LIQUIDITY PREMIUM AND AUGMENTED CAPITAL ASSET PRICING MODEL: EVIDENCE FROM MARKET FOR ALTERNATIVE INVESTMENT (MAI) THAILAND

BY

MS. THANTIP SUWANNARIT

AN INDEPENDENT STUDY SUBMITTED IN PARTIAL
FULFILLMENT OF THE REQUIREMENTS FOR
THE DEGREE OF MASTER OF SCIENCE
PROGRAM IN FINANCE (INTERNATIONAL PROGRAM)
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THAMMASAT UNIVERSITY
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ENTITLED

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ABSTRACT

Using a liquidity measure of Lui (2006) to examine liquidity premium in MAI market during period January 2005 to the first quarter of 2015, the study finds that the existence of liquidity premium is inconclusive. This indicates that, liquidity might not be an important pricing factor. A two factor (market and liquidity) model and a four factor (market, SMB, HML and liquidity) model fail to explain the stock return. Only CAPM can explain asset price in this study, while Fama and French three factor model fails to capture return of stock price. The finding of this study is contrary with the previous studies mainly due to data limitation.

Keywords: Liquidity, Asset pricing model , MAI

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Ms. Thantip Suwannarit

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CHAPTER 1
INTRODUCTION

With the increasing market capitalization and high trading volume of Thai stocks together with sound economic growth of Thailand, Thai stock market has attracted investors who would like to invest in developing countries. In Thailand, there are 2 stock exchanges, namely Stock Exchange of Thailand (SET) and Market for Alternative Investment (MAI). Many studies of equity market in Thailand focused on SET common stocks, only limited studies have studied stocks in MAI. At present, MAI is considered as a relatively small market with market capitalization of 388 trillion baht. The number of existing stock trading as of 31 December 2014 is 111 stocks.

Ninety-seven percent of trading volume came from retail investors. Foreign investors are only accounted for approximately 3% and the rest of about 0.5% or less came from local institutions and proprietary trader. These are mainly due to the size of the listed firms in MAI, which are mainly small firms. Refer to the MAI listing qualifications, prospect firm must be a public limited company or corporation established under special law with paid-up capital in common shares higher or equal THB 300 million. This limits the ability of large institutional investors and foreign investor from actively invest in them, and therefore why major player in MAI is mostly individual investors.

The shareholder structure, market capitalization, agency problem and asymmetric information of the listed firms in MAI may be an opportunity for inside trader to take advantage of and make high return. This then generate high volatility to this market, and the trading volume of stocks in this market is not dispersed evenly. Some stocks are actively traded whereas others are rarely traded inflicting with many zero-trading days. The liquidity risk should be high in this market, and since investor may require higher return to compensate this additional risk, it is intriguing to investigate whether the less frequently traded stock requires greater rate of return comparing to liquid stock in the MAI.

This study examines the existence of liquidity premium through the standardized turnover-adjusted number of zero daily trading volume measure proposed by Liu (2006). This is the first time that this measure is used with MAI data. The advantage of this measure is that it limits the error when data contains many zero-volume trading days, which is generally found in MAI stocks. The measure was created to capture at least 3 liquidity dimensions, namely, trading quantity, trading cost, and trading speed.

The liquidity determined by this measure is incorporated into Capital Asset Pricing Model (CAPM) and Fama and French three factor model (FAMA) forming liquidity augmented CAPM (LCAPM), and liquidity augmented FAMA (LFAMA), respectively. These models are tested to determine their ability in describing stock return. Then, the study concludes whether liquidity risk premium is detectable in MAI.

This study determines whether liquidity risk exists in MAI stocks. This will help elucidating whether investors in MAI market actually incorporate the liquidity of the stocks into their required return. If liquidity in MAI is indeed an important factor, market participants may be able to better value the stocks by including its liquidity. It will also provide some insights on whether the regulator and policy makers should use any policies to improve or control the liquidity in MAI market.

The remainder of this study is constructed as following; section II provides previous findings and related hypothesis regarding liquidity measures and capital asset pricing models. Section III describes the theoretical framework. Section IV describes data and methodology. Section V describes the result.

CHAPTER 2
REVIEW OF LITERATURE

Liquidity is described as the ability to trade large quantities at prompt with little price impact and low transaction cost. Market liquidity is the ability of market participants to buy or sell assets sell assets without delay or changes in market prices. In liquid market, the transaction cost is smaller than the cost found in illiquid market. Therefore, liquidity should not be excluded from asset pricing or valuation. Liquidity may be classified into four main dimensions including trading quantity, trading speed, trading cost, and price impact.

Many liquidity measures were developed to capture liquidity; however, most, if not all, of them can capture only one dimension of liquidity. For the first dimension, trading quantity, the turnover measure of Datar et al.(1998) was a well-known representative. Second, trading speed dimension, found that not much study shed the light on this area, however there still has some measure from Liu (2006) which has a part that accounts trading speed. Third, trading cost, found that it is well recognized and measure through the price gap. For example, the bid-ask spread measure of Amihud and Mendelson (1986), serial correlation-based measure of Roll (1984), price-based spread proxy of Corwin and Schultz (2012) and effective tick measure of Goyenko, Holden and Trzcinka (2009). Lastly, the price impact dimension which has a concept of price impact affects the price reaction to trading volume. Largely recognized price impact measures are from Amihud (2002) and Pastor and Stambaugh (2003).

Although these has evidences show liquidity risk has play an important role in determining asset pricing, but it found that not many studies incorporate liquidity risk on asset return model. In addition, previous studies that do observe liquidity risk is still have limited success in explaining cross-sectional variation in asset return.

Pastor and Stambaugh (2003) describe liquidity is something arbitrary. They found that high sensitivity stock to aggregate liquidity generate higher returns than low-sensitivity stock. The conclusion is that wide market liquidity is an important state variable for asset pricing, meaning that while stock liquidity measure is

imprecise, its market wild liquidity measure become more precise as the sample size becomes large. Based on a similar concept, Amihud (2002) stated that a single measure cannot capture all liquidity risk.

Bid-ask spread is also used as a liquidity risk measure and have many extend studies. Lee and Swaminathan (2000) present evidence that high turnover stocks act more similar to small stocks than low turn-over stocks, questioning the common interpretation of turnover as a liquidity proxy. Liu (2006) develops his new liquidity proxy shows that liquidity is an important source of priced risk. His study proposes a two factor model which includes market and liquidity, while Fama and French three factor model brought out insignificant result.

In term of asset pricing model, many previous studies have tested the ability of the Capital Asset Pricing Model (CAPM) Shape (1964) to see how well it can explain the asset pricing. However, many found that using CAPM to determine asset pricing has some subject that is considered ambiguity, especially when apply with market data from developing country. Later on, more additional factors are introduced and has been included Fama and French (1996) and Shum and Tang (2006) to provide better reliable explanation of the cross-section of average returns, namely asset size, market value, turnover, book to market equity ratio, the price earnings ratio, and growth of revenue and etcs. The outstanding innovation after CAPM was the Fama and French three factors model , Fama and French (1993) which indicated that firm size and market premium are created better explanation to the asset return.

The study of Acharya and Pedersen (2005) propose the Liquidity Adjusted Capital Asset Pricing Model (LCAPM). The capital asset pricing model in this study explained many channels of liquidity risk that affect the asset price. The research also identified evidence of flight to liquidity. They found that liquidity, expected liquidity and covariance of its own return and liquidity of market return are resulting in a security's required return. Moreover, a consistent adverse shock to that particular security has a decreasing effect on return, but can lead to high expected future return. Kim and Lee (2014) extend finding of Acharya and Pedersen (2005). They study the pricing implication of liquidity risk by using many liquidity measures and their principal components. According to liquidity-adjusted capital asset pricing model, they found that liquidity risk which had systematic component correlated across

measures also had undiversified risk, which were the shocks to the systematic and common component of liquidity.

Many study tests of the capital asset pricing model in developing countries. Shum and Tang (2006) found that when using contemporaneous market data from firm listed on the Hong Kong, Singapore and Taiwan Stock Exchanges in the augmented capital asset pricing model by including size and book-to-market ratios into the model, the result reports no significant improvement over the traditional CAPM; however, results confirm those of Fama and French (1993).

Hearn and Piesse (2009) borrow the liquidity measure of Liu (2006) and apply in augmented capital asset pricing model which include market and liquidity premium using Africa' equity database, namely, Morocco, Tunisia, Egypt, Kenya, Nigeria, Zambia, Botswana and South Africa. They found that the required rate of return is found to be highest in the financial sector and lowest in the blue chip stocks. The illiquidity stock markets in Nigeria and Zambia require high rate of return.

Lam and Tam (2011) found that four-factor model which includes market premium, firm size, book-to-market ratio, and liquidity premium is the best model to explain stock returns in the Hong Kong stock market.

For Thailand previous literatures. Udomsirikul (2010) employed three liquidity estimates namely Amihud illiquidity measure, modified turnover measure and modified liquidity ratio. Univariate analysis and panel regress analysis are performed with 101 Thai listed firms for the period 2002-2008. The result from all three measures is robust and remains consistent with previous studies in which higher liquid stocks require lower the cost of equity.

Oanan (2013) found that Augmented CAPM which include PI factor fail to explain the asset pricing which present a large measurement error in beta, using equity data from SET between 2003-2011. PI factor calculated from return to volume ratio and return to turnover ratio. However, Augmented Fama and Frech three factor model with PI factor can capture SMB factor and HML factor. Thus, his study concludes that augmented model which includes liquidity measure does not have a good explanatory power to traditional asset pricing model.

CHAPTER 3
THEORETICAL FRAMEWORK

3.1 The standardized turnover-adjusted number of zero daily trading volumes measure (LM)

The study borrows the liquidity measure of Liu (2006) which reflects multiple dimensions of liquidity. It is highly correlated with conventional liquidity measures such as bid-ask spread, turnover, and price impact measures, and meanwhile places particular emphasis on trading speed. This measure is claimed that it can capture liquidity risks more reliably since it concerns on the day that has zero trading volume. The measure is defined as:

$$LM_{i,t} = \left[NoZV_{i,t} + \frac{1/(turnover_{i,t})}{Deflatior}\right] \text{X} \frac{21}{NoTD_t} \quad (1)$$

where,

$NoZV_{i,t}$ is the number of trading days that have zero trading volumes for stock i in t month

$Turnover_{i,t}$ is the sum of stock turnover for stock i in t month

NoTDt is the total number of trading days in t month

Deflator is the arbitrary number. It is chosen such that

$$0 < \frac{1/(turnover_{i,t})}{Deflatior} < 1 \text{ for all sample stocks.} \quad (2)$$

NoZV serves as an indicator of liquidity. The interpretation is the lower the number of zero daily trading volumes, the more frequent the trade and, thus, the more liquid the stock and vice versa. LM uses the number of zero daily trading volumes to determine liquidity of the stocks. The measure reflects the continuity of trading and potential delay in executing a trade. Moreover, daily turnovers are collected. The turnover factor captures trade quantity. LM relies on turnover to distinguish between stocks that have the same level of liquidity as classified by the number of zero daily volumes. Meaning, it use turnover to differentiate the liquidity when stocks have the

same number of zero daily trading volume days. To make LM comparable over time, Lui (2006) multiply 21/NoTD factor to standardize the number of trading days in a month to 21. The number 21 represents the average number of monthly trading day; however, it can be changed due to the data set. The measure can be interpreted as lower value of LM indicates greater liquidity because stocks are traded frequently and have large turnover over the relevant month, and vice versa. LM reflects the speed, volume and trading cost dimensions of liquidity, but ignores price movement.

3.2 Capital Asset Pricing Model (CAPM)

CAPM was developed by Sharpe (1964) and Lintner (1965) who have described the relationship between risk and expected return. The general idea behind CAPM is that investors with a well-diversified portfolio need to be compensated for investing their cash in two ways which is time value of money and risk. The time value of money is represented by the risk-free rate (R_f) in the model which compensates investors for placing money in any investment over period of time. In term of risk, it calculates the amount of compensation the investor needs for taking on additional risk. This is calculated by taking a risk measure (β -beta) that measures the systematic risk. β compares the returns of the asset to the market over a period of time or the sensitivity of a security's excess return. The market premium (R_m-R_f) measures the excess return of the overall market compared to the return earned on a risk-free asset. The CAPM is defined as:

$$E(R_i) - R_f = \beta_1(E(R_m) - R_f) \quad (3)$$

where,

$E(R_i)$ is the Expected rate of portfolio return.

R_f is the Risk-free rate of return.

β is the sensitivity of a security's excess return

$E(R_m)$ is the Expected return of the market portfolio

CAPM is based on only one risk factor which is the excess market portfolio return. The covariance of portfolio return with the market portfolio return (β_1) explains the variations on the market premium or excess portfolio return.

Additionally, CAPM can be augmented to incorporate size premium and other specific risks which can find in many studies.

3.3 Fama and French Three-Factor model

The model was proposed as a response to the weak efficiency of CAPM in explaining asset pricing. Fama and French (1996) argue that anomalies that relate to the CAPM are better captured by their three-factor model. They base their model on the fact that the expected return on a portfolio in excess of risk free rate are sensible to its return of three factors, namely, market portfolio return in excess of risk free rate, the difference between the excess return on a portfolio of small stocks and the excess return on a portfolio of big stocks (SMB, small minus big) and the difference between the excess return on a portfolio of high-book-to-market stocks and the excess return on a portfolio of low-book-to-market stocks (HML, high minus low). Fama and French three-factor model is defined as:

$$E(R_i) - R_f = \beta_2 (E(R_m) - R_f) + \beta_3 E(SMB) + \beta_4 E(HML) \quad (4)$$

where,

$E(R_i)$ is the Expected rate of portfolio return.

R_f is the Risk-free rate of return.

$E(R_m)$ is the Expected rate of market return.

E(SMB) is the Expected value of excess return between the differences of return on a portfolio of small stocks(low market value) and the return on a portfolio of big stocks(high market value).

E(HML) is the Expected value of excess return between the differences of return on a portfolio of high book to market stocks (high B/M) and the return on a portfolio of low book to market stocks (low B/M).

β is coefficient of each variable.

Fama and French three factor model includes two additional risk factors into the CAPM (include SMB and HML) in order to explain the return variations better and mitigate the anomalies of the CAPM. The model argues that it has more ability to captures many of the variations in the cross-section of average stock returns and absorbs anomalies that have plagued in the CAPM. Again, this model can be augmented to more specific risks.

3.4 Arbitrage Pricing Theory (APT)

The APT of Ross (1976) is based on the simple and intuitive concept that asset return is affected by many, presumably factors which present by a small number of K. His study basic insight is that, in a large number of securities in the economy, a linear factor model of asset pricing implies that firm's diversifiable risk is diversifiable and that the equilibrium prices of asset will be approximately linear in its factor model. This intuition is presented into a factor model expressed as:

$$E(R_i) = \lambda_0 + \beta_{i1}\lambda_1 + \beta_{i2}\lambda_2 + \ldots + \beta_{iK}\lambda_K \quad (5)$$

where,

$E(R_i)$ is the Expected rate of portfolio return.

λ_0 is the expected zero-beta rate (or risk free rate, R_f)

β_{iK} is the sensitivity of asset i relative to the Kth factor

λ_K is the K factor's risk premium (K = 1,2, …,K)

Accordingly, the study constructed the two factor model by adding LIQ, which capture liquidity premium in the CAPM and the four factor model by adding LIQ in the Fama and French Model.

$$E(R_i) - R_f = \beta_5(\mathrm{E}(R_m) - R_f) + \beta_6\,\mathrm{E(LIQ)} \quad (6)$$

The two-factor model or liquidity augmented capital asset pricing model (LCAPM) implies that the expected excess return of portfolio is captured by the covariance of its market and the liquidity factor.

$$E(R_i) - R_f = \beta_7(\mathrm{E}(R_m) - R_f) + \beta_8\,\mathrm{E(SMB)} + \beta_9\,\mathrm{E(HML)} + \beta_{10}\,\mathrm{E(LIQ)} \quad (7)$$

The four-factor model or the liquidity augmented Fama and French three factor model (LFAMA) implies that the expected excess return of the portfolio is explained by the covariance of its market, the different of market value (SMB), the difference of B/M value (HML) and finally the liquidity factor.

where,

$E(R_m)$ is the Expected rate of market return.

R_f is the Risk-free rate of return.

E(LIQ) is the expected return of liquidity factor

E(SMB) is the Expected value of excess return between the differences of return on a portfolio of small stocks (low market value) and the return on a portfolio of big stocks (high market value).

E(HML) is the Expected value of excess return between the differences of return on a portfolio of high book to market stocks (high B/M) and the return on a portfolio of low book to market stocks (low B/M).

β is coefficient of each variable.

CHAPTER 4
RESEARCH METHODOLOGY

4.1 Data

MAI market was established on 21 June 1999 by The Stock Exchange of Thailand (SET) under the securities Exchange of Thailand Act as an alternative stock market for small and medium size companies. As of 31 March 2015, there are 113 ordinary common equities in MAI board. All warrant, REIT's, units of beneficial interest and etc are excluded.

There are 3 steps of data screening carried out as follows.

1. The sample period is 10 years and one quarter, which comprises of all MAI common stocks over the period of 1 January 2005 to 31 March 2015. The study aims to gather as long study period as possible. However, MAI was established at the beginning of 2004 and contained only 9 stocks. This is insufficient to perform analysis. Sample period is chosen at the beginning of 2005.

2. The study excludes stocks that have been traded in the market for less than two years as of the end of March 2015. This is because the analysis requires the trading data at least 24 consecutive trading months. Thirty-three stocks that have been traded less than two years are excluded.

3. The study excludes some parts of periods for four sample stocks and wholly period of one sample stock because the stocks are subjected to suspension, trading halt and/or under restructuring process.

After screening out the necessary samples, 80 common stocks from 113 existing stocks are included into this study. Each stock has been available to trade at least 2 years continuously between 1 January 2005 and 31 March 2015. Dataset requires daily trading days, trading volume, number of shares outstanding, stock closing price and market value of each sample stock, monthly turnover of stock, and finally monthly MAI index. These numbers are adjusted for dividends and stock split. All mentioned data are retrieved from SETSMARTS as provided by SET. Yield to maturity of T-bill retrieved from The Thai Bond Market Association (Thai BMA).

4.2 Research Methodology

The study is divided into 2 sections.

1. Evaluate the existence of liquidity premium using portfolio returns based on liquidity measure of Lui (2006).
2. Test whether liquidity factor provides explanation to asset pricing.

Section 1 Evaluate the existence of liquidity premium using portfolio returns based on liquidity measure of Lui (2006).

Liquidity measure (LM) of Lui (2006) is constructed based on the number of inactive trading days available within certain trading period (i.e. number of trading day without actual trading within a month). This measure is in particular suitable for the MAI market due to unique characteristics of MAI stock. MAI market has been formed as the listing platform for small to medium enterprises which leads to small listed firms in the market. Moreover, due to the limited size, many of these stocks attract only marginal focuses from investors as indicated by large number of inactive trading days observed in the market.

In this study, a one month, six months and twelve months period measurement of LM was implemented (LM1, LM6 and LM12, respectively). LM is calculated using daily stock trading data. The inactive trading day is defined as the trading day when the market is open but the particular stock is not traded. The number of these inactive days were counted and integrated into the LM as presented in equation 1. In addition to the inactive trading, total trading days of each month is also evaluated and put into the calculation. Information required for LM computation are collected from the daily dataset including number of monthly zero-trading day, total monthly trading day, and daily turnover.

Deflator was set to be 101, 51 and 12 for LM1, LM6 and LM12 calculation, respectively, in order to scale the turnover to be between 0 and 1 as indicated in equation 2. This term separates the liquidity of each stock when there have stocks with the same zero trading day.

The obtained LM was arranged ascending and divide in to quartile portfolio (P1, P2, P3, and P4). The least liquid quartile portfolio represents by high value of LM (Portfolio P4), and the most liquid quartile portfolio represents by low value of

LM (Portfolio P1). All four portfolios are held for difference holding period (HP) (1 month, 3 month, 6 months and 12 months) to compute the return. The mean portfolio holding period return of each portfolio was computed.

The study tests the existence of liquidity premium through the excess return of a zero-cost portfolio consisting of a long position in low liquidity stocks (P4) and a short selling position in high liquidity stocks (P1). Statistical analysis of the excess return is conducted by applying t-test.

Section 2 Test whether liquidity factor provides explanation to asset pricing.

The study tests whether liquidity premium would provide explanation toward portfolio return. This is evaluated by incorporating liquidity factor (LIQ factor) into asset pricing models. The asset pricing models and liquidity augmented pricing models employed in this study include:

(1) The capital asset pricing model (CAPM)

(2) The liquidity augmented capital asset pricing model (LCAPM)

(3) The Fama and French three factor model (FAMA)

(4) The liquidity augmented Fama and French three factor model (LFAMA)

Specifically, testing these models would elucidate the role of liquidity premium in asset pricing in MAI stock returns. Time series analysis is carried out to evaluate these models.

Model 1 The Capital Asset Pricing Model (CAPM)

$$R_{it} - R_{ft} = \alpha_i + \beta_1 (R_{mt} - R_{ft}) + \varepsilon_{it} \quad (8)$$

Model 2 The liquidity augmented capital asset pricing model (LCAPM)

$$R_{it} - R_{ft} = \alpha_i + \beta_2 (R_{mt} - R_{ft}) + \beta_3 \mathrm{LIQ} + \varepsilon_{it} \quad (9)$$

Model 3 The Fama and French three factor model (FAMA)

$$R_{it} - R_{ft} = \alpha_i + \beta_4 (R_{mt} - R_{ft}) + \beta_5 \mathrm{SMB}_t + \beta_6 \mathrm{HML}_t + \varepsilon_{it} \quad (10)$$

Model 4 The liquidity augmented Fama and French three factor model (LFAMA)

$$R_{it} - R_{ft} = \alpha_i + \beta_7 (R_{mt} - R_{ft}) + \beta_8 \mathrm{SMB}_t + \beta_9 \mathrm{HML}_t + \beta_{10} \mathrm{LIQ} + \varepsilon_{it} \quad (11)$$

where,

R_{ti} is the monthly return of portfolio i at time t.

R_{ft} is the monthly return on t month Thai-government Treasury bill observed at the beginning of the month.

R_{mt} is the value-weighted monthly return of MAI market at time t

β_i is the corresponding factor loading

α_i is the intercept or alpha of the portfolio

LIQ is a liquidity factor which constructed by using significant LM (with its holding period) obtained from the first section.

The monthly portfolio return and market portfolio return are computed by holder the portfolio in accordance to the holding period associated with the tested LIQ. For instance, in order to estimate model with LIQ of HP 3, the stock and market portfolios are also calculate as 3 month holding period return. The risk free rates are also chosen such that the maturity of the quoted rate matches with the holding period of other factors.

The LIQ factor of the statistically significant LM determined from the first part is calculated. The stocks at each period are sorted into ascending and divided by the LM median into 2 groups. One is high LM or low liquidity group and another one is low LM or high liquidity group. LIQ is the difference of average monthly return between high LM groups and low LM groups held for the same holding period as indicated by the HP of the LM measure. This LIQ factor represents liquidity premium of illiquid stocks over liquid stocks.

SMB and HML factor were generated following Fama and French (1993), but have some adjustment in the holding period. SMB factor is generated by separate 80 sample stocks into 2 groups which are below or above median market value at the beginning of the holing period. Group S (small market value group) contains sample stock that has market value below median at the beginning of month. In other hand,

group B (large market value group) contains sample stock that has market value above median at first trading day of each month.

HML factor is generated by separate 80 sample stocks into 3 groups at the beginning of each month. Samples were divided by its B/M value based on the breakpoints for the bottom 30 percent, middle 40 percent and top 30 percent. Group H (high B/M value group) contains top 30 percent high B/M value stocks. Group L (low B/M value group) contains bottom 30 percent low B/M value stocks. Group M (Medium B/M value group) contains the rest of stocks which account middle 40 percent B/M value stocks. Book value of stocks is updated quarterly and exclude negative book value firm. Unlike in model Fama and Fremch (1996) which BE/ME ratio of every month in year t is calculated from book common equity for the fiscal year ending in calendar year t-1, divided by equity market value at the end of December year t-1.

Sixes sizes-B/M portfolios are constructed as the intersections of two market value and B/M value groups, namely, S/H, S/M, S/L, B/H, B/M, B/L. Value weighted monthly return of each group at the end of each month which has t month holding period is calculated.

SMB is the difference of average monthly return between small market value group and large market value group (small minus big, SMB). SMB defined as follows.

$$SMB = 1/3\ [(S/H + S/M + S/L) - (B/H + B/M + B/L)] \quad (12)$$

HML is the difference of average monthly return between two high B/M groups and two low B/M groups (High Minus Low, HML). HML defined as follows.

$$HML = 1/2\ [(S/H + B/H) - (S/L + B/L)] \quad (13)$$

CHAPTER 5
RESULTS AND DISCUSSION

5.1 Descriptive statistics and Spearman rank Correlation

Table 5.1 exhibits summary statistics for main variables of MAI stocks over the period between January 2005 and the first quarter of 2015. Results show that, for 80 stocks used in this study, on average there are 1.3 percent return per month. Mean of firm's market value is approximately 1,174 million baht with standard deviation of 4,133 million baht indicating that firm market value is widely spread. Average B/M of 0.6673 indicates that stock prices are mostly traded around 35% higher than their book value. The result specifies that majority of samples have growth stock characteristics. Accordingly, it is consistent with the size and firm character since listed firms in MAI market are small to medium enterprises which still have room to enlarge the size of their business. T/O represents sum of daily turnover ratio in a month. Average turnover ratio stands at 20.26 with standard deviation of 48.84 indicating that in a month which has average trading days around 20 days, number of stocks that was traded per day is closely equal to number of company's outstanding shares. On average, the number of zero daily trading volumes per month equals to 1.5585 with standard deviation of 3.5457 suggesting that the distribution of LM is widely dispersed. Mean of LM1, LM6 and LM12 are 1.5116, 1.6505 and 1.7220 with standard deviation 3.5457, 3.3400 and 3.2221, respectively. This reveals that average monthly number of day that has zero trading volume are approximately 1 to 2 trading days.

Spearman rank correlation between each variable is computed. The correlation between NZ and T/O is negative (-0.1647). It indicates that illiquid stocks which tends to have higher zero trading volume per day, have lower trading volume similar to the result in finding of Lui (2006). The result is consistent among all tested LM (LM1, LM6 and LM12). They are negatively correlated with T/O (-0.1651, -0.1511 and -0.1360, for LM1, LM6, and LM12, respectively), signify that the LM of Lui (2006) well captures the trading quantity dimension of liquidity. Note that NZ is the main and the most influential factor affecting the value of LM (see equation 2). LM1,

LM6, LM12 and NZ are also negatively correlated with firm size (MV) at -0.0775, -0.0861, -0.0900 and -0.0768, respectively. It suggests that large firm are more liquid and size could reasonable be an indirect liquidity proxy. The result of each pair variables between LM (include NZ) and B/M is positively correlated. However, the correlation between LM & NZ and stock return is negative which specifies that illiquidity stocks tend to provide less return than liquid stocks. As a result, it is contrary with the findings of Lui (2006).

Table 5.1 Descriptive statistics and Spearman rank Correlation

This table exhibits Descriptive statistics and Spearman rank Correlation for the main variables, using MAI market data during the period of January 2005 to March 2015. Rmkt (%) is percentage of monthly return of the market. MV presents market value in million baht unit. B/M is book to market value ratio. T/O is turnover ratio which is measured by the sum of daily trading volume over market value. NZ is the number of day that has zero daily trading volume in a month. LM1, LM6 and LM12 are constructed by liquidity measure of Lui (2006), refer to equation 1 and 2.

TYPE	Rmkt (%)	MV(M)	B/M	T/O	NZ	LM1	LM6	LM12
MEAN	0.0130718	1174	0.6673	20.2643	1.5585	1.5116	1.6505	1.7220
STD	0.0702263	4133	0.4410	48.8414	3.6631	3.5457	3.3400	3.2221
N	6354	6339	6150	6343	6354	6311	5952	5474
Spearman rank correlation								
MV	0.0275							
B/M	-0.0762	0.1866						
T/O	0.0666	0.0004	0.1447					
NZ	-0.0792	0.0768	0.2420	-0.1647				
LM1	-0.0741	0.0775	0.2547	-0.1651	0.9968			
LM6	-0.0331	0.0861	0.2677	-0.1511	0.8526	0.8452		
LM12	-0.0257	0.0900	0.2591	-0.1360	0.7845	0.7747	0.9466	

* = significant at 95% confidence interval

5.2 Performance and characteristics of quartile portfolios sorted by liquidity measure of Lui (2006)

Table 5.2 exhibits LM portfolio performance and characteristic of the equally weighted quartile portfolios. Four portfolios P1, P2, P3 and P4 are formed based on each liquidity measure (LM1, LM6 and LM12) together with various holding period (1, 3, 6 and 12 months). These portfolios present the collective return of stocks with different level of liquidity as measured by the different LMs. Since higher LM represents greater number of zero-trading days, it also represents lower liquidity (less trading activity).

Among the four portfolios, portfolio P1 has the highest liquidity (as indicated by lowest LM), and gradually increase to portfolio P2, P3, and P4, which represents the lowest liquidity. Overall, portfolio returns of portfolio P4 are greater than return of portfolio P1 given the same LM and HP as showed in P4-P1. Hence, portfolio including illiquid stocks performs better than the portfolio with liquid stocks suggesting a liquidity premium in the MAI market. Interestingly, the portfolio return is expected to increase accordingly from P1 to P4 due to the decreasing in liquidity. Nonetheless, most of the highest average monthly returns at each LM and HP belong to portfolio P2 instead of portfolio P4. The discrepancy of these returns may arise due to the limitation of the number of firms available.

Moreover, the statistical analysis using t-test of the portfolio returns are mostly insignificant. More significant returns are observed with the longer HP as well as longer period LMx (i.e. LM12 has more significant results comparing to LM1). The return of the long-short portfolio of LM1 is significant at HP6 and HP12, whereas, P4-P1 of LM6 is positive and significant across HP3, HP6, and HP12. No statistically significant P4-P1 portfolio return is observed in LM12. Considering the overall portfolio return based on LM measure, the existence of liquidity premium remains inconclusive.

These results may due to the limitation of the data where the total number of stocks is relatively small (80 stocks after screening procedure described in previous part). The small stock number affects the portfolio formation because the only limited number of stocks is assigned into each portfolio and hence the portfolio returns are greatly affected by the characteristics of individual stocks. Positive and significant P4-

Table 5.2 Performance and characteristics of quartile portfolios sorted by liquidity measure of Lui (2006)

The table exhibits the results for MAI market data during the period of January 2005 to March 2015 measure by liquidity measure of Lui (2006) over the prior x months (x = 1,6,12). The obtained LMs are arranged ascending and divide into quartile portfolios, hold for n months (n = 1, 3, 6 and 12). Portfolio P4 and P1 represent least and most liquid stocks, respectively. The t-statistics is employed to test the significant of each return.

Portfolio	P1	P2	P3	P4	P4 – P1
Performance of the LM1-sorted portfolio : measured on a monthly basis					
HP1m(%)	0.1566	0.4909	0.9064	0.2718	0.1152
	(0.8671)	(0.4560)	(0.1197)*	(0.5627)	(0.8788)
HP3m(%)	-0.2494	0.8409	0.9498	0.4795	0.7289
	(0.6526)	(0.0724)	(0.0120)*	(0.1429)	(0.0797)
HP6m(%)	-0.2221	0.8147	0.9418	0.6469	0.8690
	(0.5903)	(0.0253)*	(0.0015)*	(0.0171)*	(0.0040)*
HP12m(%)	-0.0649	0.6779	0.8735	0.7325	0.7975
	(0.8166)	(0.0086)*	(0.0001)*	(0.0004)*	(0.0001)*
Performance of the LM6-sorted portfolio : measured on a monthly basis					
HP1m(%)	-0.1721	1.0098	0.4194	0.9042	1.0764
	(0.8512)	(0.1442)	(0.4649)	(0.0972)	(0.1790)
HP3m(%)	-0.0529	1.2003	0.4714	0.9583	1.0112
	(0.9282)	(0.0096)*	(0.1807)	(0.0078)*	(0.0233)*
HP6m(%)	0.1047	1.1688	0.5466	0.9765	0.8719
	(0.8170)	(0.0006)*	(0.0597)	(0.0006)*	(0.0091)*
HP12m(%)	0.2493	1.0076	0.4540	0.9084	0.6592
	(0.4096)	(0.0001)*	(0.0477)*	(0.0000)*	(0.0009)*
Performance of the LM12-sorted portfolio : measured on a monthly basis					
HP1m(%)	0.4280	1.4379	0.0930	1.0953	0.6673
	(0.6506)	(0.0268)*	(0.8846)	(0.0689)	(0.4383)
HP3m(%)	0.3884	1.4890	0.3541	0.9892	0.6008
	(0.5275)	(0.0005)*	(0.3926)	(0.0122)*	(0.2237)
HP6m(%)	0.5378	1.2860	0.3158	1.0292	0.4915
	(0.2554)	(0.0001)*	(0.3225)	(0.0009)*	(0.1598)
HP12m(%)	0.6169	0.8885	0.4998	0.9402	0.3232
	(0.0533)	(0.0002)*	(0.0305)*	(0.0001)*	(0.1406)

* = significant at 95% confidence interval

P1 excess returns are detected only in portfolios of LM1_HP6, LM1_HP12, LM6_HP3, LM6_HP6, and LM6_HP12 with the portfolio return of 0.869%, 0.797%, 1.011%, 0.872% and 0.659%, respectively. Thus, these corresponding LM measures are subjected to further analysis by incorporating into the pricing models.

5.3 Time series analysis of Asset pricing model

Table 5.3 exhibits result of time series analysis for CAPM, FAMA, LCAPM, and LFAMA. Conventional CAPM and FAMA of different holding periods are analyzed. Excess portfolio return (LIQ factor) corresponding to the chosen LM measures namely LM1_HP6, LM1_HP12, LM6_HP3, LM6_HP6, and LM6_HP12 are incorporated into CAPM and FAMA. Liquidity augmented model, LCAPM and LFAMA, are analyzed to determine the explanatory capability of these LIQ factors.

The student's t-test is employed to analyze the significance of each coefficient at 95% confident level. In the case of basic factors including RP, SMB, and HML, significant RP is observed across all models at 95% confident level as P-value of less than 0.05 rejects the null hypothesis of coefficient equal to zero. SMB is significant in most models except only FAMA with 6 month holding period, whereas significant HML is observed in FAMA augmented with LM1_HP12, LM6_HP3, and LM6_HP12 as well as FAMA with 12 month holding period.

These results suggest that market risk premium has significant contribution in explaining the returns. It also suggests that SMB and HML both help explaining the portfolio returns. These obtained results are consistent with previous studies (ref) where positive and significant coefficients of these variables are detected.

From the result of LIQ factors augmented model, all LIQ factors fail to reject null hypothesis of zero coefficient, except LIQ of LM1_HP6. It suggests that LIQ factor does not explain portfolio return, and thus, should not be included in asset pricing model. This result is different from the observation of Liu (2006), in which significant contribution of LIQ factors in asset pricing is detected. This difference may arise from the different market conditions as well as the limitation of data available in this study.

The insignificant results of LIQ factors as well as the insignificant excess return observed in P4-P1 suggest two possibilities. Firstly, this may indicate the

possibility that liquidity premium does not exist in MAI stocks or market participants do not incorporate them into their required return. Alternatively, it is also possible that the undetectable liquidity premium is rather due to the limited data availability. Since this study only has 80 stocks for portfolio formation and analysis, each portfolio contains only a number of stocks, and may subject to return variation of each individual stock and its other characteristics. MAI is a relative new market established for about a decade, hence further limit the length of study period. Therefore, the existence of liquidity premium is still inconclusive.

Table 5.3 Time series analysis of Asset pricing model

The table exhibits the result for CAPMs, two factor models, Fama and French three factor models and four factor models. Time series analysis of each model is carried out and optimal lag for each model is determined. RP represents market premium. SMB and HML are the difference of portfolio return which constructed by MV and B/M, respectively. Return of LIQ factor are generated from the significant LM1-based results for 6 and 12 month testing horizons and LM6 based results for 3, 6 and 12 months testing horizons. After obtained LMs value, sort them into ascending and divide into two portfolios. Long the least liquid equally weighted portfolio represents by high value of LM and short the most liquid equally weighted portfolio. The different of their return presents liquidity premium (LIQ factor). All models calculate in monthly basis with different holding period, using MAI stock data during the period of January 2005 to March 2015.

	Coefficient				
Model	Intercept	RP	SMB	HML	LIQ
CAPM and two factor models					
HP_3	-0.0043	0.8302			
	-0.155	(<.0001)*			
HP_6	-0.0054	0.892			
	(0.0009)*	(<.0001)*			
HP_12	-0.0041	0.8561			
	-0.2467	(<.0001)*			
LM_1 HP_6	-0.0043	0.8711			-0.0544
	(0.0169)*	(<.0001)*			-0.1142
LM_1 HP_12	-0.0041	0.8561			0
	-0.2512	(<.0001)*			-0.9993
LM_6 HP_3	-0.0021	0.8005			-0.0718
	-0.5608	(<.0001)*			-0.1568
LM_6 HP_6	-0.0032	0.8516			-0.0553
	-0.134	(<.0001)*			-0.1839
LM_6 HP_12	-0.0037	0.84			0.0375
	(0.0391)*	(<.0001)*			-0.318

Table 5.3 Time series analysis of Asset pricing model (Con't)

Model	Coefficient				
	Intercept	RP	SMB	HML	LIQ
Fama and French Three factor model and Four factor models					
HP_3	-0.0061	0.8591	0.2158	0.0681	
	(0.0274)*	(<.0001)*	(<.0001)*	-0.0596	
HP_6	-0.0052	0.8908	0.077	0.0323	
	(0.0002)*	(<.0001)*	-0.0622	-0.2394	
HP_12	-0.0054	0.858	0.1208	0.0615	
	-0.1246	(<.0001)*	(0.0069)*	(0.0425)*	
LM_1 HP_6	-0.005	0.8922	0.0874	0.0316	-0.051
	(0.0039)*	(<.0001)*	(0.0160)*	-0.1607	(0.0444)*
LM_1 HP_12	-0.0053	0.8538	0.1235	0.0617	-0.0127
	-0.1346	(<.0001)*	(0.0065)*	(0.0430)*	-0.642
LM_6 HP_3	-0.0049	0.8292	0.1944	0.0789	-0.0925
	-0.1066	(<.0001)*	(0.0002)*	(0.0256)*	-0.052
LM_6 HP_6	-0.0042	0.8837	0.0879	0.0421	-0.0586
	-0.0702	(<.0001)*	(0.0287)*	-0.0994	-0.1316
LM_6 HP_12	-0.0073	0.8617	0.1294	0.0682	0.0168
	(0.0212)*	(<.0001)*	(0.0073)*	(0.0445)*	-0.6785

* = significant at 95% confidence interval

CHAPTER 6
CONCLUSIONS AND RECOMMENDATIONS

The study has investigated the liquidity premium in MAI market during the period of January 2005 to March 2015. It aims to find whether liquidity premium exists in the market. In addition, the study also tests the explanatory ability of the liquidity premium against portfolio return using asset pricing model. The study employs illiquidity measure of Lui (2006) as a tool to measure liquidity. It is an appropriate measure for this dataset since it captures liquidity through number of day that have no trading volume while most other measures fail to perform this feature.

In the first part of this study, although all of the long-short (P4-P1) portfolios exhibit positive excess return, return of only 5 out of 12 portfolios are statistically significant. The results provide inconclusive evidences regarding to the existence of liquidity premium in the MAI stocks.

Significant liquidity measures in section one are carried for pricing analysis in section two. Liquidity factors (LIQ factor) are formed as the excess return of the zero-cost portfolio corresponding to each LM measure, and augmented into pricing models. Market risk premium, SMB, and HML are found to be statistically significant variables in explaining portfolio return in MAI. However, all LIQ factor except that of LM1_HP6, exhibit insignificant results suggesting that the LIQ factor is not incorporated into asset pricing. This contradicts to the results observed by Lui (2006) where liquidity premium is an important factor in explaining stock returns.

The inconclusive results suggest two possibilities. Firstly, liquidity premium may not exist in MAI stocks. Alternatively, these insignificant results may due to data limitation since this study only has 80 stocks for portfolio formation together with the relatively short length of study period.

For the future study regarding to liquidity premium in MAI market, number of sample should be increase when more stocks are listed in the MAI as well as when the market becomes more mature. Although liquidity measure capturing zero-trading may not reveal positive results, liquidity measures associating with other dimensions of liquidity such as trading cost, and trading quantity should be tested.

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APPENDICES

APPENDIX A

DESCRIPTIVE STATISTICS

This table exhibits statistics of market return (return), market value (MV), book to market (B/M), turnover (T/O), number of day with zero trading volume per month (NZ) during January 2005 to March 2015.

No	Ticker	Sample	Mean					Median					Standard Deviation				
			Return (%)	MV (M)	B/M	T/O	NZ	Return (%)	MV (M)	B/M	T/O	NZ	Return (%)	MV (M)	B/M	T/O	NZ
1	2S	67	1.9333	719	0.8967	6.42	3.39	3.4634	640	0.9174	1.08	1	6.8183	221	0.1423	17.34	4.35
2	ACAP	112	1.3000	899	0.8098	5.32	6.92	2.1402	844	0.8264	0.30	5	6.8977	314	0.3136	15.92	6.36
3	ADAM	123	1.0342	447	0.4246	33.32	1.23	1.5399	297	0.2793	7.95	0	6.7411	469	0.4185	63.87	4.45
4	AF	123	1.0342	380	0.7127	1.09	9.61	1.5399	284	0.6410	0.14	9	6.7411	216	0.2379	5.71	5.43
5	AGE	74	1.8808	3090	0.3220	21.32	0.00	3.3081	3,351	0.3546	13.76	0	6.7234	1,653	0.1174	28.81	0.00
6	AJP	54	-0.4633	215	0.6269	0.88	12.96	-0.2540	141	0.5525	0.09	14	6.9201	278	0.5429	3.60	5.02
7	AKP	26	1.5105	1143	0.3893	40.17	0.00	3.5415	998	0.4098	11.28	0	8.7533	387	0.1110	68.95	0.00
8	APCO	41	2.4833	3217	0.1722	33.14	0.00	3.7208	1,880	0.1880	7.55	0	7.5308	2,614	0.0812	71.08	0.00
9	ARIP	52	1.8122	562	0.4069	51.15	0.00	3.5415	550	0.4016	19.09	0	7.4745	87	0.0642	94.76	0.00
10	ARROW	28	1.9069	1532	0.4198	10.24	0.04	4.1650	1,610	0.4065	4.72	0	8.5584	229	0.0519	14.19	0.19
11	BGT	88	1.0171	438	0.7772	15.10	0.69	2.1402	421	0.7221	3.17	0	7.2512	122	0.2266	38.30	1.78
12	BOL	123	1.0342	965	0.3441	1.44	0.58	1.5399	1,053	0.2151	0.66	0	6.7411	474	0.2977	2.56	1.68
13	BROOK	123	1.0342	1012	0.7187	11.54	0.15	1.5399	601	0.5682	6.15	0	6.7411	947	0.4669	14.14	0.61
14	BSM	86	1.0959	267	0.7421	33.35	0.40	2.2642	140	0.7937	10.50	0	7.3125	347	0.3621	74.21	1.03
15	CHOW	40	2.3532	2421	0.7620	22.48	0.00	3.6552	1,600	0.8130	6.38	0	7.5800	1,801	0.3359	42.37	0.00
16	CHUO	123	1.0342	129	1.4657	24.15	3.44	1.5399	107	1.4925	2.76	2	6.7411	67	0.6387	61.55	3.73
17	CIG	123	1.0342	707	0.8799	36.19	0.71	1.5399	578	0.7463	16.84	0	6.7411	401	0.4988	46.01	2.36
18	CMO	123	1.0342	318	1.0043	26.81	0.50	1.5399	300	0.9901	8.74	0	6.7411	120	0.2776	43.33	1.39
19	COLOR	46	1.7800	530	0.6328	27.60	0.15	3.5415	456	0.6006	9.14	0	7.8713	179	0.1733	63.04	0.42

APPENDIX A

DESCRIPTIVE STATISTICS (CON'T')

No	Ticker	Sample	Mean					Median					Standard Deviation				
			Return (%)	MV (M)	B/M	T/O	NZ	Return (%)	MV (M)	B/M	T/O	NZ	Return (%)	MV (M)	B/M	T/O	NZ
20	CPR	121	0.9723	462	0.9483	18.96	4.31	1.4864	446	0.8850	1.11	1	6.7692	184	0.3319	59.27	5.28
21	CYBER	59	2.0089	1698	0.5265	64.06	0.27	3.5896	398	0.5731	34.27	0	7.1420	3,960	0.2680	83.97	1.84
22	DIMET	87	1.0365	408	0.8162	32.72	0.33	2.1509	211	0.5988	12.58	0	7.2910	754	0.5554	51.73	0.98
23	DNA	28	1.9069	3226	0.3308	25.66	0.04	4.1650	1,523	0.3436	9.10	0	8.5584	3,528	0.1985	37.76	0.19
24	E	119	1.0488	828	0.8830	57.49	0.14	1.5399	736	0.8889	12.93	0	6.7991	567	0.3581	136.88	0.57
25	EA	27	1.7741	53K	0.1035	12.50	0.00	3.5896	34K	0.0936	6.16	0	8.6920	31K	0.0485	17.67	0.00
26	ECF	25	1.4311	1562	0.2641	52.33	0.00	3.5896	1,248	0.2786	38.00	0	8.9243	723	0.0935	50.35	0.00
27	EFORL	25	1.4311	8059	0.0735	51.09	0.00	3.5896	6,630	0.0692	27.62	0	8.9243	4,631	0.0366	53.74	0.00
28	FOCUS	123	1.0342	317	0.5156	17.09	3.81	1.5399	303	0.5102	2.45	2	6.7411	106	0.1337	42.08	4.67
29	FPI	31	2.3572	3373	0.2249	23.20	0.00	4.7405	3,006	0.2268	8.07	0	8.3061	1,200	0.0521	37.97	0.00
30	GIFT	46	1.7800	679	0.4681	36.13	0.00	3.5415	549	0.4695	10.28	0	7.8713	309	0.1209	104.56	0.00
31	HOTPOT	31	2.3572	1369	0.3028	19.37	0.00	4.7405	1,307	0.2959	5.56	0	8.3061	220	0.0378	41.03	0.00
32	HTECH	73	1.9590	756	0.6530	9.97	0.00	3.4634	744	0.5650	6.15	0	6.7360	223	0.2117	11.86	0.00
33	HYDRO	40	2.3532	1118	0.2662	37.17	0.00	3.6552	1,009	0.2797	18.19	0	7.5800	452	0.0773	62.93	0.00
34	ILINK	123	1.0342	1211	0.6666	5.87	0.31	1.5399	710	0.6173	3.36	0	6.7411	1,212	0.2659	6.82	1.06
35	IRCP	123	1.0342	613	0.6422	17.76	2.50	1.5399	553	0.5525	1.73	1	6.7411	420	0.3288	47.81	3.73
36	JUBILE	65	1.7879	2999	0.2123	6.66	0.00	3.1528	2,550	0.1548	1.88	0	6.8596	1,859	0.1307	13.99	0.00
37	KASET	112	1.3000	717	0.5078	31.00	0.38	2.1402	727	0.4115	9.31	0	6.8977	383	0.2908	64.03	1.72
38	KIAT	66	1.8265	2239	0.2847	15.10	0.02	3.3081	2,148	0.2833	3.42	0	6.8138	842	0.0993	42.16	0.12
39	LVT	102	0.7315	587	0.8481	25.59	0.40	1.2420	574	0.8264	16.10	0	6.3287	221	0.2610	30.05	2.38
40	MBAX	99	1.2566	373	0.9364	15.05	1.21	2.1509	307	0.9174	2.38	0	7.1785	145	0.2879	48.65	2.62
41	MOONG	66	1.8265	525	0.7008	8.77	0.58	3.3081	541	0.6667	2.70	0	6.8138	153	0.1371	21.28	1.04
42	MPG	54	-0.4633	530	0.9588	33.44	0.78	-0.2540	359	0.9709	16.03	0	6.9201	446	0.7344	42.48	3.55

APPENDIX A

DESCRIPTIVE STATISTICS (CON'T')

No	Ticker	Sample	Mean					Median					Standard Deviation				
			Return (%)	MV (M)	B/M	T/O	NZ	Return (%)	MV (M)	B/M	T/O	NZ	Return (%)	MV (M)	B/M	T/O	NZ
43	NBC	65	1.7879	1345	0.4044	14.33	0.00	3.1528	1,197	0.3460	6.12	0	6.8596	563	0.1960	21.20	0.00
44	NINE	53	1.7812	589	0.4811	24.52	0.11	3.4935	587	0.4358	7.20	0	7.4057	292	0.2388	47.13	0.32
45	NPK	40	2.3532	271	0.9168	0.43	8.83	3.6552	241	1.0585	0.19	8	7.5800	70	0.3501	0.73	5.39
46	PHOL	52	1.8122	610	0.4858	24.47	0.00	3.5415	608	0.4926	7.56	0	7.4745	73	0.0473	44.13	0.00
47	PICO	123	1.0342	368	0.9614	6.53	2.63	1.5399	367	0.9615	2.14	1	6.7411	105	0.1883	13.92	4.07
48	PJW	38	2.2036	2324	0.3951	18.11	0.00	3.6552	2,153	0.4167	5.69	0	7.6886	455	0.0920	28.61	0.00
49	PPM	123	1.0342	610	0.9056	9.37	1.90	1.5399	477	0.8929	2.22	0	6.7411	300	0.3642	20.02	2.97
50	PPS	31	2.3572	603	0.3216	66.86	0.00	4.7405	608	0.3058	30.11	0	8.3061	168	0.0861	110.27	0.00
51	PYLON	112	1.3000	813	0.6346	9.34	1.01	2.1402	454	0.6852	5.34	0	6.8977	746	0.2547	11.40	2.00
52	QLT	70	1.9273	792	0.3756	4.34	0.40	3.3081	704	0.3803	2.19	0	6.7736	292	0.0582	8.77	1.01
53	QTC	45	1.7578	895	0.4664	31.65	0.00	3.5896	840	0.4566	20.72	0	7.9587	251	0.0990	34.77	0.00
54	SALEE	120	1.0176	1331	0.5449	12.06	0.51	1.5132	924	0.5362	2.23	0	6.7791	1,008	0.3041	26.06	1.56
55	SIMAT	88	1.0171	787	0.6114	20.24	0.48	2.1402	334	0.6250	6.34	0	7.2512	760	0.2457	59.51	1.63
56	SLC	123	1.0342	613	0.5634	41.79	2.21	1.5399	183	0.6098	9.98	0	6.7411	812	0.3393	70.29	3.62
57	STAR	115	1.1802	227	1.6258	31.64	0.32	1.7785	180	1.4085	12.83	0	6.8642	119	0.8845	41.53	1.02
58	SWC	123	1.0342	761	0.5534	0.61	7.02	1.5399	630	0.5587	0.22	5	6.7411	256	0.0744	2.22	6.51
59	TAPAC	123	1.0342	240	1.0581	12.01	1.51	1.5399	202	0.9615	3.74	0	6.7411	106	0.2891	24.46	2.78
60	THANA	64	1.8004	527	0.7792	9.89	1.38	3.3081	474	0.8097	1.64	0	6.9130	160	0.1528	24.93	2.60
61	TIES	103	1.3998	336	0.4392	49.66	0.99	2.1509	204	0.2514	15.46	0	7.1362	321	0.4497	85.17	2.68
62	TMC	30	2.1904	1436	0.5384	12.20	0.03	4.1650	1,148	0.5814	2.89	0	8.3952	509	0.0997	28.12	0.18
63	TMI	59	2.0089	627	0.3243	34.21	0.05	3.5896	594	0.3295	11.07	0	7.1420	243	0.0970	63.07	0.29
64	TMILL	29	1.9146	1021	0.5816	15.71	0.07	3.5896	958	0.6061	2.44	0	8.4043	155	0.0674	39.18	0.26

APPENDIX A

DESCRIPTIVE STATISTICS (CON'T)

No	Ticker	Sample	Mean					Median					Standard Deviation				
			Return (%)	MV (M)	B/M	T/O	NZ	Return (%)	MV (M)	B/M	T/O	NZ	Return (%)	MV (M)	B/M	T/O	NZ
65	TMW	123	1.0342	827	1.4039	4.74	3.31	1.5399	614	1.3514	0.58	1	6.7411	495	0.5136	14.95	4.23
66	TNDT	91	1.0791	766	0.4787	30.82	0.00	2.1509	550	0.5128	12.61	0	7.2718	423	0.1546	56.75	0.00
67	TNH	112	1.3000	1659	0.3468	4.82	0.04	2.1402	1,449	0.3367	2.52	0	6.8977	755	0.0816	7.01	0.31
68	TPAC	112	1.3000	813	0.5707	2.33	1.50	2.1402	885	0.5155	1.24	0	6.8977	360	0.1808	3.60	2.61
69	TRT	107	1.2807	1279	0.6471	9.24	0.20	2.1295	1,476	0.6290	4.31	0	7.0487	489	0.1090	15.10	0.71
70	TSF	112	1.3000	894	0.3768	32.79	1.33	2.1402	444	0.4124	13.93	0	6.8977	1,042	0.2069	44.67	2.61
71	TVD	32	2.4560	1963	0.3102	24.66	0.00	4.8170	1,967	0.3521	12.91	0	8.1902	329	0.1360	30.45	0.00
72	UAC	54	1.8239	3405	0.1999	18.85	0.00	3.5415	3,783	0.2073	4.43	0	7.3422	1,686	0.0460	40.47	0.00
73	UBIS	95	1.2309	892	0.3561	7.25	4.18	2.1509	874	0.3205	0.23	3	7.2724	302	0.1050	28.65	4.26
74	UEC	113	1.2307	2091	0.7051	10.85	0.00	2.1295	1,830	0.7519	5.86	0	6.9062	950	0.2073	14.31	0.00
75	UKEM	101	1.3223	818	0.6488	41.69	0.02	2.1509	753	0.6452	19.61	0	7.1658	461	0.2382	51.37	0.14
76	UMS	123	1.0342	1891	0.3721	11.30	0.18	1.5399	1,719	0.3690	2.89	0	6.7411	963	0.1335	23.74	0.59
77	UREKA	25	1.4311	599	0.3576	19.38	0.00	3.5896	578	0.3704	6.85	0	8.9243	71	0.0544	35.26	0.00
78	UWC	33	2.4943	2591	0.5577	23.93	0.33	4.7405	1,027	0.6135	9.81	0	8.0642	4,170	0.2587	34.47	0.82
79	VTE	49	1.9074	790	0.6944	47.25	0.16	3.5896	803	0.5988	19.59	0	7.6588	492	0.4112	65.98	0.47
80	YUASA	123	1.0342	477	0.8751	15.86	4.18	1.5399	364	0.6329	1.31	2	6.7411	318	0.5324	47.48	5.01
Summary		748	15.965	144K	47.511	1.7K	100	212.75	110K	45.73	656.6	5					
Average		75	1.5965	1.1K	0.5077	22.10	0.91	2.9789	1,370	0.4862	8.35	1					

APPENDIX B

DESCRIPTIVE STATISTICS OF LM PORTFOLIO

This table exhibits statistics of the calculated LM measure of Lui (2006)

No	Ticker	Sample	Mean			Standard Deviation		
			LM1	LM6	LM12	LM1	LM6	LM12
1	2S	67	3.3379	3.7462	4.1551	4.3178	3.7777	3.2268
2	ACAP	112	6.3910	7.4654	7.7874	6.0133	5.6127	5.1159
3	ADAM	123	0.2534	0.6982	0.5800	0.8088	2.4295	1.6552
4	AF	123	9.5344	9.8662	9.9142	5.3484	4.0568	3.5035
5	AGE	74	0.0019	0.0000	0.0000	0.0025	0.0000	0.0000
6	AJP	54	12.9452	13.7086	14.0151	5.1633	2.4685	1.2148
7	AKP	26	0.0019	0.0000	0.0000	0.0030	0.0000	0.0000
8	APCO	41	0.0023	0.0001	0.0000	0.0028	0.0001	0.0000
9	ARIP	52	0.0011	0.0000	0.0000	0.0014	0.0000	0.0000
10	ARROW	28	0.0437	0.0455	0.0608	0.2120	0.0781	0.0404
11	BGT	88	0.7205	0.7537	0.8083	1.8065	1.4163	1.2203
12	BOL	123	0.6181	0.5567	0.4402	1.7469	1.4217	1.0185
13	BROOK	123	0.1661	0.1414	0.1244	0.6474	0.3973	0.2848
14	BSM	86	0.4047	0.4348	0.4599	1.0458	0.5434	0.3399
15	CHOW	40	0.0033	0.0001	0.0001	0.0047	0.0001	0.0000
16	CHUO	123	3.5461	3.5376	3.5038	3.8528	2.8053	2.1971
17	CIG	123	0.7561	0.7629	0.7920	2.5323	2.0972	1.8117
18	CMO	123	0.5089	0.5323	0.5636	1.4099	1.0654	0.9850
19	COLOR	46	0.1598	0.1755	0.2061	0.4313	0.2844	0.2292
20	CPR	121	4.2851	4.6241	4.8665	5.4048	4.4716	3.7419
21	CYBER	59	0.2595	0.3016	0.1758	1.7531	0.8427	0.4599
22	DIMET	87	0.3408	0.3668	0.3840	0.9844	0.5603	0.4059
23	DNA	28	0.0386	0.0445	0.0355	0.1797	0.0763	0.0436
24	E	119	0.1511	0.1539	0.1617	0.5990	0.3236	0.2545
25	EA	27	0.0019	0.0001	0.0001	0.0012	0.0000	0.0000
26	ECF	25	0.0008	0.0000	0.0000	0.0010	0.0000	0.0000
27	EFORL	25	0.0004	0.0000	0.0000	0.0004	0.0000	0.0000
28	FOCUS	123	3.9770	4.0520	4.1715	4.8215	3.4047	2.9538
29	FPI	31	0.0047	0.0002	0.0001	0.0056	0.0002	0.0001
30	GIFT	46	0.0024	0.0001	0.0001	0.0029	0.0001	0.0001
31	HOTPOT	31	0.0018	0.0001	0.0001	0.0012	0.0000	0.0000
32	HTECH	73	0.0025	0.0001	0.0001	0.0025	0.0001	0.0000
33	HYDRO	40	0.0019	0.0001	0.0000	0.0032	0.0001	0.0000
34	ILINK	123	0.3207	0.3290	0.3258	1.1010	0.5947	0.4187
35	IRCP	123	2.6105	2.6950	2.8301	3.8856	2.9703	2.6445
36	JUBILE	65	0.0069	0.0003	0.0003	0.0059	0.0003	0.0002
37	KASET	112	0.4043	0.4155	0.3213	1.7927	1.3847	0.9369
38	KIAT	66	0.0199	0.0168	0.0188	0.1183	0.0506	0.0357
39	LVT	102	0.2091	0.1652	0.1137	1.2555	0.6171	0.3379
40	MBAX	99	1.2751	1.3210	1.3955	2.7479	2.0721	1.5758

APPENDIX B

DESCRIPTIVE STATISTICS OF LM PORTFOLIO (CON'T)

No	Ticker	Sample	Mean			Standard Deviation		
			LM1	LM6	LM12	LM1	LM6	LM12
39	LVT	102	0.2091	0.1652	0.1137	1.2555	0.6171	0.3379
40	MBAX	99	1.2751	1.3210	1.3955	2.7479	2.0721	1.5758
41	MOONG	66	0.6000	0.6391	0.7019	1.0970	0.7088	0.5281
42	MPG	54	0.8269	0.4768	0.2647	3.6905	1.6901	0.8725
43	NBC	65	0.0031	0.0001	0.0001	0.0038	0.0001	0.0001
44	NINE	53	0.1177	0.1278	0.1468	0.3184	0.1694	0.1281
45	NPK	40	9.1751	9.1766	9.5165	5.5401	4.0943	3.3789
46	PHOL	52	0.0031	0.0001	0.0001	0.0057	0.0001	0.0001
47	PICO	123	2.7559	2.8142	2.9573	4.2977	3.7249	3.5197
48	PJW	38	0.0033	0.0001	0.0001	0.0036	0.0001	0.0001
49	PPM	123	2.0408	2.0532	2.1410	3.2211	2.4568	1.9724
50	PPS	31	0.0008	0.0000	0.0000	0.0008	0.0000	0.0000
51	PYLON	112	1.0617	1.0917	1.1472	2.0950	1.5913	1.5015
52	QLT	70	0.4150	0.4275	0.4630	1.0334	0.6465	0.5397
53	QTC	45	0.0018	0.0000	0.0000	0.0041	0.0001	0.0000
54	SALEE	120	0.5336	0.5396	0.5699	1.5722	1.2389	1.0238
55	SIMAT	88	0.5150	0.5228	0.5485	1.7597	1.1057	0.9225
56	SLC	123	2.3078	2.3543	2.4553	3.7753	3.1797	3.0196
57	STAR	115	0.3345	0.3478	0.3667	1.0233	0.6286	0.4480
58	SWC	123	6.2534	7.3610	7.6962	5.8745	5.7273	5.4189
59	TAPAC	123	1.5815	1.5992	1.5955	2.9075	2.3532	2.1555
60	THANA	64	1.4486	1.5421	1.6789	2.7413	2.1376	1.5234
61	TIES	103	1.0425	1.0764	1.1460	2.8742	2.2200	1.8795
62	TMC	30	0.0427	0.0422	0.0546	0.1886	0.0764	0.0428
63	TMI	59	0.0568	0.0562	0.0643	0.3004	0.1132	0.0718
64	TMILL	29	0.0824	0.0875	0.1150	0.2773	0.1459	0.0783
65	TMW	123	3.4304	3.5434	3.7164	4.3339	3.2321	2.9160
66	TNDT	91	0.0016	0.0000	0.0000	0.0022	0.0000	0.0000
67	TNH	112	0.0478	0.0334	0.0225	0.2893	0.1265	0.0648
68	TPAC	112	1.5657	1.6046	1.5766	2.7104	2.0974	1.7799
69	TRT	107	0.2076	0.2086	0.2124	0.7394	0.4990	0.3994
70	TSF	112	1.3926	1.4269	1.4350	2.7232	1.8205	1.6099
71	TVD	32	0.0013	0.0000	0.0000	0.0016	0.0000	0.0000
72	UAC	54	0.0046	0.0002	0.0001	0.0070	0.0002	0.0001
73	UBIS	95	4.1794	4.5155	4.8031	4.1934	3.0008	2.2273
74	UEC	113	0.0031	0.0001	0.0001	0.0040	0.0001	0.0001
75	UKEM	101	0.0231	0.0213	0.0229	0.1564	0.0566	0.0441
76	UMS	123	0.1991	0.1920	0.2024	0.6083	0.3749	0.3157
77	UREKA	25	0.0032	0.0001	0.0001	0.0052	0.0001	0.0000
78	UWC	33	0.3690	0.4080	0.5120	0.8928	0.5785	0.3749
79	VTE	49	0.1660	0.1866	0.1804	0.4816	0.2853	0.2038
80	YUASA	123	4.2476	4.1848	3.9611	5.0848	4.3818	3.8777
Average		82	1.1291	1.1666	1.2047	1.6502	1.2373	1.0416

BIOGRAPHY

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