The International Journal of Business and Finance Research
Vol. 10, No. 2, 2016, pp. 81-90
ISSN: 1931-0269 (print)
ISSN: 2157-0698 (online)

IBFR
www.theIBFR.com

ILLIQUIDITY EXPOSURE OF SIZE AND VALUE IN MALAYSIAN EQUITY RETURNS

Mohamad Jais, University of Malaysia Sarawak
Chandana Gunathilaka, University of Sri Jayewardenepura

ABSTRACT

This study examines pricing implications of size, value, illiquidity and momentum effects in Malaysian stock returns. It employs time series and panel methods in testing APT-motivated pricing models over a sample period of 14 years up to 2013. Results indicate the significance of illiquidity over size and value factors. Capital Assets Pricing Model (CAPM) poorly performs in explaining average stock returns. An asset's exposure to size, value, momentum, and illiquidity characteristics subordinates CAPM's explanatory power. Momentum trading strategy is profitable in short to intermediate horizons, yet momentum risk factor is unable to improve the efficiency of pricing models. Application of illiquidity adjusted Fama-French three-factor model is apparently persuasive for investments and related decisions in Malaysia.

JEL: G10, G12

KEYWORDS: Illiquidity, Pricing, Risk Factors, Malaysia

INTRODUCTION

The variation in average stock returns in cross section has been a topic of explanation for large numbers of studies over the last several decades. Static single-period CAPM (Sharpe, 1964 and Lintner, 1965) shows low battery at the power and relative performance of multifactor Arbitrage Pricing Theory and Intertemporal CAPM motivated models. Among these models, the three factor model (Fama & French, 1993) has been successful in many markets even though some authors, including Rahim and Nor (2006) find it to be inconclusive in general. The evidence in favor of other explanatory factors and anomalies including momentum and liquidity premiums, with its recent attention on behavioral explanations, has stimulated asset-pricing research. Especially, the research seeks empirical evidence from emerging markets where information asymmetry is observed in common, suggesting that most of the anomalies are differently formed relative to the US markets.

The interest of extending the work to emerging markets can be attributed to many relative differences. Emerging markets are different (Iqbal et al., 2010; Gunathilaka, 2012) in institutional, political and macroeconomic perspectives and these conditions are known to be volatile. This volatility disallows parameters to remain constant over time. Hence, the present study examines CAPM and other - Arbitrage Pricing Theory (APT) motivated-pricing models in an advanced emerging market, the Kuala Lumpur Stock Exchange. The idea of this article is to present evidence of higher returns in market illiquidity and demonstrate significance of illiquidity and momentum risk factors in APT motivated-pricing models. We focus on evidence of improved efficiency in asset pricing models and in extending the literature by studying an emerging context, which is, arguably, an ideal context to investigate illiquidity effects. This is true because these markets are mostly illiquid relative to that of developed markets. More specifically, the two-fold objectives of this paper are: Examine pricing implications of illiquidity and momentum in the presence of market risk premium, size and book-to-market, the well documented risk factors, and; Discuss the significance of illiquidity risk factor adjusted pricing models in Malaysia. The rest of the paper covers ideas of prior research, the nature of the data and methodology concerning how the tests are carried on, together with the results and concluding comments.

LITERATURE REVIEW

Iqbal et al. (2010) propose that CAPM has generally failed both in developed and emerging markets. They suggest an augmented version of Fama-French models to perform best. Based upon similar arguments, a number of studies has explored different explanatory factors claiming that the beta (β) of CAPM cannot fully explain average stock returns in cross section. Among these risk factors, size, value and momentum effects have been widely researched. Value effect (Rosenberg et al., 1985), the observation of higher returns for firms with higher book-to-market equity (BME) ratios over low BME, has been argued to be a long-side anomaly (Phalippou, 2008). Phalippou (2008) reports that stocks with institutional investors are free of value premium. Fama and French (1998) give evidence of BME effects in 12 emerging markets including Malaysia. Fama and French (1993) three-factor model includes the size effect (Banz, 1981) and the value effect in addition to the market risk premium of CAPM. Size effect, the observation of higher returns for small stocks over big, has been confirmed by many subsequent studies including Blume and Stambaugh (1983), Jensen et al. (1997) and Eleswarapu and Reinganum (2004). The returns of size and BME portfolios represent compensation for additional market risk (Fama & French, 1993). However, Jensen et al. (1997) argue that these effects are significant only in expansive monetary policy periods. This also makes an appeal for further empirical studies on whether size and BME effects are disappearing as Fama and French (2011) report no size premium in any of four global regions.

While Agarwal (2010) argues that the size factor is indeed a proxy for financial distress risk, Liu (2006) argues it to be a result of liquidity risk in small firms. Naturally, the size effect may display its exposure to liquidity in emerging markets, due to relative illiquidity in these markets. Liquidity hypothesis, that the returns should be higher in illiquid assets, has been substantiated in different markets. Lam and Tam (2011) suggest liquidity adjusted four-factor model to be a best-use model in Hong Kong stock market. They use many liquidity proxies including Amihud (2002) illiquidity measure. Amihud (2002) develops this measure using daily price and volume data and shows that it is significant. The discussion of liquidity effect is particularly important due to absence of conclusive results (Marcelo & Miralles, 2006). They insist the importance of application of a market-wide risk proxy rather than individual stock-related characteristics like bid-ask spreads. Liu (2006) provides evidence of significant liquidity premium. They insist the robustness to the CAPM and the Fama-French three-factor model. In contrast, Nguyen and Lo (2013) find liquidity discount, they document evidence of significantly lower returns in illiquid stocks than stocks with more liquidity. On this ground, we examine whether illiquidity subsumes size and book- to-market in the Malaysian market. Jegadeesh and Titman (1993) find opportunity to make profits using a zero investment strategy because past winners (losers) become losers (winners) subsequently.

Momentum effect, relation between an asset's return and its recent relative performance history, has been extensively researched (Asness et al., 2013) and many subsequent Asian studies including Ansari and Khan (2012) in the Indian market, have confirmed the effect. Chan et al. (1999) demonstrate that momentum strategies are profitable for intermediate horizons. Asness (1997) finds partial success of momentum strategy. He reports strongly working momentum strategy for low-value (expensive) stocks. However, Hameed and Kusnadi (2002) find no momentum in Asian markets. In contrast, Husni (2006) provides evidence in Malaysia, and reveals that momentum profits are more pronounced among high trading volume turnover stocks. This Malaysian evidence is consistent with Lee and Swaminathan (2000) who find the momentum effect as a result of volume. Despite the arguments that the momentum is a result of incorrect measurements (Schiereck et al., 1999) and that window dressing by institutional investors contribute to momentum effect (Sias, 2007) many studies have attempted to find its significance in explaining average returns in cross section. Carhart (1997) promotes a four-factor model with momentum. However, subsequent evidence has no consistency, for instance, momentum is a significant risk factor for Nartea et al. (2009) but Lam and Tam (2011) find inability of the momentum factor to explain returns in cross section. Given these arguments, the present study contributes related literature by examining the equity returns in an advanced emerging market in the Asian region.

METHODOLOGY

This study conducts time series and panel data tests of Capital Asset Pricing Model and other APT-motivated models including FF three-factor model, and Carhart (1997) four-factor model augmented with illiquidity premium. We test efficiency of market risk premium (*MRP*), FF risk factors (*SMB* and *HML*), Momentum (*WML*) and illiquidity (*ILQ*). *ILQ* is measured using Amihud's (2002) illiquidity measure. The empirical model takes the following linear form in an APT-setting.

$$R_{pt} - R_{ft} = \alpha + \beta_{p1}F_{1t} + \ldots + \beta_{pk}F_{kt} + e \qquad 1$$

Where, R_{pt} is the expected return on portfolio p ($p=1,\ldots, N$) at time t; R_{ft} is the return on the risk-free asset at time t; F_k refers to ($1\times k$) vector of risk factors. The factors are *MRP, SMB, HML, ILQ* and *WML*. β s are the factor sensitivities to excess returns of p^{th} portfolio. Market portfolio is proxied by Kuala Lumpur Composite Index (KLCI), at time t. We apply time series regressions restricting to first stage with an objective of validating the factors. Answering the question whether co-skewness risk captures liquidity, following Lam and Tam (2011), we test robustness by including the higher moment factor, co-skewness (*CSK*), $(MRP\text{-}\overline{MRP})^2$ in time series regressions. Panel estimations use Stock and Watson (1993) and Kao and Chiang (2000) Dynamic Ordinary Least Squares (*DOLS*) for Cointegrated Panel Data with homogeneous long-run covariance structure across portfolios. Panel *DOLS* test statistics consist of standard asymptotic distributions, and it uses a robust single equation approach that resolve endogeneity through leads and lags of first differences of the regressors, and for serially correlated errors by a generalized least squares procedure. Construction of *SMB* and *HML* risk factors follow the methodologies of related studies including Fama and French (1993); Carhart (1997); Liu (2006); Lam and Tam (2011) and Nguyen and Lo (2013). *SMB* is the return for the small stock portfolio over big, measured as the simple average of value weighted returns of three small stock portfolios [Small - (High/Middle/Low-*BME*)] minus three big stock portfolios [Big-(High/Middle/Low-*BME*)]. *HML* is the difference between the monthly average returns on the two portfolios within the high *BME* group and, on the two portfolios with Low *BME* group. Therefore, *HML* risk factor is estimated in a similar process to *SMB*. *HML* is the return for the high *BME* stock portfolio over low, measured as the simple average of value weighted returns of two high *BME* stock portfolios (High *BME*-Small/Big) minus two low *BME* stock portfolios (Low *BME*-Small/Big).

Following the methodologies of Jegadeesh and Titman (1993), Carhart (1997), and Nartea et al. (2009) *WML* is constructed using buy/winner and sell/loser portfolios that are formed based on *J*-month lagged returns and held for *K* months. Having tested multiples of *J*-months by-*K*-month portfolios (Table 1), we apply the six-month lagged and three month forward (*j6 - k3*) momentum strategy in ascertaining return premium. The process of estimation of returns to the winners involve obtaining equally weighted returns of the top quintile of the momentum-descending-sorted firms (equal to 160 firms by 2013), those who are also independently size-sorted and classified as small and big. Returns of similarly obtained loser/sell portfolios, which consist of last quintile of firms, are used to create the *WML* risk factor. *WML* is defined as the difference in average returns of two winners (Small-Winner and Big-Winner) and two losers (Small-Loser and Big-Loser).

Table 1: Momentum in Stock Returns

	K = 3	K = 6	K = 9	K = 12
J = 3	*0.64	*0.54	0.19	-0.04
	(3.01)	(2.67)	(0.93)	(-0.30)
J = 6	*5.84	0.34	0.04	-0.13
	(34.16)	(1.80)	(0.28)	(-0.97)
J = 9	*5.66	*2.94	-0.04	-0.08
	(43.95)	(20.04)	(-0.35)	(-0.70)
J = 12	*5.48	*3.66	*1.75	-0.11
	(54.09)	(33.64)	(16.46)	(-1.08)

*This table depicts average monthly returns for Zero-investment portfolios formed on J-month lagged and K month holding periods. Reported in parentheses are t-statistics. * indicates 1% level significance.*

We construct illiquidity risk factor in a similar method used to *SMB* and *HML* construction in related studies including Fama and French (1993) and Lam and Tam (2011). Illiquidity of stocks is estimated using Amihud (2002) measure and stocks are independently sorted into three portfolios (low, medium and high illiquidity). The monthly illiquidity risk factor (*ILQ*) is the difference in average returns on the two high-illiquidity portfolios (Small-High and Big-High) and the average returns on the two low-illiquidity (Small-Low and Big-Low) portfolios. The Amihud (2002) measure is given as:

$$\mathrm{ILQ}_{\mathrm{it}} = \frac{1}{\mathrm{D}_{\mathrm{it}}} \sum_{\mathrm{d}=1}^{\mathrm{idt}} \frac{|\mathrm{r}_{\mathrm{idt}}|}{\mathrm{Vol}_{\mathrm{idt}}} \qquad 2$$

Where, *ILQ* is the illiquidity of firm *i* at the day *d* at month *t*; *r* is the return percentage (Lei et al., 2013) of firm '*i*' at day *'d'* at month '*t*'; *Vol* is the volume in Malaysian Ringgit of firm *'i'* at day '*d*' at month *'t'*. Hence, monthly illiquidity is equally weighted based on the observed days for illiquidity measure in the month'*t*'.

Test Assets

We use 48 test portfolios, 36 of them are size (*SZ*) (Market capitalization), book-to-market equity (*BME*), momentum (*Mom*) and illiquidity (*ILQ*) sorted (i.e., 2×3×3×2=36). In view of momentum risk factor's insignificance observed in estimations, we form 12 more portfolios restricting to three risk characteristics. These 12 are, therefore, *SZ-BME-ILQ* sorted (i.e., 2×3×2=12). *SZ* and *ILQ* bisect at 50 percent break point while *BME* and *Mom* trisect at bottom 30 and top 30 percentiles. This process, carried on at the end of December of the year, results in stock portfolios for which the succeeding year's value weighted monthly returns are calculated from January to December. Table 2 reports summary statistics in two panels. Panel (A) uses *WML-BME-ILQ-SZ* sorted 36 portfolios and (B) uses *BME-ILQ-SZ* sorted 12 portfolios. For its brevity, portfolios are depicted as P/i/j/k, where '*i*' '*j*' and '*k*' represent embedded risk characteristics of each portfolio. Table 2 also depicts the annual average number of firms in each portfolio under two size categories. The number of firms reported for each liquid (1) and illiquid (2) portfolios show that many big firms are grouping in to the liquid category while many small firms are in the illiquid category. Further, we observe evidence to the contrary, big firms outperform small except in case of loser portfolios (portfolios with indication '1' for momentum) across all cases. The value stock portfolios (i.e., high *BME*) outperform growth stock portfolios (i.e., low *BME*) across all the cases reported, confirming the value premium.

Table 2: Summary Statistics of Test Portfolios (P)

P/I/J/K: WML-BME-ILQ-SZ Sorted 36 Portfolios									
P	MEAN RETURNS		SD		P	MEAN RETURNS		SD	
	Sm {#F}	Bg {#F}	Sm	Bg		Sm {#F}	Bg {#F}	Sm	Bg
P111	-0.98 {16}	-1.20 {34}	9.91	7.24	P222	-0.12 {30}	-0.07 {12}	5.29	5.24
P112	-0.45 {21}	-1.73 {08}	7.53	7.95	P231	-0.12 {06}	0.32 {20}	7.74	6.38
P121	-0.93 {08}	-0.23 {24}	7.62	7.41	P232	0.41 {42}	0.66 {12}	5.44	5.83
P122	0.15 {31}	-0.18 {11}	5.79	5.94	P311	-1.27 {14}	-0.07 {44}	6.97	5.06
P131	1.17 {06}	0.50 {20}	8.95	8.02	P312	-1.45 {16}	-0.67 {06}	7.07	7.27
P132	0.66 {42}	0.82 {09}	6.53	7.98	P321	-0.79 {06}	0.41 {34}	7.74	5.35
P211	-0.42 {11}	-0.41 {37}	6.89	5.73	P322	-0.39 {26}	0.00 {09}	5.49	6.23
P212	-1.07 {14}	0.09 {06}	6.65	7.39	P331	-0.33 {07}	0.49 {18}	8.89	6.77
P221	-0.12 {06}	0.21 {32}	6.02	5.25	P332	-0.03 {40}	-0.08 {08}	5.71	6.39
BME- ILQ-SZ Sorted 12 Portfolios									
P11	-1.04 {41}	-0.42 {20}	5.9	5.4	P12	-0.94 {89}	-0.83 {123}	6.12	6.5
P21	-0.63 {51}	0.20 {20}	5.88	5.44	P22	-0.14 {32}	-0.03 {57}	5.11	4.81
P31	0.13 {115}	0.41 {86}	7.05	6.72	P32	0.34 {19}	0.52 {28}	5.55	5.78

This table reports mean returns and standard deviations (SD) of (A) WML 1/2/3 –BME1/2/3 – ILQ 1/2- Size (Sm/Bg) sorted 36 portfolios (B) BME-ILQ-Size sorted 12 portfolios across the sample, from 2000 to 2013. For instance, 'P111 – Sm' is Loser/Low/Liquid/Small – Portfolio. #F is the annual average number of firms in each portfolio.

Our data sources include DataStream database and Bursa Malaysia resources. The data set consists of 803 (2013) companies listed on Bursa Malaysia, the Kuala Lumpur Stock Exchange, from January 2000 to December 2013. Consistent with prior studies, we use monthly return data, value-weighted market returns using Kuala Lumpur Composite Index, and one-month Treasury bill yield to proxy the risk free rate. *MRP* is the return of KLCI over risk free rate. Given the above procedure in constructing, the table 3 depicts the summary statistics of risk factors. *WML* (momentum risk factor) is 9.43% for the sample period from 2000 to 2013. The minimum premium -7.39% and maximum of 36.17% indicate that the strategy is more prudent in bear markets. The correlation coefficients of factors explain that SMB and ILQ are positively correlated among other weakly correlated factors. It suggests that the size effect persists in market illiquidity. Illiquidity has an average of negative 2.38%, suggesting a liquidity premium over the period.

Table 3: Summary Statistics

	SUMMARY STATISTICS				CORRELATION COEFFICIENTS					
	MEAN	SD	MIN.	MAX.	MRP	CSK	SMB	HML	WML	ILQ
MRP	0.51	4.32	-15.51	13.39	1					
CSK	0.19	0.34	0.00	2.52	-0.15*	1				
SMB	-1.21	2.62	-8.52	9.40	-0.16*	0.10*	1			
HML	-1.71	2.45	-12.71	4.55	0.24*	-0.17*	-0.42*	1		
WML	9.43	5.05	-7.39	36.17	-0.20*	0.28*	0.07*	-0.23*	1	
ILQ	-2.38	3.51	-10.94	9.75	-0.27*	0.16*	0.74*	-0.17*	0.01*	1

*MRP is the Market risk premium, CSK is co-skewness (MRP-$\overline{MRP}$)2, SMB is the Small minus Big, HML is High minus Low, WML is the distance between average returns of Winner and Loser and ILQ is Illiquidity risk factor. SD is Standard Deviation of risk factors. Summary statistics are in percentages, monthly. Significance *1% level.*

RESULTS

Table 4 and 5 report results of time series regressions for 36 and 12 portfolios respectively. The test results have been grouped under *BME* categories, Low, Medium and High in table 4a. Table 5 presents the results of panel estimations for CAPM, and other APT-motivated models using dynamic OLS. Accordingly, in its single factor DOLS model, R^2 of MRP is 48% (12Ps) and 36% (36Ps). Not reported in the table, *ILQ, SMB* and *HML* have R^2 s of 8%, 2.4% and 4.4% respectively in their single factor estimations. Thus, *ILQ* factor is stronger than the *SMB* and *HML* risk factors. This fact is verifiable in DOLS model estimations, FF model has an adjusted R^2 of 56%, while *MRP, SMB* and *ILQ* jointly explain about 58% (see panel (a) of Table 6). *MRP* and *SMB* premiums are significant across all portfolio categories with positive coefficients. This significance has no difference even under panel estimations given in Table 5. *SMB* factor loading shows a decrease as the *SZ* increases, indicating that size effect is priced. *HML* shows a significant positive association in high to medium *BME* groups (We have tested SZ-BME sorted 12 portfolios and SZ-BME-Mom 18 portfolios (these results are available upon request) and the coefficients of these factors show no impairment across diversifications). The monotonic factor loading of *HML*, the value effect, shows significance in medium to high *BME* portfolios. *HML* factor loadings show an increase as the *BME* increase, indicating value effect. However, this evidence on *HML* contrasts Fama and French (1993) who find negative *HML* slope for small stocks. According to distress effect argument, high *BME* stocks tend to be relatively more distressed (Fama and French, 1992) and naturally require a return premium. Consistent with this argument, we find that the slopes are higher and significant in High-*HML* category, while low slopes are insignificant in Low-*HML* (i.e., growth stocks) category. This observation persists in common across portfolios.

Table 4: Results of Time Series Regressions

BME	P1/1/1	P1/1/2	P1/2/1	P1/2/2	P2/1/1	P2/1/2	P2/2/1	P2/2/2	P3/1/1	P3/1/2	P3/2/1	P3/2/2
	MRP											
Low	0.93*	0.96*	1.24*	1.23*	0.88*	0.75*	1.01*	0.91*	0.62*	0.88*	0.81*	0.60*
Med	1.06*	0.87*	1.12*	0.87*	0.82*	0.84*	0.88*	0.82*	0.66*	0.72*	0.85*	0.83*
High	0.68*	1.04*	1.15*	1.17*	0.86*	0.83*	0.96*	0.80*	1.10*	0.88*	1.01*	0.85*
	SMB											
Low	1.73*	1.51*	0.79*	0.13	1.06*	1.12*	0.51*	0.45	1.10*	1.46*	0.57*	0.53
Med	1.20*	1.43*	0.83*	0.77*	1.16*	1.03*	0.47*	0.17	1.91*	1.21*	0.32	0.70*
High	1.66*	1.43*	1.21*	0.67**	1.85*	1.15*	1.04*	0.82*	1.55*	1.18*	0.35	0.44
	HML											
Low	0.21	0.20	0.44**	-0.14	-0.16	0.23	0.25*	0.31	0.16	0.15	0.02	0.15
Med	0.69*	0.39**	0.80*	0.73*	0.37**	0.34**	0.40*	0.26	0.81*	0.38**	0.27	0.47**
High	1.29*	0.88*	1.22*	0.62**	0.99*	0.88*	0.98*	0.77*	0.95*	0.59*	0.57*	0.62*
	WML											
Low	-0.21**	-0.09	-0.08	-0.05	-0.07	0.05	-0.08**	0.07	-0.07	-0.01	-0.03	0.10
Med	0.04	0.06	-0.02	0.01	0.02	0.06	-0.03	0.08	0.04	0.11*	0.01	0.06
High	0.06	0.08**	0.09	0.02	0.05	0.12*	0.08	0.09**	0.12	0.09**	0.05	0.10
	ILLIQUIDITY											
Low	-0.81*	-0.02	-0.20	0.38	-0.33	-0.03	-0.13	0.07	-0.57**	-0.64*	-0.55*	-0.27**
Med	-0.17	-0.28	-0.38	-0.16	-0.59*	-0.13	-0.27	0.13	-0.84*	-0.46*	-0.39*	-0.23**
High	-0.67**	-0.16	-0.60*	-0.07	-0.56*	-0.22**	-0.53*	-0.36**	-0.53**	-0.31**	-0.35**	-0.08**
	CONSTANT											
Low	0.03	0.02**	0.01	-0.01	0.01	-0.01	0.01	-0.01	0.00	-0.01	-0.01	-0.03
Med	0.00	0.00	0.01	0.01	0.00	0.00	0.01	-0.01	0.00	-0.02**	0.00	-0.01
High	0.02	0.01	0.00	0.01	0.01	0.00	0.00	0.00	-0.01	-0.01	-0.01	-0.01
	ADJ. R^2											
Low	0.27	0.46	0.62	0.40	0.36	0.32	0.64	0.26	0.22	0.40	0.62	0.12
Med	0.44	0.59	0.55	0.51	0.47	0.57	0.64	0.44	0.30	0.46	0.61	0.37
High	0.19	0.65	0.57	0.43	0.40	0.63	0.63	0.48	0.39	0.57	0.53	0.38

*The table depicts results of 36 time series regressions. Pi/j/k/L-H (Mom-SZ-Illiq-BME) represent portfolio with momentum trisects (Loser1, Winner3)/Size bisects (Small1, Big2)/illiquidity bisects (liquid1, illiquid2/BME trisects (Low, Medium and High). For instance, P111L is Loser/Small/Liquid/Low – Portfolio. Each factor's coefficient is reported with * for significance at 1% level and ** for 5% level where appropriate.*

WML is insignificant in both time series and panel models; even after lead and lag structure is considered in the panel models. Where it becomes marginally significant, the magnitude of the coefficient is relatively low. Moreover, the adjusted R^2 shows no improvement as the momentum factor introduced in to Fama-French model (see Table 6). The illiquidity factor is negative as expected, and significant in all winner portfolios, suggesting that liquidity is priced in momentum-buy-side transactions. Further, negative illiquidity slopes are significant across value stock portfolios (see Table 4), suggesting that illiquidity factor is less-priced in case of growth stocks, in other word, illiquidity premium is important in value stocks due to relative low-liquidity. The inclusion of co-skewness in the model, (where explanatory variables become *MRP, SMB, HML, ILQ, WML* and *CSK*) produced consistent results to those reported in table 4a and 4b, and insignificant coefficients of *CSK*.

Table 5: Results of Time Series Regressions

	MRP		SMB		HML		ILQ		WML		CONSTANT		ADJ R^2	
	Liq	Illiq	Liq	Illiq	Liq	Illiq	Liq	Illiq	Liq	Illiq	Liq	Illiq	Liq	Illiq
P11	0.59*	0.75*	1.21*	1.47*	0.03	0.12	-0.90*	-0.46*	-0.13*	-0.07	0.01	0.01	0.51	0.67
P12	0.71*	0.72*	1.37*	1.23*	0.50*	0.31*	-0.79*	-0.47*	-0.01	0.04	0.00	-0.01	0.65	0.75
P13	0.72*	0.79*	1.90*	1.26*	1.03*	0.73*	-1.06*	-0.42*	0.02	0.07**	0.01	0.00	0.62	0.76
P21	0.87*	0.83*	0.63*	0.52**	0.19	0.01	-0.60*	-0.15	-0.07*	-0.04	0.00	0.00	0.79	0.49
P22	0.79*	0.68*	0.56*	0.48*	0.42*	0.39*	-0.70*	-0.25**	-0.02	0.00	0.00	0.00	0.75	0.68
P23	0.88*	0.77*	0.94*	0.81*	0.85*	0.67*	-0.91*	-0.59*	0.04	0.04	0.00	0.00	0.74	0.67

*This table reports results of time series regressions on Size-BME-ILQ sorted 12 portfolios. P/k/i represent portfolio with Size bisects (Sm1, Bg2) / BME trisects (Low, Medium and High). Ps are reported in columns according to their ILQ category: liquid and illiquid. For instance, 'P11-Liq' is Small/Low – Liquid Portfolio. Coefficients are reported with significance *1% and ** 5% level.*

One might argue that the association between returns of test assets may decline the significance of these results. We report results of panel estimations in Table 6, it suggests that illiquidity premium is significantly priced when the time variation (Lead/lags) and cross sectional variations are considered together. The negative slope explains compensation of illiquidity. *WML* does not improve efficiency in all models across portfolios. *MRP, SMB* and *ILQ* jointly explain more than FF model, yet adjusted R^2 in illiquidity adjusted FF model outperforms all other models. The R^2 of *CAPM+ILQ* model is 42% in case of 36 portfolios (54% in 12 Ps) (not reported in the table) which suggest that efficiency improvement of FF model is marginal relative to liquidity adjusted CAPM. We observed a significant positive correlation between *SMB* and *ILQ* (Table 3), and the low marginal efficiency between FF model and *ILQ* adjusted CAPM model supports a conclusion that illiquidity is able to control size effect. However, we doubt on whether the illiquidity measure we used in this study captures the market illiquidity, perhaps a perfect measure would completely replace size premium in Malaysian market. The explanatory power of these models decreases as the portfolios modified to include many characteristics, for instance R^2 is higher in the case of a 12 portfolio test over a 36 portfolio test. Given these results, one might conclude that liquidity adjusted FF model provides a reasonable solution in explaining cross section of average stock returns. Yet, these solutions are not absolute explanations; perhaps, the behavioral explanations would be more worthwhile in Malaysian market.

Table 6: Dynamic OLS (Panel) Estimations

Apt-Motivated Models	MRP	SMB	HML	WML	ILQ	Adj.R^2
Size (2)-BME (3) Illiquidity: 12 portfolios: N=1824						
CAPM	0.929*					0.48
FF	0.976*	0.781*	0.448*			0.56
CAPM+SMB+ILQ	0.912*	0.737*			-0.157*	0.58
FF+ WML	0.986*	0.813*	0.502*	0.026**		0.57
FF+ ILQ	0.905*	1.058*	0.561*		-0.676*	0.63
FF+ WML+ ILQ	0.945*	1.108*	0.620*	0.044	-0.301*	0.63
Size (2)-BME (3)-Momentum (3)-Illiquidity (2):36 portfolios: N=5320						
CAPM	0.918*					0.36
FF	0.963*	0.745*	0.428*			0.42
CAPM+SMB+ILQ	0.932*	0.875*			-0.605*	0.45
FF+ WML	0.973*	0.777*	0.483*	0.024**		0.42
FF+ ILQ	0.922*	1.018*	0.539*		-0.678*	0.49
FF+ WML+ ILQ	0.932*	1.069*	0.598*	0.015	-0.299*	0.51

*Table depicts the coefficients reported with *significance at 1% level and ** 5% level, obtained in regressions under CAPM and other APT-motivated models. The estimations follow Kao and Chiang (2000) Dynamic Ordinary Least Squares (DOLS) for Co-integrated Panel Data with homogeneous long-run covariance structure across cross-sectional units. DOLS step-estimations results reported in adjacent columns, using 156 monthly observations from 2001 to 2013.*

CONCLUSION

Research on pricing assets has been active for many years. The role of market illiquidity and momentum trading effect are of interest due to inconsistent and mixed evidence. This paper examines these effects in presence of well-known market wide risk factors, size and book-to-market, in a market with relatively little evidence. The evidence collected in this study demonstrates a significance of illiquidity risk factor over size, however, it does not permit us to replace size factor, perhaps due to the application of an imperfect measure of liquidity. FF three-factor model retains its significance in explaining average returns in cross section. A two-factor model with Market risk premium and illiquidity performs a little less than FF three-factor model. Results display a joint power of these factors and favor application of a 4-factor model, FF three factors together with illiquidity. The short-term momentum trading strategy found profitable in Malaysian market, yet momentum risk factor shows no role in explaining stock returns. However, none of these models explain more than two-third of the variations, thus leaving room, perhaps most challengingly, for behavioral explanations of returns in cross section.

REFERENCES

Agarwal, V. (2010). Size and book-to-market anomalies and omitted leverage risk. *European Journal of Finance*, *16*(3), 263–279.

Amihud, Y. (2002). Illiquidity and stock returns: cross-section and time-series effects. *Journal of Financial Markets*, *5*, 31–56.

Ansari, V. A., and Khan, S. (2012). Momentum anomaly: evidence from India. *Managerial Finance*, 38(2), 206–223.

Asness, C. S., Moskowitz, T. J., and Pedersen, L. H. (2013). Value and momentum everywhere. *The Journal of Finance,* 68(3), 929–985.

Banz, R. (1981). The relationship between returns and market value of common stocks. *Journal of Financial Economics*, *9*, 3–18.

Blume, M. and Stambaugh, R. (1983), Biases in computed returns: an application to the size effect, *Journal of Financial Economics*, 12, 387-404.

Carhart, M. M. (1997). On persistence in mutual fund performance. *Journal of Finance*, *52*(1), 57–82.

Chan, L. K. C., Jegadeesh, N., and Lakonishok, J. (1999). The profitability of momentum strategies. *Financial Analysts Journal*, *55*(6), 80–90.

Drew, M. E., Naughton, T., and Veeraragavan, M. (2005). Pricing of equities in China : Evidence from the Shanghai stock exchange. *Managerial Finance*, *31*(12), 46–57.

Drew, M. E., and Ye, M. (2007). Do momentum strategies work ? Australian evidence. *Managerial Finance*, *33*(10), 772–787.

Eleswarapu, V. R., and Reinganum, M. R. (2004). The predictability of aggregate stock market returns : evidence based on glamour stocks. *The Journal of Business*, *77*(2), 275–294.

Fama, E., and French, K. (1992). The cross-section of expected stock returns. *Journal of Finance*, *47*, 427–465.

Fama, E. F., and French, K. R. (1993). Common risk factors in the returns on stocks and bonds. *Journal of Financial Economics*, *33*, 3–56.

Fama, E.F. and K.R. French (2011), Size, value and momentum in international stock returns; Chicago Booth Research Paper No. 11–10. SSRN: http://ssrn.com/abstract= 1720139.

Grinblatt, M., Han, B. (2002). The disposition effect and momentum. Unpublished working paper, NBER 8734, SSRN: http://ssrn.com/abstract=298258

Gunathilaka, C. (2012). Audit expectation gap in Sri Lanka: The role of policy makers. EXCEL International Journal of Multidisciplinary Management Studies, 2(10), 364-375.

Hameed, A., and Kusnadi, Y. (2002). Momentum strategies : evidence from Pacific basin stock markets, *Journal of Financial Research*, 25(3), 383-397.

Husni, T. (2006). Momentum strategies and trading volume turnover in Malaysian stock exchange, *Journal Widya Manajemen & Akuntansi*, *6*(1), 42–51.

Iqbal, J., Brooks, R., and Galagedera, D. U. A. (2010). Testing conditional asset pricing models: An emerging market perspective. *Journal of International Money and Finance*, 29(5), 897–918.

Jegadeesh, N., and Titman, S. (1993). Returns to buying winners and selling losers: Implications for stock market efficiency. *Journal of Finance*, *48*(1), 65–91.

Jensen, G. R., Johnson, R. R., and Mercer, J. M. (1997). New evidence on in size stock and price-to-book returns effects. *Financial Analysts Journal*, *53*(6), 34–42.

Kao, C. and Chiang, M. H. (2000). On the estimation and inference of a cointegrated regression in panel data, *Advances in Econometrics,* 15, 179-222.

Lam, K. S. K., and Tam, L. H. K. (2011). Liquidity and asset pricing: evidence from the Hong Kong stock market. *Journal of Banking & Finance*, *35*(9), 2217–2230.

Lee, C. M. C., and Swaminathan, B. (2000). Price momentum and trading volume. *The Journal of Finance*, LV(5), 2017–69.

Lei, X., Zhou, Y., & Zhu, X. (2013). Capital gains, illiquidity , and stock returns. *Pacific-Basin Finance Journal,* 25, 273–293.

Lintner, J. (1965). The valuation of risk assets and the selection of risky investments in stock portfolios and capital budgets. *Review of Economics and Statistics,* 47, 13–37.

Liu, W. (2006). A liquidity-augmented capital asset pricing model, *Journal of Financial Economics*, 82, 631-671.

Marcelo, M., & Miralles, M. (2006). The role of an illiquidity risk factor in asset pricing : empirical evidence from the Spanish stock market. *The Quarterly Review of Economics and Finance*, *46*(2006), 254–267.

Nartea, G. V, Ward, B. D., and Djajadikerta, H. G. (2009). Size , BM , and momentum effects and the robustness of the Fama-French three-factor model evidence from New Zealand. *International Journal of Managerial Finance*, *5*(2), 179–200.

Nguyen, N. H., and Lo, K. H. (2013). Asset returns and liquidity effects: evidence from a developed but small market. *Pacific-Basin Finance Journal*, *21*(1), 1175–1190.

Phalippou, L. (2008). Where is the value premium? Financial Analysts Journal, 64(2), 41–48.

Rahim, R. A., and Nor, A. H. S. M. (2006). A comparison between Fama and French model and liquidity based three factor models. *Asian Academy of Management Journal*, *2*(2), 43–60.

Rosenberg, B., Reid, K. and Lanstein, R. (1985), Persuasive evidence of market inefficiency, *Journal of Portfolio Management*, 11, 9-17.

Schiereck, D., Bondt, W. De, and Weber. (1999). Contrarian strategies Germany. *Financial Analysts Journal*, 55(6), 104–116.

Sharpe, W. (1964). Capital asset prices: a theory of market equilibrium under conditions of risk. *Journal of Finance*, 19, 425–442.

Sias, R. (2007). Causes and seasonality of momentum profits. *Financial Analysts Journal*, *63*(2), 48–54.

Stock, J. and Watson, M. W. (1993) A simple estimator of cointegrating vectors in higher order integrated systems, *Econometrica*, 61(4), 783-820.

ACKNOWLEDGEMENT

Authors gratefully acknowledge the financial support from University of Malaysia Sarawak and Fundamental Research Grant Scheme [FRGS/SS05(04)/1149/2014(16)]. All remaining flaws are the responsibilities of the authors.

BIOGRAPHY

Mohamad Jais is an Associate Professor of Finance, can be reached at University of Malaysia Sarawak, 94300, Kota Samarahan, Sarawak, Malaysia, jmohamad@feb.unimas.my.

Chandana Gunathilaka is a Senior Lecturer, can be reached at University of Sri Jayewardenepura, Colombo, Sri Lanka, chandana@sjp.ac.lk.