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Reversed Size, BM and Momentum Effects: A Review of Malaysian Equity Returns Behavior

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This paper reviews behavior of widely documented equity market return anomalies and their pricing implications in multifactor asset pricing models. We apply time series and panel tests for 24 risk - mimicking portfolios, formed over a period of 14 years. In contrast to prior findings in Malaysia, we report evidence of small firm discount, together with persisting significance of the size effect. Evidence suggests that liquidity is the source of small discount. BM effect remains significant in explaining equity returns. Regardless of the evidence of short-term momentum trading profits, we dismiss application of a risk factor to the effect of momentum anomaly. Fama-French three-factor model, while efficient than CAPM, leaves a substantial unexplained component. The paper provides insights of the source of the size effect in equity returns, and pricing debate in Malaysian market.

Keywords: Size, BM, Pricing, Stock, Malaysia.

1. INTRODUCTION

In its active research area over decades, most researched equity market anomalies include size, value, and momentum effects. Evidence of anomalies blows directly to the debate of market efficiency. Prior studies in Malaysia (Drew & Veeraraghavan, 2001; Rahim et al., 2006) confirm small premium, and suggest size and book-to-market (BM) effects in pricing stocks. Conversely, instead of outperforming, we observe that small firms are left behind during post-2000 period. Even though a reversal observed, it is quite interesting that the size effect remains significant. A small firm discount may indicate a shift in behavioral factors, and its pricing implications are significant to revisit.

Fama (1998) examines the evidence on long-term return anomalies in equity markets, and interprets them as chance results. They are potentially methodology issues and thus market efficiency survives. However, evidence on reversals in anomalies raises a reasonable doubt on the argument, and is a return of the problem carpeted. Rahim and Nor (2006) find significant illiquidity premium in pricing, confirming the argument that illiquidity risk is compensated with additional return. In contrast, Nguyen and Lo (2013) find illiquidity discount, thus indicating perhaps a herding effect. Instead of the popular small premium, Al-rjoub et al. (2005) find a reversal. Their evidence contributes to the findings of Dimson et al. (1999) who document reversal of size premium in 19 countries. Authors suggest the behavioral factors to be key ingredients of size effect. Durand et al. (2007) explains disproportionate reactions of market participants in forming size effect thus any reversal of these anomalies are reflections of shifts in market sentiment. Owing to these inconsistencies across markets, the debate is significant and naturally activates research.

Size effect may also depend on momentum trading in a market. While Demir et al. (2004) document evidence of unrelated size and momentum, Durand et al. (2007) find their relationship. This is also consistent with behavioral explanations of Baker and Wurgler (2007) to equity returns.

Husni (2006) documents profitability of momentum strategy in Malaysia, thus we try to match the returns to size of the firms with investors' momentum trading patterns and analyze the pricing efficiency of momentum risk factor in a multifactor setting. Thus, this paper examines the behavior of SMB, BM, and momentum in an Arbitrage Pricing Theory (APT) setting in Malaysian market. The paper examines pricing implications in cross section using Fama and French (1993) three-factor model. In the rest of this paper, we discuss related literature in Section 2, methodology in Section 3, results in Section 4, and offer conclusions in Section 5.

2. RELATED LITERATURE

Standard finance theory considers that an asset's price is a function of economy wide risks, and the impact remains constant over time. Capital Assets Pricing Model (CAPM) (Sharpe, 1964; Lintner, 1965) considers market risk factor (beta). Fama and French (1992) find that the cross section of average equity returns shows a marginal relationship to the beta of CAPM. Fama and French (1993) three-factor model accommodates size effect (Banz, 1981) and value effect (Rosenberg et al., 1985) in addition to market risk. Subsequent studies including Jensen et al. (1997), and Kim et al. (2012) confirm these factors. Studies in Asian markets also display significant size and value premiums, for instance Eun and Huang (2007) document both size and value effects in Chinese stock markets. Small minus Big (SMB) factor of Fama and French (1993) may proxy financial distress risk (Agarwal, 2010). Liu (2006) argue that the association of smaller stocks with higher returns is due to liquidity risk in small firms. Heam (2016) finds a primacy of liquidity in Asian markets. While Fama and French (2011) find no size premium in any of four global regions, Al-rjoub et al. (2005) find higher abnormal returns for large firms than for small firms. They argue that large firm premium is due to understated risks of large firms as their trading frequency is low. Gilbert et al. (2009) find that small firms outperform large firms when BM is high. Studies in Malaysia (Drew & Veeraraghavan, 2001; Rahim & Nor, 2006) confirm the existence of small premium. Thus, a reversal may indicate a shift in market sentiment, perhaps the idea that the dissemination of knowledge could reverse such an effect. On the other hand, if a reversal is due to change in fundamentals, it becomes more challenging to discover the real proxies. Researchers also argue that asset pricing models show inconsistency due to differing accounting practices. For instance value effect, as measured by the book-to-market, is exposed to valuation treatments in accordance with financial reporting standards.

Momentum-trading effect, the relationship between an asset's return and its recent relative performance history, is one of the most studied capital market phenomenon (Asness et al., 2013). Past winners (losers) become losers (winners) in future (Jegadeesh & Titman, 1993) leaving an opportunity to make profits using a zero investment strategy. Carhart (1997) uses 'winner minus loser' factor capturing momentum. Authors confirm the effect in different markets (Drew & Ye, 2007; Ansari & Khan, 2012) while others demonstrate partially. Consistent with Lee and Swaminathan (2000), Husni (2006) provides evidence in Malaysia, momentum profits are more pronounced among stocks with high trading volume. Authors explain the source of momentum, taking risk based and behavioral (Ansari & Khan, 2012) view points. Grinblatt and Han (2002) argue that momentum is caused by the disposition effect. Technically, high momentum returns could also be a result of bad performance of losers than good performance of winners. Therefore, the restrictions and controls on short selling affect the momentum strategy. Short selling was effectively allowed in Malaysian market in 2007.

3. METHODOLOGY

Our sample consists of 803 companies (2013) listed on Bursa Malaysia and the period covers 14 years up to December 2013. Data sources include DataStream, and Bursa Malaysia resources. Value-weighted monthly returns on Kuala Lumpur Composite Index (KLCI) and one-month Treasury returns (proxy serves risk free rate) are used. Market excess return (MKT) is the KLCI's return in excess of risk free rate. Building the risk factors SMB and HML follows the methodologies of related studies including Fama and French (1993); Liu (2006); and Nguyen and Lo (2013). Size bisects at 50 percent break point and BM trisects at 30th and 70th percentiles. 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) minus three big stock portfolios (Big: High/Middle/Low). HML factor is built in a similar process, measured as the simple average of value weighted returns of two high BM stock portfolios (High: Small/Big) minus two low BM stock portfolios (Low: Small/Big).

Table 1: Returns to momentum trading strategies

		K=3	K=6	K=9	K=12
J=3	Buy	-0.16	-0.14	-0.22	-0.30
	Sell	-0.80	-0.69	-0.41	-0.25
	Diff	*0.64	*0.54	0.19	-0.04
	t-stat	3.01	2.67	0.93	-0.30
	Prob.	0.00	0.00	0.34	0.76
J=6	Buy	2.41	-0.21	-0.33	-0.33
	Sell	-3.02	-0.56	-0.37	-0.20
	Diff	*5.44	0.34	0.04	-0.13
	t-stat	34.16	1.80	0.28	-0.97
	Prob.	0.00	0.07	0.77	0.32
J=9	Buy	2.05	1.20	-0.31	-0.35
	Sell	-3.20	-1.74	-0.26	-0.27
	Diff	*5.86	*2.94	-0.04	-0.08
	t-stat	43.95	20.04	-0.35	-0.70
	Prob.	0.00	0.00	0.72	0.48
J=12	Buy	2.09	1.60	0.60	-0.37
	Sell	-3.08	-2.06	-1.14	-0.26
	Diff	*5.68	*3.66	*1.75	-0.11
	t-stat	54.09	33.64	16.46	-1.08
	Prob.	0.00	0.00	0.00	0.27

This table reports returns to buy and sell portfolios, their differences and the significance (* at 1%) of difference. Portfolios are formed with 'j' lagged months and held for 'k' months.

Table 1 reports premium for zero investment strategies. It indicates that the strategy become profitable in short-term only. There are no significant profits for more than 6-month holding periods, and profitability improves for formation periods with more than three months. This suggests that behavioural factors could better explain the persistence of market anomalies. Following prior studies, we construct WML using winner and loser portfolios, formed based on J-month lagged returns held for K months. Equally weighted returns of the top quintile of the descending-sorted firms (160 firms by 2013) those independently size-sorted (big and small) are obtained. WML is the difference in average returns of winner (SW + BW) and loser (SL + BL). Having tested multiples of J by K month portfolios, we apply six by three month (j6*k3) (Table 1) portfolios in ascertaining return premium. This portfolio gives highest significant momentum returns on average, over the sampling period.

Table 2 reports summary statistics of risk factors. Average returns to small stocks show negativity, suggesting an existence of a small discount. A considerable difference and standard deviations are observed between top and bottom quintile (winner and loser) returns. Correlations reported are significant and weak.

Table 2: Summary statistics of risk factors

	MKT	SMB	HML	WML
Mean	0.51	-1.24	1.78	19.99
SD.	4.32	2.62	2.29	7.67
Min.	-15.51	-8.52	-12.71	-5.34
Max.	13.39	9.09	4.55	69.42
Correlation coefficients				
MKT	1			
SMB	-0.19*	1		
HML	0.24*	-0.45*	1	
WML	-0.16*	0.11*	-0.20*	1

SD = standard deviations. Monthly return statistics are in percentages. Significance *1% level.

We form 24 Size, BM and Momentum risk mimicking test portfolios (P). First six are size and BM sorted, next 18 are size, BM, and momentum sorted. These are formed at the end of year, and value weighted monthly returns are ascertained for the succeeding 12 months. The table 3 depicts summary statistics of the formed. Number of firms shows a grouping tendency in big category than low BM. Moreover, big firms outperform small across all cases. Growth stocks (i.e., Low BM) outperform value stock portfolios (i.e., high BM) across all the cases in panels reported.

EMPIRICAL MODEL. We test FF 3-Factor and Carhart (1997) 4-Factor models, which conform to the following linear form.

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

Where; R_{pt} is the expected return on asset 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 risk factors are MKT, SMB, HML, and WML. βs are the factor sensitivities to excess returns of p^{th} portfolio. Panel estimations follow Stock and Watson (1993) Dynamic Ordinary Least Squares (DOLS) with homogeneous long-run covariance structure across portfolios.

Table 3: Summary statistics of test portfolios

(A) BM-Size sorted Portfolios (P):	Mean-Returns				SD	
	Sm	#F	Bg	#F	Sm	Bg
P1	-0.97	94	-0.52	136	5.56	5.45
P2	-0.25	107	0.14	122	5.12	5.15
P3	0.32	143	0.46	86	5.61	6.31
Avg	-0.3	114	0.03	114		
(B) Momentum – BM –Size sorted portfolios						
	Sm	#F	Bg	#F	Sm	Bg
P11	-0.66	38	-1.3	42	7.25	7.07
P12	-0.1	40	-0.26	34	5.86	6.57
P13	0.69	48	0.57	29	6.5	7.63
P21	-0.8	25	-0.37	43	5.94	5.59
P22	-0.11	36	0.18	45	5.15	4.94
P23	0.34	49	0.45	32	5.4	5.93
P31	-1.33	31	-0.14	51	5.95	4.87
P32	-0.44	32	0.35	43	5.45	5.13
P33	-0.02	47	0.25	25	5.81	6.26
Avg	-0.27	38	-0.03	38		

BM: 1-Low/3-High, Small (Sm)/Big(Bg) Momentum: 1-Loser/3-Winner. #F is the average number of firms in each portfolio. Avg is the simple average of the respective column. SD = standard deviations

4. RESULTS

Reported in the table-4 are the average monthly returns for monthly double-sorted stocks in the process of constructing SMB and HML risk factors. Big firms have higher returns than small, and high/low BM mean differences are significant. This is consistent with negative mean of SMB in table 2. Moreover, standard deviations of monthly returns of small firms are higher than those of big, suggesting that the big firms have stable returns. In effect, it is a large firm effect. Perhaps the trading frequency and thus liquidity premium may explain the effect. This is consistent with prior findings, for instance Hameed and Ting (2000) find that portfolios of heavily and frequently traded securities tend to earn substantially higher contrarian profits than low trading activity portfolios in Malaysia. Thus, the source of size effect is possibly the market liquidity.

Table 4: Mean monthly returns (per cent)

BM	High	Med	Low	HML	*t*-stat.
Sm	-0.10	-0.88	-1.98	1.88*	6.89
	(7.68)	(6.21)	(6.58)		
Big	1.16	0.10	-0.59	1.75*	8.42
	(5.75)	(5.71)	(6.18)		
Sm-Big	-1.26*	-0.98	-1.39*		
t-stat.	3.69		6.63		

Standard deviations are in parenthesis. *t*-stat obtained in paired sample tests. Significance * 1% of mean difference.

The table 5 presents FF three-factor model estimations for six Size-BM portfolios. For its brevity, portfolios (P) are reported as P/j/k where, *j* is BM (1/2/3 for Low/Medium/High) and *k* is Size (1/2 for small/big). MKT and SMB coefficients are significant for all portfolios. HML is insignificant in case of low BM, and the magnitude of the coefficient increases from low to high BM stock portfolios. This suggests that high BM stocks carry additional risk, and consequently they have higher expected returns. The positive SMB coefficient is relatively low in big stocks, and it is consistent with explanations of size effect suggesting that small portfolios have increased risk than the big. Consequently, small portfolios have higher risk and expected returns. Model explains 57.2% (adjusted R^2) to 69.1% of total return variation.

Table 5: FF three-factor model

P	MKT	SMB	HML	Cons	Ad. R^2
P11	0.90*	0.96*	0.06	-0.00	0.57
P21	0.88*	0.94*	0.29**	0.00**	0.64
P31	0.93*	1.03*	0.67*	0.02*	0.67
P12	1.05*	0.29*	0.14	-0.00	0.69
P22	0.93*	0.17**	0.35*	0.00	0.67
P32	1.07*	0.37*	0.67*	-0.01*	0.62

This table reports coefficients of FF factors estimated in time series OLS regressions. Portfolios are BM-size sorted. BM (1 low) and Size (1 small) sorted 6 portfolios. Significance * 1%, ** 5% levels

Table 6 reports the results of four-factor model (Carhart, 1997) estimated with 18 test portfolios in time series regressions. For its brevity, portfolios (P) are reported as P/i/j/k where *i* is Momentum group (1 for loser/3 for winner), *j* is BM (1/2/3 for Low/Medium/High) and *k* is Size (1/2 for small/big). Accordingly, the popular momentum anomaly debate as a risk factor is irrelevant in Malaysian market, and shows no role in pricing. Inclusion of momentum characteristics in portfolio formation has reduced the explanatory power. These results indicate a decrease of SMB factor loading as the Size increases, indicating size effect. HML shows a significant positive association in high to medium BM groups. The monotonic factor loading of HML shows significance in medium to high BM portfolios. HML factor loadings show an increase as the BM increase, indicating persistence of value premium. This evidence contrasts with negative HML slope of small stocks (Fama & French, 1993). WML factor shows its insignificance in many of the assets.

Table 6: Results with WML

P	MKT	SMB	HML	WML	Cons	Ad. R^2
P111	1.04*	1.29*	0.09	(0.12)**	0.02 **	0.51
P112	1.27*	0.55*	0.26	(0.06)	0.00	0.62
P121	0.96*	1.13*	0.36*	0.05	0.00	0.61
P122	1.08*	0.48*	0.67*	0.00	0.00	0.58
P131	1.05*	1.25*	0.86*	0.08 **	0.01	0.65
P132	1.21*	0.56*	0.89*	0.07	0.00	0.55
P211	0.84*	0.93*	(0.01)	0.00	(0.00)	0.44
P212	0.98*	0.38*	0.24	(0.06)	0.01	0.61
P221	0.87*	0.82*	0.29 **	0.05	(0.00)	0.59
P222	0.88*	0.20**	0.31*	0.00	0.00	0.63
P231	0.87*	0.92*	0.78*	0.11*	(0.00)	0.64
P232	0.99*	0.43*	0.75*	0.09 **	(0.00)	0.62
P311	0.83*	0.59*	0.01	(0.02)	(0.00)	0.37
P312	0.86*	0.01	(0.13)	(0.00)	(0.00)	0.56
P321	0.81*	0.74*	0.32 **	0.11*	(0.01)	0.46
P322	0.88*	(0.00)	0.18	0.01	(0.00)	0.58
P331	0.96*	0.88*	0.52*	0.09 **	(0.00)	0.58
P332	1.01*	0.06	0.48*	0.05	(0.00)	0.55

Time series estimations for M-BM-Size sorted portfolios. Momentum (loser-1)-BM (low-1)-Size (small-1). Significance * at 1%, ** 5% levels.

Table 7 reports results of DOLS (panel) regressions for Size-BM sorted 6 portfolios, and table 8 reports similar information pertaining to BM-Size-Momentum sorted 18 portfolios. These tests ignore the time series effects on individual assets, rather examine the significance of risk factors looking at returns of a panel of portfolios. Accordingly, MKT, SMB, HML, factors are priced significantly across all categories. WML does not improve model's overall efficiency. Adjusted R^2 shows no improvement as the momentum factor is introduced to the model.

Table 7: DOLS estimations for 6 portfolios

	MKT	SMB	HML	WML	Ad. R^2	Resid.
CAPM	0.93*				0.55	0.00
FF	0.97*	0.72*	0.41*		0.64	-0.01
FF+ WML	0.98*	0.75*	0.46*	0.04*	0.64	0.00

Coefficients with significance (* at 1% level) in panel estimations. Resid.= Residual mean.

In single factor CAPM, adjusted R^2 for MKT for *Mom-Size-BM* sorted portfolios stood at 55%. Note that DOLS models are estimated with no constant and it follows the rational that there is no common term across portfolios over time. Meanwhile, the range of Residual Means are from -0.1% to 0.0%. The highest negative residual mean was reported for FF model. Adjusted R^2 decreases in testing 18 Size-BM-WML sorted portfolios (table 8), the highest is (55%) reported in Carhart (1997) model. A similar decrease was also observed in time series tests. This suggests that, even though momentum risk factor cannot improve the efficiency, the assets exposure to behavioural biasness reduces the pricing models' efficiency.

Table 8: DOLS estimations for 18 portfolios

	MKT	SMB	HML	WML	Ad R^2	Resid.
CAPM	0.93*				0.47	0.00
FF	0.97*	0.72*	0.42*		0.54	-0.01
FF+ WML	0.98*	0.75*	0.47*	0.04*	0.55	0.00

Coefficients with significance (* at 1% level) in panel estimations. Resid.= Residual mean.

Table 8 explains similar results obtained for the panel of Mom-BM-Size 18 portfolios. FF model or

Carhart (1997) models do not achieve more than 55%. The inclusion of momentum factor does not improve efficiency. Hence, a risk factor to account for momentum effect becomes inappropriate. In conformity with big firm premium, the size effect appears with the ability of covering the momentum behaviour, perhaps, it may be the liquidity effect indeed.

5. CONCLUSIONS

Evidence on behavior of risk factors is a salient informative requirement of the finance community, and contributes significantly for practitioners. Our examination confirms a reversed size premium, leaving a room to discuss the profitability of following 'less risk' large stocks. Nevertheless, the size effect remains significant in explaining returns in cross section. Higher trading frequency and thus a liquidity premium may explain the large firm effect where frequently traded portfolios bring higher returns than illiquid portfolios. FF (1993) three-factor model shows a better relative efficiency, over CAPM, yet it leaves a substantial component unexplained.

Momentum trading is profitable in short to medium term, however the impact has no role in pricing. It suggests that momentum anomaly has a link to size and liquidity, it is also consistent with prior findings (Husni, 2006) in Malaysia. Results suggest that an assets exposure to behavioral biasness reduces the efficiency of the pricing models we examined. These results motivate further investigations on the source of size effect, and additional risk mimicking factors, including behavioral risk, in view of unexplained component of return variations in the APT models examined in this study.

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REFERENCES

[1] Agarwal, V. 2010. Size and Book-to-Market anomalies and omitted leverage risk. European Journal of Finance, 16(3), 263–279.

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

[3] Al-rjoub, S. A. M., Varela, O., and Hassan, M. K. 2005. The size effect reversal in the USA. Applied Financial Economics, 15(17), 1189–1197.

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

[5] Baker, M., & Wurgler, J. 2007. Investor Sentiment in the Stock Market. Journal of Economic Perspectives, 21(2), 129–151.

[6] Banz, R.1981.The relationship between returns & market value of common stocks. Journal of Financial Economics, 9, 3–18.

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

[8] Demir, I., Muthuswamy, J., and Walter, T., 2004. Momentum returns in Australian equities: the influences of size, risk, liquidity and return computation. Pacific Basin Finance Journal 12, 143–158.

[9] Drew, M. E., and Veeraraghavan, M. 2001. Explaining the Cross section of stock returns in the Asian region, International Quarterly Journal of Finance 1, 205- 221.

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

[11] Dimson, E., and Paul M. 1999. Murphy's Law and Market Anomalies. Journal of Portfolio Management, 25(2), 53–69.

[12] Durand, R. B., Juricev, A., and Smith, G. W. 2007. SMB Arousal, disproportionate reactions and the size premium. Pacific Basin Finance Journal, 15(07), 315–328.

[13] Eun, C. S., and Huang, W. 2007. Asset pricing in China's domestic stock markets: Is there a logic ? Pacific Basin Finance Journal, 15(2007), 452–480.

[14] Fama, E., and French, K. R. 1992. The cross-section of expected stock returns. Journal of Finance, 47, 427–465.

[15] 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.

[16] Fama, E. F. 1998. Market efficiency, long-term returns & behavioural finance. Journal of Financial Economics, 49, 283 - 306.

[17] Fama, E.F. and French K.R. 2011, Size, value and momentum in international stock returns; Chicago Booth Research Paper No. 11–10. SSRN abs.= 1720139.

[18] Gilbert, N. V, Ward, B. D., & 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.

[19] Grinblatt, M., and Han, B. 2002. The disposition effect and momentum. Unpublished working paper, SSRN abs.=298258

[20] Hearn, B. A. 2016. A Comparison of the Efficacy of Liquidity, Momentum, Size and Book-to-Market Value Factors in Equity Pricing on a Heterogeneous Sample: Evidence from Asia http://ssrn.com/abstract=2718696.

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

[22] 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.

[23] 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.

[24] Kim, S.H., Kim, D., and Shin, H.S. 2012. Evaluating asset pricing models in the Korean stock market. Pacific Basin Finance Journal, 20(2), 198–227.

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

[26] Liu, W. 2006. A liquidity-augmented capital asset pricing model, Journal of Financial Economics, 82, 631-671.

[27] 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.

[28] Rahim, R. A., & Nor, A. H. S. M. 2006. A comparison between Fama and French model, and liquidity based three factor models in predicting the portfolio returns. Asian Academy of Management Journal of Accounting and Finance, 2(2), 43–60.

[29] Rosenberg, B., Reid, K. and Lanstein, R. 1985, Persuasive evidence of market inefficiency, Journal of Portfolio Management, 11, 9-17.

[30] Stock, J. and Watson, M. W. 1993. A simple estimator of co-integrating vectors in higher order integrated systems, Econometrica, 61(4), 783-820.