0.303	-0.415	-0.232	1.000			
HMLt	-0.284	-0.273	-0.223	-0.276	-0.147	0.569	1.000		
STt	0.175	0.129	0.205	0.164	0.087	0.038	-0.149	1.000	
BASt	-0.382	-0.456	-0.267	-0.337	-0.275	0.229	-0.121	-0.111	1.000
Panel C: Insurance Companies									
EWt	1.000								
VWt	0.857	1.000							
EWERt	0.689	0.571	1.000						
VWERt	0.588	0.674	0.845	1.000					

RMt-RFt	0.488	0.353	0.658	0.474	1.000				
SMBt	-0.327	-0.541	-0.182	-0.309	0.023	1.000			
HMLt	0.062	-0.299	0.113	-0.129	0.134	0.272	1.000		
STt	0.016	0.034	-0.053	-0.029	0.093	0.102	-0.056	1.000	
BASt	0.143	0.068	0.254	0.096	0.002	-0.234	0.205	0.0256	1.000
Panel D: Diversified Finance Companies									
EWt	1.000								
VWt	0.465	1.000							
EWERt	0.998	0.463	1.000						
VWERt	0.705	0.678	0.70	1.000					
RMt-RFt	0.678	0.474	0.680	0.712	1.000				
SMBt	0.173	-0.248	0.166	-0.234	-0.102	1.000			
HMLt	0.063	0.181	0.064	0.004	0.033	0.241	1.000		
STt	0.005	0.191	0.016	0.023	-0.038	0.092	-0.012	1.000	
BASt	0.141	-0.311	0.143	-0.084	0.025	0.172	-0.357	-0.048	1.000

Source: Constructed by authors

4.3 Regression Analysis

According to the findings of the Augmented Dickey and Fuller (1979[55]) unit root test (ADF), variables with a probability of less than 5% (0.05) imply that examination factors are free from unit root issues at that level. But the variables which have a probability greater than 5% (0.05) demonstrate that those series are suffering from the stationarity problem. To avoid that we switch those variables into 1st different form.

To confirm the non-multicollinearity, we calculated the Variance Inflation Factor (VIF) and found that the VIF value is less than the critical value of 5. Therefore, we can conclude that this data is free from multicollinearity. We found the non-existence of serial correlation problems from BGSCLM test results. Further, outcomes of the BPGH test reveal there is no heteroscedasticity problem in time-series regressions that we performed. Jarque-Bera test shows that residuals are normally distributed. Moreover, we followed Newey and West's (1987[57]) method in all our weighted least square time-series regressions.

4.3.1 Regression Analysis on Full Sample (Financial Sector)

This analysis covers entire financial sector companies listed in CSE including all banks, insurance firms, and diversified financial sector companies. From the analysis of the financial sector, we can identify that Fama and French's (1993[3]) three-factor model augmented with liquidity factors (panels B, C, and D in table 6) has more adjusted R squared value than the conventional Fama and French (1993[3]) three-factor model (panel A in table 6). This is in line with the findings of the developed markets (Acharya and Pedersen (2005[6]); Hagstromer et. al., (2013[66]); Lee (2011[7]); Papvassiliou (2013[48]); Li, Sun and Wang (2014[49]); Butt and Virk (2015[50]); Miralles-Quiros, Miralles-Quiros, and Oliveira (2017[8])) which found that liquidity adjusted asset pricing models outperform than conventional asset pricing models without liquidity. The findings related to the financial sector in Sri Lanka is conflicted with the findings related to IPO stocks in CSE which found both models have the same explanatory power (Ediriwickrama and Azeez, 2017[21]).

The Stock turnover (ST_t) is positive and statistically significant in all models. It indicates that increasing the stock turnover ratio (ST_t) will help to increase the liquidity among listed companies in Sri Lanka and thus resulted in higher returns. In other words, higher returns derive from the high liquidity firms. This result is consistent with Brown et al. (2009[61]) who documented similar results for their sample of firms listed on the US stock exchange. Bid-ask spread (BAS_t) is also positive and statistically significant in all models. It indicates that increasing bid-ask spread (BAS_t) will help to increase the liquidity among listed companies in Sri Lanka and thus resulted in higher returns. In other words, higher returns derive from high liquidity firms. This result is in line with Amihud and Mendelson's (1986a[1]), Eleswarapu and Reinganum (1997[42]), and Chalmers and Kadlec (1998[36]) which found stocks with higher spreads have higher stock returns.

Table 6: Weighted Least Square Regression Results for Full Sample (Financial Sector)

Panel A: Three-Factor Model (Fama and French, 1993)								
Dependent Variables	EW_t		VW_t		$EWER_t$		$VWER_t$	
	Coefficient	t-Statistic	Coefficient	t-Statistic	Coefficient	t-Statistic	Coefficient	t-Statistic
Constant	-0.007*	-1.428	-0.006*	-1.138	0.001*	0.402	0.001*	0.230
RM_t-RF_t	0.686***	4.909	0.689***	5.929	1.140***	10.603	1.221***	11.396
SMB_t	0.033*	0.269	-0.151*	-1.849	0.131*	1.089	-0.146***	-1.960
HML_t	0.216*	1.905	0.053*	0.586	0.108*	1.067	0.019*	-0.306
Adjusted R-squared	0.409		0.408		0.607		0.700	
F-statistic	14.625***		14.561***		42.208***		84.948***	
Panel B: Stock Turnover with Three-Factor Model (Fama and French, 1993)								
Dependent Variables	EW_t		VW_t		$EWER_t$		$VWER_t$	
	Coefficient	t-Statistic	Coefficient	t-Statistic	Coefficient	t-Statistic	Coefficient	t-Statistic
Constant	-0.022**	-2.625	-0.020**	-2.166	-0.004*	-0.751	-0.002*	-0.535
RM-RF_t	0.687***	5.331	0.690***	6.388	1.141***	10.636	1.221***	11.274
SMB_t	0.005*	0.042	-0.176**	-2.020	0.122	0.982	-0.151*	-1.963
HML	0.202*	1.914	0.041**	0.478	0.104**	1.025	-0.022**	-0.336
ST_t	1.448***	2.904	1.261**	2.643	0.473*	1.133	0.284**	0.962
Adjusted R-squared	0.452		0.440		0.674		0.808	
F-statistic	13.168***		12.303***		31.592***		63.110***	
Panel C: Bid-Ask Spread with Three-Factor Model (Fama and French, 1993)								
Dependent Variables	EW_t		VW_t		$EWER_t$		$VWER_t$	
	Coefficient	t-Statistic	Coefficient	t-Statistic	Coefficient	t-Statistic	Coefficient	t-Statistic
Constant	-0.007*	-1.452	-0.006*	-1.158	0.000*	0.708	0.000*	-0.001
RM_t-RF_t	0.124*	0.718	0.358**	2.329	0.000***	6.490	0.621***	5.618
SMB_t	0.031**	-0.346	-0.190**	-2.557	0.000	0.000	-0.214**	-2.864
HML_t	0.162*	1.836	0.021*	0.265	0.000**	2.154	-0.076*	-1.671
BAS_t	0.492***	4.547	0.289***	2.762	1.000***	3E+16	0.526***	6.199
Adjusted R-squared	0.523		0.443		1.000		0.900	
F-statistic	17.227***		12.747***		7.17E+32***		134.1012***	
Panel D: Stock Turnover and Bid-Ask Spread with Three-Factor Model (Fama and French, 1993)								
Dependent Variables	EW_t		VW_t		$EWER_t$		$VWER_t$	
	Coefficient	t-Statistic	Coefficient	t-Statistic	Coefficient	t-Statistic	Coefficient	t-Statistic
Constant	-0.020**	-2.397	-0.019*	-1.989	0.000*	0.313	-0.000*	-0.089
RM_t-RF_t	0.158**	0.957	0.390**	2.581	0.000**	2.567	0.622***	5.513
SMB_t	0.051*	-0.553	-0.208**	-2.601	0.000	0.000	-0.215***	-2.814
HML_t	0.154*	1.891	0.014*	0.181	0.000**	1.496	-0.077***	-1.651
BAS_t	0.464***	4.509	0.263**	2.518	1.000***	1E+16	0.525***	6.119
ST_t	1.229**	2.504	1.136**	2.276	0.000*	0.594	0.036*	0.136
Adjusted R-squared	0.553		0.468		1.000		0.898	

F-statistic	15.649***	11.389***	0.000***	105.355***

Source: Constructed by authors

Note: *, * * and *** stands for 10%, 5% and 1% significance level respectively.

4.3.2 Regression Analysis on Sub-Sample of Banks

From table 7, We can observe that the models that include both or one liquidity factor have the highest adjusted R squared value compared to Fama and French's (1993[3]) original three-factor model in CSE. Therefore, can conclude that liquidity-adjusted asset pricing models explained the Sri Lankan banking firms' returns more than the conventional asset pricing models.

Table 7: Weighted Least Square Regression Results for the Sub-Sample of Banks

Panel A: Three-Factor Model (Fama and French, 1993)								
Dependent Variables	EW_t		VW_t		$EWER_t$		$VWER_t$	
	Coefficient	t-Statistic	Coefficient	t-Statistic	Coefficient	t-Statistic	Coefficient	t-Statistic
Constant	-0.012**	-2.537	-0.009**	-1.965	0.000**	0.039	0.000**	0.066
RM_t-RF_t	0.790***	5.029	0.745***	4.451	1.501***	10.113	1.398***	8.229
SMB_t	-0.444**	-2.175	-0.751**	-3.396	-0.131**	-1.598	-0.396***	-3.903
HML_t	-0.037	-0.159	-0.135	0.571	-0.114	-0.781	-0.082	-0.601
Adjusted R-squared	0.502		0.552		0.563		0.567	
F-statistic	24.283***		19.237***		20.026***		16.455***	
Panel B: Stock Turnover with Three-Factor Model (Fama and French, 1993)								
Dependent Variables	EW_t		VW_t		$EWER_t$		$VWER_t$	
	Coefficient	t-Statistic	Coefficient	t-Statistic	Coefficient	t-Statistic	Coefficient	t-Statistic
Constant	-0.012**	-2.442	0.009*	-1.892	0.001	0.219	0.001	0.172
RM_t-RF_t	0.772***	4.987	0.729***	4.404	1.479***	10.490	1.382***	8.356
SMB_t	-0.486**	-2.462	-0.789***	-3.592	-0.183**	-2.095	-0.437***	-3.921
HML_t	-0.016	0.076	-0.184	0.829	-0.046	-0.411	-0.030	-0.247
ST_t	1.261*	1.939	1.141*	1.851	1.578***	2.931	1.210**	2.385
Adjusted R-squared	0.552		0.598		0.815		0.837	
F-statistic	19.237***		22.945***		76.805***		66.032***	
Panel C: Bid-Ask Spread with Three-Factor Model (Fama and French, 1993)								
Dependent Variables	EW_t		VW_t		$EWER_t$		$VWER_t$	
	Coefficient	t-Statistic	Coefficient	t-Statistic	Coefficient	t-Statistic	Coefficient	t-Statistic
Constant	-0.011**	-2.587	0.005*	-1.936	0.000	0.086	0.001	0.244
RM_t-RF_t	0.732**	6.696	0.109***	6.112	1.493	8.992	1.363***	6.827
SMB_t	-0.336	-1.527	-0.237**	-2.572	-0.116***	-1.219	-0.333***	-2.738
HML_t	-0.147	-0.753	-0.175	-0.038	-0.121	-0.884	-0.150	-1.141
BAS_t	-1.175	-1.014	-1.205	-1.262	-0.165	-0.210	-0.724	-0.822
Adjusted R-squared	0.563		0.629		0.821		0.812	
F-statistic	20.026***		26.008***		68.412***		64.499***	
Panel D: Stock Turnover and Bid-Ask Spread with Three-Factor Model (Fama and French, 1993)								
Dependent	EW_t		VW_t		$EWER_t$		$VWER_t$	

Variables								
	Coefficient	t-Statistic	Coefficient	t-Statistic	Coefficient	t-Statistic	Coefficient	t-Statistic
Constant	-0.012**	-2.527	-0.008*	-1.902	0.000	0.195	0.001	0.297
RM_t-RF_t	0.726***	6.673	0.665**	6.050	1.482***	9.553	1.356***	7.021
SMB_t	-0.383*	-1.839	-0.648***	-2.779	-0.189*	-1.729	-0.379**	-2.638
HML_t	-0.092	-0.566	-0.037	0.242	-0.040	-0.375	-0.091	-0.731
BAS_t	-1.035	-0.856	-1.411	-1.124	-0.056	0.067	-0.575	-0.618
ST_t	1.004	1.578	0.789	1.260	1.592***	2.793	1.066*	1.859
Adjusted R-squared	0.567		0.629		0.834		0.816	
F-statistic	16.455***		20.992***		60.344***		53.218***	

Source: Constructed by authors

Note: *, * * and *** stands for 10%, 5% and 1% significance level respectively.

4.3.3 Regression Analysis on Sub-Sample of Insurance Firms

Adjusted R square is less than 50%, which means that variation of independent variables predicts less than 50% results of the dependent variables. And from the table, we can observe that Fama and French's (1993[3]) conventional three-factor model and liquidity incorporated Fama and French's (1993[3]) conventional three-factor model perform similarly in the insurance sector. This is in line with the findings of Ediriwickrama Azeez (2017[21]) related to IPO socks in Sri Lanka. So, we conclude that liquidity-adjusted asset pricing models and conventional Fama and French three-factor models perform similarly when measuring stock returns in Sri Lankan insurance firms. But this is contradicted with the findings of this research related to the whole sample (financial sector) and the sub-samples (banking and diversified finance sector).

Table 8: Weighted Least Square Regression Results for the Sub-Sample of Insurance Firms

Panel A: Three-factor model (Fama and French, 1993)								
Dependent Variables	EW_t		VW_t		$EWER_t$		$VWER_t$	
	Coefficient	t-Statistic	Coefficient	t-Statistic	Coefficient	t-Statistic	Coefficient	t-Statistic
Constant	-0.001	-0.233	-0.002	-0.409	-0.001	-0.341	-0.002	-0.413
RM_t-RF_t	0.519***	4.503	0.507***	3.763	0.915***	7.759	0.842***	5.382
SMB_t	-0.415***	-3.303	-0.667***	-3.38	-0.327**	-1.994	-0.519***	-3.280
HML_t	0.067	0.871	-0.183	-1.320	0.077	0.822	-0.129	-1.230
Adjusted R-squared	0.329		0.443		0.451		0.306	
F-statistic	10.645***		16.626***		17.139***		9.665***	
Panel B: Stock Turnover with Three-factor model (Fama and French, 1993)								
Dependent Variables	EW_t		VW_t		$EWER_t$		$VWER_t$	
	Coefficient	t-Statistic	Coefficient	t-Statistic	Coefficient	t-Statistic	Coefficient	t-Statistic
Constant	-0.001	-0.219	-0.002	-0.416	-0.001	-0.308	-0.002	-0.392
RM_t-RF_t	0.517**	3.688	0.502***	3.546	0.928***	7.867	0.852***	5.247
SMB_t	-0.417**	-2.016	-0.673***	-3.290	-0.310*	-1.877	-0.506***	-3.01
HML_t	0.068	0.566	-0.180	-1.257	0.068	0.721	-0.135	-1.247
ST_t	0.037	0.174	0.110	0.386	-0.304	-0.636	-0.224	-0.552
Adjusted R-squared	0.317		0.433		0.449		0.296	
F-statistic	0.7847***		12.307***		13.024***		7.212***	
Panel C: Bid-Ask Spread with Three-factor model (Fama and French, 1993)								

Dependent Variables	EW_t		VW_t		$EWER_t$		$VWER_t$	
	Coefficient	t-Statistic	Coefficient	t-Statistic	Coefficient	t-Statistic	Coefficient	t-Statistic
Constant	-0.001	-0.214	-0.003	-0.406	-0.001	-0.385	-0.002	-0.415
RM_t-RF_t	0.520**	3.789	0.507***	3.764	0.924***	7.059	0.845***	5.133
SMB_t	-0.400**	-2.073	-0.669***	-3.421	-0.228*	-1.888	-0.485***	-3.743
HML_t	0.059	0.471	-0.183	-1.258	0.020	0.262	-0.148*	-1.674
BAS_t	0.059	0.314	0.004	-0.022	0.398**	2.361	0.131	0.565
Adjusted R-squared	0.318		0.432		0.482		0.296	
F-statistic	7.894***		12.247***		14.768***		7.214***	
Panel D: Stock Turnover and Bid-Ask Spread with Three-factor model (Fama and French, 1993)								
Dependent Variables	EW_t		VW_t		$EWER_t$		$VWER_t$	
	Coefficient	t-Statistic	Coefficient	t-Statistic	Coefficient	t-Statistic	Coefficient	t-Statistic
Constant	-0.001	-0.215	-0.002	-0.413	-0.001	-0.343	-0.002	-0.394
RM_t-RF_t	0.519***	3.661	0.502***	3.559	0.940***	7.040	0.856***	4.985
SMB_t	-0.402**	-2.009	-0.676***	-3.32	-0.203*	-1.691	-0.469***	-3.350
HML_t	0.060	0.468	-0.178	-1.191	0.007	0.095	-0.156*	-1.722
BAS_t	0.058	0.309	0.009	-0.055	0.415**	2.508	0.143	0.619
ST_t	0.029	0.142	0.112	0.394	-0.365	-0.888	-0.245	-0.637
Adjusted R-squared	0.304		0.424		0.485		0.348	
F-statistic	6.204***		9.668***		12.126***		5.753***	

Source: Constructed by authors

Note: *, * * and *** stands for 10%, 5% and 1% significance level respectively.

4.3.4 Regression Analysis on Sub-Sample of Diversified Finance Companies

Among the independent variables in each model, even though there are some insignificant variables, the F statistics for all the models in panels A, B, C, and D in Table 9 are statistically significant at the level of 1%. Therefore, we can conclude that all the independent variables jointly influence the dependent variable of stock returns in diversified finance companies at a significant level and therefore affirms the validity of all the models.

Table 9: Weighted Least Square Regression Results for the Sub-Sample of Diversified Finance Companies

Panel A: Three-factor model (Fama and French, 1993)								
Dependent Variables	EW_t		VW_t		EW_t-RF_t		VW_t-RF_t	
	Coefficient	t-Statistic	Coefficient	t-Statistic	Coefficient	t-Statistic	Coefficient	t-Statistic
Constant	0.004	0.890	0.001	0.093	0.004	0.914	-0.004	-0.771
RM_t-RF_t	1.134***	6.761	0.611***	2.863	1.132***	6.673	1.108***	8.295
SMB_t	0.341***	4.296	-0.305***	-3.021	0.330***	4.184	-0.228**	-2.496
HML_t	0.021	-0.200	0.200*	1.906	0.017	-0.1674	0.018	0.147
Adjusted R-squared	0.455		0.277		0.403		0.409	
F-statistic	20.243***		8.528***		20.149***		21.431***	
Panel B: Stock Turnover with Three-factor model (Fama and French, 1993)								
Dependent Variables	EW_t		VW_t		EW_t-RF_t		VW_t-RF_t	
	Coefficient	t-Statistic	Coefficient	t-Statistic	Coefficient	t-Statistic	Coefficient	t-Statistic

Constant	0.004	0.631	-0.014	-1.507	0.002	0.467	-0.008	-1.363
RM_t-RF_t	1.134***	6.727	0.620***	3.048	1.133***	6.653	1.110***	8.562
SMB_t	0.340***	4.235	-0.332***	-3.177	0.328***	4.085	-0.237**	-2.589
HML_t	0.020	-0.195	0.207**	2.029	0.017	-0.159	0.020	0.164
ST_t	0.043	0.156	1.001	2.340	0.103	0.356	0.321	1.039
Adjusted R-squared	0.496		0.323		0.485		0.534	
F-statistic	14.916***		8.034***		14.868***		16.064***	
Panel C: Bid-Ask Spread with Three-factor model (Fama and French, 1993)								
Dependent Variables	EW_t		VW_t		EW_t-RF_t		VW_t-RF_t	
	Coefficient	t-Statistic	Coefficient	t-Statistic	Coefficient	t-Statistic	Coefficient	t-Statistic
Constant	0.005	0.933	-0.000	-0.013	0.004	0.969	-0.004	-0.826
RM_t-RF_t	1.124***	6.652	0.634***	3.381	1.121***	6.621	1.117***	9.045
SMB_t	0.305***	3.268	-0.223**	-2.125	0.293***	3.039	-0.197*	-1.918
HML_t	0.019	0.146	0.108	0.918	0.025	0.189	0.018	-0.131
BAS_t	0.234	0.792	-0.541	-1.553	0.247	0.849	-0.209	-0.934
Adjusted R-squared	0.493		0.315		0.492		0.507	
F-statistic	15.319***		7.795***		15.298***		16.138***	
Panel D: Stock Turnover and Bid-Ask Spread with Three-factor model (Fama and French, 1993)								
Dependent Variables	EW_t		VW_t		EW_t-RF_t		VW_t-RF_t	
	Coefficient	t-Statistic	Coefficient	t-Statistic	Coefficient	t-Statistic	Coefficient	t-Statistic
Constant	0.003	0.588	-0.014	-1.529	0.002	0.421	-0.008	-1.323
RM_t-RF_t	1.125***	6.632	0.641***	3.521	1.122***	6.622	1.119***	9.197
SMB_t	0.303***	3.207	-0.255**	-2.398	0.288***	2.960	-0.207*	-1.947
HML_t	0.020	0.153	0.123	1.089	0.027	0.204	0.013	-0.095
BAS_t	0.238	0.796	-0.495	-1.495	0.254	0.866	-0.195	-0.847
ST_t	0.079	0.27	0.927	2.383**	0.141	0.461	0.292	0.906
Adjusted R-squared	0.484		0.354		0.484		0.501	
F-statistic	12.045***		7.470***		12.056***		12.859***	

Source: Constructed by authors

Note: *, * * and *** stands for 10%, 5% and 1% significance level respectively.

5. CONCLUSION

The finding of the study reveals that Lesmond's (2005[2]) Stock turnover and Amihud and Mendelson's (1986a[1]) bid-ask as a measure of liquidity is positively correlated with the stock returns in the financial sector in CSE. In simple terms as liquidity increases, stock returns increase. This is in line with the findings of Brown et al. (2009[61]) who reported a positive relationship of stock turnover ratio. And the findings related to bid-ask spread mimic the findings of Amihud and Mendelson (1986a[61]) and Chalmers and Kadlec (1998[36]) by reporting a positive impact on stock returns.

The results expose the liquidity-adjusted Fama and French's (1993[3]) three-factor models have a high explanatory power than Fama and French's (1993[3]) conventional three-factor model. Therefore, this study concluded that the liquidity-adjusted model outperforms the asset pricing models without liquidity among financial companies in the CSE. This is in line with the findings of the developed markets as well as findings of the developing markets (Acharya and Pedersen (2005[6]); Hagstromer et al., (2013[66]); Lee (2011[7]); Papvassiliou (2013[48]); Li, Sun, and Wang (2014[49]); Butt and Virk (2015[50]); Miralles-Quiros, Miralles-Quiros, and Oliveira (2017[8])). But contradicted with the findings of the Sri Lankan market related to IPO stocks which found both the models perform similarly in stock markets (Ediriwickrama and Azeez (2017[21])).

These discoveries might have far-reaching ramifications for both academia and business. It implies that increasing the liquidity in the stock market would help to increase the stock returns of the firms. Furthermore, it implies that the liquidity-based three-factor model predicts the Sri Lankan financial sector returns more than the conventional Fama and French (1993[3]) three-factor model. For investors, policymakers, and administrators, the current study offers some practical implications and suggestions. As a developing country, the present study emphasizes the necessity and the importance of stock liquidity in the stock market during the current financial crisis due to the COVID-19 pandemic situation. Because the downturn in liquidity will lead to significant losses in assets values (Florackis, Kontonikas, and Kostakis, 2014[67]).

The study also raises some practical implications for policymakers and regulators. Increasing stock returns must be considered by the CSE as the stock market is playing an important role in the modern economy in Sri Lanka. Therefore, they mainly focus on drivers such as inflation, the economic strength of peer market economies, substitute investment products (Government treasury bills and bonds), and trends of the markets. But liquidity is an important and sometimes underrated factor. Consequently, this study reveals that much more consideration must be given to liquidity to increase the stock returns.

This study has certain disadvantages that can serve as fundamental guidance for further research. First, the scope of the analysis is limited to publicly traded businesses in Sri Lanka that are categorized as being in the financial sector by the GICS. For practical reasons, no attempt was made to include all publicly traded companies in CSE. As a result, the impact of liquidity on stock returns in the Sri Lankan market cannot be assessed using the findings of this research. Other significant disadvantages of this research are the limited availability of data and the small sample size of the data sample. Several modifications and choices have to be made about the acquisition of data to do this study to preserve the equivalence. Out of the 285 listed companies, the final sample consisted of only 63 CSE-listed companies. In addition, the period was also restricted to only five years. The present study only uses the Fama and French (1993[3]) three-factor model and there can be more independent variables and liquidity measures that can have an impact on stock returns. Therefore, We would recommend another asset pricing model like Fama and French's (2015[30]) five-factor model should be used along with new liquidity measures for further study. Moreover, to get more detailed and accurate results, we would propose to use a sample with more observations.

REFERENCES

1. Y. Amihud, and H. Mendelson, Asset pricing and the bid-ask spread, Journal of Financial Economics, 17(2), 1986a, 223-249.
2. D.A. Lesmond, Liquidity of emerging markets, Journal of financial economics, 77(2), 2005, 411-452.
3. E.F Fama, and K.R. French, Common risk factors in the returns on stocks and bonds, Journal of Financial Economics, 33 (1), 1993, 3-56.
4. T. Chordia, A. Sarkar, and A. Subrahmanyam, An empirical analysis of stock and bond market liquidity, The Review of Financial Studies, 18(1), 2005, 85-129.
5. Y. Amihud, and H. Mendelson, The effects of beta, bid-ask spread, residual risk and size on stock returns, The Journal of Finance, 44 (2), 1989, 479-486.
6. V.V. Acharya, and L.H. Pedersen, Asset pricing with liquidity risk, Journal of Financial Economics, 77(2), 2005, 375-410.
7. K.H. Lee, The World price of liquidity risk, Journal of Financial Economics, 77, 2011, 411-452.
8. M. Miralles-Quirós, J.L. Miralles-Quirós, and C. Oliveira, The role of liquidity in asset pricing: the special case of the Portuguese Stock Market, Journal of Economics, Finance and Administrative Science, 2017.
9. D.A. Lesmond, M.J. Schill, and C. Zhou, The illusory nature of momentum profits, Journal of financial economics, 71(2), 2004, 349-380.
10. M.J. Brennan, and A. Subrahmanyam, Market microstructure and asset pricing: On the compensation for illiquidity in stock returns, Journal of financial economics, 41(3), 1996 441-464.
11. Y. Amihud, Illiquidity and stock returns: cross-section and time-series effects, Journal of financial markets, 5(1), 2002, 31-56.
12. W. Kang, and H. Zhang, Measuring Liquidity in Emerging Markets, Pacific-Basin Finance Journal, 27, 2014, 49-71.
13. L. Samarakoon, The ownership structure of Sri Lankan companies, Sri Lankan Journal of Management, 4, 1999, 143-157.
14. B. Hearn, Time varying size and liquidity effects in South Asian equity markets: A study of blue-chip industry stocks, International Review of Financial Analysis, 19(4), 2010, 242-257.
15. E.F Fama, and K.R. French, The cross section of expected stock returns, The Journal of Finance, 47 (2), 1992, 427-465.

16. G. Kumar, and A.K. Misra, Closer view at the stock market liquidity: A literature review, Asian Journal of Finance and Accounting, 7 (2), 2015, 35-57.
17. E.C. So, and S. Wang, News driven return reversals: Liquidity provision ahead of earnings announcements, Journal of Financial Economics, 114(1), 2014, 20-35.
18. C. Holden, S.E. Jacobson, and A. Subrahmanyam, The empirical analysis of liquidity, Foundations and Trends in Finance, 8 (4), 2014, 263-365.
19. A.S. Kyle, Continuous auctions and insider trading, Econometrica, 1985, 1315-1335.
20. M.A. Sarr, and M.T. Lybek, Measuring liquidity in financial markets (No. 2-232), Working Paper, International Monetary Fund, 2002.
21. T.C. Ediriwickrama, and A.A. Azeez, Illiquidity Based Factor Construction in Asset Pricing: An Analysis on Long-Run Performance of Sri Lankan Initial Public Offering Stocks, Colombo Business Journal, 8(1), 2017, 1-22.
22. W.F. Sharpe, Capital asset prices: A theory of market equilibrium under conditions of risk, The Journal of Finance,19 (3), 1964, 425-442.
23. J. Lintner, The valuation of risk assets and the selection of risky investments in stock portfolios and capital budgets, The Review of Economics and Statistics, 47 (1), 1965, 13-37.
24. J. Mossin, Equilibrium in a capital asset market, Econometrica, 34 (4), 1966, 768-783.
25. F. Black, Capital market equilibrium with restricted borrowing, The Journal of Business, 45 (3), 1972, 444-455.
26. R.W. Banz, The relationship between return and market value of common stocks, Journal of Financial Economics, 9 (1), 1981, 3-18.
27. B. Rosenberg, K. Reid, and R. Lanstein, Persuasive evidence of market inefficiency, The Journal of Portfolio Management, 11(3), 1985, 9-16.
28. N. Jegadeesh, and S. Titman, Returns to buying winners and selling losers: Implications for stock market efficiency, The Journal of Finance, 48(1), 1993, 65-91.
29. M.M. Carhart, On persistence in mutual fund performance, The Journal of Finance, 52(1), 1997, 57-82.
30. E.F Fama, and K.R. French, A five-factor asset pricing model, Journal of Financial Economics, 116 (1), 2015, 1-22.
31. M. O'Hara, Liquidity and financial market stability, National Bank of Belgium Working Paper, 2004, (55).
32. H.K. Baker, Trading location and liquidity: An analysis of US dealer and agency markets for common stocks (Blackwell Pubs, 1996)
33. T. Chordia, R. Roll and A. Subrahmanyam, Common determinants of liquidity and trading (The Research Foundation of AIMR, CFA Institute, 2001).
34. W. Liu, A liquidity-augmented capital asset pricing model, Journal of Financial Economics, 82(3), 2006, 631-671.
35. Y. Amihud, and H. Mendelson, Liquidity and stock returns, Financial Analysts Journal, 42(3),1986b, 43-48.
36. J.M. Chalmers, and G.B. Kadlec, An empirical examination of the amortized spread, Journal of Financial Economics, 48(2), 1998, 159-188.
37. C.M. Lee, Market integration and price execution for NYSE-listed securities, The Journal of Finance, 48(3), 1993, 1009-1038.
38. M.J. Brennan, T. Chordia, and A. Subrahmanyam, Alternative factor specifications, security characteristics, and the cross-section of expected stock returns, Journal of Financial Economics, 49(3), 1998, 345-373.
39. V.T. Datar, N.Y. Naik, and R. Radcliffe, Liquidity and stock returns: An alternative test, Journal of Financial Markets, 1(2), 1998, 203-219.
40. L. Pástor, and R.F. Stambaugh, Liquidity risk and expected stock returns, Journal of Political Economy, 111(3), 2003, 642-685.
41. N.F. Chen, and R. Kan, Expected return and the bid-ask spread (Center for Research in Security Prices, Graduate School of Business, University of Chicago, 1989)
42. V.R. Eleswarapu, and M.R. Reinganum, The seasonal behavior of the liquidity premium in asset pricing, Journal of Financial Economics, 34(3), 1993, 373-386.
43. H. Demsetz, The cost of transacting, The Quarterly Journal of Economics, 82(1), 1968, 33-53.
44. L.R. Glosten, and P.R. Milgrom, Bid, ask and transaction prices in a specialist market with heterogeneously informed traders, Journal of financial economics, 14(1), 1985, 71-100.
45. C.M. Lee, and B. Swaminathan, Price momentum and trading volume, The Journal of Finance, 55(5), 2000, 2017-2069.
46. Y. Amihud, and H. Mendelson, Liquidity, Asset Prices and Financial Policy, Financial Analysts Journal, 47(6), 1991, 55-66.

47. R.G. Ibbotson, Z. Chen, D.Y.J. Kim, and W.Y. Hu, Liquidity as an investment style, Financial Analysts Journal, 69(3), 2013, 30-44.
48. V.G. Papavassiliou, A new method for estimating liquidity risk: Insights from a liquidity-adjusted CAPM framework, Journal of International Financial Markets, Institutions and Money, 24, 2013, 184-197.
49. B. Li, Q, Sun, and C. Wang, Liquidity, liquidity risk and stock returns: Evidence from Japan, European Financial Management, 20(1), 2014, 126-151.
50. H.A. Butt, and N.S. Virk, Liquidity and asset prices: an empirical investigation of the Nordic stock markets, European Financial Management, 21(4), 2015, 672-705.
51. R.J. Calderon-Rossell, The structure and evolution of world stock markets, Proc. 1st Annual Pacific Basin Finance Conference, Taipei, China, 1990, 13-15
52. C.A. Yartey, The determinants of stock market development in emerging economies: Is South Africa different? IMF Working Papers, (032), 2008.
53. G. Bekaert, C.R. Harvey, and C. Lundblad, Liquidity and expected returns: Lessons from emerging markets, The review of financial studies, 20(6), 2007, 1783-1831.
54. B. Hearn, and J. Piesse, An augmented capital asset pricing model: liquidity and stock size in African emerging financial markets, African Finance Journal, 2009(si-1), 45-73.
55. D.A. Dickey, and W.A. Fuller, Distribution of the estimators for autoregressive time series with a unit root, Journal of the American Statistical Association. 74 (366), 1979, 427-431.
56. T.G. Bali, R.F. Engle, and S. Murray, Empirical Asset Pricing: The Cross Section of Stock Returns (New Jersey: John Wiley & Sons, 2015)
57. W.K. Newey, and K.D. West, A simple, positive semi-definite heteroscedasticity and autocorrelation consistent covariance matrix, Econometrica, 55 (3), 1987, pp 703-708.
58. E.F Fama, and K.R. French, Size, value and momentum in international stock returns, Journal of Financial Economics, 105 (3), 2012, 457-472.
59. S.K. Agarwalla, J. Jacob, and J.R. Varma, Four factor model in Indian equities market. Indian Institute of Management, Ahmedabad Working Paper, 2014, (2013-09), 05.
60. A.P. Abeysekara, and P.D Nimal, The four-factor model and stock returns: Evidence from Sri Lanka, Afro-Asian Journal of Finance and Accounting. 7 (1), 2017, 1-15.
61. J.H. Brown, D.K. Crocker, and S.R. Foerster, Trading volume and stock investments, Financial analysts journal, 65(2), 2009, 67-84.
62. S.Y. Hu, Trading turnover and expected stock returns: The trading frequency hypothesis and evidence from the Tokyo Stock Exchange, Available at SSRN 15133, 1997.
63. T. Chordia, R. Roll and A. Subrahmanyam, Commonality in liquidity, Journal of financial economics, 56(1), 2000, 3-28.
64. D. Nguyen, S. Mishra, A. Prakash, and D.K. Ghosh, Liquidity and asset pricing under the three-moment CAPM paradigm, Journal of Financial Research, 30(3), 2007, 379-398.
65. H.W. Chan, and R.W. Faff, Asset pricing and the illiquidity premium, Financial Review, 40(4), 2005, 429-458.
66. B. Hagstromer, B. Hansson, and B. Nilsson, Illiquidity frictions and asset pricing anomalies. Working Paper, 2013.
67. C. Florackis, A. Kontonikas, and A. Kostakis, Stock market liquidity and macro-liquidity shocks: Evidence from the 2007–2009 financial crisis, Journal of International Money and Finance, 44, 2014, 97-117.