THE RELATIONSHIP AMONG BANKRUPTCY RISK, LIQUIDITY AND EQUITY RETURNS: THE EVIDENCE OF SOUTHEAST ASIA

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by

Thitima Chaiyakul

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ABSTRACT

After the Capital Asset Pricing Model (CAPM)-challenging work of Fama and French (1992, 1993), a large amount of literature has concentrated on the factors that possibly explain equity returns. However, previously published studies have concentrated on developed markets, while the literature on developing markets is limited. This thesis provides an examination of the ability of bankruptcy risk and liquidity to explain equity returns and the ability of bankruptcy explanatory variables to determine liquidity. The data were collected from five markets in Southeast Asia (ASEAN-5), namely Indonesia, Malaysia, the Philippines, Singapore and Thailand during the period 1996 to 2007. The ASEAN-5 countries are employed in this study due to their recently high growths. Additionally, they provide a good sample for this study of bankruptcy risk since they were affected by the 1997 East Asian Financial Crisis.

The portfolio-based results on the relationship between bankruptcy risk and equity returns show that there is a significant bankruptcy discount in the ASEAN-5 markets when Altman's (1968) Z- and Ohlson's (1980) O-scores are used as the proxies for bankruptcy risk. However, a positive relationship between bankruptcy risk and equity returns exists when Vassalou and Xing's (2004) DLI is used as a bankruptcy risk measure. Additionally, the cross-sectional analysis results on the relationship between bankruptcy risk and equity returns show that ASEAN-5 stocks with a higher bankruptcy risk earn higher returns, even after controlling for size and book-to-market equity ratio. The findings of the cross-sectional analysis are consistent with Vassalou and Xing (2004) and Chava and Purnanandam (2010), who studied the United States market. The different results of the portfolio and cross-sectional analyses suggest that the relationship between bankruptcy risk and equity returns can change significantly depending on how the bankruptcy risk is measured and the methodology which is used.

Both the portfolio and the cross-sectional analysis results regarding the relationship between liquidity and equity returns indicate that stocks with higher liquidity generally earn higher equity returns in the ASEAN-5 markets. Moreover, the results are consistent with the further empirical results from economic and market state-based analyses. This evidence contradicts the microstructure theory that has been supported by many studies of developed markets.

The empirical results on the effect of bankruptcy explanatory variables on liquidity in ASEAN-5 generally demonstrate that the bankruptcy explanatory variables significantly explain liquidity, even after controlling for regional index returns, stock price, and firm size. Firms with a lower financial leverage, lower efficiency of asset management, lower ability to repay short-term debts, or lower profitability will have lower liquidity. These results are consistent with an inventory paradigm and the previous evidence of Agrawal et al. (2004). The further evidence illustrated that the significance of bankruptcy explanatory variables in determining alternative liquidity measures can change significantly depending on the sectors.

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DECLARATION

No portion of this work referred to in this thesis has been submitted in support of an application for further degree or any other qualification to this or any other university or institute of learning.

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DEDICATION

This thesis is dedicated to my beloved parents and brother.

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Chapter 1

INTRODUCTION

1.1 Introduction

Research on the pricing of equity began with the studies of Sharpe (1963, 1964), Lintner (1965) and Black (1972) who developed the Capital Asset Pricing Model (CAPM), stating that equity returns can be explained by the market risk or beta. The CAPM was challenged by many scholars and the most outstanding challenge was from Fama and French's (1992, 1993, 1995, 1996) work. They found that it is not only does market risk that explains equity returns, but also size and the book-to-market equity ratio. Since then, many researchers have attempted to investigate other possible variables, including bankruptcy risk and liquidity, which could price equity returns. Generally, bankruptcy risk is explained as the possibility that a company will be unable to meet its debt obligations (Vassalou and Xing, 2004); while liquidity is described as the ability to trade a stock in large quantities and quickly at low cost with little price impact (Liu, 2006). These studies were mainly focused on the United States and other developed markets, whereas the evidence from emerging markets is still limited

There are five emerging stocks markets in Southeast Asia (ASEAN-5) which are the official founders of the Association of Southeast Asian Nations (ASEAN), namely Indonesia, Malaysia, the Philippines, Singapore and Thailand, These have drawn attention from investors since three of them, Malaysia, Singapore and Thailand, have ranked among the top 35 markets in the world in terms of capitalization in the last ten

years (World Federation of Exchanges, 2008). Moreover, the index returns of all the markets in Southeast Asia were higher than the index returns on the NYSE, the NASDAQ and the London Stock Exchange during 2007 (World Federation of Exchanges, 2008).

Asset pricing, bankruptcy risk, and liquidity have been interesting topics to investors and other participants in ASEAN-5 since the East Asian Financial Crisis 1997 severely affected stock markets in this region. This crisis began in July 1997 when traders decided that the currency of certain countries was overvalued with respect to the countries' financial situations. The crisis started in Thailand, since Thailand had a very large current account deficit, a growing foreign debt, and a governmental budget shortfall. To stop the baht from depreciating, the Thai government had to let the baht trade freely, instead of being linked to the United States dollar. As the baht fell, the other currencies in Southeast Asia also depreciated in value, for instance the Philippines peso, the Malaysian ringgit, and the Indonesian rupiah. At the same time, the stock markets in this region suffered a sharp decline and many financial institutions and companies went bankrupt.

Notably, studies related to bankruptcy risk, liquidity and liquidity returns in ASEAN-5 are rare because of limitations of data collection in these markets. Additionally, the results of previous studies, for instance, Bystrom et al. (2005), Jun et al. (2003) and Dey (2005), are still inconsistent. Hence, this empirical examination of the relationship among bankruptcy risk, liquidity and equity returns using evidence from these five markets in Southeast Asia will contribute to the literature and help with the investment decisions of stakeholders. The remainder of this chapter is organised as follows:

Section 1.2 explains the research question and contributions; Section 1.3 presents the chapter review.

1.2 Research questions and contributions

The existing empirical studies on the pricing of equity returns have been examined extensively during the past forty-five years; however, there are only a small number of studies on the relationship between bankruptcy risk and equity returns and the existing evidence on this is still conflicting. Evidently, some researchers, for instance, Lang and Stulz (1992), Vassalou and Xing (2004), and Chava and Purnanandam (2010), have found that bankruptcy risk is positively related to equity returns. On the other hand, other researchers, for instance, Dichev (1998), Griffin and Lemmon (2002), Agarwal and Taffler (2002), Garlappi et al. (2008), Campbell et al. (2008), and Avramov et al. (2009) have found that bankruptcy is negatively related to stock returns, and some researchers, such as Hussain et al. (2001), Gharghori et al. (2007), and Bystrom et al. (2005), have claimed that bankruptcy risk is insignificantly related to returns. Furthermore, the most of previous evidence is from the United States and there is only a small amount evidence from countries in ASEAN-5. The lack of evidence on the relationship between bankruptcy risk and equity returns in ASEAN-5 raises the question:

a) Is there a significant relationship between bankruptcy risk and equity returns in the ASEAN-5 markets?

Additionally, this thesis contributes to the literature on the relationship between bankruptcy risk and equity returns by providing a regression analysis of returns on the Fama and French (1993) three factor model, augmented with bankruptcy risk in

different economic states, which is based on the East Asian 1997 financial crisis. Both bankruptcy risk measures based on accounting reports (e.g. Altman's (1968) Z and Ohlson's (1980) O scores) and market data (e.g. Vassalou and Xing's (2004) DLI) are used in this study to validate the results.

Contrary to the small number of studies on the relationship between bankruptcy risk and equity returns, the number of studies on the relationship between liquidity and equity returns is bigger. These come mainly from the United States and other developed markets. The vast amount of academic literature on this issue has been investigated by scholars since the study by Amihud and Mendelson (1986). The empirical studies in developed markets have mainly reported that stocks with lower liquidity provide higher returns; for instance, Amihud and Mendelson (1986), Brennan and Subrahmanyam (1996), Datar et al. (1998), Amihud (2002), Pastor and Stambaugh (2003) , Liu (2006) and Korajczyk and Sadka (2008). On the other hand, the evidence from emerging markets is scarce and still contradictory. Some studies, for instance Bekaert et al. (2007) and Zhang et al. (2007), support the evidence existing mainly in developed markets that stocks with lower liquidity have higher returns, while other studies, for instance Jun et al. (2003) and Dey (2005), have shown that stocks with higher liquidity are rewarded by higher returns. Hence, another question arises:

b) Is there a significant relationship between liquidity and equity returns in the ASEAN-5 markets?

Unlike previous research, such as Bystrom et al. (2005), this study provides a contribution to the literature on the relationship between liquidity and equity returns by investigating the effect of liquidity on equity returns controlling for the Fama and

French (1993) three factor model in the different economic states (which is based on financial crisis) and different markets states (up and down markets).

Recently, studies on the effect of bankruptcy risk in determining liquidity have drawn attention from some researchers. Studies of the determinants of liquidity have been concentrated on since the studies of Demsetz (1968), Stoll (1978) and Ho and Stoll (1981), who suggested a set of standard determinants of liquidity and provided the inventory paradigm, which explains that liquidity depends on factors influencing the risk of holding inventory. Later, the remarkable studies of Chordia et al. (2000, 2001a) and Hasbrouck and Seppi (2001) provided supportive evidence through the time-series regression analysis and found significant co-movement in trading activities and liquidity. However, these determinants are not able to explain liquidity perfectly. Therefore, researchers still pay attention to the possible factors including bankruptcy risk, that could explain liquidity

Surprisingly, although published empirical studies on determinants of liquidity are rich in number, previous empirical evidence on the effect of bankruptcy risk on stock liquidity is rare. There is only one published study by Agrawal et al. (2004), which provides a regression of liquidity on firm performance using United States data, while other studies have provided a time series pattern of liquidity during financial difficulty periods (Lesmond, 2005; and Harris et al., 2008). Hence, the lack of the evidence on the relationship between bankruptcy risk measures and liquidity in other markets needs to be addressed. Therefore, from the gaps in this area of literature, another question arises:

c) Do the bankruptcy explanatory variables of firms determine liquidity in the ASEAN-5 markets?

Additionally, this thesis fills the gaps in Agrawal et al. (2004) by using the bankruptcy explanatory variables as bankruptcy risk measures, instead of the firm performance variables used in their study. This could provide validation of the empirical evidence. Moreover, to my knowledge, this study also provides a contribution to literature by being the first study to conduct a cross-sectional analysis of the relationship between bankruptcy risk and liquidity in the different economic states, market states, and sectors. The next section will give an overview of the contents of each chapter of this thesis and provide the structure of thesis with regards to the research questions.

1.3 Chapter review

The thesis is organized as follows. Chapter One provides the introduction to the study. Section 1.1 introduces the chapter and states the importance of the study. Section 1.2 explains the research questions and the contributions this research makes, and Section 1.3 shows the structure of the chapters in this study.

Chapter Two presents an overview of Southeast Asian markets. Section 2.1 introduces the chapter by providing the background to the Association of Southeast Asian Nations (ASEAN) and shows the key economic indicators and statistics of these five stock markets in Southeast Asia. Section 2.2 gives information about and the history of the ASEAN-5 exchange markets and reviews the Southeast Asian index series. Section 2.3 contains the financial regulations and accounting standards used in the ASEAN-5 countries. Section 2.4 explains the economic effects of the East Asian Financial Crisis

1997 on the Southeast Asian nations. The summary of the chapter is presented in Section 2.5.

Chapter Three reviews the existing literature regarding the relationship among bankruptcy risk, liquidity and equity returns. Section 3.1 introduces the chapter. Section 3.2 reviews the literature about asset pricing in two sub-sections. The first and second sub-sections present the theoretical and empirical literature on asset pricing respectively. Section 3.3 provides a discussion of the empirical evidence on the relationship between bankruptcy risk and equity returns and also reports the gaps in the previous studies. Section 3.4 discusses the literature on the relationship between liquidity and equity returns and the gaps in the previous evidence. Section 3.5 provides a review of the evidence on determinates of liquidity, as well as of literature related to the effect of bankruptcy risk on liquidity with a discussion of the gaps of previous related research. Section 3.6 reviews the literature related to bankruptcy risk prediction and Section 3.7 gives a summary of the chapter.

Chapter Four contains the data and methodology of this thesis. Section 4.1 introduces the chapter. Section 4.2 presents the data collection for this study. Section 4.3 explains the measurements of bankruptcy risk and liquidity. Section 4.4 provides the methodology for this study and is divided into three sub-sections. The first sub-section shows the methodology for the examination of the relationship between bankruptcy risk and equity returns. The second sub-section presents the methodology for the investigation of the relationship between liquidity and equity returns. The third sub-section explains the methodology for the analysis of the ability of bankruptcy explanatory variables to determine liquidity. Section 4.5 gives a summary of the chapter.

Chapter Five provides empirical evidence on the relationship between bankruptcy risk and equity returns. Section 5.1 introduces the chapter. Section 5.2 provides empirical evidence from portfolio-based analysis of the relationship between bankruptcy risk and equity returns in three sub-sections. The first sub-section presents the performance of bankruptcy-sorted quintiles. The second sub-section presents the performance of bankruptcy-sorted quintiles in size-sorted portfolios, while the third sub-sector provides the performance of bankruptcy-sorted quintiles in book-to-market-sorted portfolios. Section 5.3 shows empirical evidence from a cross-sectional based analysis in two sub-sections. The first sub-section contains the results of the cross-sectional regression of returns on bankruptcy risk and other factors in the whole period. The second sub-section offers evidence from a cross-sectional analysis in three economic states. Section 5.4 gives a summary of the chapter.

Chapter Six provides empirical evidence on the relationship between liquidity and equity returns. Section 6.1 introduces the chapter. Section 6.2 presents the empirical evidence from a portfolio-based analysis of the relationship between liquidity and equity returns in three sub-sections. The first sub-section describes the performance of liquidity-sorted portfolios. The second and third sub-sections present the performance of liquidity-sorted quintiles in size-sorted and book-to-market-sorted portfolios respectively. Section 6.3 provides a cross-sectional analysis of the relationship between liquidity and equity returns in three sub-sections. The first sub-section gives the results of a cross-sectional regression on bankruptcy risk and equity pricing for the whole period. The second sub-section shows the cross-sectional analysis results in three economic states. The third sub-section illustrates the cross-sectional analysis results in two market states. Section 6.4 provides a summary of the chapter.

Chapter Seven provides empirical evidence on the explanatory ability of bankruptcy risk to determine liquidity. Section 7.1 introduces the chapter. Section 7.2 shows the empirical evidence from ASEAN-5 in three sub-sections. The first sub-section contains the regression results for the whole period. The second sub-section gives the cross-sectional analysis results in three economic states and the third sub-section presents the cross-sectional analysis results from three market states. Section 7.3 offers empirical evidence by sectors of the Indonesian market and there are three sub-sections which have same headings as in Section 7.2. Section 7.4 provides a summary of the chapter.

Chapter Eight offers the conclusion of thesis. Section 8.1 introduces the chapter. Section 8.2 provides a summary of the empirical findings. The limitations of the research and guidelines for the future are presented in Section 8.3 and Section 8.4 respectively.

Chapter 2

AN OVERVIEW OF ASEAN

2.1 Introduction

On 8 August 1967, the Association of Southeast Asian Nations, or ASEAN was officially established by five countries; namely, Indonesia, Malaysia, the Philippines, Singapore, and Thailand. Then, the membership of Brunei Darussalam in 1984, Vietnam in 1995, Lao PDR and Myanmar in 1997 and Cambodia in 1999 made up the ten Member States of ASEAN (Association of Southeast Asian Nations, 2009).

The ASEAN Declaration states that the aims and purposes of the Association are: (1) to accelerate economic growth, social progress and cultural development in the region, (2) to promote regional peace and stability, (3) to promote collaboration and mutual assistance on matters of common interest in the economic, social, cultural, technical, scientific and administrative fields, (4) to provide assistance to each other in the form of training and research facilities, (5) to collaborate more effectively for the greater utilisation of their agriculture and industries, the expansion of their trade, the improvement of their transportation and communications facilities and the raising of the living standards of their peoples, (6) to promote Southeast Asian studies, and (7) to maintain close and beneficial cooperation with existing international and regional organisations with similar aims and purposes, and explore all avenues for even closer cooperation among themselves (Association of Southeast Asian Nations, 2009).

This study focuses mainly on the stock exchanges of five countries in ASEAN, (referred to as ASEAN-5); that is, Indonesia, Malaysia, the Philippines, Singapore, and Thailand, the five founder members of ASEAN. Appendix 1 and Appendix 2 illustrate the basic indicators and economic statistics respectively of all the countries in ASEAN in 2008. In 2008, the land area of ASEAN-5 covered 67 % of the ASEAN land area and its population was 71.65% of the ASEAN population. Their national currencies are the Indonesian Rupiah (Rp), the Malaysian Ringgit (RM), the Philippines Peso (PhP), the Singapore Dollar (S $) and the Thai Baht. ASEAN-5 has a GDP growth of 3.6% while ASEAN has a GDP growth of 4.4%.

In this chapter, some themes related to Southeast Asian markets are illustrated in order to provide a framework that will facilitate the understanding of this thesis' observations; these are essential to the analysis and interpretation of this study. The remainder of this chapter is presented as follows. Section 2.2 of this chapter provides a brief history and describes the characteristics of local stock exchanges. Section 2.3 reviews the legal and accounting regulations environment. Section 2.4 discusses the effects of the 1997 East Asian Financial Crisis on the economy of ASEAN-5.

2.2 The Southeast Asian Exchanges

This section gives an overview of the history and characteristics of the ASEAN-5 stock markets, the five founder members of ASEAN. The countries that joined ASEAN later are excluded from this study since their stock markets are relatively new. A summary of the characteristics of ASEAN-5 stock exchanges is presented in Appendix 3.

2.2.1 Indonesia

Currently, the formal stock market of Indonesia is the Indonesian Stock Exchange (IDX), which was formed from a merger between the Jakarta Stock Exchange (JSX) and the Surabaya Stock Exchange (SSX). The Jakarta Stock Exchange (JSX) was founded in 1912 during the Dutch colonial era. During that period, the JSX was closed several times for various reasons, such as World War I and World War II and the transition of power from the Dutch government to the Indonesian government. In 1977, the JSX was reopened as a financial institution under the management of the newly created Capital Market Executive Agency (Badan Pelanksana Pasar Model or Bapepam), an institution answering to the Ministry of Finance. Since then, trading activity and market capitalization have increased along with the development of Indonesia's financial markets and private sector.

In 1992, the exchange was privatized under the ownership of Jakarta Stock Exchange, Inc. As a result of this privatization, Bapepam was managed by the Capital Market Supervisory Agency. In 1995, the Jakarta Automated Trading System (JATS) was launched. The JATS is the computerized system that replaced the manual trading system. The Surabaya Stock Exchange (SSX) was established in 1989 and was managed by Surabaya Stock Exchange Inc. However, in 2007 the Surabaya Stock Exchange was merged with the Jakarta Stock Exchange and changed its name to the Indonesia Stock Exchange. The current headquarters of the Indonesia Stock Exchange are located at Jakarta, Indonesia (Indonesia Stock Exchange, 2007). As of 31 December 2008, the Indonesia Stock Exchange had 396 listed companies with an aggregated market capitalization of 99 billion US dollars (World Federation of Exchanges, 2008).

Listed stocks in the Indonesia Stock Exchange are classified into two listing boards: the Main Board and the Development Board. The Main Board is intended for listing large companies with established track records, while the Development Board is intended for companies that have not yet fulfilled the listing requirements of the Main Board, including prospective companies that have not produced any profits and companies that are in a state of reorganization (Indonesia Stock Exchange, 2007). According to the DATASTREAM database, Indonesian stocks are divided into nine sectors: (1) Agriculture, (2) Basic Industry, (3) Construction & Property, (4) Consumer Goods, (5) Manufacturing, (6) Mining, (7) Miscellaneous Industry, (8) Trading & Service, and (9) Utility Infrastructure.

2.2.2 Malaysia

The history of formal securities business organisations in Malaysia began after the establishment of the Singapore Stockbrokers' Association in 1930. Seven years later, it was re-registered as the Malayan Stockbrokers' Association; however, it did not trade public shares. In 1964, the Stock Exchange of Malaysia was officially established and a year later it became known as the Stock Exchange of Malaysia and Singapore following the secession of Singapore from Malaysia. In 1973, as the result of currency interchangeability between Malaysia and Singapore ceasing, the Stock Exchange of Malaysia was divided into the Kuala Lumpur Stock Exchange and the Stock Exchange of Singapore. In 2004, the Kuala Lumpur Stock Exchange changed its name to Bursa Malaysia (Bursa Malaysia, 2009). As of 31 December 2008, the Malaysia Stock Exchange had 976 listed companies with an aggregated market capitalization of 189 billion US dollars (World Federation of Exchanges, 2008).

Bursa Malaysia provides two dynamic markets for listed stock. First, the Main Market provides an ideal platform for established companies to raise funds. Second, the Access, Certainty, and Efficiency (ACE) Market is an alternative sponsor-driven market design for companies of in business sectors looking for a conductive growth platform. In other words, the Main Market is for established companies, while the aim of the ACE Market is to provide emerging companies with early access to the capital market. Listed stocks in Bursa Malaysia are divided into nine sectors: (1) Construction, (2) Consumer Products, (3) Finance, (4) Industrial Products, (5) Mining, (6) Plantations, (7) Property, (8) Technology, and (9) Trading and Services. (Bursa Malaysia, 2009)

2.2.3 Philippines

There are two main stock exchanges in the Philippines: the Philippine Stock Exchange (PSE) and the Philippine Dealing and Exchange Corp. (PDEx). The PSE is a merger between two former markets, namely the Manila Stock Exchange (MSE) and the Makati Stock Exchange (MkSE). The MSE was the first stock exchange market in the Philippines and was established in 1927. Originally, the MSE was located in Manila and moved to Pasig City in 1992, while the MkSE, based in Makati City, is the second stock exchange market and was founded in 1963. After almost three decades, in 1992, the MSE and MkSE were combined to form the PSE. Currently, the PSE maintains two trading floors, which are in Pasig City and Makati City. With two trading floors, the PSE maintains a 'one-price, one-market' exchange through the MakTrad System.

Companies are listed in the PSE on the First Board, Second Board or the Small and Medium Enterprises Board. Listed companies in the PSE are classified into six sectors:

(1) Financial, (2) Industrial, (3) Holding Firms, (4) Property, (5) Services, and (6) Mining and Oil (Philippines Stock Exchange, 2001). As of 31 December 2008, the PSE had 246 listed companies with an aggregated market capitalization of 52 billion US dollars (World Federation of Exchanges, 2008).

Another major exchange in the Philippines is PDEx. It was founded in 2005 in order to meet the best international standards. As a result, PDEx is an exchange that acts under the provisions of the Securities Regulation Code (SRC) and is licensed by the Securities and Exchange Commission (SEC). In 2006, PDEx was formally recognized by SEC as a Self-Regulatory Organisation (SRO) in the Inter-Dealer Market. A year later, the SRO of PDEx covered the Inter-Professional Market, and in 2008 it was expanded to cover members of PDEx in all markets within the PDEx Trading Systems. Under the Securities Regulation Code (Republic Act No. 8799), an SRO is forced to comply with the provisions of the Code and its rules and regulations, and mandated to make and enforce its own rules. Hence, this should enforce fair, ethical and efficient practices in the securities industry (Philippines Stock Exchange, 2001).

2.2.4 Singapore

The Singapore Exchange (SGX) has been the main stock exchange in Singapore since 1999, following the merger of two financial institutions, namely the Stock Exchange of Singapore (SES) and the Singapore International Monetary Exchange (SIMEX). The Stock Exchange of Singapore was established in 1973 after the termination of the currency interchange between Malaysia and Singapore. As a result, the Stock Exchange of Malaysia and Singapore (SEMS) was divided into the SES and the Kuala Lumpur Stock Exchange.

On the other hand, the SIMEX was a futures exchange that was established in 1984. Hence, the Singapore Exchange is the first demutualised and integrated securities and derivatives exchange in the Asia Pacific region (SIAS, 2008). As of 31 December 2008, the Singapore exchange had 767 listed companies with a combined market capitalization of 265 billion US dollars (World Federation of Exchanges, 2008). Stocks listing in the Singapore Exchange are sorted into 13 sectors: (1) Multi-Industry, (2) Manufacturing, (3) Construction, (4) Commerce, (5) Loans and Debentures, (6) Hotel and Restaurants, (7) Transport, Storage, and Communications, (8) Finance, (9) Properties, (10) Services, (11) Agriculture, (12) Mining, and (13) Electricity, Gas, and Water.

2.2.5 Thailand

The modern Thai capital market began in 1962 with the founding of the Bangkok Stock Exchange (BSE), which was privately owned. However, the BSE was unsuccessful. Its turnover value and trading values decreased continually until it finally ceased operations in the early 1970s. The general reasons for BSE's failure were a lack of official government support and limited investor understanding of the equity market. In spite of the failure of the BSE, the government continued to consider establishing a securities market with appropriate facilities and procedures for securities trading. Following a 1975 study on the development channel of the Thai capital market by the former Chief Economist at the United States Securities and Exchange Commission, Professor Sidney M. Robbins from Columbia University, the Securities Exchange of Thailand was officially founded. Then, in 1991, its name was formally changed to the Stock Exchange of Thailand (SET) (Stock Exchange of Thailand, 2009).

There are eight industrial groups in SET: (1) Agro and Food Industry, (2) Consumer Products, (3) Financials, (4) Industrials, (5) Property and Construction, (6) Resources, (7) Service, and (8) Technology. As of 31 December 2008, the Stock Exchange of Thailand had 525 listed companies with a combined market capitalization of 103 billion US dollars (World Federation of Exchanges, 2008). Another stock exchange in Thailand, the Market for Alternative Investment (MAI) was officially established in 1999 by the Stock Exchange of Thailand. In principle, the Market for Alternative Investment was founded to list the securities of small and medium-sized enterprises (SMEs).

2.2.6 The Southeast Asian index series

The FTSE/ASEAN index series is designed especially to represent the performance of ASEAN markets, major emerging players in the global markets. Stocks are selected and weighted by market capitalisation from five Southeast Asian financial markets, namely Indonesia, Malaysia, the Philippines, Singapore and Thailand. These indices have been produced to give investors access to the ASEAN markets.

Two indices have been created: (1) the FTSE/ASEAN represents companies from the ASEAN region and has 180 constituents, and (2) the FTSE/ASEAN 40 represents the performance of the largest companies in the ASEAN region's markets. It consists of the 40 largest companies by full market capitalisation from the eligible markets. The FTSE/ASEAN 40 is suitable for Exchange Traded Funds (ETFs), derivatives and other tradable products.

Harvell et al. (2006) explained that the FTSE/ASEAN Index series has prominent features. First, it provides exposure to five Southeast Asian countries with coverage of

up to 180 stocks and ensures their tradability by screening their liquidity. The calculation of the FTSE/ASEAN Index is based on the Industry Classification Benchmark (ICB), and the free-float calculation method ensures that only the investable opportunities set is included in the indices. Second, it is governed and maintained by an independent committee of leading market professionals. This confirms its transparent and freely available index rules. The ASEAN-5 countries' weighting in FTSE/ASEAN and FTSE/ ASEAN 40 are illustrated in Appendix 4.

2.3 Financial reporting, security regulations and accounting standards in ASEAN-5

Craig and Diga (1996) pointed out that in terms of their overall objective and institutional structure, the financial reporting regulations in ASEAN have clearly focused on the use of financial reports for making decisions concerning an individual enterprise, rather than for decisions regarding an industry or national economy. This approach is consistent with the regulations in the United Kingdom, the United States, Australia and Canada. Furthermore, Craig and Diga's (1996) study showed that Indonesia, Malaysia, the Philippines and Thailand have opted for a United States-style regulation of their security markets, while Singapore alone has opted for a centralized approach to securities market regulation. They argued that the worldwide prominence of the United States securities markets has probably been the essential factor governing this choice.

Saudagaran and Diga (2000) and Ball et al. (2003) found that each country in Southeast Asia developed its domestic accounting standards against a global benchmark, either the International Accounting Standard Committee (IASC) or the

United States standards. Indonesia, Malaysia, Singapore and Thailand have professionally-based accounting standards that incorporate a large proportion of the International Accounting Standard Committee's (IASC) standards. After the IASC's formation in 1973, Malaysia and Singapore were the two earliest countries in ASEAN to adopt IASC standards. In Malaysia, most International Accounting Standards (IAS) are adopted as Approved Accounting Standards, while in Singapore, adopted IAS are referred to as Singapore Accounting Standards (SAS). In September 1994, Indonesia adopted 21 International Accounting Standards (IAS), which were renamed Indonesian Financial Accounting Standards, and made them mandatory for all publicly listed companies. In the 1980s, Thailand gradually began to adopt the IAS issued by the IASC. Currently, 17 of the 23 Thai accounting standards are based on the IAS.

Contrary to other countries in ASEAN-5, the Philippines have a mixed government-private sector body which draws its standards from the United States, instead of the adopting IASC standards. Therefore, the five countries can be divided into two groups composed of those that have adopted IAS (Indonesia, Malaysia, Singapore and Thailand) and the only non-adopter (the Philippines). Saudagaran and Diga (2000) pointed out that in adopting countries the professional accounting bodies have leadership roles in determining the details of accounting standards. Consequently, the national professional bodies in those countries can concentrate on gaining acceptance for IAS as a basis for national standards. In contrast, the accounting standard-setting in the Philippines is not exclusively in the hands of the accounting profession. Rather, it includes representatives from various government groups. Regarding the colonial and economic ties of the Philippines with the United States, the Philippines depends on the United States Generally Accepted Accounting Principles (GAAP) as the model for its accounting standards.

2.4 The economic effects of the 1997 East Asian Financial Crisis

East Asia enjoyed an average real GDP growth per person of 4.6 a year from 1960 to the mid-1990s (Collins and Bosworth, 1996). After this, East Asia began to experience difficulties on 2 July1997 when the Bank of Thailand devaluated the baht. Since Thailand had a very large current account deficit, a growing foreign debt, and a governmental budget shortfall, the traders decided that the country's currency was overvalued in relation to the country's financial situation (Baig and Goldfajn, 1999). To stop the baht from depreciating, the Thai government had to let the baht trade freely, instead of it being linked to the United States dollar. In August 1997, as the baht was falling, the currencies of three of Thailand's neighbours, the Indonesian rupiah, Malaysian ringgit and Philippines peso, were devalued substantially by their governments to stop these currencies from falling. During October 1997, the currency of Singapore came under intense pressure with a depreciation of 9.15 percent in spite of its strong economic base including a huge foreign exchange and fiscal reserves, and a solid financial sector (Jin, 2000). The rates of depreciation in each currency between June and October 1997 are presented in Appendix 5.

2.4.1 Indonesia

Hamann (1999) stated that prior to July 1997 the Indonesian economy was strong, since the nation had good macroeconomic indicators; however, a large number of Indonesian companies borrowed in US dollars due to the strength of the Indonesian rupiah against the US dollar. Furthermore, the effective levels of debt and financing costs had decreased as the local currency's value increased. After the Thai baht was floated in July 1997, the Indonesian rupiah came under pressure. The country's

currency suddenly depreciated in August 1997 (see Appendix 7). As a result, companies that had borrowed in dollars had to face higher costs, and many companies reacted by buying dollars through selling rupiah (Lane and Schulze-Ghattas, 1999).

Later, the rupiah was free-floated; however, its value dropped continually. At the end of 1997, the rupiah dropped dramatically to a value of 70 percent in comparison with the previous year (see Appendix 12) and the Jakarta stock market also decreased to around 400 from around 637 at the end of 1996 (see Appendix 9). In early November 1997, Indonesia received a loan from the International Monetary Fund (IMF) with support from the World Bank and the Asian Development Bank. However, the effects of the financial and economic crisis were severe. The Indonesian economy reached its lowest point in 1998 when its real GDP decreased by 13.13 percent (see Appendix 10). Inflation reached 58.2 percent in 1998 (see Appendix 11) and the rupiah depreciated by almost 100 percent in 1998 (see Appendix 12). The Indonesian economy recovered in the last quarter of 1999 as inflation was brought to pre-crisis levels at 6 percent in the last quarter of 1999 (see Appendix 8). The GDP grew by 5.35 percent in 2000 (see Appendix 10) relative to the same period in the previous year.

2.4.2 Malaysia

Before the crisis, Malaysian macroeconomic conditions were stronger than those of other countries in the region. In particular, the nation had a high Kuala Lumpur Composite Index (see Appendix 9). Its banking system and corporate sector were healthier than those of the other crisis-affected countries (Lindgren et al., 1999). In July 1997, after the Thai baht devaluation, the Malaysian ringgit also sank. By the end of 1997, the Malaysian ringgit had dropped by almost 40 percent and the KLSE had

also lost more than 50 percent, dropping from above 1,200 to below 600 points (see Appendix 9 and Appendix 13).

Lindgren et al. (1999) stated that after refusing the aid offered from the International Monetary Fund (IMF), the Malaysia government responded with a tightening of monetary and fiscal conditions, an emphasis on structural reforms, particularly in financial sector regulations, and the supervision of intermediation. In September 1998, the country imposed capital controls; the Malaysian Ringgit was pegged at 3.80 to a US dollar. The controls were relaxed in September 1999. In 1999, the GDP grew by 6.14 percent, whereas in the previous year it had suffered a sharp 7.36 percent contraction (see Appendix 10). Inflation decreased to 4.1 percent in 1999 (see Appendix 11). The fixed exchange rate system was abandoned in July 2005 in favour of a managed floating system.

2.4.3 The Philippines

Unlike other countries in ASEAN-5, in the late-1980s and early-1990s the Philippines had been on an IMF-supported programme of macroeconomic adjustment and structural reforms. However, in 1997, after Thailand started the crisis, the PSE Composite Index, the main index of the Philippine Stock Exchange, fell to less than 1,900 points from a high of more than 3,000 points in 1996 (see Appendix 9). In 1997, the Philippines peso dropped and was trading at about 35 pesos per US dollar in comparison with the 26 pesos per US dollar at the start of the crisis (see Appendix 6). The Philippines government dealt with the East Asian Financial Crisis by floating the peso, tightening monetary policy and strengthening the banking system (IMF, 2000). It eventually relaxed its fiscal and monetary policies as stabilization took hold in the

middle of 1998. Recovery was good with a real GDP growth of 3.4 percent in 1999 (see Appendix 10). The PSE Composite Index grew to more than 2000 points (see Appendix 9).

2.4.4 Singapore

Before the crisis, Singapore had a strong fundamental economy with a GDP growth range of 7 to 11 percent (see Appendix 10), and a reasonably low inflation rate of between 2 and 4 percent (see Appendix 11). However, the Singapore dollar was not saved from the financial effects of the crisis. From a high of 1.49 Singapore dollars per US dollar before the floatation of the Thai baht, the Singapore dollar went down to 1.68 Singapore dollars per US dollar in the first quarter of 1998, a decline of 12.75 percent over the six-month period (see Appendix 7). Nevertheless, this was smaller than the depreciation rate of other currencies in the same region. As a result, the Singapore exchange rate was relatively stable both before and during 1997.

After experiencing very strong growth in 1997, Singapore's macroeconomy slowed down due to the effects of the East Asian Financial Crisis in 1998 and its regional exposure. Singapore's GDP growth declined significantly from a positive 8.34 percent in 1997 to a negative 1.38 percent in1998 (see Appendix 10). The stock market in Singapore was badly hit by the crisis. The Straits Times Index (ST Index) declined drastically to nearly 790 points in 1998 from more than 1200 points in 1996 (see Appendix 9). The Singapore economy recovered strongly in 1999. For the whole of 1999, the nation earned a 7.2 percent GDP growth (see Appendix 10) and the ST index increased to nearly 100 percent (see Appendix 13). Singapore's V-shaped recovery can be attributed to two main factors: one was the strong growth in global electronics,

which absorbed approximately two thirds of Singapore's domestic exports; the other was the quick turnaround in the regional economies (Jin, 2000).

2.4.5 Thailand

Before 1997, Thailand had a high GDP growth rate of between 6 and 9 percent (see Appendix 10) and inflation was reasonably low, ranging from 5 to 6 percent (see Appendix 11). The Thai baht was pegged at 25 to the US dollar. In May 1997, the nation's currency was hit by massive speculative attacks and the markets lost confidence in the economy. The Thai government was eventually forced to float the Thai baht on 2 July 1997. The baht devalued quickly and lost more than half of its value, going from around 25 to only 40 baht to the US dollar at the end of 1997. As a result, over the whole of 1997, the Thai stock market dropped by more than 50 percent (see Appendix 12).

On August 1997, the International Monetary Fund (IMF) approved a 17.2 billion US dollars rescue package for Thailand. The package focused on the adapted a monetary policy of floating the baht, the restructuring and reorganizing of distressed financial institutions, including the closure of 56 bankrupt finance companies, and the establishment of regulatory frameworks for banks and other financial institutions (IMF, 2000). The Thai economy recovered in late 1998 with the appreciation of the Thai baht from 41 baht to the US dollar in the third quarter of 1998 to nearly 37 baht per US dollar (see Appendix 7). GDP growth reached over 4 percent in 1999 (see Appendix 10). The inflation rate decreased to lower than 5 percent (see Appendix 11). With output recovering and reserves restored to comfortable levels, the authorities

treated the IMF loan as precautionary and made no further drawings after September 1999. The stand-by arrangement expired on 19 June 2000.

A time summary covering the financial crisis period in ASEAN-5 is presented in Figure 2-1 below.

Figure 2-1: The time period of the financial crisis in ASEAN-5

<table>
<tr><td>Country</td><td>Indonesia</td><td>Malaysia</td><td>Philippines</td><td>Singapore</td><td>Thailand</td></tr>
<tr><td>Jan-96</td><td rowspan="2">Pre-crisis</td><td rowspan="2">Pre-crisis</td><td rowspan="2">Pre-crisis</td><td rowspan="3">Pre-crisis</td><td rowspan="2">Pre-crisis</td></tr>
<tr><td>Jun-96</td></tr>
<tr><td>Jul-97</td><td rowspan="5">Crisis</td><td rowspan="3">Crisis</td><td rowspan="5">Crisis</td><td rowspan="3">Crisis</td></tr>
<tr><td>Dec-97</td></tr>
<tr><td>Jan-98</td></tr>
<tr><td>Sep-99</td><td rowspan="3">Post-crisis</td><td rowspan="3">Post-crisis</td></tr>
<tr><td>Oct-99</td></tr>
<tr><td>Dec-99</td></tr>
<tr><td>Jan-00</td><td rowspan="2">Post-crisis</td><td rowspan="2">Post-crisis</td><td rowspan="2">Post-crisis</td><td rowspan="2">Post-crisis</td></tr>
<tr><td>Dec-07</td></tr>
</table>

2.5 Summary of ASEAN overview

The history and basic economic indicators of the Association of Southeast Nations (ASEAN) were introduced in this chapter to provide an understanding of the region and to compare the capabilities of ASEAN-5 with other countries in the same region. Additionally, the overview of the history, the key characteristics, and the accounting standards and security regulations of ASEAN-5 stock markets were explored to provide a framework for the study and a background for the interpretation of the results.

Furthermore, this chapter reviewed the effect of the 1997 East Asian Financial Crisis on five markets in Southeast Asia. The macroeconomy of ASEAN-5 had been strong

for more than 30 years up until July 1997, when the Thai baht was devaluated by the government to protect it from depreciation. Then, the ASEAN-5 countries started to experience financial difficulties. The review of the effect of the 1997 East Asian Financial Crisis on ASEAN-5 provides the time period for the economic state-based analysis in this study. The next chapter provides a discussion of the literature relating to the relationship among bankruptcy risk, liquidity and equity returns.

Chapter 3

LITERATURE REVIEW

3.1 Introduction

This chapter presents a review of the literature related to the relationship among bankruptcy risk, liquidity and equity returns. The literature review provides the theoretical and empirical foundations for the creation of a methodology and the discussion of results in the later chapters of the thesis.

First, the theoretical and empirical literature of asset pricing models is reviewed to gain an understanding of the previous methodologies used in the pricing of returns. Then, the empirical evidence on the relationship between bankruptcy risk and returns and the empirical evidence on the relationship between liquidity and returns are discussed in order to highlight gaps in the research related to the ability of bankruptcy risk and liquidity to explain equity returns. Subsequently, reviews of both theoretical and empirical evidence regarding liquidity determinants are provided to aid understating on the ability of factors including bankruptcy risk to explain liquidity. Later, the literature on bankruptcy risk measurement is presented to provide knowledge background relating to the methodology used for bankruptcy risk measurement in this study. Finally, a summary of the literature review is given.

3.2 Asset pricing literature

Financial literature on asset pricing models has been examined enormously for more than forty years. Several models have been introduced in order to explain investor's

perception of risk and return trading-off by providing specific variables to predict equity returns. To provide the conceptual framework of asset pricing, this section is divided into two parts. In Section 3.2.1 the theoretical literature on asset pricing is presented then the empirical literature on asset pricing is further discussed in Section 3.2.2.

3.2.1 Theoretical literature on asset pricing

The literature on asset pricing models began with the theoretical article of Markowitz (1952), which provided the process of portfolio selection. Markowitz assumed that investors are risk averse, or prefer stocks with lower risk. Investors will accept a higher risk only when they receive higher returns which compensate for the higher risk. The risk and returns trade-off varies according to investor's aversion to risk. Markowitz suggests the identification of the efficiency set of portfolios, also called the efficiency frontier of optimal investment. Mathematically, the efficient frontier is the intersection of the set of portfolios with minimum variance (risk) and the set of portfolios with maximum returns. In other words, the efficient frontier provides the highest possible expected return, while at the same time giving the lowest level of risk for each level of expected returns. Markowitz showed that investors choose their personal portfolios along the efficient frontier depending on their individual attitudes towards risk.

Tobin (1958) expanded Markowitz's analysis by showing how to identify which efficient portfolio should be held by each individual investor. He explained how an investor should divide his or her funds between a high liquid (low risk) asset such as cash or treasury bills and a low liquid (risky) asset such as a bond or equity portfolio by proposing a framework of asset allocation known as the Separation Theorem, as a

basis for identifying an efficient portfolio. Tobin's separation theorem proposes that the allocation to a low risk asset (cash or treasury bills) should reflect the degree of risk aversion or risk tolerance of the investor; however the optimal portfolio of risky assets should be independent of the risk preferences of the investors.

Hicks (1962) provided a theorem similar to Tobin's separation theorem. However, Hicks' model is more precise about the formulation of risk by mentioning standard deviation as a measure of certainty and the mean of portfolio. The difference between the Hicks and Tobin models is that Hicks presented a general formula for portfolio variance, written in terms of correlations rather than covariance. Hicks derived the Tobin conclusion that, among portfolios which include cash, there is a linear relationship between portfolio mean and standard deviation, and that the proportions among risky assets remain constant among this linear portion of the efficient frontier.

Sharpe (1963) extends Markowitz's (1952) work on the portfolio selection process. He presents a simplified model of the relationship among securities. He provides the diagonal model, which states that the return from any security is linearly related to a single index level. The index may be the level of the stock market as a whole, the Gross National Product, some price index or any other factor. His results suggest that the diagonal model may be able to represent the relationship among securities and the value of portfolio analyses. Thus, the diagonal model is useful for an initial determination of an efficient set of Markowitz (1952).

Sharpe (1964) showed that efficient sets of portfolios may be described as a weighted combination of two basic portfolios, with different weights being used to generate the different portfolios in the efficiency set. Sharpe also determined the relationship

between the prices of assets and their risk attributes by using the theory of portfolio selection. He reported that there is a linear relationship between the excess returns (expected returns minus the risk-free rate) of a security and its beta (regression against market returns).

Sharpe (1964) developed a theoretical equilibrium model of market prices called the Capital Asset Pricing model (CAPM). Asset pricing models categorise risk factors into two types as (1) systematic risk factors or non diversifiable risk factors and (2) unsystematic risk factors or diversifiable risk factors. Investors cannot eliminate systematic risk, no matter what they do, but they can eliminate unsystematic risk via diversification. The CAPM has only a systematic risk, or a market risk factor, as measured by a stock's beta. A stock's beta is the slope of the stock's returns regressed against the market's returns. Later, Sharp's work was extended to more complex factor models of asset pricing and relaxed the strong assumptions that underpin the original CAPM.

Lintner (1965) showed that a number of relations can be derived when there is no riskless asset. His model can be interpreted, in a case where all investors agree on the joint distribution of end-of-period values for all assets, as saying that even when there is no riskless asset, every investor holds a linear combination of two basic portfolios, and the prices of assets in equilibrium are related in a relatively simple way even without a riskless asset.

Fama (1965a) defined the efficient market to explain the theory of random walks in stock market pricing. He showed that, in the efficient market, at any given time the actual price of a security will be a good estimate of its intrinsic value. When prices

follow a random walk the only relevant information in the series of present and past prices, for the trader, is the most recent price. Thus, the people involved in the market have already made perfect use of the information in past prices. Suppose prices are available very frequently. Then, if only the latest price is relevant it follows that those prices very quickly reflect the information in the historical record of prices. A market will be called perfectly efficient if the price fully reflects available information, so that prices adjust fully and instantaneously when new information becomes available. Then, stock price changes are random and unpredictable and past stock price cannot be used to predict the future price of stocks.

Fama (1965b) developed the capital asset pricing model, extended from the Markowitz-Sharp diagonal model. Fama removed the assumption of normal distributions. The hypothesis is then that price changes are independent and have identical distributions. Whether or not stock prices fit the normal distribution or some other distribution is an important issue. Two stocks may have the same expected returns (means of past returns) but the probability of large or small price changes may be different depending on the probability distribution the stock price follows. Fama applied several statistical tests and concluded that the alternative of Paretian distribution fit the data better than the normal distribution.

Mossin (1966) clarified Sharpe's (1964) CAPM by providing a more precise specification of equilibrium conditions. His CAPM model noted that the assumption of identical perceptions among agents about the probability distributions of the yields of risky assets is not crucial, and also the specification of quadratic utility functions is unnecessary.

Fama (1968) showed that Sharpe's (1964) capital asset pricing model is completely consistent with Lintner (1965). In particular, the two models are based on the same assumptions. Thus, it seems unlikely that the implications of the two models for the measurement of risk and the relationship between risk and returns can be different. He reported that the conflict which Sharpe and Lintner found in their results was from a misinterpretation of the implications of the Sharpe model.

The most frequently cited modification of the Sharpe-Lintner CAPM is the work of Black (1972). Black (1972) examined how the original CAPM would change if there was no risk-free asset in which the investor could borrow and lend. Black's model is known as the zero-beta CAPM. He demonstrated that the expected return on any risky asset is a linear function of its beta, just as it is without any restrictions or borrowing. Additionally, a model in which borrowing is restricted is consistent with the empirical findings reported by Black et al. (1972).

Although some researchers argued with the original CAPM and relaxed its assumptions, Lintner and Sharpe (1972) emphasised that the assumption of perfect competition is crucial for the theory of asset pricing models in stock markets. The assumptions of CAPM imply a linear relationship between excess returns and the beta of a security, defined as its regression against the returns on the market portfolio. This was interpreted as the investor being paid to bear risk. Subsequently, the capital asset pricing model (CAPM) was the model of investors' return expectations that was to remain dominant as a research paradigm.

3.2.2 Empirical literature on asset pricing

Following the development of the theory in the early 1960s, empirical analysis of the CAPM has been conducted to validate the model. One of the earliest empirical studies of the CAPM is that of Black et al. (1972). Using monthly return data and portfolios rather than individual stocks, Black et al. found supportive evidence for the CAPM that the relationship between mean excess returns and beta was linear, and portfolios with high (low) betas have high (low) average returns. However, they also found that the intercept and the slope of the cross-sectional relation varied with different sub-periods and were not consistent with the traditional form of the capital asset pricing model.

Furthermore, Fama and MacBeth (1973) provided empirical results on the CAPM by using data from the New York Stock Exchange (NYSE) during the period January 1962 to June 1968. They found that the average returns on the NYSE common stocks were positively related to their risk. Fama and MacBeth (1973) conducted a two-pass methodology for testing the CAPM. At the first pass they ran a time series regression of portfolio returns on the market returns, which gave estimates of portfolio betas. To gain maximum efficiency, the portfolios were pre-sorted into various groups based on their beta. At the second pass, they performed cross-sectional regressions on a month-by-month basis and then took the time-series average of the estimated risk premium. This, it turned out, allowed them to test directly from the validity of the zero-beta CAPM. Noticeably, their methodology is one of the most frequently used methodologies in later literature related to the relationship between risk and returns.

Nevertheless, some of the empirical analysis found anomalies in the CAPM. Roll (1977) showed that the Sharpe-Lintner CAPM and the Black CAPM are likely to show

a type II error, i.e., they are likely to be rejected when they are true. He argued that the early tests were not much evidence for the validity of the CAPM model because the proxies used for the market portfolio did not come close to the portfolio of invested wealth called for by the model. The market index must include bonds, property, foreign assets, human capital and anything else, tangible or intangible, which adds to the wealth of mankind. Thus the efficiency or inefficiency of the proxy does not imply anything about the efficiency of the true market portfolio.

Ross (1976) provides a multi-factor model, namely the arbitrage pricing theory (APT). He showed that there is not just one, but many, measures of systematic risk that explain returns. Each measure captures the sensitivity of the asset to the corresponding pervasive factor. After the work of Ross (1976) and Roll (1977), a large number of empirical studies began to identify variables other than market beta to explain the cross-section of expected returns. The factors include firm size and the book-to-market equity ratio.

3.2.2.1 Size and book-to-market equity ratio and returns

A large number of studies have examined the relationship between excess returns and firm characteristics. It has been found that a number of firm variables, such as size and book to market equity value are related to excess returns. The size effect was the first of the firm variables to be shown to be related to excess returns. The relationship between size and stock returns has been analysed since the 1980s. One of the earliest firm size effect studies is that by Banz (1981), who tested the CAPM by checking whether the size of a firm can explain the average asset returns that remain unexplained by the CAPM's beta. He showed that the size of the firm and the returns

on its common stock are inversely related, and concluded that the average returns on the stocks of small firms were higher than the average returns on the stocks of large firms. This finding has become known as the size effect.

The relationship between the book value to market value ratio and returns has been examined in a number of studies. For instance, Fama and French (1992), in examining portfolio formed on the basis of book-to-market equity ratio over the 1963 to 1990 period, found that higher values of this ratio are associated with higher average returns. Since growth stocks tend to have low book-to-market equity ratios, and value stocks tend to have high book-to-market equity ratio, the findings suggest that value stocks outperformed growth stocks over the period studied.

The idea of the CAPM has been challenged by Fama and French (1992). They reported on the role of size and book-to-market equity ratio in the cross-section of expected stock returns, and showed that the cross section of average stock returns is not fully explained by the CAPM beta and that stock risks are multidimensional. Notably, they found that the three factors that explain 95 percent of the variability of stock market returns are market risk, firm size and the book-to-market equity ratio. Their empirical evidence also supported the claim that size and book-to-market equity ratios are negatively and positively related to expected returns respectively.

In a subsequent study, Fama and French (1993, 1995, 1996, 1998) increased the validity of the original three-factor model in their previous study. Fama and French (1993) argued that it should be implemented in place of the CAPM. They provided evidence that a three-factor model based on factors formed on the size (SMB) and book-to-market equity ratio (HML), and the market explains average returns, and

argued that these characteristics compensate for distress risk. This argument is in line with Chan and Chen (1991) who found that smaller firms are less likely to survive in poor economic conditions since they tend to have high financial leverage and cash-flow problems and to be poor performers.

Fama and French (1995) provided a deeper economic foundation for their three-factor pricing model. They found that size and book-to-market equity ratio are related to profitability. In particular, firms with high book-to-market equity ratio tend to be persistently more distressed than those with low book-to-market equity ratio. They concluded that the better performance of stock with a high book-to-market equity ratio is due to compensation from holding less profitable and riskier stocks.

Fama and French (1996) showed that their three factor model could explain average returns on portfolios sorted by earning yield, cash flow yield, and sale growth. They also concluded that their three factor model could capture many of the CAPM average-return anomalies, except for the continuation of short-term returns.

Subsequently, Fama and French (1998) provided additional out-of-sample evidence from their three factor model. Fama and French (1998) tested their three factor model in 13 different markets over the period 1975 to 1995. They found that value stocks outperformed growth stocks in 12of 13 major markets. They thus suggested that the value premium exists in emerging markets as well as in the United States.

Other researchers also found results consistent with the Fama and French three factor model in other markets, including Southeast Asian markets. For instance, Chui and Wei (1998) tested the ability of the three factor model in five Pacific Basin emerging markets: Hong Kong, Korea, Malaysia, Taiwan and Thailand. They found that in all

these markets the relationship between average stock returns and the market beta is weak. On the other hand, their results confirm the ability of size and book-to-market equity ratio to explain equity returns in emerging markets. The book-to-market equity could explain the cross-sectional variation of expected stock returns in Hong Kong, Korea, and Malaysia, while the size effect was significant in all markets except Taiwan.

Along the same lines, Lau et al. (2002) confirmed the presence of CAPM anomalies in Singapore and Malaysia during the period 1988 to1996. They illustrated that there is a market risk premium during months with positive market excess returns and found the existence of a negative relationship between stock returns and size for both countries. Ding et al. (2005) examined value and growth portfolios in seven East Asian countries, namely, Hong Kong, Indonesia, Japan, Malaysia, Singapore, Taiwan and Thailand, before the 1997 Asian Financial Crisis (July 1976 to June 1997). The value premiums in these countries, except in Indonesia, Taiwan and Thailand, were found to be mainly positive.

Although many empirical studies have shown the significance and validity of the Fama and French (1993) three factor model in international markets including Southeast Asian markets, the model does not perfectly explain equity returns. There is empirical evidence demonstrating that other factors, for instance bankruptcy risk (Vassalou and Xing, 2004) and liquidity (Amihud, 2002; and Liu ,2006), can capture equity returns after controlling for Fama and French's (1993) three factors. A discussion on the relationship between bankruptcy risk, liquidity and returns is presented in the following sections.

3.3 The relationship between bankruptcy risk and returns

Recently, bankruptcy risk has been investigated as the one of factors that could affect equity returns, in order to improve the quality of asset pricing models. Since Ross (1976) and Roll (1977) argued on the CAPM that the beta is not only a variable explaining equity returns, and Fama and French (1993, 1995, 1996) provide evidence that the size and book-to-market effects could be explained by the distress risk of firms, the empirical evidence about the relationship between bankruptcy risk and equity returns has been growing recently. Nevertheless, previous examinations have reported inconsistent findings. The findings can be divided into three groups: positive, negative and non relationships between bankruptcy risk and equity returns. The following discussion of this topic is divided into three sub-sections according to the relationship between bankruptcy risk and returns.

3.3.1 The positive relationship between bankruptcy risk and returns

Some studies have found that bankruptcy risk is a systematic risk; stock with a higher bankruptcy risk provides higher returns. For instance, Lang and Stulz (1992) studied the effect of bankruptcy announcements on the equity value of bankrupt firms' competitors in the United States between January 1970 and December 1989. They showed that the bankruptcy announcement of a firm has a significant effect on reducing the equity value of a bankrupt firm's competitors, and argued that bankruptcy risk could be positively related to systematic risk.

Vassalou and Xing (2004) provide supportive evidence for Lang and Stulz's (1992) view that bankruptcy is a systematic risk. They firstly developed a bankruptcy measure

based on Merton's (1974) option pricing model, to fill the gap in the bankruptcy measurements based on accounting statements which provide a picture of a firm's past performance, rather than its future prospects. Vassalou and Xing examined the effect of bankruptcy on equity returns in United States stocks during the period 1971 to 1999 with portfolio and cross-sectional analyses. They provided significant evidence that bankruptcy risk is another factor that explains equity returns apart from size and book-to-market equity ratio and they argued against the view of Fama and French (1996) that their SMB and HML factors are a proxy for bankruptcy risk.

Later, using the option-based bankruptcy risk measure, Chava and Purnanandam (2010) confirmed a positive relationship between bankruptcy risk and expected stock returns in United States stocks between 1963 and 2005. Their results suggest that investors expected higher returns for bearing bankruptcy risk throughout the sample period. However they were negatively surprised in the 1980s by higher-than-expected bankruptcy filings and lower-than-expected cash flows from high default risk stocks. The cost of capital is employed to estimate returns instead of ex-post realized returns as in previous studies. They contribute to the literature by showing that the risk-return trade-off can change significantly depending on how the expected returns are measured.

3.3.2 The negative relationship between bankruptcy risk and returns

On the other hand, some studies have found that stock with higher bankruptcy risk does not have higher returns nor is it a systematic risk. For instance, Opler and Titman (1994) studied the effect of financial distress on corporate performance in the United States during the period 1972 to 1991. The results showed that highly leveraged firms

lose their market shares to less leveraged competitors in a period of industrial decline. In addition, the stock returns of more leveraged firms in distressed industries are lower than those of less leveraged firms. They implied that bankruptcy risk is not a systematic risk.

Dichev (1998) used two existing bankruptcy prediction models, namely, Altman's (1968) and Ohlson's (1980) models, to investigate whether bankruptcy risk is a systematic risk that is priced in subsequent security returns. The sample of his study consisted of all the industrial firms in the New York Stock Exchange (NYSE), the American Stock Exchange (AMEX), and the over-the-counter market from 1981 to 1995. The main result from the tests was that stocks with higher bankruptcy risk earn returns that are substantially lower than average. The negative relationship observed is inconsistent with a risk-based explanation for default. Dichev provided evidence that the relationship between bankruptcy risk and returns is negative because the market does not fully impound the available financial distress information.

Griffin and Lemmon (2002) examined the relationship between the book-to-market equity ratio, bankruptcy risk and stock returns in the United States markets from July 1965 to June 1996; Ohlson's (1980) model was employed to calculate the probability of bankruptcy. Consistently with Dichev (1998), they showed that bankruptcy risk is not a systematic risk. Their evidence shows a strong negative relationship between bankruptcy risk and equity returns in stocks with low book-to-market equity ratio. Their findings suggested that a negative relationship exist in those companies because firms with high bankruptcy risk have characteristics that make them more likely to be mispriced by investors.

Zaretzky and Zumwalt (2007) investigated the stocks in the NYSE, AMEX, and NASDAQ during the period 1984 to 1995. Altman's (1968) Z- and Ohlson's (1980) O-scores were used to measure bankruptcy risk. Using portfolios analysis, they demonstrated that higher bankruptcy risk firms provide significantly lower returns, and none of the zero-investment strategies earn significant positive returns. Additionally, they showed that firms with high bankruptcy risk have comparatively low book-to-market equity values. They reported that the market is slow to react to declining financial health, so the market value will not be bid down to reflect the true value of the firm. Their view supports the Griffin and Lemmon (2002) mispricing argument.

Garlappi et al. (2008) examined the relationship between bankruptcy probability and stock returns in nonfinancial United States firms between January 1969 and December 2003. Using Moody's KMV market-based bankruptcy measure, they documented that stocks with higher bankruptcy risk are not associated with higher expected stock returns. Their empirical evidence illustrated that a distressed firm with a stronger shareholder advantage should exhibit lower expected returns in the cross section. They defined the shareholder advantage as the combination of shareholders' bargaining power and the efficiency gained through bargaining. Those shareholders with a stronger advantage have high potential in re-negotiations with claim holders in periods of financial difficulty and leading to a lower equity risk. The stock then provides lower returns even though its bankruptcy risk increases.

Employing the United States data for the period January 1963 to December 2003, Campbell et al. (2008) investigated the empirical measurement of firm bankruptcy and the pricing of financially distressed stocks. With an empirical bankruptcy risk measure based on both accounting and equity market variables, they showed that stocks with

higher financial distress risk deliver lower returns than those with lower financial risk. Their findings showed that the negative relationship between bankruptcy risk and equity returns is described by three rationales. First, it is because of the unexpectly strong shift of equity ownership from individuals to institutions during the sample period. Since institutional investors generally prefer to hold profitable stocks with low failure risk, they tend to sell stocks that enter financial distress, thus driving the negative relationship between bankruptcy risk and returns. Second, they reported evidence that investors underestimate that the importance of bankruptcy risk, and the relationship between bankruptcy risk and return is one of the causes of this. Third, it is because of the characteristics of distressed stocks that induce investors to hold them despite their low average returns. Investors who are majority owners hold distressed stock, rather than selling it, because they can extract private benefits; for example, by buying the company's output or assets at bargain prices.

Later, using a sample of the United States markets, Avramov et al. (2009) found that during the period from October 1985 to December 2007 there was a significant negative relationship between bankruptcy risk and returns in Fama and MacBeth's (1973) cross-sectional regressions of monthly individual stock returns on credit rating. Their work contributes to the literature showing that negative credit risk effects are concentrated in the worst-rated stocks around downgrades. They explained that the negative relationship between bankruptcy risk and return is caused by the mispricing regenerated by retail investors and sustained by illiquidity and short sell limitations.

A negative relationship between bankruptcy risk and equity returns is not only found in the United States but also exists in other developed markets outside the United States. For instance, Agarwal and Taffler (2002) used the Taffler (1983, 1984) bankruptcy

prediction model to measure bankruptcy risk and test whether bankruptcy risk is a separately priced risk factor. A sample from the United Kingdom during the period 1979 to 2002 was used in their study, and their findings illustrated that financially distressed stocks earn lower returns than do non-distressed stocks. In contrast to Dichev (1998), who argues for a market mispricing story, they find that bankruptcy risk is, in fact, rationally priced by the market, since it varies over time, with time variation being linked to both the state of the economy and the state of the stock market.

In addition, Gharghori et al. (2009) examined the relationship between bankruptcy risk and equity returns using a cross-sectional regression on individual stocks in the Australian market during the period 1995 to December 2003. Using the option-based model to measure bankruptcy probability, they found that bankruptcy risk is negatively related to returns and suggested that this negative relationship is not due to a leverage, volatility or momentum effect.

Noticeably, all of this evidence (Dichev,1998; Campbell et al., 2008; and Griifin and Lemmon, 2002) contradicts the Fama and French (1993) argument that the book-to-market equity ratio is positively related to expected returns because book-to-market equity ratio captures financial distress. They support the hypothesis that investors under-react to information in the balance sheet about impending distress.

3.3.3 The insignificant relationship between bankruptcy risk and returns

Some studies of the relationship between bankruptcy risk and returns have reported that there is an insignificant relationship between them. Similarly to the negative relationship between bankruptcy risk and equity returns, the insignificant relationship between bankruptcy risk and equity returns indicates that that bankruptcy risk is not a systematic risk. The studies reporting an insignificant relationship between bankruptcy risk and returns are discussed as follows.

Asquith et al. (1994) analyzed the ways in which financially distressed firms try to avoid bankruptcy through public and private debt restructuring, asset sales, mergers, and capital expenditure reductions. Firms that issued high yield bonds in the United States over the period 1976 to 1989 and then became financially distressed were used as their sample. There is no evidence that the better performing companies in their sample are more successful in dealing with financial distress. They are as likely to go bankrupt as are other firms. Therefore, the conclusion of their study was that bankruptcy is an idiosyncratic factor.

Hussain et al. (2001) studied the behaviour of relative financial distress with application to the Capital Asset Pricing Model (CAPM) and the Fama and French (1993) three-factor model using United Kingdom data for the period 1980 to 1999. Their results showed that bankruptcy risk is insignificant in explaining equity returns when it is added into the Fama and French (1993) model. This implies that bankruptcy risk is not a systematic risk factor. They reported that the Fama and French (1993) three factor model already captures bankruptcy risk, and their results are consistent

with the view of Fama and French (1996) that their HML variable is a proxy for relative distress.

Bystrom et al. (2005) examined whether default risk is systematic in 50 Thai companies during the period 1996 to 2003 and applied Merton's (1974) model to measure the probability of bankruptcy. They contributed to the literature by being a first paper to deal with this issue using emerging market data, and they conducted the tests over a time horizon during the East Asian crisis period. Noticeably, instead of augmenting their bankruptcy risk model with the Fama and French three (1993) factor model, they conducted a regression of returns on bankruptcy risk measure with size and book-to-market ratio. In line with Hussain et al. (2001), their results presented the view that bankruptcy risk is an unsystematic risk. However, inconsistently with the view of Fama and French (1996) and Hussain et al. (2001), Bystrom et al. (2005) reported that the book-to-market equity ratio is insignificantly related to bankruptcy risk.

Gharghori et al. (2007) employed data from the Australian market during the period January 1996 to December 2004 to investigate whether default risk is priced in the cross-section of equity returns. They augmented the Capital Asset Pricing Model (CAPM) and the size and book-to-market equity ratio of the Fama and French (1993) model with their new default risk factor, which was developed from Merton's (1974) option-based model. Their results showed that bankruptcy risk is not priced in equity returns. Additionally, they also showed that the Fama and French factors are not proxies for bankruptcy risk, although they can explain returns and this is consistent with the evidence of Bystrom et al. (2005) but inconsistent with the findings of Fama and French (1996) and Hussain et al. (2001).

3.3.4 Gaps in the literature on the relationship between bankruptcy risk and returns

The review of the previous literature on the relationship between bankruptcy risk and returns in the above sections has illustrated that the results on bankruptcy risk and equity returns are inconsistent with the positive, negative and non relationships between them. Some researcher for instance, Vassou and Xing (2004) and Chava and Purnanandam (2010) found that bankruptcy risk is positively related to equity returns. They explained that a positive relationship exists because investors expect higher returns for bearing higher bankruptcy risk. On the other hands, some studies for instance, Dichev (1998), Griffin and Lemmon (2002), Agarwal and Taffler (2002), Garlappi et al. (2008), Campbell et al. (2008), and Avramov et al. (2009), found a negative relationship between bankruptcy risk and equity returns and explained that the mispricing of investors on bankruptcy risk information is a cause of negative relationship. Additionally, some researchers, for instance Hussain et al. (2001), Gharghori et al. (2007), and Bystrom et al. (2005), have reported that bankruptcy risk is insignificantly related to returns since the Fama and French (1993) three factor model already captures bankruptcy risk. It is interesting that not only are there conflicts in the findings but there are also some gaps in those studies.

First, they generally used data from developed markets such as the United States, the United Kingdom and Australia. There is limited evidence that has used the data from emerging markets due to limitations of data collection in these markets. For instance, a study by Bystrom et al. (2005) used Thai data, with a small sample (50 companies). Therefore, empirical evidence relating to this issue in other markets would be beneficial to literature, as Lo and Mackinlay (1990) stated that empirical findings need

to be examined out-of-sample to ensure that any conclusions reached are not product of data snooping.

Second, although there is a first test of alternative horizontal periods depending on economic states in Bystrom et al. (2005), they did not control for market risk, which is generally reported in both theoretical and empirical studies (for instance, Sharpe, 1963, 1964; Lintner, 1965; Black, 1972; and Fama and French, 1992, 1993, 1996) for its ability to explain returns. Additionally, a regression of returns on the Fama and French (1993) factors model augmented with bankruptcy risk during a financial crisis period has not yet been conducted. Therefore, this thesis will contribute to the literature by providing a regression analysis of returns on the Fama and French (1993) factors model, augmented with bankruptcy risk in different economic states, which is based on the East Asian 1997 financial crisis.

Third, there is a lack of empirical evidence from using both bankruptcy risk measures based on accounting reports (e.g., Altman's (1968) Z and Ohlson's (1980) O scores) and market data (e.g., Vassalou and Xing's (2004) DLI) to test the effect of bankruptcy risk on equity pricing in identical samples. The different bankruptcy risk measures might change the relationship between bankruptcy risk and returns. Hence, in this thesis both bankruptcy risk measures based on accounting reports (e.g., Altman's (1968) Z and Ohlson's (1980) O scores) and market data (e.g., Vassalou and Xing's (2004) DLI) will be used in this study to validate the results.

3.4 The relationship between liquidity and returns

Apart from bankruptcy risk, size and the book-to-market equity ratio, liquidity is another variable that has been investigated as an anomaly in the asset pricing. A

discussion of the relationship between liquidity and returns is presented in this section and will be divided into three sub-sections depending on the growth of market-collected research data. First, the relationships between liquidity and equity returns in the United States and other developed markets are discussed in Section 3.4.1 and Section 3.4.2 respectively. Then, a review of the relationship between liquidity and equity returns in emerging markets will be provided in Section 3.4.3.

3.4.1 The relationship between liquidity and equity returns in the United States

There has been increasing interest in the relationship between liquidity and returns since the empirical work of Amihud and Mendelson (1986), who examined the effect of trading costs measured by bid-ask spreads on asset pricing in the United States during the period 1961 to 1980. Stocks with higher trading costs refer to stocks with lower liquidity or higher illiquidity. They found that there is a positive relationship between trading costs (illiquidity) and equity returns, and reported that the illiquidity effect represents a rational response by an efficient market to illiquidity. They reported that in market equilibrium there is a clientele effect; the small investors hold less liquid stocks over longer investment period, which gives a concave relationship between returns and illiquidity. The following empirical studies have investigated the validation of Amihud and Mendelson (1986) results by employing different liquidity measures and data periods.

Brennan and Subrahmanyam (1996) investigated the empirical relationship between monthly stock returns and illiquidity on NYSE stocks for the period 1984 to 1991. The Fama and French (1993) three factor model was used to examine the relationship

between returns and illiquidity as measured by both variable and fixed components of transaction costs. Their findings are mainly consistent with the evidence of Amihud and Mendelson (1986) who found a significant positive (negative) relationship between the required rate of returns and illiquidity (liquidity) after controlling for the Fama and French (1993) factors. However their findings showed that there is no evidence of seasonality in illiquidity effect as reported in Amihud and Mendelson (1986).

Not only trading costs but also trading activities are employed as measures of liquidity in previous studies. Stocks with higher trading activities refer to stocks with higher liquidity. Datar et al. (1998) used turnover rate as an alternative proxy for liquidity. Employing data from the NYSE from 31 July 1962 to 31 December 1991, their empirical evidence suggested that liquidity plays a significant role in explaining cross-sectional variation in stock returns. Stock returns are strongly and negatively related to their turnover rate (liquidity), confirming the idea of Amihud and Mendelson (1986) that low liquidity stocks provide higher than average returns. This effect persists even after controlling for firm size, the book-to-market equity ratio, the firm's beta and the January effect.

By using the ratio of absolute stock returns to its dollar volume as an illiquidity measure, Amihud (2002) examined the relationship between illiquidity and returns in the NYSE in the years 1963 to 1997. His findings showed that, over time, expected market illiquidity has a positive and significant effect on ex ante stock excess return. This supports the cross-sectional positive (negative) relationship between illiquidity (liquidity) and equity returns of Amihud and Mendelson (1986).

Pastor and Stambaugh (2003) investigated the effect of aggregate liquidity on equity returns in NYSE and AMEX stocks during the period 1966 to 1999. The trading costs or daily data of temporary price changes accompanying order flow are used as a proxy for illiquidity. Consistently with the evidence in Amihud and Mendelson (1986), they found that expected stock returns are positively related to stock liquidity beta, the sensitivity of stock returns to market liquidity. Stocks that are more sensitive to market liquidity have substantially higher expected returns even after controlling for size, value and momentum factors. Moreover, they found that smaller stocks are less liquid and the smallest stocks have a high sensitivity to market liquidity.

Acharya and Pedersen (2005) presented a theoretical model and empirical results that helps to explain how asset prices are affected by liquidity risk. Data from the NYSE and AMEX over the period 1963 to 1999 were examined. Employing Amihud's (2002) measure as a proxy for illiquidity, they found that the liquidity-adjusted CAPM explains returns better than the standard CAPM. In addition, they showed that a persistent negative shock to a security's liquidity results in low contemporaneous returns and high predicted future returns.

Liu (2006) used his new empirical liquidity measures based on trading activity, namely, the standardized turnover-adjusted number of zero trading volumes over the prior 12 months, to test the significant of liquidity on the asset pricing of all NYSE, AMEX, and NASDAQ ordinary common stocks during the period January 1960 to December 2003. He found that liquidity is an important source of price risk even after being adjusted for either the CAPM or the Fama and French (1993) three factor model. Indeed, his two-factor (market and liquidity) model not only successfully describes the cross-section of stock returns but also provides evidence supporting a liquidity risk-

based explanation of alternative market anomalies. The size, book-to-market equity, cash flow to price, earnings to price, dividends to price ratios, and long-term contrarian premiums are all explained by the two-factor model.

Korajczyk and Sadka (2008) use an empirical liquidity measure that combines eight liquidity measures based on both trading costs and trading activities, to examine the relationship between liquidity and the equity returns of NYSE and AMEX firms for the period January 1983 to December 1992. Consistently with the evidence from previous literature, they found that with a different liquidity measure there is a negative relationship between liquidity and equity returns in the cross-section. Their results are robust even after controlling for market risk, size, the book-to-market equity ratio and momentum.

On the other hand, Chordia et al. (2001b) reported inconsistent results with the general evidence of previous studies finding a negative (positive) relationship between market liquidity (illiquidity) and returns and positive relationship between sensitivity to liquidity (liquidity beta) and returns in the United States. Chordia et al. (2001b) investigated the relationship between expected equity returns and the variability of liquidity, measured by the second moment of liquidity, on NYSE and AMEX stocks during the period January 1966 to December 1995. Using a trading activity measure, i.e. dollar trading and share turnover, they found a negatively cross-sectional relationship between average stock returns and the second moment of liquidity, after controlling for size, the book-to-market equity ratio, momentum, price, and dividend yield; stocks with a higher variability in liquidity provide lower equity returns.

Results of Chordia et al. (2001b) are contrary to the reasonable hypothesis that the variability of liquidity should be positively related to equity returns. Given that investors are risk-averse and dislike sensitivity in liquidity, stocks with greater liquidity volatility should command higher expected returns. They stated that one potential way of describing their findings concerning the negative relationship between equity returns and the variability of liquidity is the clientele effect hypothesis of Merton (1987), who stated that stocks with heterogeneous investor followings should command lower expected returns.

3.4.2 The relationship between liquidity and equity returns in other developed markets

From the previous section, it appears that empirical studies on the relationship between liquidity and equity returns in the United States have been growing greatly. However, there are some empirical studies on this issue which concentrate on other developed markets. A review and discussion of other developed markets is shown in this section.

Chan and Faff (2003) investigated whether liquidity explained equity pricing in the Australian market during 1990 and 1999. They used the cross-section of equity returns from the Fama and French (1992) factor model augmented by the liquidity factor (turnover). Their methodology is similar to Datar et al. (1998); however, they provided additional analyses, such as incorporating a momentum variable, examining nonlinearities, and testing for both January and July seasonality. They generally found evidence consistent with the main evidence from the United States that turnover (liquidity) is negatively related to stock returns and its importance persists even after controlling for the book-to-market equity ratio, size, stock beta and momentum.

Martinez et al. (2005) employed three alternative trading cost measures as proxies for liquidity to investigate the relationship between alternative liquidity measures and returns in Spain during January 1991 to December 2000. Their findings demonstrated that liquidity is significant and negatively priced in the Spanish stock market. Additionally, their evidence showed that the HML factor is related to systematic liquidity. Their results are consistent with the evidence from the United States.

Vaihekoski (2007) investigated the pricing of equity and liquidity in the Finnish stock market for the period 1987 to 2004. Using trading cost measured by a bid-ask spread as a proxy for liquidity, the results strongly support the negative relationship between equity returns and liquidity reported in earlier studies of the United States. His findings showed that the market-wide liquidity is a systematic risk and also showed that the price of liquidity risk varies over time periods, as suggested by Gibson and Mougeot (2004).

Chang et al. (2010) investigated the relationship between the variability of liquidity and equity returns in the Japanese market between February 1975 and December 2004. They used a liquidity measure based on trading costs, which is Amihud's (2002) measure, and five alternative liquidity measures based on trading activity; (1) share turnover, (2) trading volume, (3) Liu's (2006) measure, (4) the proportion of the trading days in the past 3 months in which the return was zero, and (5) the proportion of trading days in the past 3 months in which the return is zero and the trading volume is positive. Consistently with the general results from the United States and other developed markets, they found that liquidity (illiquidity) was significant and negatively (positively) related to equity returns across business cycles, different sub-periods and all sections of the Tokyo Stock Exchange.

Furthermore, Chang et al. (2010) found a negative relationship between the variation of liquidity and returns and this is consistent with Chordia et al. (2001b). They showed evidence that this can be explained by the overconfidence hypothesis of Daniel et al. (1998) and Odean (1998) , who reported that investors become overconfident when past stock returns are high, and will then trade more and drive higher turnover. At the same time, their over-optimism causes stock over-valuation. When the stock price is subsequently corrected, there will be a negative return. Therefore, according to this overconfidence hypothesis, one should observe a sequence of higher stock returns, high turnover and lower stock returns.

3.4.3 The relationship between liquidity and equity returns in emerging markets

Among the small number of the academic investigations into the effect of liquidity on asset pricing in markets outside the United States, there are some researchers who have concentrated on this issue in emerging markets. This section will present and discuss the literature on the relationship between liquidity and equity returns in emerging markets. The empirical evidence from emerging markets is not steady. On the one hand, some findings from emerging markets are inconsistent with the general results from United States studies because they show a positive (negative) relationship between liquidity (illiquidity) and returns; for instance, we can include Jun et al. (2003) and Dey (2005) in this.

Jun et al. (2003) employed data from 27 emerging equity markets for the period from January 1992 to December 1999 in order to examine the relationship between equity returns and market liquidity as measured by turnover ratio, trading value and turnover-

volatilities. They found a positive relationship between equity returns and market liquidity in a cross-sectional analysis, controlling by stocks indices, firm size, price to book ratio and exchange rate. Their evidence is contrary to the main empirical evidence from the United States and other developed markets. Jun et al. (2003) provided a potential explanation for the positive relationship between liquidity and market returns by stating that it is because emerging equity markets have a lower degree of integration with the global economy; this is consistent with Bekaert and Harvey (1997). If emerging markets are not fully integrated with the global economy, lack of liquidity will not function as a risk factor and thus cross-sectional returns will not necessarily be lower for liquid markets.

Dey (2005) examined the relationship between liquidity and returns in 48 stock markets, including ASEAN-5 markets, during the period 1995 to 2001. The turnover measured is used as a proxy for the liquidity measure in his study. With multiple regression models of equity returns on turnover ratio augmented with market size and market volatility of all equity markets, he generally found a positive relationship between liquidity and returns. His empirical findings are consistent with the evidence of Jun et al. (2003). Additionally, Dey (2005) reported that his evidence strongly supported the view of Bekaert and Harvey (1995) that risk perceptions in developed and emerging markets are different and cannot be treated similarly for asset pricing.

On the other hand, some research, for instance, Beakaeart et al. (2007), Zhang et al. (2007) and Hearn et al. (2009), has found the evidence consistent with the main findings in the United States which showed a negative (positive) relationship between liquidity (illiquidity) and returns. Stocks with lower liquidity (higher illiquidity) have higher returns.

Bekaert et al. (2007) examined the impact of liquidity on expected returns for the period January 1993 to December 2003 by focusing on 19 emerging equity markets, including Indonesia, Malaysia, the Philippines and Thailand. Both trading costs and trading activity measures were used as proxies for liquidity. They illustrated that predicted future returns are positively related to bid-ask spreads (illiquidity) and negatively related to market turnover (liquidity). Moreover, they suggested that local market liquidity is an important driver of expected returns in emerging markets.

Zhang et al. (2007) investigated the effect of liquidity risk on pricing equity in Chinese stock markets during the period 1991 to 2001. Consistently with Bekaert (2007), their results showed that stocks with higher sensitivities to liquidity risk (liquidity beta) provide higher returns than those with lower sensitivities, after controlling for market risk, size and the book-to-market equity ratio.

Subsequently, Hearn et al. (2009) examined the liquidity premium in four major African markets: South Africa, Kenya, Egypt, and Morocco over the period 1991 to 2007. By using a capital asset pricing model augmented with size and liquidity (Amihud's (2002) measure), their results showed that liquidity is an important factor in pricing asset returns. Consistently with the main results from the United States, stocks with lower liquidity have greater returns.

3.4.4 Gaps in the literature on the relationship between liquidity and equity returns

Many studies on the relationship between liquidity and equity returns has been concentrated in developed market for instance, Amihud and Mendelson (1986),

Brennan and Subrahmanyam (1996), Datar et al. (1998), Amihud (2002), Pastor and Stambaugh (2003) , Liu (2006) and Korajczyk and Sadka (2008). Their results have mainly shown that there is a negative (positive) relationship between liquidity (illiquidity) and equity return. This is consistent with the risk and returns trade-off paradigm. On the other hand, the evidence from emerging markets is limited and still inconsistency. Bekaert et al. (2007) and Zhang et al. (2007) found the evidence consistent with the main results in developed markets that there is a negative relationship between liquidity and returns, while other studies, i.e., Jun et al. (2003) and Dey (2005), reported that there is a positive relationship between liquidity and returns, and explained that it is because the risk perceptions of investors in emerging markets are different from those in developed markets and cannot be treated similarly for asset pricing. The review of the literature on the relationship between liquidity and returns shows that there are some gaps in this issue that should be highlighted.

First, the major empirical studies on the effect of liquidity on equity returns have been investigated by using data from the United States and developed markets, whereas the number of studies looking at this issue in emerging markets is small because data in these markets are limited. Additionally, the empirical results from emerging markets are still incoherent over whether there is a positive or negative relationship between liquidity and returns. Hence, an examination of the effect of liquidity on equity returns in emerging markets is an essential area of attention for clarifying the importance of liquidity in asset pricing.

Second, among the riches of the previous literature on this issue there is no published study providing the cross-sections of returns on liquidity augmented with the Fama and Frech (1993) three factor model which are concerned with economic states based on

financial crises and market states (up and down markets). This could validate the relationship between liquidity and equity returns in relation to the states of the economy and the markets. Although a cross-sectional analysis of the states of economies was investigated by Chang (2010), they conducted the analysis into two sub-periods, i.e., before and after crisis periods around the bubble periods in Japan. They did not consider the relationship between liquidity and returns during the crisis periods and did not control equity returns with the Fama and French (1993) three factor model, which is mainly used for control variables in general asset pricing investigations. Therefore, this study will contribute to the literature by examining the effect of liquidity on equity returns controlling for the Fama and French (1993) three factor model in the different economic states (which is based on financial crisis) and different markets states (up and down markets).

3.5 The determinants of liquidity

This section presents a review and discussion of literature related to the determinates of liquidity for both a theoretical and empirical understanding of data collection, methodology development, data analysis, and results interpretation relating to this issue.

Studies of factors that could explain stock liquidity have been concentrated on since the work of Demsetz (1968). He studied the effect of trading on transaction costs in the New York Stock Exchange and introduced the inventory paradigm, stating that higher trading activity can be explained by lower of transaction costs in trading (spreads) because of inventory balance. He originally suggested that a firm's trading characteristics provided a set of standard determinants of liquidity: trading volume and number of trades, volatility, firm size, and price. From an inventory perspective,

trading activity measured by trading volume and number of trades should be positively related to liquidity, as an increase in trading activity allows the market maker to reduce his inventory risk, while volatility should have the opposite effect.

Along the lines of Demsetz (1968), Benston and Hagerman (1974) collected data from the NYSE between 31 January and 31 December 1967 and provided the first empirical evidence for a positive relationship between trading activity and liquidity and for a negative relationship with volatility. They reported that firms with more shareholders, lower volatility or more market makers have lower spreads. However, they do not control for differences in size even though they noted that size may drive the results.

Stoll (1978) using the data from the NASDAQ in July 1973, proposed that stock illiquidity is positively related to stock risk since the bid-ask spread set by a risk-averse market marker increases risk. He also found that turnover (volume divided by share outstanding) has a large and significant positive effect on spread. Additionally, he provided results supporting Dimsetz's (1968) inventory paradigm in which increases in trading activities or numbers of dealers reduce the trading costs of stocks in the NASDAQ.

Ho and Stoll (1981) showed that the bid-ask spread depends on the market maker's inventory of traded security. They assumed that a risk-averse market maker would manage his inventory to reduce his risk exposure. They provided supportive evidence for the inventory paradigm and suggested that liquidity depends on factors that influence the risk of holding inventory and extreme events that provoke order imbalances and thereby cause inventory overload.

Aitken and Frino (1996) developed the empirical model to predict bid ask spreads by using Australian data from between 1 June 1992 and 30 November 1992. They showed that stock price, trading activity and stock price volatility can explain the market bid-ask spreads at a range of between 83 and 94 percent. Generally, this is consistent with the findings from the United States summarised in Stoll (1978).

Noticeably, early empirical investigations of the determinants of liquidity focused mainly on cross-sectional analysis; for instance, Benston and Hagerman (1974) and Stoll (1978). Later some researchers shifted their focus towards time-series analysis after the empirical studies of Chordia et al. (2000, 2001a) and Hasbrouck and Seppi (2001), which considered co-movements in trading activities and liquidity.

Chordia et al. (2000) provided empirical work on common determinants of liquidity in the NYSE using data from the year 1992. After controlling for individual liquidity determinants, such as volatility, volume, and price, they found that cross-sectional correlation in inventory holding costs across stocks may result in commonality in liquidity, if specialists revise bid-ask spreads and depths similarly across stocks. The empirical results in Chordia et al. (2000) are consistent with the inventory paradigm. They provide evidence supporting the idea that changes in trading activities, or volatility, or from changes to interest rates, all of which affect the cost of inventory holding, significantly influence liquidity. They also reported that the liquidity of larger stocks shows a greater response to market liquidity than smaller stocks, and that stocks also exhibit significant responses to industry-wide changes in liquidity.

Chordia et al. (2001a) showed that market returns were positively related to market liquidity. This is contrary to the general empirical cross-sectional studies on the pricing

of returns. Hence, based on the inventory paradigm, we should expect a positive correlation between market returns and liquidity, as positive returns reduce inventory risk. Nevertheless, the positive effect of market returns on liquidity is consistent with Shefrin and Statman's (1985) view of the disposition effect. They used the term 'disposition effect' to describe market agents' inclination to sell winners too early and ride losers too long.

Hasbrouck and Seppi (2001) conducted an analysis of the 30 stocks in the Dow Jones Industrial Average (DJIA) in 1994 using time-aggregated trade and quote data over 15-minute intervals. They found that both returns and order flows are characterized by common factors. Commonality in the order flows explains roughly two-thirds of the commonality in returns.

Recently, most of the literature on the cross-sectional analysis of liquidity has paid attention to the possible factors that could explain liquidity; for instance, corporate governance (i.e., Ascioglu et al., 2005; and Chung, 2006), information asymmetry (i.e., Attig et al., 2006; and Rhee and Wang, 2009), capital structure (i.e., Lipson and Mortal, 2009) and bankruptcy risk factors (i.e., Agrawal et al., 2004).

3.5.1 Bankruptcy risk and liquidity

Among the riches of the literature on the cross-sectional analysis of liquidity, some academics have paid attention to the ability of bankruptcy risk to explain liquidity. A review of the literature on the effect of bankruptcy risk on liquidity is discussed below. The published evidence on the relationship between bankruptcy and liquidity has been mainly concentrated on the bond markets. For instance, Ericsson and Renault (2006) developed a bond valuation model to capture liquidity and credit risk and found

evidence of a positive correlation between illiquidity and default risk. As the default becomes more likely, the components of bond yield spreads attributable to illiquidity increase.

However, it seems surprising that there are few studies that examine the ability of the bankruptcy explanatory variables to determine the liquidity of stocks. For instance, Agrawal et al. (2004) examined the relationship between the financial conditions of firms and liquidity in the NYSE and the AMEX. Tobin's Q, earning performance, bond ratings, and common stock ratings are used as financial performance measures in their study. They provide evidence that firms with poor financial conditions suffer from reduced stock liquidity (increased bid-ask spreads), even after controlling for price, trading volume, share turnover and volatility. They argued that the positive relationship between bid-ask spreads (illiquidity) and the financial distress of firms is explained by an increased proportion of informed and specialist investors relative to uninformed investors. This will increase the adverse selection problem faced by market markers or dealers since they generally expect to profit in their transactions with uninformed traders and expect losses in trades to informed investors. The dealers will respond by widening their spreads to ensure that their profits from uninformed traders cover the losses.

Lesmond (2005) investigated the efficiency of five common liquidity measures in estimating firm-level liquidity both within and across 31 emerging markets between 1993 and 2000. Based on the time series behaviour of liquidity, he found that trading costs (illiquidity) sharply increased during the period of Asian and Russian financial crisis. This supports the evidence of Agrawal et al. (2004) on the negative relationship between a firm's poor performance and liquidity. Additionally, their investigation of

liquidity determinants for emerging markets provides evidence that those countries with weak legal and political institution have significantly higher illiquidity than those countries with strong legal and political systems, even after controlling for volume, price volatility and market capitalization.

Harris et al. (2008) examined the time-series pattern of the liquidity of delisted stocks from the NASDAQ in 1999 and 2002 and found that those stocks were accompanied by a large decline in share volume, a large increase in quoted and effective spreads and price volatility. They also provided a regression exploring the determinants of quoted spread during delisting. After controlling for trading volume, firm size and price volatility, they found that the change in quote spread is not related to the reason for delisting, i.e. bankruptcy filing or liquidation, corporate governance issues, core violations such as minimum number of market markers, or non-core violations such as minimum bid prices, but is mainly related to trading and market characteristics (i.e. trading volume, firm size, and price volatility).

Yeyati et al. (2008) examined the relationship between emerging market liquidity and crises in seven emerging markets including Thailand over the period April 1994 to June 2004. The regression of alternative liquidity measures on crisis periods, controlling for positive and negative returns, local currency, delayed effects and stocked fixed effects, showed that both trading volume (Amihud's (2002) measure) and trading costs (bid-ask spreads) increase in a crisis period. The positive relationship between trading costs and trading activity during a crisis period is contrary to the evidence from tranquil times. They argued that crises are associated with portfolio reallocation among heterogeneous agents that do not fully anticipate them; hence, volume increases during market downturns rather than before since liquidity

constrained investors want fire sales to pay large premiums and bring in outside capital.

3.5.2 Gaps in the literature on the relationship between bankruptcy risk and liquidity

The review of studies on the determinants of liquidity shows gaps in this issue. First, there are many researchers interested in this strand; but the number of investigations into the ability of the bankruptcy risk of firms to explain liquidity is very small. To find the relationship between bankruptcy risk and liquidity, studies have mainly used an indirect method by using the time series behaviour of liquidity during a crisis period, rather than by using cross-sectional analysis. To my knowledge, there is only one published study in the United States, by Agrawal et al. (2004), providing regression evidence on the relationship between financial condition and stock liquidity. The lack of regression analysis reflects on the reliabilities of previous evidence; therefore, regression on the effect of bankruptcy risk proxies on the liquidity of stocks in markets other than the United States would contribute to literature on this area.

Second, Agrawal et al. (2004) used the firm performance measures i.e. Tobin's Q, earning performance, bond ratings, and common stock rating in their analyses. The using of direct bankruptcy measures instead of performance measures as Agarawal et al. (2004), in the tests of the effect bankruptcy risk explanatory variables to liquidity of stock would improve the quality of the results. Therefore, this thesis will fill the gaps in Agrawal et al. (2004) by using the bankruptcy explanatory variables as bankruptcy risk measures, instead of the firm performance variables used in their study.

Third, in previous literature, there is no evidence of the relationship between bankruptcy risk and liquidity conducted by economic states, market states, and sectors. Hence, the cross-sectional investigation on the relationship between bankruptcy risk and liquidity regarding economic states, market states and sectors will provide the contribution to the literature. To my knowledge, this study will contribute to literature by being the first study to conduct a cross-sectional analysis of the relationship between bankruptcy risk and liquidity in the different economic states, market states, and sectors.

3.6 Bankruptcy risk prediction

The development of bankruptcy risk prediction is reviewed in this section providing the foundation of knowledge needed for methodology development, data analyses and results interpretations regarding issues related to bankruptcy risk.

The bankruptcy risk measurement issue has interested researchers for more than forty years, since Beaver's (1966) study which employed univariate analysis to predict business failure. Using a sample of 79 failed and 79 non-failed firms and 30 financial ratios averaged over five years prior to failure, he claimed that the cash-flow-to-total-debt ratio is significant in predicting failure. This ratio misclassified only 13 percent of the sample for one year before bankruptcy and 22 percent of the sample for five years before bankruptcy. He suggested that ratio analysis is a useful tool for predicting failures at least five years before the actual failures occur.

Altman (1968) later extended Beaver's work by using multiple discriminant analysis (MDA) to combine five ratios into a single score to predict business failure. His study used 66 failed and 66 non-failed firms selected from manufacturing industries. Altman

applied 22 accounting and non-accounting variables grouped under five categories: liquidity, profitability, leverage, solvency and activity ratios. Finally, five ratios are included in Altman's (1968) model: (a) working capital to total assets, a liquidity indicator; (b) retained earnings to total assets, which is considered an indicator of leverage; (c) earnings before interest and taxes to total assets, a measure of the productivity of the firm's assets; (d) market value of equity to book value of total debt, which shows how much the firm's assets can decline in value before the liabilities exceed the assets and the firm becomes bankrupt; (e) sales to total assets, which presents the sales-generating ability of a firm's assets. Altman (1968) recommended a cut-off point of 2.675 as the Z-score that discriminates best between bankrupt and non-bankrupt firms. Firms with a Z-score of less than 2.675 are predicted to become bankrupt and Z-scores greater than 2.675 lead to a prediction of non-bankruptcy. Thus, a larger Z-score implies a lower bankruptcy risk.

Subsequently, Ohlson (1980) estimated three models using 105 bankrupt and 2,058 non-bankrupt firms: Model 1 predicts bankruptcy within one year; Model 2 predicts bankruptcy within two years, given that the firm does not go bankrupt in the first year; and Model 3 predicts bankruptcy within one or two years. Ohlson introduced logit analysis as a means of incorporating conditional probabilities into financial distress models. Ohlson selected nine variables based on previous uses in the literature. Ohlson illustrated that a cut-off value of P=0.038 minimized the number of Type I and Type II errors. Thus, probability values greater than 0.038 lead to a prediction of bankruptcy. Therefore, a larger O score represents a higher bankruptcy risk.

Both Altman's (1968) and Ohlson's (1980) models were constructed by employing a sample from the United States; therefore, a large number of later studies have

attempted to fill this gap in the research by constructing a bankruptcy risk measurement model using a sample from other countries. For instance, Altman et al. (1995) constructed a distress classification model of Korean companies using a sample of 34 distressed and 34 non-distressed firms. The discrimination classification methodology was used in this study. The resulting models combine the measures of firm size, asset turnover, solvency and leverage.

Later, using a sample of Korean listed companies that went bankrupt during the period from 1997 to 1998, when there was a deep economic recession driven by the East Asian Financial Crisis, Nam and Jinn (2000) studied the predictive model of bankruptcy risk prediction using the logit model as their statistical technique. They employed 33 financial ratios including those measuring profitability, turnover, growth, productivity, fixed charge coverage, solvency, leverage and liquidity. Their sample consisted of 46 bankrupt and 46 non-bankrupt listed firms in non-financial sectors. The variables used in their prediction model are the measures of a firm's ability to service short-term debts, interest expenses to sales and the accounting receivables turnover ratio.

Charitou et al. (2004) employed neural networks and logit methodologies to develop failure prediction models for UK public industrial firms. The sample was 51 matched pairs of failed and non-failed firms. The evidence showed that the resulting model, which includes three financial variables, namely, cash flow, profitability and financial leverage, provided an overall correct classification that had 83 percent accuracy for bankruptcy prediction in the year before failure.

Chen et al. (2006) examined the usefulness of financial ratios in predicting business failures in China. They found that the earnings before interest and tax to total assets, earnings per share, total debt to total assets, price to book and the current ratio are shown to be significant predictors, with a prediction accuracy rate of between 78 percent and 93 percent.

Ugurlu and Aksoy (2006) identified predictors of corporate financial distress, using the discriminant and logit models in the Istanbul Stock Exchange over a period of economic turbulence between 1996 and 2003. The results showed that the logistic regression model has a greater classification power and predictive accuracy than has the discriminant model. They used the accounting ratio as a predictor of financial distress. The earnings before interest, taxes, depreciation and amortization (EBITDA) to total assets ratio is the most significant predictor of financial distress in both models.

3.7 Summary of the literature review

Studies of asset pricing have had a wide focus among scholars since the Capital Asset Pricing Model (CAPM) was developed by Markowitz (1952), Tobin (1958), Sharpe (1963 and 1964), Lintner (1965), and Black (1972). Later, the outstanding work of Fama and French (1992, 1993, 1995, 1996) presented the three-factor model and they argued that it should be implemented in place of the CAPM. Since then, researchers have attempted to investigate other variables including bankruptcy risk and liquidity, which could explain equity returns.

Mainly, studies of the relationship between bankruptcy risk and equity returns have been focused on the United States, while evidence from other markets, especially the Southeast Asian markets, is limited, and those empirical results are inconsistent with

the positive, negative and non relationships between bankruptcy risk and equity returns. Empirical evidence from crisis periods on the effect of bankruptcy risk on equity returns, controlling for the Fama and French (1993) three factor model, has not been examined yet. In previous studies of this area, the three models that have been most employed to measure the bankruptcy possibilities of firms are Altman's (1968) Z, Ohlson's (1980) O, and Vassalou and Xing's (2004) DLI-option based models. Nevertheless, there is a lack of empirical evidence from using alternative bankruptcy risk measures to test the effect of bankruptcy risk on equity pricing in identical samples.

Similarly to the evidence on the relationship between bankruptcy risk and returns, studies of the relationship between liquidity and returns in emerging markets are small in number. In general, portfolio cross-sectional regression analyses are used to examine the ability of liquidity to determine equity returns. However, there is a lack of evidence that providing the cross-sections of returns on liquidity controlled with the Fama and Frech (1993) three factor model and concerning economic states based on financial crises and market states (up and down markets).

Additionally, among the riches of the published literature on determinants of liquidity, evidence concerning the relationship between bankruptcy risk and liquidity is very small and it is mainly investigated by time series patterns of liquidity rather than cross-sectional analyses. Moreover, there is a lack of evidence using bankruptcy explanatory variables as proxies for bankruptcy measures. This review of literature on bankruptcy risk, liquidity and the determinants of liquidity provides an understanding of and background for the data collection and methodology presented in Chapter 4.

Chapter 4

METHODOLOGY AND DATA

4.1 Introduction

This chapter provides the research method and some background information about the methodology chosen to analyse the empirical evidence in order to answer the research objectives. In light of the research questions discussed in Chapter 1, this thesis has three main objectives, shown as follows.

a) To examine the relationship between bankruptcy risk and equity returns in five markets of Southeast Asia

b) To examine the relationship between liquidity and equity returns in five markets of Southeast Asia

c) To investigate the ability of bankruptcy explanatory variables of firms to determine liquidity in five markets of Southeast Asia

Following this section, Section 4.2 describes the methodology used for the investigation of the relationship between bankruptcy risk and equity returns. Section 4.3 explains the method used to examine the relationship between liquidity and equity returns. Section 4.4 provides the methodology used to explore the ability of bankruptcy explanatory variables to determine liquidity. Section 4.5 describes the data used in this study and Section 4.6 contains a summary of this chapter.

4.2 Methodology used to investigate the relationship between bankruptcy risk and equity returns

In this section, the methodology employed to examine the relationship between bankruptcy risk and equity returns is presented into three sub-sections. First, the method used to measure bankruptcy is provided in Section 4.2.1. Then, the methods used to examine the relationship between bankruptcy risk and equity return by portfolio analysis and cross-sectional analysis are illustrated in Sections 4.2.2 and 4.2.3 respectively.

4.2.1 The bankruptcy risk measure

Among the bankruptcy models that have been constructed, Altman's (1968) and Ohlson's (1980) bankruptcy risk measure models are most often employed to measure bankruptcy risk in the few existing empirical studies on the issue of the relationship between bankruptcy risk and equity returns. For instance, Dichev (1998) and Zaretzky and Zumwalt (2007) employed both Altman's (1968) and Ohlson's (1980) models to measure bankruptcy risk. Similarly, the studies of Griffin and Lemmon (2002) employed Ohlson's (1980) O-score as a proxy for bankruptcy risk.

For the remaining academic empirical studies on the issue of the relationship between bankruptcy risk and equity returns, Merton's (1974) option-based model is another model generally applied to measure bankruptcy risk. The first study to apply Merton's (1974) option-based model was Vassalou and Xing's (2004) paper. They argued that the models that were derived from financial statement information, such as Altman's (1968) and Ohlson's (1980) models, are naturally backward-looking, since financial

statements tend to present a firm's past performance rather than its future prospects. Therefore, they employed Merton's (1974) option pricing model to compute the bankruptcy risk of firms because the model uses the market value of a firm's equity in calculating its bankruptcy risk. It also uses the market value of debts, rather than using the book value of debts.

Hence, the option-based model contains forward-looking information, which is more suitable for calculating the bankruptcy risk of a firm in advance. Additionally, Merton's (1974) option-based model is commonly used as a bankruptcy risk measure in later studies on the relationship between bankruptcy risk and equity returns; for instance, Bystrom et al.(2005), Campbell et al. (2008), Garlappi et al. (2008), Gharghori et al. (2009) and Chava and Purnanandam (2010). In this study, to test the relationship between bankruptcy risk and equity returns, Altman's (1968) Z-model , Ohlson's (1980) O-model and Vassalou and Xing's (2004) DLI, the three most commonly used bankruptcy risk models in the previous literature, are employed as proxies for bankruptcy risk. The details of how these bankruptcy risk proxies are calculated are presented below.

4.2.1.1 Altman's Z-score

The first model is Altman's (1968) Z-score, which is a multiple discriminant analysis. Altman's (1968) Z-score is defined as follows:

$$Z = 1.2X_1 + 1.4X_2 + 3.3X_3 + 0.6X_4 + 0.999X_5 \qquad (4\text{-}1)$$

where X_1 is working capital divided by total assets, X_2 is retained earnings divided by total assets, X_3 is earnings before interest and taxes divided by total assets, X_4 is the

market value of equity divided by the book value of total debts, and X_5 is sales to total assets. The working capital is calculated from current assets minus current liabilities. Market value is the share price multiplied by the number of ordinary shares in issue. Altman (1968) recommended a cut-off point of 2.675 as the Z-score that discriminates best between bankrupt and non-bankrupt firms. Thus, a Z-score of less than 2.675 leads to a prediction of bankruptcy for a firm and a Z-score greater than 2.675 leads to a prediction of non-bankruptcy. Hence, a larger Z-score indicates a lower bankruptcy risk stock. Following Dichev (1998), all the data for calculated the Z- scores were collected from the DATASTREAM database as of the fiscal year end of a given year T.

4.2.1.2 Ohlson's O-score

The second model used as a bankruptcy measure, is Model 1 in Ohlson (1980), which is a conditional logit method. Ohlson's (1980) model 1 is described as follows:

$$O = -1.32 - 0.407W_1 + 6.03W_2 - 1.43W_3 + 0.076W_4 + 1.72W_5$$

$$-2.37W_6 - 1.83W_7 + 0.285W_8 - 0.52W_9 \qquad (4\text{-}2)$$

where W_1 is the logarithm of total assets to GNP price-level index; W_2 is total liabilities to total assets; W_3 is working capital to total assets; W_4 is current liabilities to current assets; W_5 is one if total liabilities exceed total assets, zero otherwise; W_6 is net income to total assets; W_7 is funds from operations to total liabilities; W_8 is one if net income was negative for the last two years, zero otherwise; and W_9 is (the difference between present-year net income and last-year net income) divided by (the sum of absolute present-year net income and absolute last-year net income).

Ohlson (1980) illustrated that a cut-off value of 0.038 minimized the number of Type I and Type II errors. Thus, an O-score greater than 0.038 lead to a prediction of bankruptcy for a firm. Therefore, a larger O-score represents a higher bankruptcy risk for a firm. Following Dichev (1998), all the data for the calculated O-scores were collected from the DATASTREAM database as of the fiscal year end of a given year T. Additionally, following Griffin and Lemmon (2002), the GNP price-level index was assumed to be 1.

4.2.1.3 Vassalou and Xing's DLI

Following Vassalou and Xing (2004), the third model to be used as a proxy for bankruptcy risk measurement is named the Default Likelihood Indicator (DLI). The DLI is developed from Merton's (1974) option pricing model. The DLI formula is shown as follows:

$$DLI_t = N(-DD_t) \tag{4-3}$$

$$DD_t = \frac{\ln(V_A/X_t)+(r-(1/2)\sigma_A^2)(T)}{\sigma_A\sqrt{T}} \tag{4-4}$$

where DLI_t is the Default Likelihood Indicator, N is the cumulative density function of the standard normal distribution, DD_t represents the number of standard deviations that a firm deviates from the mean for bankruptcy to occur, V_A is the market value of the firm's equity, X_t is the total amount of firm's debts, r is the risk free rate, σ_A is the volatility of the firm's asset returns, and T is the time to maturity of the firm's debt. The larger the value of DD, the smaller the probability of bankruptcy risk; a higher DLI indicates a higher probability of bankruptcy.

The model choices follow previous studies in the literature, i.e., Vassalou and Xing (2004) and Bystrom et al. (2005). Following Vassalou and Xing (2004), the daily data are aggregated in order to obtain monthly observations. The daily market values for firms V_A are employed while the annual data are used for the book value of debt D_t calculated by the 'Short Term Debt and Current Portion of Long Term debt' (DATASTREAM Item WC03051) plus half the 'Long Term Debt' (DATASTREAM Item WC03251). This study includes long-term debt in the calculations because firms need to deal with their long-term debts, and these interest payments are part of their short-term liabilities. Following Vassalou and Xing (2004) and Moody's KMV which is a credit rating company, this study uses 50 percent of long-term debt encounters in the calculations. Moody's KMV argued that this choice is sensible and adequately captures the financing constraints of firms. Vassalou and Xing (2004) also found that having a different proportion of long-term debts included in the DLI calculations does not lead to a significant change in the results. The monthly equity volatilities σ_A were estimated using 12-month historical sample volatilities. The risk-free rates for each market are the one-month interbank offer rates of each market. Following Bystrom et al. (2005) the maturity of debt T is always assumed to be one year.

4.2.2 The portfolio analysis

Following Vassalou and Xing (2004), portfolio analysis is employed to examine whether portfolios with different degrees of bankruptcy risk provide significantly different returns. A significant difference in the returns would indicate that bankruptcy risk is significantly related to equity returns. To indicate whether bankruptcy risk affects equity returns, portfolios with different degrees of bankruptcy risk are constructed to investigate whether those portfolios' returns are significantly different.

First, the stocks are sorted into five equally weighted portfolios based on their bankruptcy risk. Subsequently, the average returns of each bankruptcy-sorted portfolio are calculated. In this study, the bankruptcy effect or bankruptcy premium is defined as a positive average return difference between high and low bankruptcy risk firms. A bankruptcy discount is presented when the highest bankruptcy risk portfolios provide significantly lower returns than the lowest bankruptcy risk portfolios do.

Next, to make the results robust, this study investigates whether different bankruptcy risk stocks pay different returns when the firm's characteristics (size and book-to-market equity ratio) are controlled. The previous studies of the relationship between bankruptcy risk and returns, for instance, Dichev (1998), Vassalou and Xing (2004) and Bystrom et al. (2005), are regularly controlled for size (SIZE) and the book-to-market equity ratio (BM) because of their association with returns. To examine the bankruptcy effect with firm characteristics-sorted portfolios, the stocks are sorted into three portfolios by firm characteristic (size or BM), and then the stocks in each firms' characteristic-sorted portfolio are sorted into five portfolios according to their bankruptcy risk. Consequently, this procedure produces 15 portfolios in total for each market. Then, the return differences between high and low bankruptcy portfolios controlled for firm characteristics are examined.

4.2.2.1 The reliability test of the difference between the two means

The difference between high and low bankruptcy risk portfolios is tested for reliability with an independent sample t-test using samples of high and low bankruptcy risk portfolios as the independent samples. In other words, high and low bankruptcy risk portfolios are independent when the method of sample selection is such that those

individuals selected for a high bankruptcy risk portfolio do not have any relationship with those individuals selected for a low bankruptcy risk portfolio. Hence, the independent condition leads us to consider the independent sample t-test.

a) ***Hypotheses on the difference between the two means***

The hypotheses to be evaluated for detecting a difference between the means of the returns of high and low bankruptcy risk portfolios are shown as follows. The null hypothesis H_0 is that there is no difference between the two means of the returns of high and low bankruptcy risk portfolios, which is denoted as follows:

$$H_0: \bar{X}_1 - \bar{X}_2 = 0 \qquad (4\text{-}10)$$

where $\bar{X}_1$ is the mean of the returns of a high bankruptcy risk portfolio and $\bar{X}_2$ is the mean of the returns of a low bankruptcy risk portfolio. Here, there is no difference between the two means of returns of high and low bankruptcy risk portfolios. The alternative hypothesis H_1 is that there is a difference between the two means of the returns of high and low bankruptcy risk portfolios, which is denoted as follows:

$$H_1: \bar{X}_1 - \bar{X}_2 \neq 0 \qquad (4\text{-}11)$$

The null hypothesis H_0will be rejected here in favour of the alternative hypothesis H_1 if the means of the returns are different.

b) ***The independent t –test***

Lomax (2007) stated that the test statistic of the difference between two means is known as t and is denoted as follows:

$$t = \frac{\bar{X}_1 - \bar{X}_2}{s_{\bar{X}_1 - \bar{X}_2}} \tag{4-12}$$

where $\bar{X}_1$ and $\bar{X}_2$ are the means for sample 1 and sample 2 respectively, and $s_{\bar{X}_1 - \bar{X}_2}$ is the standard error of the difference between the two means. This standard error is the standard deviation of the sampling distribution of the difference between the two means and is computed as below:

$$s_{\bar{X}_1 - \bar{X}_2} = S_p \sqrt{\frac{1}{n_1} + \frac{1}{n_2}} \tag{4-13}$$

where S_p is the pooled standard deviation, computed as follows:

$$S_p = \sqrt{\frac{(n_1 - 1)S_1^2 + (n_2 - 1)S_2^2}{n_1 + n_2 - 2}} \tag{4-14}$$

and where S_1^2 and S_2^2 are the sample variances for groups 1 and 2 respectively, and n_1 and n_2 are the sample sizes for groups 1 and group 2 respectively. Conceptually, the standard error $s_{\bar{X}_1 - \bar{X}_2}$ is a pooled standard deviation weighted by the two sample sizes; more specifically, the two sample variances are weighted by their respective sample sizes and then pooled.

4.2.3 The cross-sectional regression analysis

Furthermore, this study examines whether bankruptcy risk significantly relates to equity returns by extending the Fama and French (1993) three-factor model with the bankruptcy risk factor, since many studies have reported that firm size and the book-to-market equity ratio are related to returns; for instance, Chan and Chen (1991), and Fama and French (1992, 1993, 1995).

Firstly, equity pricing tests for the whole period between 1996 and 2007 are examined. Next, a cross-sectional examination of the effect of bankruptcy risk on equity returns in different economic states is provided to make the results robust. Stocks are subdivided into three periods: pre-crisis, crisis, and post-crisis periods. Since the East Asian Financial Crisis 1997 affected each country in different periods, the crisis period in each country is different. The crisis periods are from July 1997 to September 1999 for Malaysia and Thailand, from July 1997 to December 1999 for Indonesia and the Philippines, and from January 1998 to December 1999 for Singapore (see Figure 2-1).

4.2.3.1 The explanatory variables for analysis

To investigate the cross-sectional relationship between bankruptcy risk and returns, it is important to consider a possible empirical asset-pricing model in which bankruptcy risk appears as a factor. Previous literature, for instance, Dichev (1998) and Vassalou and Xing (2004) showed that a model that includes only a bankruptcy risk factor is not able to explain the equity returns exactly. Thus, it is possible to have other factors related to equity returns.

a) ***The Fama and French (1993) three factors***

In previous studies on the relationship between bankruptcy risk and equity returns, such as Griffin and Lemmon (2002), Vassalou and Xing (2004), and Gharghori (2007), Fama and French's (1993) three factors are incorporated to investigate the explanatory power of bankruptcy risk in pricing equity returns, since their model has shown a significant ability to explain equity returns and is often used in investigations of asset pricing. Therefore, this study employs excess market returns and the returns on zero-net investment portfolios for size and the book-to-market equity ratio in the cross-

sectional regression analysis so as to present the market risk, size and book-to-market equity ratio respectively.

b) ***The bankruptcy factor***

In many previous studies, for instance Dichev (1998), Vassalou and Xing (2004), and Bystrom et al. (2005), bankruptcy risk was measure using Altman's (1968) Z model, Ohlson's (1980) O model, or Vassalou and Xing's (2004) DLI. These bankruptcy measures are directly and simply applied in the cross-sectional regression models. Additionally, some studies, i.e. Hussain et al. (2001) and Gharghori et al. (2007), have used the zero net-investment portfolio of Lis' (1972)[1] Z model and a zero net-investment portfolio from an option-based model to represent the market bankruptcy risk respectively. Unlike previous studies, this study initially use the average DLI (ADLI), returns from zero net-investment portfolios sorted by Z-scores (BMNz), and returns from zero net-investment portfolios sorted by O-scores (BMNo) as the proxies for bankruptcy risk. The reason for this is that if assets are priced rationally, bankruptcy risk must proxy as a non-diversifiable risk factor in returns. Therefore, mimicking portfolios related to bankruptcy risk or market average bankruptcy risk give direct evidence on this issue.

c) ***Regression model***

As in the above explanation of the choices of variables, this study considers a cross-sectional analysis of equity returns on alternative bankruptcy risk variables (ADLI,

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[1] Cited in Taffler (1983) and Hussain et al. (2001)

BMN_Z, or BMN_O) and Fama and French's (1993) model. The reason for extending the Fama and French (1993) model is that their model still cannot explain equity returns perfectly. Hence, this thesis uses ordinary least square (OLS) regression to examine the relationship between bankruptcy risk and equity returns. The empirical models of the relationship between bankruptcy risk and equity returns are shown as follows:

$$R_t = a + bEMKT_t + sSMB_t + hHML_t + gADLI_t + \varepsilon_t \quad (4\text{-}15)$$

$$R_t = a + bEMKT_t + sSMB_t + hHML_t + gBMNz_t + \varepsilon_t \quad (4\text{-}16)$$

$$R_t = a + bEMKT_t + sSMB_t + hHML_t + gBMNo_t + \varepsilon_t \quad (4\text{-}17)$$

where R_t denotes the return at month t of stocks i in excess of the risk-free rate, and $EMKT_t$ refers to the excess return on the stock market portfolio over the risk-free rate. The risk-free rates for each market are the one-month interbank offer rate of each market at month t. SMB_t refers to the return on the zero-investment portfolio, which is long on small market capitalization (size) stocks and short on big size stocks. HML_t refers to the return on the zero-investment portfolio, which is long on high book-to-market stocks and short on low book-to-market stocks. $ADLI_t$ represents the average DLI, which is the equally weighted average of the DLI of all firms at month t. Using a Z-score to measure bankruptcy risk, $BMNz_t$ is the average value weighted monthly returns for firms from July of year T to June of year $T+1$ in the predicted-to-bankrupt stocks for June of year T minus the average weighted returns for firms from July of year T to June of year $T+1$ in the predicted-to-non-bankrupt stocks for June of year T. Employing an O-score to measure bankruptcy risk, $BMNo_t$ is the average value

weighted monthly returns for firms from July of year T to June of year $T+1$ in the predicted-to-bankrupt stocks for June of year T minus the average weighted returns for firms from July of year T to June of year $T+1$ in the predicted-to-non-bankrupt stocks for June of year T.

4.3 Methodology used to investigate the relationship between liquidity and equity returns

The method used to examine the relationship between liquidity and equity returns is illustrated in this section. The method used to measure liquidity in this study is explained in Section 4.3.1. Next, the method used to investigate the relationship between liquidity and equity returns through portfolio and cross-sectional analyses are shown in Sections 4.3.2 and 4.3.3 accordingly.

4.3.1 The liquidity measurement

Following Yeyati (2008), the existing liquidity proxies that were used in the previous literature have been divided into two types: trading activities and trading costs.

4.3.1.1 Trading activities

The first type are liquidity measures related to trading activities, such as dollar trading volume and share turnover, which are used in Brennan et al. (1998), Datar et al. (1998) and Chordia et al.(2001a, 2001b). Since the limited data from trading activities in Southeast Asian markets are difficult to collect, the share turnover rate represents trading activity.

Individual firms' share turnover is employed in the portfolio analysis of the relationship between liquidity and equity returns, and in the investigation of the relationship between bankruptcy explanatory variables and liquidity. Following Datar et al. (1998), the turnover rate (TO) of stock refers to the monthly trading volume divided by the number of shares outstanding of those firms. The formula is presented as follows:

$$TO_{m,i} = \frac{VOL_{m,i}}{N_t} \tag{4-5}$$

where $TO_{m,i}$ is the monthly share turnover rate of stock i in month t, $VOL_{m,i}$ refers to the monthly trading volume of stock i in month t, and N_t refers to the number of shares outstanding of stock i in month t.

The average market turnover (ATO) is employed in the cross-sectional tests on the relationship between liquidity and equity returns. The monthly average market turnover ($ATO_{m,t}$), is calculated as the equally weighted average of the monthly individual turnover measure:

$$ATO_{m,t} = \frac{1}{M_t}\sum_{i=1}^{M_t} TO_{m,i} \tag{4-6}$$

where $ATO_{m,t}$ refers to the monthly average market turnover of all stocks in month t, and M_t denotes the number of stocks available in a particular market in month t. The larger value for the average market turnover illustrates the higher liquidity of the stock market.

4.3.1.2 Trading costs

Another type of liquidity measure is related to trading costs, such as price reactions to trading and bid-ask spreads, which are used in Amihud and Mendelson (1986), Brennan and Subrahmanyam (1996), and Amihud (2002). Due to the difficulties of collecting the limited data about trading costs in the ASEAN-5 markets, Amihud's (2002) measure (IL) is a proxy for trading costs in this study. Amihud's (2002) measure is defined as below:

$$IL_{d,i} = \frac{|R_{d,i}|}{Value_{d,i}} \tag{4-7}$$

where $IL_{d,i}$ refers to Amihud's (2002) measure of stock i on day d, $|R_{d,i}|$ is the absolute returns of stock i on day d, and $Value_{d,i} = P_{d,i}.N_{d,i}$ is the total value traded for stock i on day d and is measured in the local currency. $P_{d,i}$ is the official closing price of stock i on day d and $N_{d,i}$ is the number of traded shares of stock i on day d.

In the portfolio analysis that examines the liquidity premium, and in the investigation of the determinants of liquidity, the monthly average Amihud's (2002) measure ($IL_{m,i}$) for each stock i is used. It is calculated as follows:

$$IL_{m,i} = \frac{1}{D_{t,i}} \sum_{i=1}^{D_{t,i}} IL_{d,i} \tag{4-8}$$

where $D_{t,i}$ is the number of days for which data are available for stock i in month t. The larger the price impact of the trade, as a measure in the absolute stock returns per trading volume $IL_{m,i}$, the more illiquid the stock. Hence, Amihud's (2002) measure is also called Amihud's (2002) illiquidity in this study.

To test the cross-sectional regression on the relationship between market liquidity and returns, this study employs the monthly average market Amihud's (2002) measure ($AIL_{m,t}$) as a proxy of market illiquidity calculated as the equally weighted monthly average of Amihud's (2002) measure of individual stock:

$$AIL_{m,t} = \frac{1}{M_t}\sum_{i=1}^{M_t} IL_{m,i} \quad (4\text{-}9)$$

where M_t denotes the number of stocks available in a particular market in month t. A larger value for the average market Amihud's (2002) measure illustrates a lower liquidity (higher illiquidity) in the stock market.

4.3.2 The portfolio analysis

For examining the relationship between liquidity and returns, following Liu (2006), portfolio analysis is employed to investigate whether there is a significant and positive return difference between the portfolio with the lowest liquidity and the portfolio with the highest liquidity. In this study, when the portfolio with the lowest liquidity consistently earns a significantly higher return than the portfolio with the highest liquidity, this is defined as the liquidity premium. Firstly, following Liu (2006), stocks are sorted into five portfolios according to their liquidity measures. Then, the monthly average returns of each portfolio are calculated. If the portfolio with the lowest liquidity outperforms the portfolio with the highest liquidity, a liquidity premium is present. Conversely, if the portfolio with the highest liquidity outperforms the portfolio with the lowest liquidity, a liquidity discount is present.

*For robustness reasons, the investigation next considers whether there is a liquidity premium in portfolios controlled by firm characteristics, namely size and book-to-*market equity ratio. The stocks are sorted into three portfolios by firm characteristics and then in each firm characteristic-sorted portfolio, stocks are subdivided into five portfolios by their liquidity measure. As a result, in each market, 15 portfolios are produced for each controlled firm characteristic. Then, the liquidity premiums of the liquid portfolios controlled by firm characteristics are examined. Additionally, the difference between low and high liquidity portfolios is checked for reliability with an independent sample *t*-test.

4.3.3 The cross-sectional regression analysis

Another methodology used to examine the ability of liquidity to expalin equity returns is cross-sectional regression analysis. Firstly, this study begins with a cross-sectional regression of returns on liquidity during the period 1996 to 2007. Then, according to the economic state-based analysis, the cross-sectional analyses are examined in three sub-periods relating to the economic states to ensure the robustness of the pricing of liquidity on equity returns over time. The three sub-periods are the pre-crisis, crisis, and post-crisis periods (see Figure 2-1). Next, to confirm the robustness of results, cross sectional analyses on the market states are carried out. The regressions examine up- and down-markets separately. Following Lakonishok and Shapiro (1986), an up-market month refers to a month when the rate of returns on the market is greater than the risk-free rate and a down-market month refers to a month when the rate of returns on the market is lower than the risk-free rate.

4.3.3.1 The explanatory variables

a) *Fama and French's (1993) three factors*

Following recently published literature such as Liu (2006) and Hearn et al. (2009), a cross-sectional analysis of equity returns on liquidity augmented with the Capital Asset Pricing model (CAPM) and Fama and French (1993) three factor model is carried out to explore the relationship between liquidity and equity returns, since it is mainly reported by previous researchers that these models generally explain equity returns. Therefore, this study adds excess market returns and Fama and French's (1993) zero-net investment portfolios for size and the book-to-market equity ratio into the models to present the market risk, size and book-to-market equity ratio respectively in the cross-sectional regression analysis of equity returns.

b) *Liquidity variables*

Turnover and Amihud's (2002) measure are proxies for liquidity in this study due to the difficulties of collecting deep data on trading activities and trading costs. In the cross-sectional analysis, the equally weighted average of individual turnover (ATO) and the equally weighted average of illiquidity (AIL) are constructed (see Section 4.3.1). Market liquidity measures are used to present market liquidity or as a factor of systematic risk which cannot be diversified.

c) *Regression model*

The previous literature on asset pricing models showed that Fama and French's (1993) three factors are able to explain equity returns but their model cannot explain equity returns perfectly. Thus, this study provides a cross-sectional analysis of equity returns

on alternative liquidity measures and Fama and French's (1993) three factors. To test whether liquidity can explain equity returns, ordinary least square (OLS) regression is used for the investigation. The empirical models for investigating the relationship between liquidity and equity returns are shown as follows:

$$R_t = a + bEMKT_t + sSMB_t + hHML_t + mATO_t + \varepsilon_t \quad (4\text{-}18)$$

$$R_t = a + bEMKT_t + sSMB_t + hHML_t + mAIL_t + \varepsilon_t \quad (4\text{-}19)$$

where R_t denotes the return at month t of stocks in excess of the risk-free rate; $EMKT_t$ is the excess market returns on the risk-free rate; SMB_t refers to the return on the zero-investment portfolio, which is long on small market capitalization (size) stocks and short on big size stocks; HML_t refers to the return on the zero-investment portfolio, which is long on high book-to-market stocks and short on low book-to-market stocks; $ATO_{m,t}$ denotes equally weighted average market turnover; $AIL_{m,t}$ refers to the equally weighted average market illiquidity measured by the Amihud's (2002) measure.

4.4 Methodology used to investigate the relationship between bankruptcy explanatory variables and liquidity

This section demonstrates the methodology used to investigate the ability of bankruptcy explanatory variables to explain liquidity. It begins with a cross-sectional regression of liquidity on bankruptcy explanatory and other variables in the whole period between 1996 and 2007 for each market of ASEAN-5. Then, for robustness reasons, cross-sectional analyses on economic states are carried out. The sample is divided into three sub-periods: pre-crisis, crisis and post-crisis (see Figure 2-1).

Subsequently, a cross-sectional regression of the relationship between the explanatory ability of bankruptcy variables and liquidity in the different market states is examined. Stocks are equally sorted into two groups: up- and down-markets. Following Lakonishok and Shapiro (1986), an up-market month refers to a month when the rate of returns on the market is greater than the risk-free rate and a down-market month refers to a month when the rate of returns on the market is lower than the risk free rate.

There is a further analysis in the examination of the explanatory ability of bankruptcy explanatory variables to determine liquidity in different sectors. Stocks within a sector tend to move together since firms in the same group are affected in similar ways by market and economic conditions. Indonesian stocks are used as a case study since this thesis shows that there is strong evidence for the effect of bankruptcy risk explanatory variables on determining liquidity. According to DATASTREAM, Indonesian stocks are divided into nine sectors: (1) Agriculture, (2) Basic Industry, (3) Construction & Property, (4) Consumer Goods, (5) Manufacturing, (6) Mining, (7) Miscellaneous Industry, (8) Trading & Service and (9) Utility Infrastructure. The methodologies used to analyse the evidence by sector are the same as those used to investigate the evidence from ASEAN-5.

4.4.1 The explanatory variables for analysis

Four bankruptcy explanatory variables based on accounting data are employed in the models, and accompanied by Southeast Asian Index returns, stock price, and firm size. These bankruptcy explanatory variables are: (i) total liabilities to total assets (TLTA), representing the financial leverage or the use of debts of firms, (ii) free cash flow from operations to total assets (FCFTA), representing the productivity of firms' assets, (iii)

earnings before interest and taxes to sales (EBITS), representing the profitability of firms, and (iv) current assets to current liabilities (CACL) representing the ability of firms to repay their short-term debts. Accounting variables are employed as proxies for bankruptcy risk explanatory variables since they are often used in the literature on bankruptcy prediction models. This section provides the literature regarding the bankruptcy explanatory variables used in this study.

4.4.1.1 Total liabilities to total assets (TLTA)

The total liabilities to total asset ratio (TLTA) represents the level of total liabilities of a company compared to the total assets. TLTA is known as the debt ratio since it presents debts' source of finance. This ratio is employed in the bankruptcy risk models of Ohlson (1980), Zmijewski (1984) and Chen et al. (2006). A higher TLTA company refers to a company that has a higher proportion of debt employment than investment in the business. Therefore, higher TLTA firms have a higher possibility of bankruptcy since they have to bear the repayable risk on principals and interests. Nevertheless, Modigliani and Miller (1958) stated in their Proposition II that a higher leverage amount could increase the growth of firms.

4.4.1.2 Free cash flow from operations to total assets (FCFTA)

The free-cash-flow-from-operations to total assets ratio (FCFTA) presents the productivity of a firm's assets. Pompe and Bilderbeek (2005) employed this ratio in their bankruptcy prediction model. Higher FCFTA firms are those with high efficiency in managing their assets. Hence, the higher FCFTA firms have the lower possibility of becoming bankrupt.

4.4.1.3 Earnings before interest and taxes to sales (EBITS)

The earnings before interest and taxes to sales ratio (EBITS) shows the ability of a firm to make a profit. The EBITS is employed in Ugurlu and Aksoy (2006) and Li-Chiu and Tseng-Chung (2006) to predict the possibilities of firms becoming bankrupt. Higher EBITS firms are those firms with a greater ability to make a profit; thus these firms have lower possibilities of becoming as less likely to become bankrupt.

4.4.1.4 Current assets to current liabilities (CACL)

The current assets to current liabilities ratio (CACL) presents a firm's ability to repay its short-term debts. Ohlson (1980), Zmijewski (1984), Chen et al. (2006) and Sun (2007) employed this ratio in their bankruptcy prediction models. Higher CACL firms are those with less chance of becoming bankrupt.

4.4.2 Regression Model

As reported in many previous studies, such as Stoll (1978), Chordia et al. (2000, 2001a) and Hasbrouck and Seppi (2001), a set of variables, i.e., returns, price and size significantly determines liquidity; however, they cannot completely determine liquidity. To examine whether the bankruptcy explanatory variables of firms are able to explain stock liquidity, it is significant to extend these sets of variables into the models. The empirical models are illustrated as follows:

$$\ln(TO) = a + b_1 \ln(TLTA) + b_2 \ln(FCFTA) + b_3 \ln(EBITS)$$

$$+b_4 \ln(CACL) + b_5 \ln(IRSEA) + b_6 \ln(PRICE)$$

$$+b_7 \ln(SIZE) \quad (4\text{-}20)$$

$$\ln(IL) = a + b_1 \ln(TLTA) + b_2 \ln(FCFTA) + b_3 \ln(EBITS)$$

$$+b_4 \ln(CACL) + b_5 \ln(IRSEA) + b_6 \ln(PRICE)$$

$$+b_7 \ln(SIZE) \quad (4\text{-}21)$$

Where TO denotes the turnover rate of stocks i in month t; IL refers to Amihud's (2002) illiquidity measure of stocks i in month t; $TLTA$ refers to the financial leverage ratio, which is the total liabilities to total assets; $FCFTA$ refers to the free cash flow from operations to total assets; $EBITS$ refers to the earnings before interests and taxes (EBIT) to total sales; $CACL$ refers to the current assets to current liabilities; $IRSEA$ refers to the Southeast Asia Index returns calculated from the FTSE/ASEAN Index in month t; $PRICE$ is the monthly average trading price of stock i in month t; and SIZE is the monthly market capitalizations of stock i in month t. All variables are natural log scaled. The data from accounting statements were collected at the fiscal year end of given year T and employed to compute four bankruptcy explanatory variables. Ordinary least square (OLS) regression is used to examine the relationship between bankruptcy explanatory variables and liquidity.

4.4.3 The tests of difference between two coefficients

The reliability of the significance of bankruptcy explanatory variables in determining liquidity in different two groups (up- and down-markets) is investigated when regression of the relationship between the explanatory ability of bankruptcy variables and liquidity in the different market states is examined. To test whether the same explanatory variables of regression analysis in two portfolios determine liquidity significantly and differently, the Z-tests of the difference between two coefficients are provided.

4.4.3.1 Hypotheses on the difference between two coefficients

The regression coefficients of two portfolios can be compared with the testing null hypothesis:

$$H_0: b_1 - b_2 = 0 \qquad (4\text{-}22)$$

where $b_1$is the regression coefficient for portfolio 1, and b_2 is the regression coefficient for portfolio 2. Here, H_0, there is no difference between the two coefficients of the two portfolios. The alternative hypothesis H_1 is that there is a difference between the two coefficients of two portfolios, which it denotes as follows:

$$H_1: b_1 - b_2 \neq 0 \qquad (4\text{-}23)$$

The null hypothesis H_0will be rejected here in favour of the alternative hypothesis H_1if the regression coefficients are different.

4.4.3.2 The Z-test

Clogg et al. (1995) offered the Z-test to examine the difference between the coefficients of regression models in two groups that have the same predictor variables in them. Clogg et al.'s (1995) Z is denoted as follows:

$$Z = \frac{b_1 - b_2}{\sqrt{s_{b1}^2 - s_{b2}^2}} \qquad (4\text{-}24)$$

where b_1 and b_2 are the regression coefficients for portfolio 1 and portfolio 2 respectively, and s_{b1}^2 and s_{b2}^2 are the standard error squares of regression coefficients for portfolio 1 and portfolio 2 respectively.

4.5 Data

The data in this study come from non-financial sector firms in the South East Asian market, comprising Indonesia, Malaysia, the Philippines, Singapore and Thailand for the period January 1996 to December 2007. Financial firms are excluded because financial reporting practices differ between the non-financial and financial sectors. All data were collected from the DATASTREAM database and the items used in this study are presented in Table 4-1 above. A return is the monthly average return calculated from the percentage change of the monthly return index. The monthly Altman's (1968) Z, Ohlson's (1980) O and Vassalou and Xing's (2004) DLI are employed as monthly bankruptcy risk variables.

Size, or the market capitalization, is the share price multiplied by the number of ordinary shares in issue. The daily market values of firms are employed to calculate the monthly average size of firms. Each month, the book-to-market equity ratio (BM) of a

firm, is the last fiscal year's book value of the equity divided by the current month's market value of the equity. Following previous literature such as Vassalou and Xing (2004) and Griffin and Lemmon (2002), firms with a negative BM are excluded from this study because it is difficult to interpret BM portfolios. The stocks in low BM portfolios refer to those with the highest growth potential; however, many negative BM stocks face financial difficulties.

Table 4-1: Summary of DATASTREAM items

Data	DATASTREAM Item
Book value of equity	03501
Current assets	02201
Current liabilities	03101
Earnings before interest and taxes	18191
Free cash flow from operations	04201
Long term debt	03251
Market capitalization/ value	08001
Net income	01751
Number of shares in issue/ outstanding	NOSH
Price	P
Retained earnings	03495
Returns index	RI
Sales	01001
Short term debt & current portion of long term debt	03051
Total assets	02999
Total liabilities	03351
Trading volume	VO
Working capital	03151

The summary statistics of the key variables between 1996 and 2007 which are used in this study are presented in Table 4-2 below. The first row of Table 4-2 shows the monthly average returns between 1996 and 2007 with a range from -3.22 percent in Indonesia to 2.86 percent in the Philippines. The next three rows are the bankruptcy variables, which are calculated by Vassalou and Xing's (2004) DLI, Altman's (1968) Z, and Ohlson's (1980) O models, respectively. A higher DLI, lower Z, or higher O indicates a stock with higher possibilities of becoming bankrupt. The fifth row shows

the average size of stocks or market capitalisation stated in million pounds sterling. The mean size of Singaporean stocks is around twice as big as the mean size of other market stocks. The sixth row presents the book-to-market equity ratio which ranges from 1.02 in Singapore to 14.00 in the Philippines.

Table 4-2: Summary statistics of ASEAN-5, 1996-2007

Country	Indonesia	Malaysia	Philippines	Singapore	Thailand
RETURN	-3.22%	0.34%	2.86%	1.00%	0.96%
DLI	0.069	0.087	0.066	0.085	0.075
Z	1.24	0.58	-0.93	1.25	1.27
O	0.34	0.27	9.23	-0.30	0.04
SIZE	117.40	124.20	105.86	229.30	102.10
BM	2.44	1.27	14.00	1.02	4.00
TO	0.17	0.10	1.41	0.08	0.26
IL	0.0001	0.0135	0.0136	0.0239	0.0043
TLTA	0.64	0.63	1.46	0.55	0.67
FCFTA	0.05	0.44	-0.04	0.04	0.08
EBITS	1.41	-0.37	-1.64	0.14	-0.47
CACL	3.22	2.93	10.10	2.22	1.99

Source: calculated data are collected from DATASTREAM

The turnover rate (TO) is measured as the monthly trading volume divided by the number of shares outstanding in month t. It ranges from 0.08 in Singapore to 1.41 in the Philippines. The Amihud's (2002) measure (IL) varies from 0.0001 in Indonesia to 0.0239 in Singapore. In the ninth row of Table 4-2, the TLTA is calculated by total liabilities to total assets; the highest mean leverage ratio is in the Philippines at 1.46 and it is about three times higher than the lowest mean leverage ratio in Singapore at 0.55. The average free cash flow from operations to total assets (FCFTA) varies from -0.04 in the Philippines to 0.44 in Malaysia. The mean of earnings before interest and taxes to sales (EBITS) ranges from -1.64 in the Philippines to 1.41 in Indonesia. Finally, the last row of Table 4-2 shows that the mean of current ratio or current assets to current liabilities (CACL) ranges from 1.99 in Thailand to 10.10 in the Philippines.

4.6 Summary of methodology and data

This chapter describes the methodology and data used to answer the three main objectives of this research. Data from stock markets in ASEAN-5 between 1996 and 2007 were collected from the DATASTREAM database. To examine the effects of bankruptcy risk and liquidity on equity returns in ASEAN-5 markets, both portfolio and cross-sectional analyses are used in this study. Additionally, to examine the ability of bankruptcy explanatory variables to determine liquidity, cross sectional analyses of ASEAN-5 markets and of sectors are employed. The empirical results regarding the relationship between bankruptcy risk and equity returns are presented in the next chapter. The empirical evidence from the investigation of the relationship between liquidity and equity returns is provided in Chapter Six and the empirical evidence on the ability of bankruptcy explanatory variables to determine liquidity is shown in Chapter Seven.

Chapter 5

BANKRUPTCY RISK AND EQUITY RETURNS

5.1 Introduction

The existing published empirical evidence on the bankruptcy risk- equity return relationship is still conflicting. Some researchers, for instance, Lang and Stulz (1992), Vassalou and Xing (2004) and Chava and Purnanandam (2010), have found a significant and positive relationship between bankruptcy risk and returns while, other researchers, for instance, Dichev (1998), Griffin and Lemmon (2002), Agarwal and Taffler (2002), Garlappi et al. (2008), Campbell et al. (2008) and Avramov et al. (2009), have found a significant and negative relationship between bankruptcy risk and returns. Additionally, some researchers, such as Hussain et al. (2001), Gharghori et al. (2007), and Bystrom et al. (2005), have claimed that there is an insignificant relationship between bankruptcy risk and equity returns.

Interesting, the majority of the previous studies on the relationship between bankruptcy risk and equity returns were carried out in the United Stated and other developed markets. To my knowledge, there is only one study by, Bystrom et al. (2005), that reports on evidence on this topic in an emerging market, i.e. Thailand. Hence, due to the limited evidence on the relationship between bankruptcy risk and returns in ASEAN-5 markets, this chapter investigates whether bankruptcy risk is significantly related to equity returns in the ASEAN-5 markets. Two main methodologies, portfolio and cross-sectional regression analyses, are used in this study. The chapter presents evidence of a bankruptcy premium through a portfolio analysis in Section 5.2. Then,

Section 5.3 provides the empirical results of a cross-sectional analysis of the relationship between bankruptcy risk and equity returns. Finally, Section 5.4 , the summary of the chapter, is presented in the end of the chapter.

5.2 Empirical evidence from portfolio analysis

Following Vassalou and Xing (2004), the first method used to investigate the relationship between bankruptcy risk and equity returns is a portfolio analysis. A significant return difference between portfolios with different degrees of bankruptcy risk would indicate that bankruptcy risk is significantly related to equity returns. The presence of a bankruptcy premium occurs when the highest bankruptcy risk portfolio provides significantly higher returns than the lowest bankruptcy risk portfolio does. A bankruptcy discount is present when the highest bankruptcy risk portfolio provides significantly lower returns than the lowest bankruptcy risk portfolio does.

5.2.1 Performance of bankruptcy-sorted quintiles

The examination of whether portfolios with different bankruptcy risk provide significantly different returns is illustrated in Table 5-1. Altman's (1968) Z-score, Ohlson's (1980) O-score and Vassalou and Xing's (2004) DLI are the proxies for bankruptcy risk. The stocks are sorted into five portfolios based on bankruptcy risk measures. Subsequently, the average returns of each bankruptcy-sorted portfolio are calculated.

The performances of portfolios sorted by Altman's (1968) Z-score are presented in Panel A of Table 5-1. The evidence shows that stocks with higher Z-scores are stocks with lower possibilities of bankruptcy and vice versa. In Panel A, the highest

bankruptcy risk portfolio is Portfolio 1. The results clearly show that there are significant bankruptcy discounts in Indonesia, Malaysia, Singapore and Thailand. In other words, the return of the highest bankruptcy risk portfolio (Portfolio 1) is significantly lower than the lowest bankruptcy risk portfolio (Portfolio 5) at the 1% level in all markets except for the Philippines. Interestingly, in Indonesia, Malaysia and Singapore the movements of the monthly average returns monotonically decrease from the lowest to the highest bankruptcy risk portfolios (Portfolio 5 to Portfolio 1).

Table 5-1: Performance of portfolios sorted by bankruptcy risk measures

	Average returns (%)						
Panel A: Z-sorted portfolios							
Market	1 High	2	3	4	5 Low	High-Low	t-value
Indonesia	-6.759	-1.826	-0.947	-0.238	0.001	-6.76**	-7.29
Malaysia	-1.358	-0.784	-0.405	-0.010	0.455	-1.81**	-4.36
Philippines	-1.790	-1.160	-0.370	0.502	0.437	-2.23	0.97
Singapore	-1.036	0.308	0.316	0.562	1.178	-2.21**	-7.28
Thailand	-1.584	-0.271	0.156	1.140	1.120	-2.70**	-3.8
Panel B: O-sorted portfolios							
Market	1 Low	2	3	4	5 High	High-Low	t-value
Indonesia	0.296	-0.003	-1.052	-2.700	-8.300	-8.60**	-8.25
Malaysia	0.380	0.085	-0.235	-0.729	-1.575	-1.96**	-3.6
Philippines	0.369	0.556	-0.613	-0.540	-2.084	-2.45*	-2.54
Singapore	1.171	0.945	0.556	-0.201	-1.168	-2.34**	-5.79
Thailand	1.210	0.877	0.612	-0.506	-1.683	-2.89**	-3.38
Panel C: DLI-sorted portfolios							
Market	1 Low	2	3	4	5 High	High-Low	t-value
Indonesia	-0.525	-1.402	-1.670	-2.264	-0.669	-0.14	-0.23
Malaysia	-1.371	-0.375	-0.236	-0.292	-0.030	1.34**	4.02
Philippines	-1.028	-0.610	-0.960	-0.229	0.752	1.78**	4.93
Singapore	0.450	0.199	-0.094	0.144	0.704	0.25**	2.74
Thailand	-0.713	0.067	0.031	0.371	0.929	1.64**	5.79

Stocks are sorted into five portfolios by their bankruptcy risk measures, which are Altman's (1968) Z, Ohlson's (1980) O, and Vassalou and Xing's (2004) DLI models. Then, the average returns of each portfolio are computed. When stocks are sorted by Z-scores, Portfolio 1 contains the stocks with the highest bankruptcy risk. When stocks are sorted by O-scores or DLI, Portfolio 5 contains the stocks with the highest bankruptcy risk. 'High-Low' is the return difference between the high and low bankruptcy risk portfolios. Significance at 1% and 5% levels is indicated by ** and * respectively.

The performances of portfolios sorted by O-scores are presented in Panel B of Table 5-1. A higher O-score means a stock has a higher possibility of bankruptcy, and vice versa. In Panel B, the highest bankruptcy risk portfolio is Portfolio 5. There are bankruptcy discounts in all market at a significance level of at least 5%. This implies that the returns of the highest bankruptcy risk portfolios are significantly lower than the returns of the lowest bankruptcy risk portfolio. Moreover, there are monotonic and decreasing movements of returns from the least to the greatest bankruptcy risk portfolios (from Portfolio 1 to Portfolio 5) in all markets except for the Philippines.

Additionally, the weak evidence for a relationship between bankruptcy risk and returns in the Philippines as shown in Panel A and Panel B of Table 5-1 would appear to be caused by a lack of understanding of asset pricing and bankruptcy risk amongst investors; since there are only about 200 stocks traded in the Philippines Stocks Exchange, which is the smallest number among the ASEAN-5 markets, they do not consider bankruptcy risk as a factor expaling equity returns.

The examination of whether there is a return difference between high and low DLI stocks is demonstrated in Panel C of Table 5-1. A high Vassalou and Xing (2004) DLI indicates that a stock has a high possibility of bankruptcy. The stocks in Portfolio 5 are the highest bankruptcy risk stocks. The evidence shows that when DLI is a proxy for bankruptcy risk, there are significant bankruptcy premiums at the 1% significance level in Malaysia, the Philippines, Singapore and Thailand. These results are inconsistent with the results in Panel A and Panel B. In addition, there is a non-monotonic movement of returns from the lowest to highest bankruptcy risk portfolios in all markets.

The findings of the portfolio analysis in Table 5-1 show inconsistent evidence relating to bankruptcy premiums and discounts in ASEAN-5 markets. One of the possible reasons for the conflicting results is the differences in the bankruptcy risk measures used in the analysis. Altman's (1968) Z- and Ohlson's (1980) O-scores are generally calculated from accounting statement-based data and thus tend to show the past bankruptcy risk of firms, while the DLI is calculated from market-based data and mainly provides information on the present prospects of firms. This suggests that the relationship between bankruptcy risk and equity returns can change significantly depending on how bankruptcy risk is measured.

Significant bankruptcy discounts were mainly found in ASEAN-5 markets when the Z-scores and O-scores were used. This supports the mispricing argument of Dichev (1998), Griffin and Lemmon (2002) and Zaretzky and Zumwait (2007) that investors are slow to react to financial distress because they consider data from accounting statements, in which the market value of stocks does not reflect the true value of firms. Significant bankruptcy premiums were found in most ASEAN-5 markets when Vassalou and Xing's (2004) DLI was employed. The DLI tends to show the presences of bankruptcy risk because it is calculated from market-based data and is therefore likely to present the market bankruptcy risk. Therefore, when DLI is used as a bankruptcy risk measure there is a positive relationship between bankruptcy risk and returns. This is consistent with the evidence of Vassalou and Xing (2004) and Chava and Purnanandam (2010) which states that investors expect higher returns in compensation for the bankruptcy risk.

5.2.2 Performance of bankruptcy-sorted quintiles in size-sorted portfolios

To provide robustness in the results, this section examines whether there is a bankruptcy premium in stocks with a similar size. By controlling for firm size, stocks are sorted into three size portfolios by their market capitalizations, and then each size-sorted portfolio is subdivided into five bankruptcy risk portfolios. In each country, 15 bankruptcy-size sorted portfolios are constructed from this process.

Table 5-2: Performance of Z-sorted portfolios controlled by size

	Average Returns (%)						
	Z						
SIZE	1 High	2	3	4	5 Low	High-Low	t-value
Panel A: Indonesia							
1 Small	-28.65	-26.71	-8.17	-5.53	-9.19	-19.46**	-3.97
2	-5.96	-2.69	-1.83	-1.23	-0.66	-5.30**	-5.11
3 Big	-1.83	0.81	0.61	1.11	1.81	-3.64**	-3.84
Panel B: Malaysia							
1 Small	-3.07	-2.28	-1.76	-1.61	-0.97	-2.10**	-4.04
2	-0.98	-0.76	-0.25	0.48	0.58	-1.56	-1.35
3 Big	0.32	0.34	0.88	1.21	1.26	-0.94	0.08
Panel C: Philippines							
1 Small	-2.95	-2.15	-1.89	-0.21	-0.51	-2.44	-1.58
2	-0.88	-0.86	-0.93	0.22	0.46	-1.34	1.34
3 Big	-0.70	0.66	0.21	1.18	1.02	-1.72	-1.23
Panel D: Singapore							
1 Small	-2.74	-0.79	-1.22	-0.45	0.10	-2.83**	-5.21
2	-0.96	0.19	0.51	0.66	1.40	-2.36**	-4.74
3 Big	0.48	1.19	1.60	1.65	1.92	-1.44*	-2.41
Panel E: Thailand							
1 Small	-1.90	-1.67	-0.39	0.13	0.28	-2.18	-1.14
2	-1.60	-0.09	0.27	1.15	1.56	-3.16**	-2.76
3 Big	-0.87	0.17	0.93	1.84	1.52	-2.39	-1.72

Stocks are sorted into three portfolios by their market capitalization (size). Then, in each size-sorted portfolio, stocks are sorted into five portfolios by their Z-scores. Next, the average returns of the Z-size-sorted portfolios are computed. When stocks are sorted by size, Portfolio 3 contains the biggest stocks. When stocks are sorted by Z-scores, Portfolio 1 contains the stocks with the highest bankruptcy risk. 'High-Low' is the return difference between the high and low bankruptcy risk portfolios. Significance at 1% and 5% levels is indicated by ** and * respectively.

By employing Altman's (1968) model as a proxy for bankruptcy risk, each size-sorted portfolio is divided into five portfolios by their Z-scores. The evidence in Table 5-2 illustrates that there are significant bankruptcy discounts in the small stocks of Indonesia, Malaysia and Singapore at the 1% significance level; in the medium stocks of Indonesia, Singapore and Thailand at the 1% significance level; and in the big stocks of Indonesia and Singapore at the 1% and 5% significance levels respectively. Notably, there are significant bankruptcy discounts in Indonesian and Singaporean stocks with all firm sizes at a significance level of at least 5%. In those size portfolios with significant bankruptcy discounts, there are mainly monotonically decreaseing movements of monthly average returns from the lowest to highest bankruptcy risk portfolios.

Next, the investigation of bankruptcy premiums in portfolios sorted by Ohlson's (1980) model is illustrated in Table 5-3. Each of the three size portfolios is divided into five portfolios by their O-scores. The evidence shows that significant bankruptcy discounts exist in the smallest stocks of all markets except for the Philippines at a significance level of at least 5%. Bankruptcy discounts also exist in the medium size stocks of Indonesia and Thailand at the 1% level and in Singapore at the 5% level. In the big stocks, there are significant presences of bankruptcy discounts in Indonesian and Malaysian stocks at the 1% and 5% levels, in the order given. Interestingly, negative return differences between the highest and lowest bankruptcy risk portfolios exist significantly in Indonesian stocks of any size. Additionally, in portfolios with a significant bankruptcy discount, the monthly average returns generally monotonically decrease when the bankruptcy risk is higher.

Table 5-3: Performance of O-sorted portfolios controlled by size

	Average Returns (%)						
	O						
SIZE	1 Low	2	3	4	5 High	High-Low	t-value
Panel A: Indonesia							
1 Small	-5.23	-9.69	-15.69	-15.84	-17.24	-12.01**	-2.65
2	-0.96	-0.65	-1.73	-2.23	-8.29	-7.33**	-4.64
3 Big	1.73	1.61	0.21	0.44	-1.34	-3.07**	-3.07
Panel B: Malaysia							
1 Small	-1.33	-1.53	-1.86	-2.05	-2.93	-1.61*	-2.08
2	0.36	0.26	-0.08	-0.60	-0.72	-1.07	0.33
3 Big	1.07	0.87	0.95	0.86	0.34	-0.73*	2.13
Panel C: Philippines							
1 Small	-0.72	-1.04	-1.43	-1.25	-3.35	-2.63	-1.35
2	0.80	-0.39	-0.56	-0.04	-1.66	-2.46	-1.47
3 Big	0.71	1.26	0.91	0.09	-0.63	-1.34	-1.27
Panel D: Singapore							
1 Small	0.02	-0.31	-0.89	-1.11	-2.83	-2.86**	-4.13
2	1.22	1.03	0.25	-0.01	-0.66	-1.89*	-2.30
3 Big	1.57	1.71	1.34	1.48	0.76	-0.82	-0.70
Panel E: Thailand							
1 Small	0.74	0.17	-1.19	-1.47	-1.90	-2.65**	2.62
2	1.30	0.90	0.78	-0.26	-1.48	-2.78**	-3.83
3 Big	1.54	1.49	1.34	0.19	-1.05	-2.59	-1.75

Stocks are sorted into three portfolios by their market capitalization (size). Then, in each size-sorted portfolio, stocks are sorted into five portfolios by their O-scores. Next, the average returns of O-size-sorted portfolios are computed. When stocks are sorted by size, Portfolio 3 contains the biggest stocks. When stocks are sorted by O-scores, Portfolio 5 contains the stocks with the highest bankruptcy risk. 'High-Low' is the return difference between the high and low bankruptcy risk portfolios. Significance at 1% and 5% levels is indicated by ** and * respectively.

Table 5-4 shows the performance of bankruptcy risk portfolios in size-sorted portfolios in which the Vassalou and Xing (2004) model is a proxy for bankruptcy risk. Each size-sorted portfolio is subdivided into five portfolios by their DLI. A higher DLI indicates a stock with a higher possibility of bankruptcy. Contrary to the results from Table 5-2 and Table 2-3, the evidence in Table 5-4 shows significant bankruptcy premiums. For small stocks, there is a a significant and positive returns difference between the highest and lowest bankruptcy risk portfolios in Malaysia and Singapore at the 1% and 5% levels respectively. For medium size stocks, significant bankruptcy premiums exist in Indonesia, Malaysia, Singapore and Thailand at the 1% significance level. Furthermore, for big stocks, there are significant bankruptcy premiums in Malaysia, the Philippines and Thailand at the 1% significance level.

Table 5-4: Performance of DLI-sorted portfolios controlled by size

	Average Returns (%)						
	DLI						
SIZE	1 Low	2	3	4	5 High	High-Low	t-value
Panel A: Indonesia							
1 Small	-9.10	-14.68	-17.15	-12.56	-8.18	0.92	-0.05
2	-9.41	-1.80	-1.21	-0.22	-0.01	9.41**	8.48
3 Big	0.37	-0.06	0.74	1.51	1.02	0.65	1.41
Panel B: Malaysia							
1 Small	-2.95	-2.02	-2.02	-1.53	-1.30	1.66**	5.44
2	-4.93	0.00	0.66	1.22	1.12	6.05**	13.43
3 Big	-0.42	1.38	0.85	1.85	1.37	1.79**	5.32
Panel C: Philippines							
1 Small	-0.86	-1.24	-2.18	-1.72	-1.53	-0.67	1.30
2	-5.24	-1.24	0.33	1.96	1.32	6.56	-0.49
3 Big	-0.57	-0.81	1.17	1.48	1.21	1.78**	3.29
Panel D: Singapore							
1 Small	-1.29	-1.91	-1.04	-0.45	-0.34	0.95*	2.18
2	-3.22	0.37	0.69	1.30	2.06	5.27**	11.47
3 Big	1.16	1.02	1.12	2.04	1.43	0.27	1.46
Panel E: Thailand							
1 Small	0.22	-0.77	-1.82	-1.01	-0.21	-0.43	-1.42
2	-4.03	0.48	1.37	1.69	1.26	5.29**	8.15
3 Big	-0.64	2.81	0.62	1.94	1.98	2.62**	6.05

Stocks are sorted into three portfolios by their market capitalization (size). Then, in each size-sorted portfolio, stocks are sorted into five portfolios by their DLI. Next, the average returns of DLI-size-sorted portfolios are computed. When stocks are sorted by size, Portfolio 3 contains the biggest stocks. When stocks are sorted by DLI, Portfolio 5 contains the stocks with the highest bankruptcy risk. 'High-Low' is the return difference between the high and low bankruptcy risk portfolios. Significance at 1% and 5% levels is indicated by ** and * respectively.

The findings of the relationship between bankruptcy risk and returns in size-sorted portfolios in Table 5-2, Table 5-3 and Table 5-4 show evidence consistent with the results of bankruptcy quintiles-based analysis. Generally, significant bankruptcy discounts were found in ASEAN-5 markets when Z-scores and O-scores were used, while significant bankruptcy premiums were found when Vassalou and Xing's (2004) DLI was employed. This confirms the suggestion that the relationship between bankruptcy risk and equity returns can change significantly depending on how the bankruptcy risk is measured even after controlling for the firm size.

5.2.3 *Performance of bankruptcy-sorted quintiles in BM-sorted portfolios*

This section considers whether there is a bankruptcy premium within stocks with a similar book-to-market equity ratio (BM) characteristic. To control for BM, the stocks are sorted into three portfolios by their BM, and then each BM-sorted portfolio is divided into five bankruptcy risk portfolios. This procedure provides 15 bankruptcy-BM-sorted portfolios in total for each market.

Table 5-5: Performance of Z-sorted portfolios controlled by BM

	Average Returns (%)						
	Z						
BM	1 High	2	3	4	5 Low	High-Low	t-value
Panel A: Indonesia							
1 Low	-2.24	0.43	0.96	1.63	1.07	-3.31**	-3.29
2	-5.10	-1.46	-1.66	-0.17	-1.42	-3.69*	-2.14
3 High	-14.74	-8.92	-9.21	-4.28	-3.29	-11.45**	-3.75
Panel B: Malaysia							
1 Low	0.94	0.87	1.18	1.31	1.50	-0.56	1.53
2	-0.64	-0.20	-0.43	-0.06	0.09	-0.72	0.33
3 High	-3.31	-2.38	-2.08	-1.67	-1.30	-2.02*	-2.12
Panel C: Philippines							
1 Low	0.59	-0.05	0.79	1.60	1.14	-0.55	0.61
2	-0.46	-0.76	-0.12	0.76	-0.18	-0.28	1.76
3 High	-4.55	-1.80	-2.57	-1.08	-1.28	-3.27**	-2.69
Panel D: Singapore							
1 Low	0.49	1.61	1.89	2.59	2.83	-2.34**	-2.78
2	-0.55	1.11	0.33	0.37	0.84	-1.38**	-3.58
3 High	-1.99	-1.27	-1.75	-1.36	-1.05	-0.94*	-1.99
Panel E: Thailand							
1 Low	0.62	0.76	2.00	2.13	2.33	-1.72	-0.35
2	-0.98	0.16	0.30	1.02	1.19	-2.17**	-2.66
3 High	-3.78	-2.09	-1.00	-0.63	2.00	-5.78**	-3.00

Stocks are sorted into three portfolios by their book-to-market equity ratio (BM). Then, in each BM-sorted portfolio, stocks are sorted into five portfolios by their Z-scores. Next, the average returns of the Z-BM-sorted portfolios are computed. When stocks are sorted by BM, Portfolio 3 contains the stocks with the highest BM. When stocks are sorted by Z-scores, Portfolio 1 contains the stocks with the highest bankruptcy risk. 'High-Low' is the return difference between the high and low bankruptcy risk portfolios. Significance at 1% and 5% levels is indicated by ** and * respectively.

Table 5-5 illustrates the results using Altman's (1968) Z-score as a proxy for bankruptcy risk in the construction of bankruptcy-BM-sorted portfolios. Evidently, there are significant bankruptcy discounts in low BM stocks in Indonesia and Singapore at the 1% level. A significant bankruptcy discount also exists in medium BM stocks in Singapore and Thailand at the 1% significance level, and in Indonesia at the 5% significance level. Interestingly, for stocks with high BM, there are significant and negative return differences in all the markets at a significance level of at least 5%. Moreover, significant bankruptcy discounts are present in Indonesian or Singaporean stocks with all BM levels.

Table 5-6: Performance of O-sorted portfolios controlled by BM

	Average Returns (%)						
	O						
BM	1 Low	2	3	4	5 High	High-Low	t-value
Panel A: Indonesia							
1 Low	2.06	1.48	0.83	-0.65	-3.17	-5.23**	-4.32
2	-0.64	-0.23	-0.88	-2.37	-10.88	-10.25	-1.75
3 High	-2.56	-3.93	-6.75	-10.13	-20.91	-18.35**	-5.34
Panel B: Malaysia							
1 Low	1.44	1.31	1.27	1.22	0.61	-0.83	1.52
2	0.23	0.19	0.15	-0.61	-1.24	-1.47	0.85
3 High	-0.89	-1.37	-1.86	-2.66	-4.09	-3.2**	-5.16
Panel C: Philippines							
1 Low	1.09	1.68	0.77	0.58	-0.16	-1.25	-1.72
2	0.46	0.22	0.25	-0.30	-1.47	-1.93**	-3.26
3 High	-0.53	-1.88	-2.57	-1.87	-4.64	-4.11**	-2.70
Panel D: Singapore							
1 Low	2.78	2.47	2.36	1.82	-0.03	-2.81**	-3.06
2	1.04	0.99	0.87	0.00	-0.83	-1.87*	-2.26
3 High	-0.50	-0.50	-1.28	-2.01	-3.27	-2.76**	-5.66
Panel E: Thailand							
1 Low	2.41	1.74	2.27	0.89	0.56	-1.85	-0.16
2	1.09	1.29	0.52	-0.03	-1.23	-2.32**	-5.63
3 High	0.44	-0.26	-1.07	-3.14	-3.71	-4.15**	-3.42

Stocks are sorted into three portfolios by their book-to-market equity ratio (BM). Then, in each BM-sorted portfolio, stocks are sorted into five portfolios by their O-scores. Next, the average returns of the O-BM-sorted portfolios are computed. When stocks are sorted by BM, Portfolio 3 contains the stocks with the highest BM. When stocks are sorted by O-scores, Portfolio 5 contains the stocks with the highest bankruptcy risk. 'High-Low' is the return difference between the high and low bankruptcy risk portfolios. Significance at 1% and 5% levels is indicated by ** and * respectively.

The performances of bankruptcy-BM-sorted portfolios in which Ohlson's (1980) O-score is used as a bankruptcy measure are presented in Table 5-6. In stocks with low BM, there are significant bankruptcy discounts in Indonesia and Singapore at the 1% significance level. In stocks with medium BM, negative differences between the returns of the highest and lowest bankruptcy risk portfolios are significantly present in the Philippines and Thailand at the 1% significance level and in Singapore at the 5% significance level. Additionally, there are highly significant and the strongest negative differences in the highest BM stocks of all the markets at the 1% significance level.

Table 5-7: Performance of DLI-sorted portfolios controlled by BM

	Average Returns (%)						
	DLI						
BM	1 Low	2	3	4	5 High	High-Low	t-value
Panel A: Indonesia							
1Low	1.09	1.29	0.22	-0.25	-0.22	-1.31	-0.39
2	-2.36	-1.20	-1.57	-1.43	-0.67	1.69	1.44
3High	-11.43	-7.14	-8.27	-5.99	-2.39	9.04**	3.25
Panel B: Malaysia							
1Low	0.79	0.84	1.02	1.33	1.74	0.95**	4.47
2	-1.29	-0.19	-0.16	-0.03	0.20	1.48**	3.26
3High	-5.57	-1.55	-1.72	-1.25	-1.19	4.38**	6.89
Panel C: Philippines							
1Low	0.39	1.57	0.79	0.23	2.37	1.98**	3.73
2	-1.50	-0.36	-0.41	0.44	0.70	2.2**	3.17
3High	-4.14	-2.26	-2.94	-1.51	-0.50	3.64	-0.30
Panel D: Singapore							
1Low	1.91	1.63	2.00	1.51	2.67	0.75**	4.04
2	0.08	0.08	0.06	0.84	1.32	1.24**	3.56
3High	-1.69	-1.69	-1.18	-1.24	-1.00	0.68	1.48
Panel E: Thailand							
1Low	-0.52	1.15	2.01	2.40	2.95	3.47**	5.98
2	-0.42	0.07	0.24	0.85	1.05	1.47**	3.91
3High	-1.71	-2.08	-1.81	-1.33	-0.45	1.27*	2.27

Stocks are sorted into three portfolios by their book-to-market equity ratio (BM). Then, in each BM-sorted portfolio, stocks are sorted into five portfolios by their DLI. Next, the average returns of the DLI-BM-sorted portfolios are computed. When stocks are sorted by BM, Portfolio 3 contains the stocks with the highest BM. When stocks are sorted by DLI, Portfolio 5 contains the stocks with the highest bankruptcy risk. 'High-Low' is the return difference between the high and low bankruptcy risk portfolios. Significance at 1% and 5% levels is indicated by ** and * respectively.

Table 5-7 illustrates the examination of bankruptcy-BM sorted portfolios in which DLI is a proxy for bankruptcy risk. In contrast to the results in Table 5-5 and Table 5-6, there is no significant bankruptcy discount in any market. However, bankruptcy premiums are present. Significant bankruptcy premiums exist in low to medium BM stocks at the 1% significance level in all markets except for Indonesia. In addition, for high BM stocks bankruptcy premiums exist in Indonesia and Malaysia at the 1% significance level and in Thailand at the 5% significance level.

The findings of the relationship between bankruptcy risk and returns in BM-sorted portfolios in Table 5-5, Table 5-6 and Table 5-7 show evidence conssistent with the results in the previous two sections. In general, after controlling for book-to-market equity ratio, significant bankruptcy discounts were found in ASEAN-5 markets when Z-scores and O-scores were used, while significant bankruptcy premiums were found when Vassalou and Xing's (2004) DLI was employed. This confirms the suggestion that the relationship between bankruptcy risk and equity returns can change significantly depending on how the bankruptcy risk is measured.

5.3 Empirical evidence from cross-sectional analysis

By employing cross-sectional regression models, this section answers the question of whether bankruptcy risk can explain equity returns. To investigate precisely whether bankruptcy risk is priced in equity returns, it is necessary to consider other possible variables encountered in cross-sectional analysis. The size and book-to-market equity ratio (BM) of firms are considered. Therefore, the tests of this study present a cross-sectional analysis of equity returns on market risk, size, BM, and alternative bankruptcy risk measures. Model (4-15), Model (4-16) and Model (4-17) are investigated in this section.

5.3.1 The regressions on the whole period

Table 5-8 illustrates the results of cross-sectional tests of excess equity returns on excess market returns (EMKT), size (SMB), book-to-market equity ratio (HML), and alternative bankruptcy variables (ADLI, BMNz, or BMNo) in the whole period between 1996 and 2007.

Panel A of Table 5-8 illustrates the results of the cross-sectional analysis of Model (4-15) in which the average of Vassalou and Xing's (2004) default likelihood indicator (ADLI) is a proxy for market bankruptcy risk. A higher DLI stock indicates a stock with a higher possibility of bankruptcy. The evidence shows that the coefficients of ADLI are positive in Singapore and Thailand at the 1% significance level, and in the Philippines at the 5% significance level. This implies that stocks in those markets with a higher bankruptcy risk (high DLI) earn significantly higher returns, even after controlling for Fama and French's (1993) three factors.

Notably, market risk (EMKT) and firm size (SMB) are able to explain the variation in the excess equity returns at the 1% significance level in all markets. Additionally, there is significance in the book-to-market equity ratio (HML) in the pricing of excess equity returns with a positive relationship in Malaysia and Singapore, and a negative relationship in Thailand at the 1% significance level.

Table 5-8: Bankruptcy risk and equity pricing in the whole period

Panel A: Model (4-15) FF+ADLI						
Market	CONST	EMKT	SMB	HML	ADLI	R-Sq(adj)
Indonesia	-0.007	0.841**	0.158**	0.064	0.194	10.0%
	(-0.75)	(29.94)	(4.29)	(1.53)	(1.4)	
Malaysia	-0.017**	1.076**	-0.026**	0.615**	-0.02	35.8%
	(-10.48)	(161.05)	(-4.05)	(39.01)	(-1.14)	
Philippines	-0.059*	0.907**	-0.071**	0.115	0.964*	1.7%
	(-2.03)	(11.32)	(-3.81)	(1.64)	(2.28)	
Singapore	-0.031**	1.1**	0.505**	0.336**	0.169**	28.5%
	(-10.52)	(91.17)	(28.5)	(17.55)	(5.07)	
Thailand	-0.065**	0.82**	0.345**	-0.068**	0.691**	19.4%
	(-7.68)	(80.05)	(30.14)	(-5.09)	(6.29)	
Panel B: Model (4-16) FF+BMNz						
Market	CONST	EMKT	SMB	HML	BMNz	R-Sq(adj)
Indonesia	0.006**	0.847**	0.151**	0.063	-0.015	10.0%
	(2.68)	(30.62)	(4.15)	(1.49)	(-0.83)	
Malaysia	-0.018**	1.134**	-0.052**	0.604**	-0.187**	36.0%
	(-32.26)	(146.93)	(-7.9)	(38.38)	(-14.8)	
Philippines	0.006	1.056**	-0.044**	-0.011	-0.016	3.4%
	(0.86)	(12.27)	(-2.71)	(-0.17)	(-0.26)	
Singapore	-0.017**	1.114**	0.504**	0.337**	0.045**	28.5%
	(-21.09)	(88.91)	(28.4)	(17.53)	(4.07)	
Thailand	-0.012**	0.831**	0.345**	-0.085**	0.0001	19.3%
	(-10.56)	(68.12)	(28.17)	(-6.35)	(0.01)	
Panel C: Model (4-17) FF+BMNo						
Market	CONST	EMKT	SMB	HML	BMNo	R-Sq(adj)
Indonesia	0.006**	0.85**	0.128**	0.046	0.047*	10.0%
	(2.93)	(30.84)	(3.4)	(1.07)	(2.32)	
Malaysia	-0.017**	0.991**	-0.017**	0.431**	0.338**	36.3%
	(-30.49)	(133.08)	(-2.67)	(24.63)	(23.77)	
Philippines	0.003	0.884**	-0.073**	0.121	0.069	1.7%
	(0.37)	(10.71)	(-3.9)	(1.7)	(1.42)	
Singapore	-0.017**	1.1**	0.492**	0.32**	0.035*	28.4%
	(-20.69)	(91.06)	(27.63)	(14.53)	(2.36)	
Thailand	-0.012**	0.837**	0.349**	-0.084**	-0.024	19.3%
	(-10.73)	(74.69)	(29.4)	(-6.48)	(-1.29)	

This table presents the results from the tests on the Fama and French (1993) size and book-to-market equity ratio factors along with bankruptcy risk measures. EMKT refers to the excess return on the stock market portfolio over the risk-free rate. SMB refers to the return on the zero-investment portfolio, which is long on small market capitalization (size) stocks and short on big size stocks. HML refers to the return on the zero-investment portfolio, which is long on high book-to-market stocks and short on low book-to-market stocks. ADLI presents the average DLI, which is the simple average of the DLI of all firms. Employing Altman's (1968) model to measure the bankruptcy risk, BMNz denotes a zero investment portfolio, which is long on predicted-bankruptcy stocks and short on non-predicted-bankruptcy stocks. Employing Ohlson's (1980) model to measure the bankruptcy risk, BMNo refers to a zero investment portfolio, which is long on predicted-bankruptcy stocks and short on non-predicted-bankruptcy stocks. The estimate period is from January 1996 to December 2007. Significance at the 1% and the 5% levels is indicated by ** and * respectively.

Panel B of Table 5-8 illustrates the examination of Model (4-16) in which BMNz is a proxy for bankruptcy risk. Employing Altman's (1968) model to measure the bankruptcy risk, BMNz denotes returns of a zero investment portfolio, which is long on predicted-to-go-bankruptcy stocks and short on predicted-to-non-bankruptcy stocks. The evidence illustrates that the BMNz is negatively and positively related to the excess equity returns at the 1% level in both Malaysia and Singapore. This implies that the Malaysian stocks with a low bankruptcy risk and Singaporean stocks with a high bankruptcy risk provide significantly higher returns.

There are significances of market risk in the cross-section of excess equity returns with positive relationships in all markets at the 1% significance level. Size is significant to explain returns, with a positive relationship in Indonesia, Singapore and Thailand, and with a negative relationship in Malaysia and the Philippines. Moreover, in Malaysia, Singapore and Thailand, equity returns can be explained by book-to-market equity ratio at the 1% level.

The results of Model (4-17), in which BMNo represents bankruptcy risk, are presented in Panel C of Table 5-8. Employing Ohlson's (1980) model to measure the bankruptcy risk, BMNo refers to the returns of zero investment portfolios, which are long on predicted-bankruptcy-stocks and short on predicted-non-bankruptcy stocks. There are significances of BMNo in the cross-section of excess equity returns in Indonesia and Singapore at the 5% level, and in Malaysia at the 1% level. This implies that stocks in those markets with a higher bankruptcy risk (high O-score) will earn higher returns. Market risk and size are related to excess equity returns in all markets at the 1% level of significance. Furthermore, the book-to-market equity ratio is able to explain the variation in excess equity returns in Malaysia, Singapore, and Thailand at the 1% level.

The results of the cross-sectional analysis on the relationship between bankruptcy risk and equity returns in the whole period are generally consistent with the bankruptcy premiums found in the portfolio analysis when DLI is the bankruptcy risk measure. However, they are generally inconsistent with the results of portfolio analysis when Z- and O-scores are proxies for bankruptcy risk. This confirms the evidence from the portfolio analysis in Section 5.2 that the relationship between bankruptcy risk and equity returns can change significantly depending on how the methodology is used.

5.3.2 The regressions on three economic states

For robustness reasons, this section illustrates the relationship between bankruptcy risk and equity returns by conducting a cross-sectional analysis in different economic states. Unlike Bystrom et al. (2005), the study provides a contribution to the literature on the relationship between liquidity and equity returns by investigating the effect of liquidity on equity returns, controlling for Fama and French (1993) three factor model, in market states based on financial crisis. Firstly, stocks are subdivided into three economic states: pre-crisis, crisis and post-crisis periods (see Figure 2-1). Then, cross-sectional regressions on Model (4-15), Model (4-16) and Model (4-17) are examined.

5.3.2.1 Pre-crisis period

The results of the regression tests on bankruptcy variables (ADLI, BMNz, or BMNo) augmented with excess market returns (EMKT), size (SMB) and book-to-market equity ratio (HML) in the pre-crisis period are presented in Table 5-9. The empirical results of Model (4-15) are reported in Panel A of Table 5-9. Notably, the ADLI is insignificantly related to returns in all markets at the 5% significance level. This

implies that the bankruptcy risk measured by DLI is unimportant in explaining the equity returns in the pre-crisis period.

Table 5-9: Bankruptcy risk and equity pricing in the pre-crisis period

Panel A: Model (4-15) FF+ADLI						
Market	CONST	EMKT	SMB	HML	ADLI	R-Sq(adj)
Indonesia	0.076	0.929**	-0.229	0.466	-1.601	6.9%
	(1.28)	(10.47)	(-1.16)	(1.93)	(-1.3)	
Malaysia	-0.019**	1.101**	0.314**	0.22	0.457	25.6%
	(-3.36)	(22.31)	(6.04)	(1.74)	(1.47)	
Philippines	0.009	0.671**	-0.06**	-0.155**	-0.657	17.2%
	(0.21)	(11.66)	(-6.34)	(-6.56)	(-0.49)	
Singapore	0.006	0.973**	0.628**	0.091	-0.22	30.8%
	(0.3)	(31.19)	(11.63)	(1.7)	(-0.59)	
Thailand	-0.064	0.822**	0.249	0.098	0.746	10.8%
	(-1)	(12.98)	(1.47)	(0.53)	(0.75)	
Panel B: Model (4-16) FF+BMNz						
Market	CONST	EMKT	SMB	HML	BMNz	R-Sq(adj)
Indonesia	-0.001	0.949**	-0.267	0.529*	0.027	6.8%
	(-0.15)	(10.85)	(-1.32)	(2.18)	(0.34)	
Malaysia	-0.017**	1.061**	0.477**	0.153	-0.341**	25.8%
	(-4.88)	(20.41)	(6.41)	(1.22)	(-2.8)	
Philippines	-0.017**	0.87**	0.025	-0.189**	0.018	22.8%
	(-2.89)	(12.3)	(1.37)	(-7.45)	(0.13)	
Singapore	-0.007**	1.015**	0.67**	0.189**	0.025	38.4%
	(-4.58)	(34.69)	(17.55)	(5.19)	(0.6)	
Thailand	-0.017**	0.818**	0.33	0.05	0.073	10.9%
	(-5.56)	(14.65)	(1.88)	(0.27)	(1.77)	
Panel C: Model (4-17) FF+BMNo						
Market	CONST	EMKT	SMB	HML	BMNo	R-Sq(adj)
Indonesia	-0.002	0.927**	-0.316	0.577*	0.093	7.0%
	(-0.3)	(10.5)	(-1.65)	(2.49)	(1.71)	
Malaysia	-0.013**	1.03**	0.248**	0.188	0.266**	25.8%
	(-4.27)	(19.01)	(4.45)	(1.51)	(3.48)	
Philippines	-0.009	0.655**	-0.064**	-0.156**	0.104	17.4%
	(-1.56)	(12.64)	(-6.47)	(-6.76)	(1.31)	
Singapore	-0.006**	1.006**	0.613**	0.149**	0.091	38.4%
	(-3.98)	(38.26)	(10.97)	(3.55)	(1.46)	
Thailand	-0.016**	0.836**	0.25	0.116	0.066	10.8%
	(-5.3)	(15.07)	(1.48)	(0.64)	(0.76)	

This table presents the results from the test on Fama and French's (1993) factors of size and book-to-market equity ratio along with bankruptcy risk measures. EMKT refers to the excess return on the stock market portfolio over the risk-free rate. SMB refers to the return on the zero-investment portfolio, which is long on small market capitalization (size) stocks and short on big size stocks. HML refers to the return on the zero-investment portfolio, which is long on high book-to-market stocks and short on low book-to-market stocks. ADLI presents the average DLI, which is the simple average of the DLI of all firms. Employing Altman's (1968) model to measure the bankruptcy risk, BMNz denotes a zero investment portfolio, which is long on predicted-bankruptcy -stocks and short on non-predicted-bankruptcy stocks. Employing Ohlson's (1980) model to measure bankruptcy risk, BMNo refers to a zero investment portfolio, which is long on predicted-bankruptcy -stocks and short on non-predicted-bankruptcy stocks. The estimate period is from January 1996 to June 1997 for Indonesia, Malaysia, Philippines and Thailand, while the estimate period is January 1996 to December 1997 for Singapore. Significance at the 1% and 5% levels is indicated by ** and * respectively.

There are positive and significant relationships between market risk (EMKT) and equity returns in all markets at the 1% level. The size of firms explains the variation in excess equity returns at the 1% significance level with a positive sign in Malaysia and Singapore and a negative sign in the Philippines. Additionally, there is evidence that the book-to-market equity ratio is a significant factor in the cross-section of excess equity returns in the Philippines at the 1% level. The lower book-to-market stocks in the Philippines will earn higher returns.

Panel B of Table 5-9 illustrates the results of Model (4-16). The BMNz is significant and able to explain excess equity returns only in Malaysia at the 1% level. Due to the negative coefficient of BMNz, Malaysian stocks with a higher bankruptcy risk (lower Z-scores) will earn lower returns.Market risk is positively related to excess equity returns at the 1% level in all markets. There is significance to firm size in the pricing of equity returns in Malaysia and Singapore at the 1% level. The stocks that earned higher returns are the smaller firms in the Malaysian and Singaporean stock markets. The coefficient of HML is positive at a significance level of at least 5% in Indonesia and Singapore and is negative at the Philippines in the 1% level of significance.

Model (4-17), in which BMNo is a proxy for bankruptcy risk, is presented in Panel C of Table 5-9. There is a direct relationship between BMNo and equity returns in Malaysia at the 1% level. Malaysian stocks with a higher bankruptcy risk measured as by O-scores provide higher returns. Furthermore, the positive relationship between market risk and excess equity returns exists in all ASEAN-5 markets at the 1% significance level. Additionally, the smaller Malaysian or Singaporean stocks and the bigger Philippine stocks earn higher returns at the 1% significance level. Moreover, the book-to-market equity ratio is able to explain excess equity returns with a positive

relationship in Indonesia and Singapore and a negative relationship in the Philippines at a significance level of at least 5%.

The evidence from the pre-crisis period shows that generally the alternative bankruptcy variables insignificantly explain returns in all markets except for Malaysia, where positive and negative relationships are present when O-scores and Z-scores are used as bankruptcy risk measures respectively.

5.3.2.2 Crisis period

The results of cross-sectional tests on the Fama and French (1993) model in the crisis period, augmented with bankruptcy variables (ADLI, BMNz, or BMNo), are presented in Table 5-10. By employing DLI as a bankruptcy measure, Panel A of Table 5-10 illustrates that bankruptcy risk is positively related to equity returns in Indonesia at the 1% level significance. This indicates that during a crisis period stocks in Indonesia with a higher bankruptcy risk (higher DLI) will earn higher returns.

There are significances in the market risk in the pricing of equity returns in all markets at the 1% level. Moreover, the size of firms is able to explain the variation in excess equity returns in all markets at a significance level of at least 5%. The evidence suggests that, in a crisis period, the smaller ASEAN-5 stocks, except for the Philippine stocks, will earn higher returns while smaller Philippine stocks will earn lower returns. The book-to-market equity ratio increasingly explains the equity returns in Malaysia, Singapore, and the Philippines at a significance level of at least 5%.

Table 5-10: Bankruptcy risk and equity pricing in the crisis period

Panel A: Model (4-15) FF+ADLI						
Market	CONST	EMKT	SMB	HML	ADLI	R-Sq(adj)
Indonesia	-0.044	0.913**	0.264*	0.000	1.643**	22.5%
	(-1.79)	(14.7)	(2.02)	(0)	(3.18)	
Malaysia	-0.026**	1.043**	0.411**	0.449**	0.071	68.2%
	(-7.94)	(87.8)	(17.26)	(9.04)	(0.99)	
Philippines	0.008	1.032**	-0.076**	0.19*	-0.434	37.3%
	(0.2)	(24.14)	(-2.92)	(2.42)	(-0.72)	
Singapore	-0.034**	1.098**	0.357**	0.454**	0.093	55.4%
	(-3.56)	(23.69)	(9.44)	(7.64)	(0.38)	
Thailand	-0.125	0.836**	0.422**	-0.062	1.543	23.9%
	(-1.49)	(30.16)	(8.17)	(-1.16)	(1.19)	
Panel B: Model (4-16) FF+BMNz						
Market	CONST	EMKT	SMB	HML	BMNz	R-Sq(adj)
Indonesia	0.031**	1**	0.291*	-0.087	0.053	22.0%
	(3.62)	(16.91)	(2.11)	(-0.65)	(1.07)	
Malaysia	-0.025**	1.025**	0.449**	0.449**	0.074*	68.2%
	(-10.43)	(72.32)	(15.9)	(9.05)	(2.57)	
Philippines	-0.019*	1.05**	-0.077**	0.187*	-0.02	37.2%
	(-2.15)	(13.4)	(-2.98)	(2.38)	(-0.34)	
Singapore	-0.031**	1.096**	0.343**	0.495**	0.092**	55.5%
	(-9.69)	(25.7)	(9.14)	(8.11)	(2.73)	
Thailand	-0.028**	0.814**	0.432**	-0.057	0.058	23.9%
	(-4.7)	(21.74)	(8.39)	(-1.07)	(1.17)	
Panel C: Model (4-17) FF+BMNo						
Market	CONST	EMKT	SMB	HML	BMNo	R-Sq(adj)
Indonesia	0.028**	0.979**	0.333**	-0.143	-0.001	22.1%
	(3.31)	(16.92)	(2.58)	(-1.17)	(-1.37)	
Malaysia	-0.022**	0.994**	0.377**	0.269**	0.216**	68.3%
	(-9.08)	(72.69)	(15.54)	(4.74)	(6.47)	
Philippines	-0.021*	1.028**	-0.077**	0.183*	0.000	37.2%
	(-2.32)	(24.33)	(-2.97)	(2.32)	(-0.24)	
Singapore	-0.03**	1.092**	0.324**	0.562**	-0.069	55.4%
	(-9.29)	(25.19)	(7.7)	(6.27)	(-1.65)	
Thailand	-0.026**	0.83**	0.436**	-0.088	0.118	23.9%
	(-4.56)	(28.03)	(8.4)	(-1.52)	(1.12)	

This table presents the results from the test on Fama and French's (1993) factors of size and book-to-market equity ratio along with bankruptcy risk measures. EMKT refers to the excess return on the stock market portfolio over the risk-free rate. SMB refers to the return on the zero-investment portfolio, which is long on small market capitalization (size) stocks and short on big size stocks. HML refers to the return on the zero-investment portfolio, which is long on high book-to-market stocks and short on low book-to-market stocks. ADLI presents the average DLI, which is the simple average of the DLI of all firms. Employing Altman's (1968) model to measure the bankruptcy risk, BMNz denotes a zero investment portfolio, which is long on predicted- to-bankrupt -stocks and short on non-predicted-bankrupt stocks. Employing Ohlson's (1980) model to measure the bankruptcy risk, BMNo refers to a zero investment portfolio, which is long on predicted-bankruptcy -stocks and short on non-predicted-bankruptcy stocks. The estimate periods are from July 1997 to September 1999 for Malaysia and Thailand, from July 1997 to December 1999 for Indonesia and the Philippines, and from January 1998 to December 1999 for Singapore. Significance at the 1% and 5% levels is indicated by ** and * respectively.

Panel B of Table 5-10 illustrates that the coefficients of BMNz in Malaysia and Singapore are positive at the 5% and the 1% levels of significance respectively. This implies that in crisis periods the Malaysian or Singaporean stocks with a higher bankruptcy risk or lower Z-scores will earn lower returns. Market risk is positively related to excess equity returns at the 1% significance level in all markets. Additionally, firm size is able to explain the equity returns in all markets at a significance level of at least 5%. Smaller firms in Indonesia, Malaysia, Singapore, or Thailand, and bigger firms in the Philippines will earn higher returns. The book-to-market equity ratio is priced in the equity returns of Malaysia the Philippines and Singapore at a significance level of least 5%. The evidence shows that the higher book-to-market stocks in those markets will earn higher returns.

The results of Model (4-17) in crisis periods are illustrated in Panel C of Table 5-10. The BMNo is positively related to equity returns at the 1% level in the Malaysian stock market. Therefore, in a crisis period, Malaysian stocks with a higher bankruptcy risk (higher O-scores) will earn higher returns. The evidence shows that market risk and size explain variations in equity returns at the 1% significance level in all markets. Additionally, the significance of the book-to-market equity ratio in pricing equity returns is present in Malaysia, the Philippines and Singapore at a significance level of at least 5%. The stocks in those markets with a higher book-to-market equity ratio provide higher returns. The results from the crisis period show that at least one of the three alternative bankruptcy variables is positively related to equity returns in Indonesia, Malaysia, and Singapore.

5.3.2.3 Post-crisis period

Table 5-11 illustrates the results of equity pricing tests on the bankruptcy risk variable augmented with excess market returns (EMKT), size (SMB) and book-to-market equity ratio (HML) in the post-crisis periods. The equity pricing test results of Model (4-15) are presented in Panel A of Table 5-11. There are positive coefficients of DLI in Malaysia, Singapore and Thailand at the 1% significance level. In post-crisis periods, stocks with a higher bankruptcy risk (higher DLI) in those markets will earn higher returns. Market risk is able to explain the excess equity returns in all markets at the 1% significance level. The significance of size in explaining equity returns exists in all markets at a significance level of at least 5%, except for the Philippine market. Smaller Indonesian, Singaporean or Thai stocks, and bigger Malaysian stocks will earn higher returns. The coefficients of the book-to-market equity ratio in almost all markets are significantly positive at the 1% significance level. Higher book-to-market stocks in ASEAN-5, except for Thailand, earn higher returns.

Panel B of Table 5-11 illustrates the regression results of Model (4-16). There is a negative relationship between BMNz and returns in Indonesia and Malaysia at the 1% significance level, while there is a positive relationship in the Singaporean market at the 1% level. This implies that stocks with a lower bankruptcy risk (higher Z-scores) in Indonesia or Malaysia, and stocks with a higher bankruptcy risk (lower Z-scores) in Singapore will provide significantly higher returns. Market risk is significantly and positively related to excess equity returns in all markets at the 1% significance level. Firm size is able to explain the variations in excess equity returns with a positive relationship at the 1% level in Indonesia, Singapore and Thailand, and with a negative relationship at the 1% level in Malaysia.

Table 5-11: Bankruptcy risk and equity pricing in the post-crisis period

Panel A: Model (4-15) FF+ADLI						
Market	CONST	EMKT	SMB	HML	ADLI	R-Sq(adj)
Indonesia	0.0005	0.742**	0.106*	0.144**	0.075	4.4%
	(0.02)	(15.82)	(2.49)	(3.07)	(0.22)	
Malaysia	-0.041**	1.04**	-0.1**	0.633**	0.226**	19.0%
	(-7.71)	(88.72)	(-14.9)	(37.32)	(4.33)	
Philippines	-0.02	0.967**	-0.07	0.391**	0.375	0.7%
	(-0.19)	(5.72)	(-1.08)	(3)	(0.27)	
Singapore	-0.055**	1.113**	0.597**	0.291**	0.393**	19.5%
	(-7.94)	(72.15)	(24.97)	(11.07)	(5.51)	
Thailand	-0.052**	0.791**	0.27**	-0.162**	0.559**	14.5%
	(-5.27)	(62.39)	(23.88)	(-11.29)	(4.62)	
Panel B: Model (4-16) FF+BMNz						
Market	CONST	EMKT	SMB	HML	BMNz	R-Sq(adj)
Indonesia	0.006*	0.733**	0.102**	0.145**	-0.058**	4.5%
	(2.52)	(15.87)	(2.59)	(3.16)	(-2.88)	
Malaysia	-0.018**	1.09**	-0.116**	0.637**	-0.107**	19.0%
	(-30.71)	(78.79)	(-16.93)	(37.65)	(-6.05)	
Philippines	0.005	1.121**	-0.003	0.155	0.174	1.1%
	(0.4)	(5.28)	(-0.03)	(0.96)	(1.27)	
Singapore	-0.017**	1.131**	0.59**	0.291**	0.055**	19.5%
	(-18.46)	(70.48)	(24.7)	(10.9)	(4.26)	
Thailand	-0.006**	0.804**	0.255**	-0.169**	-0.039	14.4%
	(-5.83)	(58.15)	(20.3)	(-11.27)	(-1.79)	
Panel C: Model (4-17) FF+BMNo						
Market	CONST	EMKT	SMB	HML	BMNo	R-Sq(adj)
Indonesia	0.006*	0.741**	0.098*	0.141**	0.01	4.4%
	(2.57)	(16.04)	(2.34)	(2.95)	(0.34)	
Malaysia	-0.018**	1.03**	-0.096**	0.561**	0.154**	19.0%
	(-29.83)	(87.18)	(-14.38)	(28.47)	(7.61)	
Philippines	0.008	0.951**	-0.085	0.403**	0.015	0.7%
	(0.69)	(5.44)	(-1)	(3.01)	(0.18)	
Singapore	-0.017**	1.115**	0.553**	0.307**	0.033	19.4%
	(-18.35)	(71.63)	(21.96)	(11.47)	(1.62)	
Thailand	-0.007**	0.795**	0.265**	-0.18**	-0.001	14.4%
	(-6)	(54.37)	(21.81)	(-12.92)	(-0.05)	

This table presents the results from the test on Fama and French (1993)'s factors of size and book-to-market equity ratio along with bankruptcy risk measures. EMKT refers to the excess return on the stock market portfolio over the risk-free rate. SMB refers to the return on the zero-investment portfolio, which is long on small market capitalization (size) stocks and short on big size stocks. HML refers to the return on the zero-investment portfolio, which is long on high book-to-market stocks and short on low book-to-market stocks. ADLI presents the average DLI, which is the simple average of the DLI of all firms. Employing Altman's (1968) model to measure the bankruptcy risk, BMNz denotes a zero investment portfolio, which is long on predicted-bankruptcy stocks and short on non-predicted-bankruptcy stocks. Employing Ohlson's (1980) model to measure the bankruptcy risk, BMNo refers to a zero investment portfolio, which is long on predicted-bankruptcy stocks and short on non-predicted-bankruptcy stocks. The estimate periods are from October 1999 to December 2007 for Malaysia and Thailand, and from January 2000 to December 2007 for Indonesia, the Philippines and Singapore. Significance at the 1% and 5% levels is indicated by ** and * respectively.

Furthermore, there are positive relationships between book-to-market equity ratio and equity returns in Indonesia, Malaysia, and Singapore at the 1% level while a negative relationship between book-to-market equity ratio and equity returns at the 1% level is found in Thailand.

Panel C of Table 5-11 presents the equity pricing tests of Model (4-17). Notably, there is a significant and positive relationship between BMNo and equity returns only in Malaysian stocks at the 1% level. Market risk is significantly and positively related to excess equity returns at the 1% level in all markets. There are significant presences of size and book-to-market equity ratio explaining equity returns in almost all markets at a significance level of at least 5% with a mixed relationship between negative and positive signs. The evidence from the post-crisis period shows that at least one of the three alternative bankruptcy variables significantly explain returns in all markets except for the Philippines with different relationship depending on the bankruptcy risk measure used.

The further explanatory evidence in the economic states tests in Table 5-9, Table 5-10, and Table 5-11 shows that a significant relationship between bankruptcy risk and returns exists in Malaysian stocks in pre-crisis periods, in Indonesia, Malaysia, and Singapore during crisis periods, and in almost all ASEAN-5 markets in post-crisis periods. However, the significant observations are mixed between positive and negative relationships subject to the bankruptcy risk model used. This implies that the relationship between bankruptcy risk and equity returns can change significantly depending on the economic state and on how the bankruptcy risk is measured.

5.4 Summary of findings

The previous studies on the effect of bankruptcy risk on equity returns are inconsistent. Moreover, evidence on this topic from emerging markets is rare. Hence, this chapter investigates the relationship between bankruptcy risk and equity returns using evidence from five Southeast Asian markets (ASEAN-5) during the period 1996 to 2007. Three bankruptcy risk models, that is, Altman's (1968) Z-score, Ohlson's (1980) O-score, and Vassalou and Xing's (2004) DLI, are employed as proxies for bankruptcy risk. Using three alternative measures of the probability of bankruptcy, the general findings of the portfolio analysis showed inconsistent evidence concerning bankruptcy premiums and discounts in ASEAN-5 markets. This implies that alternative bankruptcy risk measures provide different relationships between bankruptcy risk and returns.

Significant bankruptcy discounts were mainly found in ASEAN-5 markets when Z-scores and O-scores were used. This is consistent with the mispricing view of Dichev (1998), Griffin and Lemmon (2002) and Zaretzky and Zumwait (2007) that investors are slow to react to financial distress because they consider data from accounting statements, in which the market value of stocks does not reflect the true value of firms. Significant bankruptcy premiums were found when Vassalou and Xing's (2004) DLI was employed. This is consistent with the evidence of Vasalou and Xing (2004) and Chava and Pennandam (2010), who found a positive relationship between bankruptcy risk and returns and explained that the higher expected returns of investors are due to the increases in bankruptcy risk which investors face. Further evidence controlling for size and book-to-market equity ratio gave robustness to the results. The findings of the

portfolio analysis confirm that the relationship between bankruptcy risk and equity returns can change significantly depending on how bankruptcy risk is measured.

The empirical evidence from cross-sectional regression analysis of the periods between 1996 and 2007 generally showed that at least one of the three alternative bankruptcy measures positively explains equity returns in ASEAN-5 markets. ASEAN-5 stocks with a higher bankruptcy risk will earn higher returns, even after controlling for market risk, size and book-to-market equity ratio. This implies that bankruptcy risk is a systematic factor in pricing equity returns in ASEAN-5 markets, and supports the risk-returns paradigm in the previous work of Vassalou and Xing (2004) and Chava and Purnanandam (2010), which found a positive relationship between bankruptcy risk and returns in the United States.

In general, the cross-sectional analysis results are consistent with the bankruptcy premiums found in the portfolio analysis when DLI was the bankruptcy risk measure; however, they are inconsistent with the results of the portfolio analysis when Z-and O-scores were proxies for bankruptcy risk. This suggests that the relationship between bankruptcy risk and equity returns can change significantly depending on how the methodology is used. Additionally, the investigation into the effect of liquidity on equity returns, controlling for Fama and French (1993) three factor model, in market states based on financial crises contributes to the previous literature showing that the relationship between bankruptcy risk and equity returns can change significantly depending on how the methodology is used and economic states. Next, Chapter 6 provides empirical evidence on the relationship between liquidity and equity returns.

Chapter 6

LIQUIDITY AND EQUITY RETURNS

6.1 Introduction

To date, studies on the relationship between liquidity and equity returns have primarily focused on the United States and other developed markets. Most of them, for instance Amihud and Mendelson (1986), Brennan and Subrahmanyam (1996), Datar et al. (1998), Amihud (2002), Pastor and Stambaugh (2003) , Liu (2006) and Korajczyk and Sadka (2008), have reported a negative relationship between liquidity and returns. Stocks with lower liquidity provide higher returns because investors expect higher returns in compensation for lower liquidity. Nevertheless, despite the evidence from the United States, evidence from emerging markets including ASEAN- 5 is rare and still contradictory. There is evidence of both negative (Bekaert et al., 2007; and Zhang et al., 2007) and positive (Jun et al., 2003; and Dey, 2005) relationships between liquidity and returns. Hence, this chapter provides evidence for the liquidity effect on equity returns in ASEAN-5 markets.

The empirical evidence on the relationship between liquidity and equity returns in ASEAN-5 markets during the period 1996 to 2007 is explored using two main methods: portfolio and cross-sectional analyses. Following this section, Section 6.2 reports on the empirical evidence from the portfolio analysis. Section 6.3 illustrates the relationship between equity and equity returns through the cross-sectional analyses. Finally, Section 6.4 provides a summary of the chapter.

6.2 Empirical evidence from portfolio analysis

Following Liu (2006), this section shows an examination of the relationship between liquidity and equity returns from the portfolio analysis. A significant return difference between portfolios with different liquidity would indicate that liquidity is significantly related to equity returns. Turnover (TO) and Amihud's (2002) measure (IL) are used as the liquidity measures. If the portfolio with the lowest liquidity outperforms the portfolio with the highest liquidity, a liquidity premium is present. Conversely, if the portfolio with the highest liquidity outperforms the portfolio with the lowest liquidity, a liquidity discount is present.

6.2.1 Performance of liquidity-sorted quintiles

This section examines whether portfolios with different liquidity provided significantly different returns in ASEAN-5 markets during the period 1996 to 2007. Firstly, stocks are sorted into five portfolios by their liquidity measure. Then, the monthly average returns of each portfolio are computed and presented in Table 6-1. The portfolios, which were sorted by turnover, are illustrated in Panel A of Table 6-1. The higher turnover portfolios contain more liquid stocks. The most liquid portfolio is Portfolio 5. Interestingly, the results show that there is no liquidity premium in any market. In contrast, there are significant liquidity discounts. The returns of the least liquid portfolios are lower than those of the most liquid portfolios in all markets at the 1% significance level. In moving from the portfolio with the highest to the portfolio with the lowest liquidity there are monotonic decreases in monthly average returns in Indonesia, Malaysia, the Philippines, and Singapore. In addition, there is a generally

monotonic decrease in monthly average returns from the most to the least liquid portfolios in Thailand.

Panel B of Table 6-1 shows the performance of IL-sorted portfolios. A higher Amihud's (2002) measure indicates stocks with low liquidity or high illiquidity. The highest IL-sorted portfolios or Portfolio 5, contains the stocks with the lowest liquidity. The results in Panel B are consistent with the results in Panel A; specifically, that there is no liquidity premium in any market. Nevertheless, there are significant liquidity discounts at the 1% level in all markets. This implies that the returns of the least liquid stocks are significantly lower than the returns of the most liquid stocks. Moreover, the monthly average returns from the portfolio with the highest to the portfolio with the lowest liquidity are generally decreasing and monotonic in all markets.

Table 6-1: Performance of portfolios sorted by liquidity measures

				Average returns (%)			
Panel A: Turnover sorted portfolios							
Market	1 Low	2	3	4	5 High	Low-High	t-value
Indonesia	-2.19	-2.01	-1.60	-0.43	1.53	-3.72**	-6.78
Malaysia	-2.08	-1.84	-1.02	0.54	4.24	-6.32**	-20.45
Philippines	-2.00	-1.37	-1.20	-0.09	4.10	-6.1**	-3.52
Singapore	-2.20	-1.47	-0.75	1.31	5.37	-7.57**	-28.15
Thailand	-0.62	-1.16	-0.88	-0.21	4.84	-5.46**	-11.26
Panel B: IL sorted portfolios							
Market	1 High	2	3	4	5 Low	Low-High	t-value
Indonesia	1.88	-0.42	-0.98	-3.70	-12.24	-14.12**	-10.51
Malaysia	1.94	0.46	-0.60	-1.41	-1.99	-3.93**	-13.08
Philippines	-0.68	2.03	0.08	-0.89	-2.00	-1.32**	-3.08
Singapore	4.08	1.53	-0.39	-1.60	-2.65	-6.73**	-25.99
Thailand	2.96	0.53	-0.57	-0.39	-1.83	-4.79**	-10.13

Stocks are sorted into five portfolios by their liquidity measures, which are turnover and Amihud's (2002) measure (IL). Then, the average returns of each portfolio are computed. When stocks are sorted by turnover, Portfolio 5 contains the stocks with the highest liquidity. When stocks are sorted by IL, Portfolio 1 contains the stocks with the highest liquidity. 'Low-High' is the return difference between the low and high liquid portfolios. Significance at the 1% level is indicated by **.

Notably, the evidence from Table 6-1 is inconsistent with the majority of the previous results from the United States market; for instance, Brennan and Subrahmanyam (1996), Datar et al. (1998), Amihud (2002) and Liu (2006), who found a significant liquidity premium. However, the empirical results of this study are consistent with Chordia et al. (2001b), Jun et al. (2003) and Dey (2005). The evidence of liquidity discounts in ASEAN-5 can be explained by the following reasons.

First, the results may arise from the overconfidence of investors. Crodia et al. (1998) and Odean (1998) explained that investors become overconfident when the past return of stock is high; then they will trade more and drive higher turnover. At the same time, their over-optimism causes stock overvaluation. When the stock price is subsequently corrected, there will be negative returns. Therefore, according to this overconfidence hypothesis, one should subsequently observe higher stock returns, higher turnover and lower stock returns.Another potential way to describe their finding on the negative relationship between equity returns and the variability of liquidity is the clientele effect hypothesis of Merton (1987), who stated that stocks with heterogeneous investor following should command lower expected returns. Second, the liquidity discount in ASEAN-5 would supported by the view of Bekaert and Harvey (1995) that risk perceptions in developed and emerging markets are different and therefore cannot be treated similarly for asset pricing.

6.2.2 Performance of liquidity-sorted quintiles in size-sorted portfolios

The investigations into a liquidity premium in stocks of a similar size are illustrated in this section. Stocks are first sorted into three size portfolios by their market capitalizations. The size-sorted Portfolio 3 contains the biggest stocks. Then, each size-

sorted portfolio is divided into five liquidity portfolios. Thus, 15 liquidity-size-sorted portfolios are produced for each country.

Using turnover as a proxy for liquidity, Table 6-2 presents the tests for liquidity premiums. Portfolio 1 contains the stocks with the lowest liquidity. In any size of firm in Malaysia, Singapore and Thailand, the evidence shows that low liquid (low turnover) portfolios provide lower average returns than high liquid (high turnover) portfolios at the 1% significance level. Moreover, liquidity discounts also exist in both small and big stocks in Indonesia and the Philippines at a significance level of at least 5%. Notably, there are significant liquidity discounts in small and big firms in all ASEAN-5 markets.

Table 6-2: Performance of turnover-sorted portfolios controlled by size

	Average Returns (%)						
	TO						
SIZE	1 Low	2	3	4	5 High	Low-High	t-value
Panel A: Indonesia							
1 Small	-19.02	-11.81	-9.75	-7.71	-11.65	-7.37*	-2.51
2	-1.72	-1.75	-2.90	-1.76	-1.83	0.11	-0.57
3 Big	-0.05	0.12	0.74	0.27	5.55	-5.6**	-4.52
Panel B: Malaysia							
1 Small	-2.63	-2.69	-2.37	-1.13	0.69	-3.32**	-9.05
2	-2.10	-1.79	-1.04	0.90	5.18	-7.28**	-11.25
3 Big	-1.24	-0.45	0.29	1.32	6.03	-7.27**	-19.61
Panel C: Philippines							
1 Small	-2.99	-2.43	-1.96	-0.94	3.53	-6.52**	-5.06
2	-1.00	-0.98	-1.07	-1.02	4.73	-5.73	0.97
3 Big	-1.16	-0.37	-0.35	1.29	4.20	-5.36**	-4.48
Panel D: Singapore							
1 Small	-2.64	-2.60	-2.06	-1.07	3.85	-6.49**	-12.00
2	-1.64	-1.77	-0.86	1.33	6.53	-8.17**	-19.34
3 Big	-0.71	-0.06	1.05	2.11	5.40	-6.12**	-15.04
Panel E: Thailand							
1 Small	-1.63	-1.29	-1.40	-1.93	2.66	-4.29**	-7.75
2	-0.37	-0.84	-1.26	-0.34	5.97	-6.34**	-6.84
3 Big	-0.15	-0.51	0.02	0.76	5.48	-5.63**	-7.35

Stocks are sorted into three portfolios by their market capitalization (size). Then, in each size-sorted portfolio, stocks are sorted into five portfolios by their turnover. Next, the average returns of turnover-size-sorted portfolios are computed. When stocks are sorted by size, Portfolio 3 contains the biggest stocks. When stocks are sorted by turnover, Portfolio 5 contains the stocks with highest liquidity. 'Low-High' is the return difference between the low and high liquid portfolios. Significance at the 1% and 5% levels is indicated by ** and *, respectively.

The empirical results on the performance of IL-size sorted portfolios are presented in Table 6-3. Amihud's (2002) IL is used as a liquidity measure. The IL-sorted Portfolio 5 contains the lowest liquid stocks. The findings show that, except for the medium-size Philippine stocks, all ASEAN-5 stocks of any size of firm provide significantly negative differences between stocks with low and high liquidity (high and low trading costs) at a significance level of at least 5%. This is consistent with the results in Table 6-2. Using either turnover or trading costs as a proxy for liquidity, the findings in Table 6-2 and Table 6-3 mainly confirm that ASEAN-5 stocks with low liquidity (low turnover or high trading costs) provide significantly lower returns than those with high liquidity (high turnover or low trading costs).

Table 6-3: Performance of IL-sorted portfolios controlled by size

	Average Returns (%)						
	IL						
SIZE	1 High	2	3	4	5 Low	Low-High	t-value
Panel A: Indonesia							
1 Small	-4.86	-8.22	-10.41	-24.66	-32.94	-28.08**	-5.43
2	0.05	-1.68	-1.10	-2.90	-4.40	-4.45**	-4.09
3 Big	3.22	2.13	0.28	0.22	-0.72	-3.94**	-5.07
Panel B: Malaysia							
1 Small	-0.35	-1.17	-1.93	-2.62	-2.66	-2.32**	-7.37
2	2.25	0.68	-0.31	-1.22	-1.88	-4.13**	-6.75
3 Big	2.82	1.77	0.26	-0.37	-0.37	-3.2**	-8.31
Panel C: Philippines							
1 Small	-3.31	3.94	-0.35	-0.27	-2.01	1.3*	2.23
2	0.89	1.38	0.01	-1.59	-2.00	-2.89	1.00
3 Big	3.09	2.52	0.08	-1.14	-1.69	-4.78**	-4.23
Panel D: Singapore							
1 Small	2.93	-0.21	-1.77	-2.94	-3.21	-6.14**	-11.25
2	6.27	1.11	-0.83	-1.80	-2.36	-8.63**	-21.62
3 Big	3.65	3.49	1.45	-0.15	-1.59	-5.24**	-14.38
Panel E: Thailand							
1 Small	1.42	-0.75	-0.24	-2.08	-2.74	-4.16**	-5.79
2	4.42	0.18	-0.84	-0.43	-0.99	-5.41**	-6.15
3 Big	3.26	1.71	0.32	-0.86	-0.31	-3.57**	-6.56

Stocks are sorted into three portfolios by their market capitalization (size). Then, in each size-sorted portfolio, stocks are sorted into five portfolios by their Amihud's (2002) measure (IL). Next, the average returns of turnover-size-sorted portfolios are computed. When stocks are sorted by size, Portfolio 3 contains the biggest stocks. When stocks are sorted by IL, Portfolio 1 contains the stocks with the highest liquidity. 'Low-High' is the return difference between the low and high liquid portfolios. Significance at the % and 5% levels is indicated by ** and * respectively.

6.2.3 Performance of liquidity-sorted quintiles in BM-sorted portfolios

By controlling for the book-to-market ratio, further examinations of the liquidity effect in BM-sorted portfolios are presented in Table 6-4 and Table 6-5. Firstly, stocks are sorted into three portfolios by their book-to-market equity ratio. The BM-sorted Portfolio 3 contains those stocks with a high book-to-market equity ratio. Next, each of the three BM-sorted portfolios is subdivided into five portfolios. In total, 15 liquidity-BM-sorted portfolios are constructed for each market. Then, the liquidity effect is investigated.

Table 6-4: Performance of turnover-sorted portfolios controlled by BM

	Average Returns (%)						
	TO						
BM	1 Low	2	3	4	5 High	Low-High	t-value
Panel A: Indonesia							
1 Low	0.31	-0.38	0.74	0.95	5.60	-5.29**	-4.65
2	-2.76	-1.94	-1.43	-0.49	-0.52	-2.24**	-3.43
3 High	-6.40	-5.42	-9.66	-6.54	-7.26	0.86	-0.12
Panel B: Malaysia							
1 Low	-1.44	-0.83	0.92	1.95	6.93	-8.37**	-10.16
2	-1.61	-1.57	-0.72	0.51	3.83	-5.44**	-17.67
3 High	-2.71	-2.63	-2.26	-1.87	0.69	-3.4**	-10.09
Panel C: Philippines							
1 Low	0.10	1.05	0.73	1.14	6.77	-6.67**	-4.82
2	-1.60	-0.35	-0.59	-0.58	4.86	-6.46**	-6.14
3 High	-3.00	-3.45	-4.49	-2.49	-0.41	-2.59	0.96
Panel D: Singapore							
1 Low	-1.40	-0.58	1.41	2.94	8.67	-10.07**	-18.16
2	-1.19	-1.07	-0.48	1.14	4.59	-5.78**	-14.24
3 High	-3.08	-2.72	-2.21	-1.00	1.51	-4.59**	-10.25
Panel E: Thailand							
1 Low	-0.53	0.03	-0.12	1.27	9.38	-9.91**	-7.56
2	0.03	-0.15	-0.69	0.25	3.33	-3.3**	-6.08
3 High	-1.71	-1.52	-2.57	-2.23	0.90	-2.61**	-3.87

Stocks are sorted into three portfolios by their book-to-market equity ratio (BM). Then in each BM-sorted portfolio, stocks are sorted into five portfolios by their turnover. Next, the average returns of turnover-BM-sorted portfolios are computed. When stocks are sorted by BM, Portfolio 3 contains the stocks with the highest BM. When stocks are sorted by turnover, Portfolio 5 contains the stocks with the highest liquidity. 'Low-High' is the return difference between the low and high liquid portfolios. Significance at the 1% and 5% levels is indicated by ** and * respectively.

Employing turnover as a liquidity measure, Table 6-4 presents the examination of the liquidity effect in BM-sorted portfolios. Portfolio 1 contains the stocks with the lowest liquidity. The evidence shows that there are liquidity discounts in all BM-sorted portfolios in ASEAN-5 markets, except for Indonesian and Philippine stocks with high book-to-market equity ratio. Stocks in those markets with low liquidity (low turnover) provide lower returns than do stocks with high liquidity at the 1% significance level. Notably, significant liquidity discounts are strongest in the lowest BM portfolios in all ASEAN-5 markets.

Table 6-5: Performance of IL-sorted portfolios controlled by BM

	Average Returns (%)						
	IL						
BM	1 High	2	3	4	5 Low	Low-High	t-value
Panel A: Indonesia							
1 Low	3.68	2.14	0.70	1.14	-4.74	-8.42**	-7.21
2	0.31	-0.39	-1.78	-2.65	-9.04	-9.35**	-6.29
3 High	-4.25	-5.37	-6.21	-15.44	-25.36	-21.11**	-4.16
Panel B: Malaysia							
1 Low	3.32	2.04	0.77	0.08	-0.88	-4.21**	-9.66
2	1.93	0.63	-0.52	-1.18	-1.64	-3.57**	-12.57
3 High	-0.35	-1.31	-2.05	-3.02	-2.76	-2.41**	-9.14
Panel C: Philippines							
1 Low	1.50	4.03	1.00	1.23	1.07	-0.43	0.44
2	-0.32	1.60	-0.01	-0.38	0.01	0.33	1.67
3 High	-4.24	-0.22	-2.41	-3.18	-5.00	-0.76	1.02
Panel D: Singapore							
1 Low	4.74	4.54	1.64	-0.03	-2.01	-6.75**	-13.36
2	3.34	1.50	-0.27	-1.36	-1.19	-4.54**	-11.36
3 High	1.59	-0.83	-1.75	-2.74	-4.44	-6.03**	-13.34
Panel E: Thailand							
1 Low	4.68	3.42	0.39	0.27	-0.64	-5.32**	-4.22
2	2.50	0.59	-0.18	-0.09	-0.80	-3.3**	-6.49
3 High	0.07	-1.88	-1.47	-1.19	-3.32	-3.39**	-6.56

Stocks are sorted into three portfolios by their book-to-market equity ratio (BM). Then in each BM-sorted portfolio, stocks are sorted into five portfolios by their Amihud's (2002) measure (IL). Next, the average returns of turnover-BM-sorted portfolios are computed. When stocks are sorted by BM, Portfolio 3 contains the stocks with the highest BM. When stocks are sorted by IL, Portfolio 1 contains the stocks with the highest liquidity. 'Low-High' is the return difference between the low and high liquid portfolios. Significance at the 1% and 5% levels is indicated by ** and * respectively.

Using Amihud's (2002) measure as a proxy for liquidity, the examinations of the liquidity effect in each BM-sorted portfolio are presented in Table 6-5. Portfolio 5 contains the stocks with the lowest liquidity. The evidence shows that the negative differences between the returns of low and high liquid (high and low trading costs) stocks at the 1% significance level exist in all the BM portfolios of all the markets except for the Philippines. Additionally, the strongest liquidity discount appears in the lowest BM stocks of Malaysia, Singapore and Thailand, and in the highest BM stocks of Indonesia. Using either turnover or trading costs as a liquidity measure, significant liquidity discounts exist in almost all BM-sorted portfolios. The findings in the BM-sorted portfolios of this section are consistent with the results in sections 6.2.1 and 6.2.2.

6.3 Empirical evidence from cross sectional analysis

To investigate the ability of liquidity to explain equity returns, this section starts with the results of the cross-sectional regression on liquidity for the full period of the data. Then, the tests on the pricing of returns on liquidity in three economic periods and two market states are examined to give robustness to the results on the relationship between liquidity and equity returns over time.

6.3.1 The regressions on the whole period

Table 6-6 shows the cross-sectional analysis of equity returns on liquidity and other factors during the period 1996 to 2007. Using turnover as a liquidity measure, Panel A of Table 6-6 presents the cross-sectional regression of equity returns on the average market turnover (ATO) augmented with Fama and French's (1993) three factors.

Interestingly, the results show that there are positive relationships between liquidity (turnover) and equity returns in all markets at a significance level of at least 5%. This implies that those stocks in Southeast Asian markets with low liquidity (low turnover) will earn lower returns than those with high liquidity (high turnover).

In addition, the results in Panel A of Table 6-6 illustrate that excess market returns are significantly priced in all ASEAN-5 markets at the 1% significance level with a direct relationship. Size is able to explain excess equity returns at the 1% significance level in all markets except for Malaysia. Additionally, there is a significant effect of book-to-market equity ratio on pricing equity returns at the 1% level in Indonesia, Malaysia, the Philippines, and Singapore with a mixed relationship. Higher book-to-market stocks in Indonesia, Malaysia and Singapore, and lower book-to-market stocks in the Philippines will earn higher equity returns.

Using Amihud's (2002) measure as a liquidity measure, Panel B of Table 6-6 illustrates the regression on the average market illiquidity (AIL) combined with Fama and French's (1993) three factors. The results are consistent with those in Panel A of Table 6-6. Illiquidity is negatively related to returns in all ASEAN-5 markets except for the Philippines at the 1% significance level. This evidence implies that stocks with high illiquidity (or low liquidity) will earn lower returns. Market risk and size are strongly related to equity returns at the 1% level in all markets. Stocks with a high market risk or small size will provide higher returns. The evidence shows that Indonesian, Malaysian or Singaporean stocks with a higher book-to-market equity ratio and Philippian stocks with a lower book-to-market equity ratio have higher returns at the 1% significance level.

Table 6-6: The regression of market liquidity on equity returns in the whole period

Panel A: Model (4-18)						
Market	CONST	EMKT	SMB	HML	ATO	Adj-R2
Indonesia	0.008	1.289**	0.269**	0.273**	0.008**	12.60%
	(1.89)	(50.81)	(7.33)	(6.44)	(10.29)	
Malaysia	0.023**	1.056**	0.008	0.583**	0.01**	29.50%
	(15.85)	(177.68)	(1.35)	(35.43)	(31.57)	
Philippines	0.128**	1.169**	0.165**	-0.619**	0.016*	0.20%
	(3.27)	(6.48)	(4.47)	(-4.48)	(2.57)	
Singapore	0.021**	1.08**	0.42**	0.361**	0.009**	29.30%
	(13.29)	(111.96)	(29.41)	(23.37)	(26.53)	
Thailand	0.025**	0.88**	0.4**	0.01	0.01**	10.30%
	(9.16)	(68.81)	(26.63)	(0.57)	(18.01)	
Panel B: Model (4-19)						
Market	CONST	EMKT	SMB	HML	AIL	Adj-R2
Indonesia	-0.173**	1.258**	0.286**	0.276**	-0.01**	13.20%
	(-16.66)	(48.81)	(7.76)	(6.44)	(-14.18)	
Malaysia	-0.045**	1.036**	0.054**	0.52**	-0.003**	18.70%
	(-16.58)	(114.87)	(6.16)	(22.2)	(-10.09)	
Philippines	0.141	1.29**	0.18**	-0.673**	0.01	0.20%
	(1.78)	(5.93)	(4.16)	(-4.15)	(1.21)	
Singapore	-0.049**	1.087**	0.436**	0.371**	-0.004**	30.00%
	(-28.8)	(111.85)	(30.38)	(23.81)	(-20.18)	
Thailand	-0.071**	0.884**	0.394**	0.017	-0.006**	9.70%
	(-15.2)	(65.97)	(24.81)	(0.97)	(-12.51)	

This table illustrates the estimations of the models:

$$R_t = a + bEMKT_t + sSMB_t + hHML_t + mATO_t + \varepsilon_t \quad (4\text{-}18)$$

$$R_t = a + bEMKT_t + sSMB_t + hHML_t + mAIL_t + \varepsilon_t \quad (4\text{-}19)$$

where R_t denotes the return at time t of stocks in excess of the risk-free rate, EMKT is the excess market returns on risk-free rate, SMB refers to the return on the zero-investment portfolio, which is long on small market capitalization (size) stocks and short on big size stocks, HML refers to the return on the zero-investment portfolio, which is long on high book-to-market stocks and short on low book-to-market stocks. ATO_t denotes local market turnover. AIL_t refers to the local market illiquidity measured by Amihud's (2002) measure. The estimate period is from January 1996 to December 2007. Significance at the 1% and 5% levels is indicated by ** and * respectively.

Mainly, the results in Table 6-6 show a direct relationship between liquidity and returns in ASEAN-5 markets. This is consistent with Jun et al. (2003) and Dey (2005), who also found a positive relationship in a cross-sectional regression between liquidity (measured as turnover) and equity returns in emerging markets. However, the current findings contradict the microstructure theory that has been supported by many previous empirical findings on developed markets. For instance, Amihud and Mendelson (1986), Brenan and Subrahmanyam (1996), Pastor and Stambaugh (2003), Liu (2006) and Korajczyk and Sadka (2008) show that there is a negative relationship between

liquidity and equity returns in the United States market; since liquidity influences investors' decisions in the efficient markets, then rational investors who invest in the stocks with less liquidity will require higher expected returns to compensate for the higher illiquidity costs.

6.3.2 The regressions on three economic states

The 1997 East Asian Financial Crisis affected the stock markets of ASEAN-5 countries. This section examines whether liquidity is priced in equity returns in different economic states. Unlike Bystrom et al. (2005), this study provides a contribution to the literature on the relationship between liquidity and equity returns by investigating the effect of liquidity on equity returns controlling for Fama and French (1993) three factor model in different economic states. The regression analysis on the relationship between liquidity and equity returns is investigated in three sub-periods: pre-crisis, crisis, and post-crisis (see Figure 2-1) and the results are presented as follows.

6.3.2.1 Pre-crisis period

The cross-sectional regression tests on the relationship between liquidity and equity returns before the 1997 East Asian Financial Crisis are presented in Table 6-7. By measuring liquidity with turnover, the findings on the cross-sectional analysis of equity returns on liquidity and Fama and French's factors in Panel A of Table 6-7 illustrate that turnover (liquidity) is positively and related to equity returns at the 1% significance level in all markets except for Thailand. Market risk is able to explain equity returns with a direct relationship in all markets at the 1% level. The smaller stocks in Malaysia, Singapore, and Thailand will earn higher returns at the 1% level.

The book-to-market equity ratio is priced in equity returns in Indonesia, Malaysia, and Singapore at a significance level of at least 5%.

Table 6-7: The regression of market liquidity on equity returns in the pre-crisis period

Panel A: Model (4-18)						
Market	CONST	EMKT	SMB	HML	ATO	Adj-R2
Indonesia	0.072**	0.751**	-0.288	0.612**	0.017**	5.10%
	(7.91)	(10.54)	(-1.86)	(3.25)	(9.22)	
Malaysia	0.035**	1.067**	0.479**	0.158*	0.016**	29.90%
	(11.87)	(34.46)	(14.67)	(2)	(21.17)	
Philippines	0.106*	0.643*	0.061	0.059	0.023**	0.40%
	(2.51)	(2.08)	(1.57)	(0.67)	(2.92)	
Singapore	0.026**	1.006**	0.672**	0.236**	0.007**	41.10%
	(8.88)	(53.39)	(25.09)	(9.52)	(11.98)	
Thailand	-0.025**	0.919**	0.351**	0.102	-0.001	11.70%
	(-6.8)	(24.72)	(2.95)	(0.79)	(-1.24)	
Panel B: Model (4-19)						
Market	CONST	EMKT	SMB	HML	AIL	Adj-R2
Indonesia	-0.103**	0.736**	-0.335*	0.643**	-0.008**	3.40%
	(-3.63)	(10.16)	(-2.13)	(3.36)	(-4.09)	
Malaysia	-0.031*	1.05**	0.419**	0.294**	-0.002	25.80%
	(-2.46)	(26.23)	(9.94)	(2.9)	(-1.5)	
Philippines	-0.019	0.671*	0.065	0.071	-0.002	0.10%
	(-0.2)	(2.01)	(1.53)	(0.74)	(-0.25)	
Singapore	-0.057**	0.996**	0.645**	0.221**	-0.006**	41.90%
	(-13.4)	(53.48)	(24.28)	(8.99)	(-12.31)	
Thailand	-0.023**	0.928**	0.366**	0.08	-0.0002	12.20%
	(-4.01)	(24.94)	(3.08)	(0.63)	(-0.34)	

This table illustrates the estimations of the models:

$$R_t = a + bEMKT_t + sSMB_t + hHML_t + mATO_t + \varepsilon_t \quad (4\text{-}18)$$

$$R_t = a + bEMKT_t + sSMB_t + hHML_t + mAIL_t + \varepsilon_t \quad (4\text{-}19)$$

where R_t denotes the return at time t of stocks in excess of the risk-free rate, EMKT is the excess market returns on risk-free rate, SMB refers to the return on the zero-investment portfolio, which is long on small market capitalization (size) stocks and short on big size stocks, HML refers to the return on the zero-investment portfolio, which is long on high book-to-market stocks and short on low book-to-market stocks. ATO_t denotes local market turnover. AIL_t refers to the local market illiquidity measured by Amihud's (2002) measure. The estimate period is from January 1996 to June 1997 for Indonesia, Malaysia, the Philippines and Thailand, while the estimate period is January 1996 to December 1997 for Singapore. Significance at the 1% and 5% levels is indicated by ** and * respectively.

Using Amihud's (2002) measure as the liquidity measure, Panel B of Table 6-7 presents the cross-sectional regression on the cross-sectional regression of equity returns on Fama and French's factors, augmented with the liquidity factor. Illiquidity (liquidity) is significantly and negatively (positively) related to equity returns at the 1% level in Indonesia and Singapore. The evidence shows that market risk is priced in all

ASEAN-5 markets at a significance level of at least 5%. There are significant size effects on equity returns in all markets except for the Philippines. In other words, small firms have higher returns than big firms at a significance level of at least 5%. Significant book-to-market effects exist in Indonesia, Malaysia, and Singapore at the 1% level.

6.3.2.2 Crisis period

The cross-sectional analysis of equity returns on liquidity and Fama and French's factors during the crisis period is presented in Table 6-8. Using turnover as a liquidity measure, the regression results of Model (4-18) in Panel A of Table 6-8, show that there is a significant effect of liquidity on equity pricing with a positive relationship in all ASEAN-5 markets during a crisis period at a significance level of at least 5%. Thus, stocks with a higher turnover rate (higher liquidity) will earn higher returns. Furthermore, market risk is an important factor in explaining equity returns in all markets at the 1% level. The evidence shows that at the 1% significance level, stocks with higher returns are the smaller Indonesian, Malaysian, Singaporean, or Thai stocks and the bigger Philippine stocks. Additionally, there is a book-to-market effect in all markets at the 1% level, except for Thailand.

Subsequently, Panel B of Table 6-8 shows the results of the cross-sectional analysis of equity returns on Fama and French's factors augmented with Amihud's (2002) liquidity measure. Amihud's (2002) measure is able to explain the equity returns in all ASEAN-5 markets at the 1% level. In other words, stocks with higher illiquidity (or lower liquidity) in ASEAN-5 markets will earn lower returns. Additionally, the results show the strong significance of market risk in all the markets at the 1% level. It is

evident that small stocks in Indonesia, Malaysia, Singapore, and Thailand, and big stocks in the Philippines earn higher returns at the 1% significance level. In addition, there is a book-to-market effect in all the ASEAN-5 markets at the 1% significance level, except for Thailand.

Table 6-8: The regression of market liquidity on equity returns in the crisis period

Panel A: Model (4-18)						
Market	CONST	EMKT	SMB	HML	ATO	Adj-R2
Indonesia	-0.001	1.476**	0.329**	0.451**	0.005*	20.30%
	(-0.07)	(30.82)	(4.05)	(4.46)	(2.45)	
Malaysia	0.015**	1.016**	0.597**	0.275**	0.011**	67.30%
	(4.57)	(148.65)	(39.9)	(8.81)	(13.32)	
Philippines	0.059**	1.092**	-0.137**	0.51**	0.013**	19.80%
	(4.98)	(33.51)	(-8.65)	(8.5)	(6.63)	
Singapore	0.012*	1.056**	0.319**	0.5**	0.01**	52.70%
	(2.22)	(32.17)	(11.27)	(11.03)	(8.35)	
Thailand	0.04**	0.898**	0.591**	-0.071	0.019**	22.20%
	(4.52)	(40.27)	(13.67)	(-1.58)	(11.03)	
Panel B: Model (4-19)						
Market	CONST	EMKT	SMB	HML	AIL	Adj-R2
Indonesia	-0.212**	1.449**	0.296**	0.517**	-0.013**	21.00%
	(-6.98)	(29.52)	(3.61)	(5.11)	(-6.44)	
Malaysia	-0.048**	1.018**	0.548**	0.27**	-0.003**	65.10%
	(-7.28)	(118.68)	(29.18)	(6.88)	(-3.64)	
Philippines	-0.09**	1.179**	-0.146**	0.545**	-0.009**	21.10%
	(-3.98)	(32.77)	(-8.51)	(8.4)	(-3.79)	
Singapore	-0.066**	1.061**	0.344**	0.5**	-0.005**	53.10%
	(-10)	(32.4)	(12.28)	(11.14)	(-5.95)	
Thailand	-0.138**	0.906**	0.601**	-0.074	-0.012**	23.20%
	(-11.08)	(39.83)	(11.86)	(-1.45)	(-7.92)	

This table illustrates the estimations of the models:

$$R_t = a + bEMKT_t + sSMB_t + hHML_t + mATO_t + \varepsilon_t \quad (4\text{-}18)$$

$$R_t = a + bEMKT_t + sSMB_t + hHML_t + mAIL_t + \varepsilon_t \quad (4\text{-}19)$$

where R_t denotes the return at time t of stocks in excess of the risk-free rate, EMKT is the excess market returns on risk-free rate, SMB refers to the return on the zero-investment portfolio, which is long on small market capitalization (size) stocks and short on big size stocks, HML refers to the return on the zero-investment portfolio, which is long on high book-to-market stocks and short on low book-to-market stocks. ATO_t denotes local market turnover. AIL_t refers to the local market illiquidity measured by Amihud's (2002) measure. The estimate periods are from July 1997 to September 1999 for Malaysia and Thailand, from July 1997 to December 1999 for Indonesia and the Philippines, and from January 1998 to December 1999 for Singapore. Significance at the1% and 5% levels is indicated by ** and * respectively

6.3.2.3 Post-crisis period

Table 6-9 illustrates the cross-sectional analysis on the relationship between liquidity and returns during the post-crisis period. Using turnover as a proxy for liquidity, the results of the regression on Model (4-18) are presented in Panel A of Table 6-9. The evidence shows that there is a positive relationship between liquidity (turnover) and equity returns at the 1% significance level in all ASEAN-5 markets except for the Philippines. There is a direct relationship between market risk and equity returns at a significance level of at least 5% in all countries. The firm size and book-to-market equity ratio explain equity returns in all ASEAN-5 markets.

Using Amihud's (2002) measure as a liquidity measure, Panel B of Table 6-9 presents the cross-sectional analysis results of Model (4-19). Stocks with lower illiquidity (or higher liquidity) earn higher returns at the 1% significance level in all markets except for the Philippines. This is consistent with the results reported in Panel A. Market risk is positively related to equity returns in all markets at a significance level of at least 5%. In all ASEAN-5 markets, the equity returns are significantly explained by firm size and book-to-market equity ratio at a significance level of at least 5%; however, the relationships are mixed.

Interestingly, there is a general consistency between the results obtained by conducting cross-sectional analyses over the whole period and in the windows of the pre-crisis, crisis, and post-crisis periods. There is a direct relationship between equity returns and the alternative measures of liquidity; i.e., stocks with higher liquidity have significantly higher returns.

Table 6-9: The regression of market liquidity on equity returns in the post-crisis period

Panel A: Model (4-18)						
Market	CONST	EMKT	SMB	HML	ATO	Adj-R2
Indonesia	0.003	1.154**	0.287**	0.174**	0.007**	5.20%
	(0.62)	(23.69)	(6.09)	(3.52)	(7.17)	
Malaysia	0.026**	1.034**	-0.107**	0.613**	0.01**	11.50%
	(14.06)	(77.03)	(-15.71)	(29.54)	(25.36)	
Philippines	0.068	1.001*	0.871**	-0.798**	0.012	0.50%
	(1.08)	(2.44)	(8.6)	(-2.82)	(1.24)	
Singapore	0.022**	1.087**	0.482**	0.304**	0.009**	18.50%
	(11.87)	(85.09)	(23.8)	(13.57)	(23.55)	
Thailand	0.032**	0.836**	0.276**	-0.094**	0.009**	4.40%
	(10.03)	(38.18)	(14.49)	(-3.93)	(14.43)	
Panel B: Model (4-19)						
Market	CONST	EMKT	SMB	HML	AIL	Adj-R2
Indonesia	-0.167**	1.114**	0.282**	0.159**	-0.009**	6.40%
	(-14.7)	(22.71)	(5.98)	(3.17)	(-12.43)	
Malaysia	-0.042**	0.963**	-0.032**	0.54**	-0.003**	5.60%
	(-13.35)	(45.94)	(-3.06)	(18.23)	(-8.41)	
Philippines	0.224	1.172*	1.025**	-0.879*	0.024	0.60%
	(1.82)	(2.19)	(8.17)	(-2.42)	(1.9)	
Singapore	-0.046**	1.097**	0.499**	0.321**	-0.004**	18.80%
	(-24.59)	(84.36)	(24.1)	(13.96)	(-16.84)	
Thailand	-0.051**	0.846**	0.277**	-0.091**	-0.005**	3.80%
	(-8.6)	(35.37)	(13.76)	(-3.56)	(-8.25)	

This table illustrates the estimations of the models:

$$R_t = a + bEMKT_t + sSMB_t + hHML_t + mATO_t + \varepsilon_t \quad (4\text{-}18)$$

$$R_t = a + bEMKT_t + sSMB_t + hHML_t + mAIL_t + \varepsilon_t \quad (4\text{-}19)$$

Where R_t denotes the return at time t of stocks in excess of the risk-free rate, EMKT is the excess market returns on risk-free rate, SMB refers to the return on the zero-investment portfolio, which is long on small market capitalization (size) stocks and short on big size stocks, HML refers to the return on the zero-investment portfolio, which is long on high book-to-market stocks and short on low book-to-market stocks. ATO_t denotes local market turnover. AIL_t refers to the local market illiquidity measured by Amihud's (2002) measure. The estimate periods are from October 1999 to December 2007 for Malaysia and Thailand, and from January 2000 to December 2007 for Indonesia, the Philippines, and Singapore. Significance at the 1% and 5% levels is indicated by ** and * respectively.

6.3.3 The regressions on two market states

In this section, the cross-sectional analysis of equity returns on liquidity and Fama and French's factors in up- and down-markets is examined. Following Lakonishok and Shapiro (1986), an up-market month refers to a month when the rate of returns on the market is greater than the risk-free rate and a down-market month refers to a month when the rate of returns on the market is lower than the risk-free rate.

To my knowledge, this study provides the first contribution to the literature on the relationship between liquidity and equity returns by investigating the effect of liquidity on equity returns controlling for Fama and French (1993) three factor model in the different markets states (up and down markets).

Table 6-10 shows the results of the regression on Model (4-18). Panel A of Table 6-10 shows that in up-markets, liquidity (turnover) positively explains variations in equity returns at the 1% significance level in all markets except for the Philippines. It mainly implies that in up-markets stocks with higher liquidity (turnover) will earn higher returns. Additionally, market risk positively explains equity returns during up-markets at the 1% significance level in all ASEAN-5 markets. Besides this, firm size and the book-to-market equity ratio are able to explain equity returns with a positive sign in almost all ASEAN-5 markets.

Panel B of Table 6-10 illustrates the regression results of Model (4-18) in down-markets where the market return is lower than the risk-free rate. The evidence shows that there is a significant relationship between liquidity (turnover) and equity returns at the 1% level in all ASEAN-5 markets, with mixed signs. Stocks with higher liquidity (turnover) in Indonesia, Malaysia and the Philippines, and stocks with lower liquidity (turnover) in Singapore and Thailand, provide higher returns. Notably, the evidence from Singapore and Thailand is different from the general results of ASEAN-5; stocks with higher liquidity (turnover) will earn higher returns. In addition, market risk is increasingly priced equity returns in all markets at the 1% level. Smaller size or higher book-to-market stocks have higher returns at a significance level of at least 5% in almost all ASEAN-5 markets.

Table 6-10: The regression of market liquidity (turnover) on equity returns in two market states

Panel A: Up market						
Market	CONST	EMKT	SMB	HML	ATO	Adj-R2
Indonesia	0.053**	0.804**	0.202**	0.099	0.012**	3.70%
	(8.07)	(14.01)	(4.09)	(1.85)	(12.4)	
Malaysia	0.048**	1.046**	-0.022**	0.576**	0.016**	30.90%
	(26.28)	(123.04)	(-3.76)	(32.01)	(42.47)	
Philippines	0.115	1.261**	0.522**	-1.037**	0.02	0.30%
	(1.46)	(3.31)	(5.89)	(-3.73)	(1.65)	
Singapore	0.06**	1.046**	0.303**	0.412**	0.017**	23.60%
	(22.86)	(55)	(14.99)	(17.43)	(34.84)	
Thailand	0.086**	0.738**	0.381**	0.053*	0.022**	7.60%
	(16.79)	(28.57)	(19.56)	(2.29)	(22.95)	
Panel B: Down market						
Market	CONST	EMKT	SMB	HML	ATO	Adj-R2
Indonesia	-0.008	1.472**	0.34**	0.573**	0.004**	12.50%
	(-1.03)	(35.57)	(6.03)	(7.84)	(3.21)	
Malaysia	-0.005	1.08**	0.637**	0.216**	0.002**	13.30%
	(-1.66)	(71.98)	(22.65)	(5.65)	(4.08)	
Philippines	0.049**	1.023**	-0.019	0.062	0.008**	0.60%
	(2.8)	(8.08)	(-1.36)	(1.17)	(3.19)	
Singapore	-0.017**	1.186**	0.541**	0.28**	-0.001**	15.20%
	(-8.28)	(59.48)	(27.39)	(13.51)	(-2.92)	
Thailand	-0.02**	1.119**	0.412**	0.104	-0.003**	7.20%
	(-6.77)	(45.17)	(9.58)	(1.68)	(-6.17)	

This table illustrates the estimations of the models:

$$R_t = a + bEMKT_t + sSMB_t + hHML_t + mATO_t + \varepsilon_t \quad (4\text{-}18)$$

where R_t denotes the return at time t of stocks in excess of the risk-free rate, EMKT is the excess market returns on risk-free rate, SMB refers to the return on the zero-investment portfolio, which is long on small market capitalization (size) stocks and short on big size stocks, HML refers to the return on the zero-investment portfolio, which is long on high book-to-market stocks and short on low book-to-market stocks. ATO_t denotes local market turnover. The estimate period is from January 1996 to December 2007. An up-market month refers to a month when the rate of returns on the market is greater that the risk-free rate and a down-market month refers to a month when rate of returns on the market is lower than the risk free rate. Significance at the 1% and 5% levels is indicated by ** and * respectively.

Using Amihud's (2002) measure as proxy for liquidity, the cross-sectional analysis results of equity returns on Fama and French's factors augmented with the liquidity factor in up- and down-markets are presented in Table 6-11. Panel A of Table 6-11 shows that in up-markets, stocks with higher illiquidity (or lower liquidity) will earn lower returns at the 1% level in all markets except for the Philippines. This evidence is consistent with the significant and positive relationship between turnover and returns in Panel A of Table 6-10. Furthermore, market risk and size are significant and are able to explain equity returns during up-markets in all ASEAN-5 markets at the 1% level

with a positive relationship. There is a direct relationship between the book-to-market equity ratio and returns in Malaysia and Singapore, and an inverse relationship in the Philippines, at the 1% level.

Table 6-11: The regression of market liquidity (AIL) on equity returns in two market states

Panel A: Up market						
Market	CONST	EMKT	SMB	HML	AIL	Adj-R2
Indonesia	-0.171**	0.85**	0.259**	0.084	-0.011**	3.80%
	(-12.41)	(14.68)	(5.2)	(1.55)	(-12.59)	
Malaysia	-0.058**	1.079**	0.028**	0.516**	-0.004**	16.80%
	(-15.88)	(76.96)	(3.01)	(18.15)	(-10.08)	
Philippines	0.236	1.419**	0.591**	-1.185**	0.023	0.30%
	(1.55)	(3.15)	(5.71)	(-3.6)	(1.6)	
Singapore	-0.058**	1.052**	0.361**	0.467**	-0.006**	22.60%
	(-21.05)	(54.09)	(17.55)	(19.19)	(-17.34)	
Thailand	-0.114**	0.807**	0.395**	0.042	-0.011**	6.20%
	(-12.71)	(29.57)	(19.03)	(1.71)	(-13.72)	
Panel B: Down market						
Market	CONST	EMKT	SMB	HML	AIL	Adj-R2
Indonesia	-0.148**	1.437**	0.338**	0.613**	-0.008**	13.10%
	(-8.83)	(34.1)	(5.95)	(8.3)	(-7.53)	
Malaysia	-0.026**	1.065**	0.635**	0.151**	-0.002**	10.20%
	(-6.08)	(52.9)	(17.31)	(3.16)	(-3.73)	
Philippines	-0.028	1.059**	-0.022	0.073	-0.004	0.50%
	(-0.85)	(6.85)	(-1.35)	(1.19)	(-1.22)	
Singapore	-0.032**	1.182**	0.534**	0.284**	-0.003**	15.90%
	(-14.31)	(58.9)	(27.07)	(13.75)	(-10.28)	
Thailand	0.009	1.157**	0.327**	0.23**	0.001**	7.80%
	(1.9)	(44.91)	(7.36)	(3.55)	(3.32)	

This table illustrates the estimations of the models:

$$R_t = a + bEMKT_t + sSMB_t + hHML_t + mAIL_t + \varepsilon_t \quad (4\text{-}19)$$

where R_t denotes the return at time t of stocks in excess of the risk-free rate, EMKT is the excess market returns on risk-free rate, SMB refers to the return on the zero-investment portfolio, which is long on small market capitalization (size) stocks and short on big size stocks, HML refers to the return on the zero-investment portfolio, which is long on high book-to-market stocks and short on low book-to-market stocks. AIL_t refers to the local market illiquidity measured by Amihud's (2002) measure. The estimate period is from January 1996 to December 2007. An up-market month refers to a month when the rate of returns on the market is greater that the risk-free rate and a down-market month refers to a month when rate of returns on the market is lower than the risk free rate. Significance at the 1% and 5% levels is indicated by ** and * respectively.

The cross-sectional analysis of equity returns on Fama and French's factors augmented with Amihud's (2002) measure in down-markets are presented in Panel B of Table 6-11. The evidence shows that stocks with high illiquidity (lower liquidity) in Indonesia, Malaysia, and Singapore, and stocks with low illiquidity (higher liquidity) in Thailand

have higher returns at the 1% significance level. Besides this, market risk is significantly priced in equity returns in all ASEAN-5 markets at the 1% significance level. There are size and book-to-market effects in all ASEAN-5 markets excluding the Philippines at the 1% significance level.

Table 6-10 and Table 6-11 show that the results of the market-based analysis are generally consistent with the findings reported in the economic state-based analysis. Except for very few observations, the relationship between equity returns and alternative liquidity measures is direct across both up- and down-market states.

6.4 Summary of findings

Previous evidence on the relationship between liquidity and equity returns in emerging markets is rare and inconsistent. This chapter aimed to investigate the relationship between liquidity and equity returns in Southeast Asian markets, consisting of Indonesia, Malaysia, the Philippines, Singapore and Thailand, during the period 1996 to 2007. Portfolio and cross-sectional analyses were used to accomplish the aim of this chapter.

Using both turnover and Amihud's (2002) measure as proxies for liquidity, the empirical results of the portfolio analysis consistently and mainly showed that, during the period 1996 to 2007, there were significant liquidity discounts in all ASEAN-5 markets. In other words, stocks with higher liquidity provided higher returns. Using a cross-sectional analysis of equity returns on market liquidity and Fama and French's (1993) factors, the empirical evidence is consistent with that of the portfolio analysis. The findings generally show that ASEAN-5 stocks with higher liquidity provided significantly higher returns during the period 1996 to 2007. Besides this, the current

results contribute to the literature the fact that a direct relationship between liquidity and returns generally exists in all ASEAN-5 markets in all economic states. In addition, the results of the market state analysis generally show consistency with the evidence from the whole period analysis and the economic state analysis. Except for very few observations, ASEAN-5 stocks with higher liquidity have higher returns.

This significant direct relationship between liquidity and equity returns in ASEAN-5 markets is contrary to the microstructure theory that has been supported by many empirical studies in developed markets; for instance, Liu (2006), Korajczyk and Sadka (2008) and Chang et al. (2010). In mature markets, the reason investors invest in stocks with low liquidity is that they wish to earn more returns than those who invest in stock with high liquidity in order to compensate for the higher transaction costs they face. However, the current findings on liquidity discounts are consistent with studies in emerging markets such as Chordia et al. (2001b), Jun et al. (2003) and Dey (2005). The evidence for liquidity discounts in ASEAN-5 results from, first, the overconfidence of investors and, second, risk perceptions in developed and emerging markets being different. In the next chapter, Chapter 7, the relationship between bankruptcy explanatory variables and liquidity is investigated.

Chapter 7

BANKRUPTCY EXPLANATORY VARIABLES AND LIQUIDITY

7.1 Introduction

The topic of the determinants of liquidity has been concentrated on by many researchers, for instance Demsetz (1968), Stoll (1978), Ho and Stoll (1981), Chordia et al. (2000, 2001a) and Hasbrouck and Seppi (2001); however, the number of published studies on the relationship between bankruptcy risk and liquidity is very small. There is only published evidence from Agrawal et al. (2004), who carried out a cross-sectional analysis of the effect of liquidity on firm performance using United States data. Other studies, such as Lesmond (2005) and Harris et al. (2008), have provided a time series pattern of liquidity during difficult financial periods. Due to the lack of evidence on the relationship between bankruptcy risk measure and liquidity in other markets, another question has arisen of whether the bankruptcy explanatory variables of firms can explain variations in liquidity, especially in ASEAN-5 markets.

To answer the question above, this chapter provides an examination of the relationship between bankruptcy explanatory variables and liquidity in ASEAN-5 markets. The remainder of this chapter is organized as follows. Section 7.2 provides empirical evidence on Southeast Asia. Section 7.3 illustrates the empirical evidence by industry, and Section 7.4 offers a summary of this chapter.

7.2 Empirical evidence from Southeast Asia

This section demonstrates the effect of bankruptcy explanatory variables on determining stock liquidity in the Southeast Asian market by means of a cross-sectional analysis of liquidity on bankruptcy explanatory variables augmented with the Southeast Asia Index returns, stock price and firm size. The turnover ratio and Amihud's (2002) measure are used as proxies for the liquidity of stock. The bankruptcy explanatory variables used in this study are (i) total liabilities to total assets (TLTA) representing the financial leverage of a firm; (ii) free cash flow from operations to total assets (FCFTA), representing the efficiency of a firm when employing its assets; (iii) earnings before interest and taxes to sales (EBITS) representing the profitability of a firm; and (iv) current assets to current liabilities (CACL), representing the ability of a firm to repay its short-term debts. The empirical results are presented in the following three sub-sections: Section 7.2.1 offers regressions over the whole period, Section 7.2.2 offers the regressions over three economic states, and Section 7.2.3 offers the regressions over two market states.

7.2.1 The regressions over the whole period

In Table 7-1, the cross-section results of the effect of liquidity on Southeast Asia index returns, stock price, firm size, and bankrupt explanatory variables between 1996 and 2007 are presented. Using turnover as a proxy for liquidity, Panel A of Table 7-1 presents the cross-sectional analysis results of Model (4-20). The higher turnover stocks refer to stocks with higher liquidity. The results generally demonstrate that financial leverage (TLTA), asset efficiency (FCFTA), profitability (EBITS) and the ability to repay short-term debts (CACL) are positively related to liquidity (turnover) at

the 1% significance level in all markets except for the Philippines. In other words, generally speaking ASEAN-5 stocks with higher leverage, higher asset efficiency, higher profitability, or higher ability to repay short-term debts will have higher liquidity. In addition, the return of the Southeast Asia index positively explains the equity returns at the 1% significance level in three out of the five markets. Stock price and size determines the liquidity (turnover) in almost all markets at the 1% level with negative and positive relationships, respectively.

Next, the cross-section analysis of Amihud's (2002) illiquidity on bankrupt explanatory variables and other variables between 1996 and 2007 is presented in Panel B of Table 7-1. Amihud's (2002) measure is employed as a proxy of liquidity. Higher Amihud's (2002) measure values indicate higher trading costs or the higher illiquidity of stocks. The findings show that at least two out of the four bankruptcy explanatory variables determine Amihud's (2002) illiquidity at a significance level of at least 5% in all markets. In general, stocks with higher leverage (TATL), higher asset efficiency (FCFTA), higher ability to repay short-term debts (CACL), or higher profitability (EBITS) tend to have lower illiquidity (higher liquidity). Moreover, any stocks in ASEAN-5 with higher regional index returns or a bigger size of firm have lower illiquidity (higher liquidity) at a significance level of at least 5%. In addition, Malaysian, Philippine, or Singaporean stocks with a higher price and Thai stocks with a lower price, will tend to have lower illiquidity (higher liquidity) at the 1% significance level.

Notably, the results of Model (4-21) in Panel B of Table 7-1 are consistent with those of Model (4-20) in Panel A of Table 7-1. The bankruptcy explanatory variables are mainly able to explain the variations in liquidity, even after controlling for regional

index returns, stock price, and firm size. In general, stocks with higher leverage (TATL), higher asset efficiency (FCFTA), higher ability to repay short-term debts (CACL), or higher profitability (EBITS) have higher liquidity.

Table 7-1: The determinants of liquidity in the whole period

Variables	Indonesia	Malaysia	Philippines	Singapore	Thailand
Panel A: Model (4-20)					
Constant	-0.66**	-2.84**	-5.02**	-4.09**	-2.19**
	(-3.89)	(-42.09)	(-24.27)	(-43.89)	(-21.56)
ln(TLTA)	0.15**	0.49**	0.06	0.37**	1.01**
	(3.04)	(23.89)	(0.97)	(12.67)	(31.11)
ln(FCFTA)	0.21**	0.06**	-0.05	0.24**	0.07**
	(8.07)	(5.6)	(-1.35)	(17.34)	(3.28)
ln(EBITS)	0.25**	0.18**	0.32**	0.12**	0.19**
	(11.54)	(16.56)	(9.76)	(9.39)	(10.84)
ln(CACL)	0.09**	0.23**	-0.08	0.27**	0.64**
	(2.65)	(12.68)	(-1.45)	(11.89)	(23.93)
ln(IRSEA)	0.12**	0.15**	0.03	0.26**	0.02
	(4.65)	(14.24)	(0.77)	(21.06)	(1.29)
ln(PRICE)	-0.73**	0.07**	-0.07**	-0.35**	-0.85**
	(-35.48)	(6.88)	(-2.95)	(-23.68)	(-70.09)
ln(SIZE)	0.62**	0.04**	0.03	0.48**	0.45**
	(39.05)	(6.04)	(1.08)	(39.7)	(42.98)
Adj-R2	21.00%	4.00%	1.90%	12.10%	30.10%
Panel B: Model (4-21)					
Constant	-11.05**	-7.89**	-7.88**	-4.53**	-7.37**
	(-66.66)	(-86.05)	(-44.91)	(-45.77)	(-64.73)
ln(TLTA)	-0.01	-0.18**	-0.07	-0.33**	-0.81**
	(-0.19)	(-6.59)	(-1.33)	(-10.84)	(-22.48)
ln(FCFTA)	-0.04	-0.03*	0.08*	-0.23**	-0.14**
	(-1.43)	(-2.06)	(2.57)	(-15.73)	(-5.73)
ln(EBITS)	-0.16**	-0.1**	-0.25**	-0.11**	0.01
	(-7.87)	(-6.74)	(-9.13)	(-7.96)	(0.46)
ln(CACL)	-0.07*	-0.04	-0.16**	-0.36**	-0.7**
	(-2.13)	(-1.75)	(-3.68)	(-14.65)	(-23.67)
ln(IRSEA)	-0.14**	-0.14**	-0.06*	-0.23**	-0.05*
	(-5.66)	(-9.42)	(-2.13)	(-17.56)	(-2.5)
ln(PRICE)	0.03	-1.07**	-0.27**	-0.08**	0.44**
	(1.64)	(-76.28)	(-13.55)	(-4.85)	(32.63)
ln(SIZE)	-1.41**	-0.32**	-0.66**	-1.39**	-1.45**
	(-91.66)	(-33.19)	(-30.51)	(-107.33)	(-125.13)
Adj-R2	60.30%	27.90%	45.90%	61.20%	52.10%

This table presents the estimation of the models:

$$\ln(TO) = a + b_1 \ln(TLTA) + b_2 \ln(FCFTA) + b_3 \ln(EBITS) + b_4 \ln(CACL) + b_5 \ln(IRSEA) + b_6 \ln(PRICE) + b_7 \ln(SIZE) \quad (4\text{-}20)$$

$$\ln(IL) = a + b_1 \ln(TLTA) + b_2 \ln(FCFTA) + b_3 \ln(EBITS) + b_4 \ln(CACL) + b_5 \ln(IRSEA) + b_6 \ln(PRICE) + b_7 \ln(SIZE) \quad (4\text{-}21)$$

Where, *TO* denotes turnover rate. *IL* refers to the illiquidity level (trading cost) measured by Amihud's (2002) measure. *TLTA* refers to the financial leverage ratio which is the total liabilities to total assets. *FCFTA* refers to the free cash flow from operations to total assets. *EBITS* refers to the earnings before interests and taxes (EBIT) to total sale. *CACL* refers to the current assets to current liabilities. *IRSEA* refers to the Southeast Asia Index returns. *PRICE* is the daily average trading price in a month and SIZE is the monthly market capitalizations. All variables are natural log scaled. The estimate period is from January 1996 to December 2007. Significance at the 1% and 5% levels is indicated by ** and * respectively.

The results in Table 7-1 generally show that increases in a firm's financial leverage (TLTA), asset efficiency (FCFTA), profitability (EBITS), or ability to repay short-term debts (CACL) will lead to increases in market liquidity. This empirical evidence supports the results of the previous study of Agrawal et al. (2004), which found that United States firms with better financial performances have higher liquidity.

The positive relationship between a firm's financial performance (bankruptcy risk) and liquidity (illiquidity) is consistent with Agrawal et al. (2004). They stated that the positive (negative) relationship between illiquidity (liquidity) and bankruptcy risk of firms is explained by an increase in the proportion of informed and specialist investors relative to uninformed investors. This will increase the adverse selection problem faced by market markers or dealers since they generally expect to profit in their transactions with uninformed traders and expect lose in trades to informed investors. The dealers will respond by widening their spreads to ensure that their profits from uninformed traders cover the losses. In addition, the negative relationship between bankruptcy risk and liquidity could be explained by the inventory paradigm of Demsetz (1968), Stoll (1978) and Ho and Stoll (1981). They stated that the factors that reduce the inventory risk would lead to increases in liquidity; therefore, stock with a lower bankruptcy risk would reduce the inventory risk of investors and increase liquidity.

Notably, the evidence that firms with higher financial leverage (TLTA) increase their liquidity (turnover) supports the theory of Modigliani and Miller (1958), who stated that an increase in the amount of debts should lead to an increase in the growth opportunities of firms; therefore, this would explain why stocks with higher leverage have higher liquidity.

7.2.2 The regressions over three economic states

Among previous studies there is no published study on the explanatory ability of bankruptcy explanatory variables to explain alternative liquidity variables in three economic states. To explore this gap in the previous literature, this section will provide regressions of liquidity on bankruptcy explanatory variables in three sub-periods divided by the financial crisis period in each market (see Figure 2-1). These are the pre-crisis, crisis and post-crisis periods.

Table 7-2 presents the cross-sectional analysis of liquidity (turnover) and bankruptcy risk explanatory and other variables. Turnover is used as the liquidity measure. The results in Panel A show that, before the crisis period, all four bankruptcy explanatory variables determine turnover (liquidity) with positive relationships in Malaysia and Thailand at a significance level of at least 5%. In addition, two out of the four bankruptcy explanatory variables are able to explain liquidity in Indonesia, the Philippines and Singapore at a significance level of at least 5%.Furthermore, the Southeast Asia Index returns positively explain liquidity at a significance level of at least 5% in Indonesia and Malaysia. There are inverse relationships between the level of price and turnover at the 1% level in all markets except for Malaysia. Size is able to explain the variations in liquidity with a positive relationship in Indonesia, Singapore and Thailand, and a negative relationship in Malaysia, at the 1% level.

Table 7-2: The determinants of turnover in three economic states

Variables	Indonesia	Malaysia	Philippines	Singapore	Thailand
Panel A: Pre-Crisis period					
Constant	3.79**	0.72*	-3.26**	-4.98**	-2.47**
	(7.62)	(2.35)	(-5.43)	(-16.07)	(-9.02)
ln(TLTA)	0.57**	0.65**	0.8**	0.37**	0.79**
	(3.35)	(8.36)	(4.87)	(4.03)	(8.88)
ln(FCFTA)	0.19*	0.13**	0.16	0.2**	0.22**
	(2.09)	(3.24)	(1.62)	(4.05)	(4.48)
ln(EBITS)	0.04	0.13*	0.17	0.01	0.2**
	(0.79)	(2.55)	(1.78)	(0.19)	(4.06)
ln(CACL)	0.23	0.51**	0.3*	0.11	0.65**
	(1.53)	(6.58)	(2.15)	(1.68)	(10.58)
ln(IRSEA)	0.14*	0.18**	-0.08	0.04	-0.05
	(2.22)	(4.43)	(-0.97)	(1.1)	(-1.32)
ln(PRICE)	-1.11**	0.08	-0.27**	-0.74**	-0.82**
	(-19.62)	(1.83)	(-4.14)	(-17.58)	(-26.56)
ln(SIZE)	0.33**	-0.44**	0.12	0.44**	0.49**
	(8.13)	(-12.65)	(1.54)	(11.77)	(17.46)
Adj-R2	37.90%	14.60%	7.60%	17.70%	36.70%
Panel B: Crisis period					
Constant	1.40**	-1.90**	-4.59**	-3.64**	-2.92**
	(4.41)	(-8.86)	(-9.82)	(-11.71)	(-12.91)
ln(TLTA)	1.03**	0.76**	0.56**	0.62**	0.66**
	(6.62)	(9.9)	(3.74)	(6.19)	(8.05)
ln(FCFTA)	0.25**	-0.01	0.02	0.28**	0.18**
	(4.12)	(-0.28)	(0.22)	(6.38)	(3.74)
ln(EBITS)	0.17**	0.36**	0.24**	-0.07	0.02
	(4.2)	(8.35)	(2.95)	(-1.4)	(0.42)
ln(CACL)	0.33**	0.11	0.14	0.21**	0.5**
	(3.54)	(1.59)	(1.14)	(3.34)	(7.33)
ln(IRSEA)	0.10*	0.03	0.09	0.23**	0.12**
	(2.12)	(1.17)	(1.57)	(8.58)	(3.7)
ln(PRICE)	-0.85**	-0.01	-0.33**	-0.39**	-0.85**
	(-17.74)	(-0.3)	(-6.28)	(-9.08)	(-24.21)
ln(SIZE)	0.6**	-0.06*	0.29**	0.45**	0.66**
	(16.84)	(-2.53)	(4.4)	(12.44)	(22.6)
Adj-R2	31.90%	6.70%	6.60%	14.70%	37.10%
Panel C: Post crisis period					
Constant	-2.15**	-2.88**	-4.94**	-4.1**	-2.04**
	(-10.03)	(-38.66)	(-19.55)	(-39.14)	(-16.23)
ln(TLTA)	-0.02	0.47**	0.02	0.37**	1.05**
	(-0.47)	(21.38)	(0.26)	(11.58)	(27.32)
ln(FCFTA)	0.10**	0.08**	-0.08	0.25**	0.03
	(3.45)	(6.64)	(-1.92)	(16.28)	(0.98)
ln(EBITS)	0.23**	0.16**	0.36**	0.14**	0.23**
	(8.4)	(14.00)	(9.54)	(10.07)	(11.01)
ln(CACL)	0.13**	0.26**	-0.03	0.34**	0.62**
	(3.56)	(13.44)	(-0.5)	(12.62)	(19.17)
ln(IRSEA)	0.05	0.17**	0.03	0.25**	0.01
	(1.75)	(14.07)	(0.73)	(16.7)	(0.74)
ln(PRICE)	-0.66**	-0.004	-0.002	-0.33**	-0.85**
	(-27.37)	(-0.32)	(-0.06)	(-19)	(-59.65)
ln(SIZE)	0.62**	0.04**	-0.11**	0.47**	0.41**
	(32.88)	(5.18)	(-3.89)	(34.55)	(33.88)
Adj-R2	18.40%	3.50%	2.80%	12.20%	29.10%

This table presents the estimation of the models:

$$\ln(TO) = a + b_1 \ln(TLTA) + b_2 \ln(FCFTA) + b_3 \ln(EBITS) + b_4 \ln(CACL) + b_5 \ln(IRSEA) + b_6 \ln(PRICE) + b_7 \ln(SIZE) \quad (4\text{-}20)$$

The pre-crisis periods are from January 1996 to June 1997 for Indonesia, Malaysia, the Philippines, and Thailand, and from January 1996 to December 1997 for Singapore. The crisis periods are from July 1997 to September 1999 for Malaysia and Thailand, from July 1997 to December 1999 for Indonesia and the Philippines, and from January 1998 to December 1999 for Singapore. The post-crisis periods are from October 1999 to December 2007 for Malaysia and Thailand, and from January 2000 to December 2007 for Indonesia, the Philippines and Singapore. Significance at the 1% and 5% levels is indicated by ** and * respectively.

Panel B of Table 7-2 shows that in the crisis periods, all four bankruptcy explanatory variables explain the variation of liquidity at the 1% significance level only in Indonesia. In other markets, at least two out of the four bankruptcy explanatory variables positively determine liquidity at a significance level of at least 5%. In addition, the Southeast Asia Index returns positively determine liquidity at the 1% significance level in Indonesia, Singapore and Thailand. Additionally, there is a significant and inverse relationship between price and liquidity (turnover) at the 1% level in all markets except for Malaysia. Furthermore, smaller stocks in Malaysia and bigger stocks in the rest of the ASEAN-5 markets provide higher returns at the 5% and 1% significance levels respectively. Evidently, all seven independent variables in Model (4-20) explain the turnover variations in Indonesia during the crisis periods at a significance level of at least 5%.

The results for the post-crisis period provided in Panel C of Table 7-2 illustrate that there are significant and positive relationships between all four bankruptcy explanatory variables and liquidity (turnover) at the 1% level in Malaysian and Singaporean stocks. Besides this, at least one out of the four bankruptcy explanatory variables determines stocks' liquidity in Indonesia, the Philippines and Thailand at the 1% significance level. Moreover, the Southeast Asia Index returns are positively related to liquidity at the 1% level in Malaysia and Singapore. Stocks in Indonesia, Singapore, and Thailand with a higher price will have lower liquidity (turnover) at the 1% significance level. Firm size is negatively and positively related to liquidity at the 1% level in the Philippines and the rest of ASEAN-5 respectively. Notably, all seven independent variables in Model (4-20) explain the liquidity variations in Singapore after the crisis periods at the 1% significance level.

The cross-sectional analysis of liquidity (trading costs) and bankruptcy explanatory variables and other factors in each market state are illustrated in Table 7-3. Amihud's (2002) measure is a proxy for liquidity. A higher Amihud's (2002) measure indicates stocks with higher illiquidity (lower liquidity). Panel A of Table 7-3 illustrates that at least one out of the four bankruptcy explanatory variables is significant in determining illiquidity (liquidity) with a mainly negative (positive) relationship at a significance level of at least 5% in ASEAN-5 markets excluding the Indonesian market. Furthermore, an increase in the Southeast Asia Index returns provides higher illiquidity (lower liquidity) in Malaysian and Thai stocks at a significance level of at least 5%; and lower illiquidity (higher liquidity) in Indonesian stocks at the 1% level. Stocks with a higher price in Malaysia will have lower illiquidity (higher liquidity), while those in Singapore will provide higher illiquidity (lower liquidity) at the 1% significance level. Additionally, the bigger stocks of ASEAN-5 will provide lower illiquidity (higher liquidity) at the 1% significance level.

The results in Panel B of Table 7-3 show that, during the crisis periods, all four bankruptcy explanatory variables are able to explain liquidity in Indonesia at a significance level of least at 10%. Furthermore, three out of the four bankruptcy explanatory variables significantly and inversely (directly) determine illiquidity (liquidity) in the rest of the ASEAN-5 markets, excluding the Philippines, at a significance level of at least 5%. Additionally, the Southeast Asia Index returns and price are significantly related to illiquidity (liquidity) with a negative (positive) relationship at a significance level of at least 5% in Malaysia, the Philippines and Singapore. Furthermore, bigger stocks in ASEAN-5 determine lower illiquidity (higher liquidity) at the 1% significance level.

Table 7-3: The determinants of IL in three economic states

Variables	Indonesia	Malaysia	Philippines	Singapore	Thailand
Panel A: Pre-Crisis period					
Constant	-11.63**	-8.34**	-7.9**	-3.36**	-4.92**
	(-24.2)	(-30.18)	(-14.02)	(-12.28)	(-17.92)
ln(TLTA)	-0.14	-0.51**	-0.02	-0.26**	-0.66**
	(-0.84)	(-7.23)	(-0.14)	(-3.14)	(-7.4)
ln(FCFTA)	0.09	0.14**	-0.2*	-0.07	0.09
	(1.04)	(4.01)	(-2.15)	(-1.68)	(1.76)
ln(EBITS)	-0.06	0.02	-0.2*	-0.03	-0.24**
	(-1.39)	(0.35)	(-2.32)	(-0.74)	(-4.95)
ln(CACL)	-0.14	-0.42**	-0.06	-0.09	-0.54**
	(-0.96)	(-6.03)	(-0.51)	(-1.63)	(-8.88)
ln(IRSEA)	-0.20**	0.12**	-0.07	-0.02	0.08*
	(-3.20)	(3.14)	(-0.99)	(-0.59)	(2.03)
ln(PRICE)	0.05	-0.34**	-0.1	0.08*	-0.03
	(1.00)	(-8.26)	(-1.73)	(2.02)	(-0.81)
ln(SIZE)	-1.08**	-0.25**	-0.93**	-1.21**	-1.21**
	(-27.67)	(-8.02)	(-12.92)	(-36.64)	(-42.89)
Adj-R2	54.70%	11.70%	49.80%	53.10%	63.30%
Panel B: Crisis period					
Constant	-11.84**	-7.61**	-6.29**	-5.60**	-5.28**
	(-37.58)	(-30.35)	(-14.66)	(-17.97)	(-19.26)
ln(TLTA)	-0.51**	-0.32**	-0.16	-0.78**	-0.51**
	(-3.27)	(-3.59)	(-1.20)	(-7.78)	(-5.1)
ln(FCFTA)	-0.11	0.1*	0.11	-0.21**	0.05
	(-1.75)	(2.11)	(1.42)	(-4.82)	(0.87)
ln(EBITS)	-0.17**	-0.2**	-0.10	-0.03	-0.12*
	(-4.3)	(-3.89)	(-1.30)	(-0.61)	(-2.16)
ln(CACL)	-0.27**	-0.01	-0.08	-0.23**	-0.37**
	(-2.91)	(-0.14)	(-0.72)	(-3.65)	(-4.48)
ln(IRSEA)	-0.07	-0.22**	-0.13*	-0.23**	-0.03
	(-1.62)	(-7.24)	(-2.54)	(-8.49)	(-0.85)
ln(PRICE)	0.04	-0.91**	-0.17**	-0.2**	-0.01
	(0.76)	(-18.21)	(-3.31)	(-4.56)	(-0.31)
ln(SIZE)	-1.28**	-0.29**	-0.99**	-1.16**	-1.27**
	(-36.03)	(-9.86)	(-15.69)	(-31.84)	(-34.57)
Adj-R2	59.50%	23.60%	59.30%	58.40%	55.40%
Panel C: Post crisis period					
Constant	-10.53**	-8.34**	-8.16**	-4.59**	-8.07**
	(-49.25)	(-79.01)	(-37.07)	(-40.75)	(-60.88)
ln(TLTA)	0.06	-0.12**	-0.01	-0.31**	-0.97**
	(1.11)	(-4.01)	(-0.12)	(-9.05)	(-24.23)
ln(FCFTA)	-0.01	-0.06**	0.11**	-0.22**	-0.01
	(-0.45)	(-3.6)	(3.28)	(-13.57)	(-0.49)
ln(EBITS)	-0.11**	-0.12**	-0.28**	-0.12**	-0.13**
	(-3.86)	(-7.39)	(-8.5)	(-8.08)	(-6.12)
ln(CACL)	-0.05	0.02	-0.16**	-0.34**	-0.63**
	(-1.38)	(0.63)	(-2.96)	(-11.74)	(-18.67)
ln(IRSEA)	-0.09**	-0.22**	-0.12**	-0.23**	-0.1**
	(-2.87)	(-12.02)	(-2.89)	(-14.59)	(-4.62)
ln(PRICE)	0.07**	-1.1**	-0.29**	-0.15**	0.44**
	(2.85)	(-69.66)	(-11.94)	(-7.99)	(29.45)
ln(SIZE)	-1.54**	-0.30**	-0.61**	-1.42**	-1.47**
	(-81.31)	(-27.84)	(-23.8)	(-95.82)	(-115.25)
Adj-R2	61.80%	25.20%	42.40%	62.50%	53.80%

This table presents the estimation of the models:

$$\ln(IL) = a + b_1 \ln(TLTA) + b_2 \ln(FCFTA) + b_3 \ln(EBITS) + b_4 \ln(CACL) + b_5 \ln(IRSEA) + b_6 \ln(PRICE) + b_7 \ln(SIZE) \quad (4\text{-}21)$$

The pre-crisis periods are from January 1996 to June 97 for Indonesia, Malaysia, the Philippines, and Thailand, and from January 1996 to December 1997 for Singapore. The crisis periods are from July 1997 to September 1999 for Malaysia and Thailand, from July 1997 to December 1999 for Indonesia and the Philippines, and from January 1998 to December 1999 for Singapore. The post-crisis periods are from October 1999 to December 2007 for Malaysia and Thailand, and from January 2000 to December 2007 for Indonesia, the Philippines, and Singapore. Significance at the 1% and 5% levels is indicated by ** and * respectively.

The results for the post-crisis period provided in Panel C of Table 7-3 illustrate that there are significantly inverse relationships between all four bankruptcy explanatory variables and Amihud's (2002) illiquidity at the 1% level in Singapore. In addition, at least one out of the four bankruptcy explanatory variables determines the liquidity of stocks in the rest of the ASEAN-5 at the 1% significance level. The Southeast Asia Index returns and firm size are negatively related to Amihud's (2002) illiquidity at the 1% level in any ASEAN-5 stock. Indonesian and Thai stocks with a higher price will provide higher illiquidity (lower liquidity) while those in the rest of the ASEAN-5 markets with a lower price at will provide lower illiquidity (higher liquidity) the 1% level. Notably, all seven independent variables in Model (4-21) explain the liquidity variations in Singapore after the crisis period at the 1% significance level.

The results of the economic state-based analysis in Table 7-2 and Table 7-3 are mainly consistent with the findings from the whole period. In general, stocks with higher leverage (TATL), higher asset efficiency (FCFTA), higher ability to repay short-term debts (CACL), or higher profitability (EBITS) have higher liquidity, measured by either turnover or Amihud's (2002) measure, even after controlling for regional index returns, stock price, and firm size. Interestingly, all seven independent variables can explain both turnover and trading costs in Indonesia in the crisis period and in Singapore in the post-crisis period at a significant level of at least 10%.

7.2.3 The regressions over two market states

Since there is a lack of evidence on the explanatory ability of bankruptcy explanatory variables to determine liquidity in different market states in the previous literature, this section contributes to knowledge by providing the first investigation of this issue in

two market states: up- and down-markets. Following Lakonishok and Shapiro (1986), an up-market month refers to a month when the rate of returns on the market is greater than the risk-free rate, and a down-market month refers to a month when the rate of returns on the market is lower than the risk-free rate. The results are illustrated in Table 7-4.

Using turnover as a liquidity measure, Panel A of Table 7-4 shows that at least one of the four bankruptcy explanatory variables is able to explain turnover in both up- and down- markets at a significance level of at least 5%. Particularly, profitability (EBITS) is significantly and positively related to turnover at the 1% level in both up- and down-markets in all the countries. Obviously, in both down- and up-market months, all four bankruptcy explanatory variables are able to explain the turnover of Malaysia and Singapore at the 1% significance level. Additionally, the significances of all four bankruptcy explanatory variables in determining liquidity exist in the up-market months of Thailand. Furthermore, the Southeast Asia Index returns, level of price, and firm size are generally able to explain liquidity at a significance level of at least 5% in ASEAN-5 stocks.

The coefficient difference tests generally show that the explanatory ability of all four bankruptcy explanatory variables to explain turnover in up-markets is similar to that in down-markets, at the 5% significance level in ASEAN-5 markets. There are very few observations; one of the four bankruptcy explanatory variables, FCFTA, explains turnover between down- and up-markets differently at the 5% significance level in Indonesia and Singapore.

Table 7-4: The determinants of liquidity in two market states

	Panel A: Model (4-20)				
	Indonesia	Malaysia	Philippines	Singapore	Thailand
Variables	Down market (1)				
Constant	-0.69*	-2.444**	-6.105**	-4.245**	-2.527**
	(-2.38)	(-13.5)	(-17.32)	(-21.24)	(-13.6)
ln(TLTA)	0.25**	0.557**	-0.09	0.406**	1.009**
	(2.64)	(11.16)	(-0.82)	(6.42)	(18.14)
ln(FCFTA)	0.302**	0.091**	0.019	0.313**	0.058
	(6.46)	(3.36)	(0.3)	(10.04)	(1.61)
ln(EBITS)	0.289**	0.196**	0.31**	0.106**	0.196**
	(7.85)	(7.53)	(5.07)	(3.61)	(6.51)
ln(CACL)	0.075	0.294**	-0.187*	0.293**	0.632**
	(1.13)	(6.64)	(-2)	(5.88)	(13.88)
ln(IRSEA)	-0.106*	0.207**	-0.157**	0.167**	-0.032
	(-2.39)	(6.68)	(-3.03)	(7.22)	(-1.12)
ln(PRICE)	-0.767**	0.064**	-0.102*	-0.382**	-0.838**
	(-19.65)	(2.65)	(-2.37)	(-12.28)	(-40.81)
ln(SIZE)	0.607**	0.009	0.089	0.465**	0.423**
	(20.13)	(0.48)	(1.87)	(17.8)	(23.51)
adj-R2	25.00%	4.00%	3.00%	11.00%	30.00%
	Up market (2)				
Constant	-0.671**	-2.923**	-4.544**	-3.945**	-2.251**
	(-3.2)	(-39.98)	(-17.1)	(-36.17)	(-18.11)
ln(TLTA)	0.106	0.479**	0.128	0.359**	1.015**
	(1.9)	(21.2)	(1.75)	(11.08)	(25.47)
ln(FCFTA)	0.166**	0.057**	-0.067	0.224**	0.068*
	(5.45)	(4.65)	(-1.62)	(14.48)	(2.51)
ln(EBITS)	0.225**	0.179**	0.318**	0.129**	0.19**
	(8.62)	(14.75)	(8.19)	(8.77)	(8.95)
ln(CACL)	0.097*	0.219**	-0.025	0.272**	0.64**
	(2.42)	(10.95)	(-0.4)	(10.54)	(19.37)
ln(IRSEA)	0.206**	0.14**	0.12*	0.316**	-0.015
	(6.89)	(12.18)	(2.33)	(19.05)	(-0.74)
ln(PRICE)	-0.72**	0.071**	-0.058*	-0.346**	-0.855**
	(-29.6)	(6.29)	(-2.03)	(-20.31)	(-56.92)
ln(SIZE)	0.617**	0.051**	-0.003	0.485**	0.461**
	(33.38)	(6.37)	(-0.1)	(35.33)	(36.03)
adj-R2	20.00%	4.00%	2.00%	12.00%	30.00%
	Comparing coefficients of Down & Up market (3)=(1)-(2)				
Constant	-0.018	0.479*	-1.561**	-0.299	-0.277
	(-0.051)	(2.453)	(-3.536)	(-1.315)	(-1.238)
ln(TLTA)	0.143	0.077	-0.218	0.047	-0.006
	(1.306)	(1.411)	(-1.648)	(0.667)	(-0.089)
ln(FCFTA)	0.136*	0.034	0.086	0.088*	-0.01
	(2.431)	(1.145)	(1.127)	(2.539)	(-0.216)
ln(EBITS)	0.064	0.017	-0.008	-0.023	0.006
	(1.417)	(0.592)	(-0.108)	(-0.711)	(0.176)
ln(CACL)	-0.022	0.075	-0.162	0.021	-0.008
	(-0.287)	(1.536)	(-1.435)	(0.377)	(-0.151)
ln(IRSEA)	-0.312**	0.067*	-0.278**	-0.149**	-0.018
	(-5.821)	(2.039)	(-3.794)	(-5.255)	(-0.5)
ln(PRICE)	-0.047	-0.007	-0.044	-0.036	0.016
	(-1.024)	(-0.253)	(-0.86)	(-1.025)	(0.643)
ln(SIZE)	-0.01	-0.043*	0.092	-0.019	-0.038
	(-0.279)	(-2.186)	(1.642)	(-0.651)	(-1.706)

Table continued

Table 7-4 (Continued)

Panel B: Model (4-21)					
	Indonesia	Malaysia	Philippines	Singapore	Thailand
Variables			Down market (1)		
Constant	-10.989**	-7.749**	-7.43**	-4.514**	-6.94**
	(-39.2)	(-33.23)	(-24.76)	(-22.2)	(-33.16)
ln(TLTA)	-0.053	-0.203**	-0.012	-0.241**	-0.706**
	(-0.57)	(-3.17)	(-0.14)	(-3.69)	(-11.26)
ln(FCFTA)	-0.137**	-0.065	0.069	-0.287**	-0.086*
	(-2.99)	(-1.88)	(1.27)	(-9.1)	(-2.14)
ln(EBITS)	-0.177**	-0.139**	-0.231**	-0.059*	0.004
	(-4.99)	(-4.14)	(-4.5)	(-1.97)	(0.11)
ln(CACL)	-0.064	-0.069	-0.108	-0.303**	-0.655**
	(-0.97)	(-1.22)	(-1.34)	(-5.91)	(-12.88)
ln(IRSEA)	-0.098*	-0.055	-0.064	-0.296**	-0.031
	(-2.26)	(-1.38)	(-1.45)	(-12.81)	(-0.94)
ln(PRICE)	-0.021	-0.979**	-0.259**	-0.038	0.412**
	(-0.55)	(-30.74)	(-6.92)	(-1.2)	(17.89)
ln(SIZE)	-1.35**	-0.321**	-0.684**	-1.414**	-1.362**
	(-46.06)	(-14.12)	(-15.67)	(-52.82)	(-67.14)
adj-R2	61.00%	25.00%	47.00%	61.00%	49.00%
			Up market (2)		
Constant	-11.092**	-7.899**	-7.633**	-4.244**	-7.005**
	(-54.22)	(-78.79)	(-34.08)	(-36.19)	(-51.02)
ln(TLTA)	0.005	-0.176**	-0.077	-0.347**	-0.876**
	(0.09)	(-5.77)	(-1.26)	(-10.01)	(-20.21)
ln(FCFTA)	-0.003	-0.022	0.077*	-0.212**	-0.126**
	(-0.11)	(-1.34)	(2.22)	(-12.86)	(-4.33)
ln(EBITS)	-0.165**	-0.09**	-0.254**	-0.121**	-0.012
	(-6.49)	(-5.49)	(-7.82)	(-7.63)	(-0.54)
ln(CACL)	-0.069	-0.035	-0.171**	-0.358**	-0.704**
	(-1.75)	(-1.29)	(-3.21)	(-12.95)	(-19.68)
ln(IRSEA)	-0.147**	-0.156**	0.047	-0.122**	0.116**
	(-5.02)	(-9.53)	(1.1)	(-6.79)	(4.97)
ln(PRICE)	0.053*	-1.088**	-0.273**	-0.093**	0.441**
	(2.2)	(-69.93)	(-11.44)	(-5.12)	(27.07)
ln(SIZE)	-1.428**	-0.324**	-0.666**	-1.386**	-1.491**
	(-78.96)	(-29.95)	(-26.52)	(-93.72)	(-107)
adj-R2	60.00%	29.00%	46.00%	61.00%	54.00%
			Comparing coefficients of Down & Up market (3)=(1)-(2)		
Constant	0.103	0.149	0.204	-0.27	0.065
	(0.298)	(0.587)	(0.544)	(-1.151)	(0.259)
ln(TLTA)	-0.058	-0.027	0.065	0.106	0.17*
	(-0.54)	(-0.379)	(0.59)	(1.428)	(2.237)
ln(FCFTA)	-0.133*	-0.043	-0.008	-0.075*	0.039
	(-2.449)	(-1.122)	(-0.129)	(-2.11)	(0.786)
ln(EBITS)	-0.013	-0.049	0.023	0.062	0.016
	(-0.287)	(-1.302)	(0.374)	(1.84)	(0.397)
ln(CACL)	0.005	-0.034	0.063	0.055	0.049
	(0.066)	(-0.547)	(0.651)	(0.945)	(0.785)
ln(IRSEA)	0.049	0.102*	-0.111	-0.174**	-0.147**
	(0.931)	(2.368)	(-1.812)	(-5.969)	(-3.63)
ln(PRICE)	-0.074	0.109**	0.014	0.056	-0.03
	(-1.638)	(3.065)	(0.309)	(1.522)	(-1.049)
ln(SIZE)	0.079*	0.003	-0.018	-0.028	0.129**
	(2.285)	(0.111)	(-0.358)	(-0.914)	(5.235)

The stocks are sorted into two groups; up- and down- markets. Then, the cross-sectional regressions of following models are computed.

$$\ln(TO) = a + b_1 \ln(TLTA) + b_2 \ln(FCFTA) + b_3 \ln(EBITS) + b_4 \ln(CACL) + b_5 \ln(IRSEA) + b_6 \ln(PRICE) + b_7 \ln(SIZE) \quad (4\text{-}20)$$

$$\ln(IL) = a + b_1 \ln(TLTA) + b_2 \ln(FCFTA) + b_3 \ln(EBITS) + b_4 \ln(CACL) + b_5 \ln(IRSEA) + b_6 \ln(PRICE) + b_7 \ln(SIZE) \quad (4\text{-}21)$$

The estimate period is from January 1996 to December 2007. Significance at the 1% and 5% levels is indicated by ** and * respectively.

Using Amihud's (2002) measure as a proxy of liquidity, the investigations of ability of the bankruptcy explanatory variables to explain liquidity in up- and down-markets are presented in Panel B of Table 7-4. A higher Amihud's (2002) measure indicates stocks with higher illiquidity (lower liquidity). This is evidence that at least one out of the four bankruptcy explanatory variables determines Amihud's (2002) illiquidity at a significance level of at least 5% in both up- and down-markets. Interestingly, in both the up-and down-markets of Singapore, Amihud's (2002) illiquidity is explained by four bankruptcy explanatory variables at a significance level of at least 5%. Besides this, profitability (EBITS) shows a significant explanatory ability to determine trading costs in all markets, except for in Thailand, in both up- and down-markets at a significance level of at least 5%. In general, there are significances of Southeast Asia Index returns, stock price and firm size in explaining Amihud's (2002) illiquidity. Particularly, bigger stocks in any market will provide lower illiquidity (higher liquidity) at the 1% significance level.

The coefficient difference tests demonstrate that in general the explanatory ability of all four bankruptcy explanatory variables to explain Amihud's (2002) illiquidity in up-markets are insignificantly different to those in down-markets at the 5% level in ASEAN-5 markets. There are few observations in Indonesia, Singapore and Thailand; only one out of the four bankruptcy explanatory variables differently explains illiquidity between stocks in up- and down-markets at the 5% significance level.

The results of the market state-based analysis in Table 7-4 are consistent with the findings over the whole period and the economic state-based analysis. In general, bankruptcy explanatory variables can determine liquidity; stocks with higher leverage (TATL), higher asset efficiency (FCFTA), higher ability to repay short-term debts

(CACL), or higher profitability (EBITS) have higher liquidity, as measured by either turnover or Amihud's (2002) measure. Moreover, the ability of bankruptcy explanatory variables to determine alternative liquidity measures (turnover or trading costs) is similar in both up- and down-markets.

7.3 Empirical evidence by sectors

Stocks within a sector tend to move together since firms in the same group are affected in similar ways by market and economic conditions. To my knowledge, there is no previous literature examining whether the bankruptcy explanatory variables of firms can determine liquidity in different sectors. Hence, this section will contribute to knowledge by providing a cross-sectional analysis of liquidity on bankruptcy explanatory variables and other factors in different sectors. Stocks from the Indonesian market are used for the study, since the previous empirical evidence presents the significance of all bankruptcy explanatory variables in explaining both turnover and the Amihud's (2002) measure, which are proxies for liquidity, in Indonesian markets during the crisis period. According to the DATASTREAM database, Indonesian stocks are divided into nine sectors: (1) Agriculture, (2) Basic Industry, (3) Construction & Property, (4) Consumer Goods, (5) Manufacturing, (6) Mining, (7) Miscellaneous Industry, (8) Trading & Service, and (9) Utility Infrastructure.

7.3.1 The regressions by sector over the whole period

Table 7-5 presents the cross-sectional regression of liquidity on and bankruptcy risk explanatory variables and other factors by nine sectors for the period 1996 to 2007. In Panel A of Table 7-5, the results of the determinants of turnover (Model 4-20) show

that all bankruptcy explanatory variables strongly determine turnover in the Construction & Property sector at the 1% significance level. Stocks with a higher leverage ratio (TLTA), higher asset management efficiency (FCFTA), higher profitability (EBITS), or higher short-term debt payment ability (CACL) will have higher turnover (higher liquidity). In other sectors, at least one out of the four bankruptcy explanatory variables also explains turnover at a significance level of at least 5%. However, the relationships between bankruptcy explanatory variables and turnover in each sector are mixed with positive and negative signs. Moreover, the stock prices and sizes of firms are able to explain the turnover of stocks in all sectors with high significance at the 1% significance level. Stocks with a lower share price or stocks of bigger firms will have higher turnover (higher liquidity).

The results of Model (4-21) are illustrated in Panel B of Table 7-5. Amihud's (2002) measure is a proxy for liquidity. The higher the Amihud's (2002) measure, the lower the liquidity. There is significant explanatory ability of on the part of bankruptcy explanatory variables in determining Amihud's (2002) illiquidity at a significance level of at least 5% in the Mining sector. In other sectors, Amihud's (2002) illiquidity is determined by at least one out of the four bankruptcy explanatory variables at a significance level of at least 5%. Notably, the significance of bankruptcy risk is mixed, with positive and negative signs. Similarly to the results in Panel A of Table 7-5, firm size is significantly able to determine illiquidity in all sectors. Stocks with bigger firm size will have lower illiquidity (higher liquidity), and vice versa. The results by sectors in Panel A and Panel B of Table 7-5 consistently suggest that the significance of bankruptcy explanatory variables determining alternative liquidity measures can change significantly depending on the sector.

Table 7-5: The determinants of liquidity by sector over the whole period

Variables	Agriculture	Basic Ind.	Cons.&Prop.	Consumer	Manufact.	Mining	Miscell.	Trade&Ser.	Utility
Panel A: Model (4-20)									
Constant	-0.515	-7.009**	2.331**	-0.727	-0.612	2.528**	-0.959	-0.236	-0.641
	(-0.52)	(-7.36)	(4.78)	(-1.22)	(-1.22)	(2.96)	(-1.74)	(-0.69)	(-1.55)
ln(TLTA)	1.114**	-1.524**	1.189**	0.444*	0.187	0.322	-0.316**	-0.311**	-0.301
	(5.26)	(-5.42)	(6.77)	(2.32)	(1.3)	(1.03)	(-2.65)	(-2.99)	(-1.47)
ln(FCFTA)	0.299*	-0.008	0.421**	0.403**	0.449**	0.388**	-0.061	0.345**	-0.11
	(2.42)	(-0.05)	(5.73)	(4.11)	(5.77)	(3.06)	(-0.75)	(6.73)	(-1.69)
ln(EBITS)	-0.075	-0.239*	0.77**	-0.104	0.104	0.779**	0.171*	0.053	0.255**
	(-0.9)	(-2.55)	(13.99)	(-1.43)	(1.86)	(4.92)	(2.5)	(1.12)	(4.62)
ln(CACL)	-0.484**	-0.539**	1.114**	0.866**	-0.001	-0.267	-0.276**	-0.012	-0.02
	(-2.72)	(-2.74)	(6.68)	(6.67)	(0)	(-1.08)	(-3.64)	(-0.18)	(-0.17)
ln(IRSEA)	0.264**	0.018	0.13*	0.052	0.129*	0.116	0.199**	0.141**	0.041
	(3.07)	(0.19)	(2.15)	(0.57)	(2.12)	(1.1)	(2.58)	(2.79)	(0.67)
ln(PRICE)	-1.065**	-0.267**	-0.868**	-0.771**	-0.799**	-0.869**	-1.027**	-0.871**	-0.716**
	(-10.64)	(-2.98)	(-13.97)	(-13.03)	(-14.97)	(-5.17)	(-10.91)	(-23.63)	(-12.07)
ln(SIZE)	1.36**	0.512**	0.6**	0.47**	0.884**	0.604**	0.885**	0.711**	0.424**
	(18.64)	(5.42)	(14.23)	(6.91)	(19.47)	(4.68)	(13.83)	(20.17)	(10.73)
Adj-R2	54.40%	9.00%	42.40%	18.10%	32.10%	42.10%	19.30%	24.80%	30.20%
Panel B: Model (4-21)									
Constant	-9.014**	-7.75**	-11.553**	-11.548**	-11.392**	-14.616**	-9.165**	-11.765**	-10.195**
	(-8.29)	(-8.43)	(-23.39)	(-21.68)	(-22.31)	(-15.93)	(-17.42)	(-34.66)	(-21.86)
ln(TLTA)	-0.154	0.431	-1.133**	0.188	-0.145	0.672*	0.313**	0.524**	-0.305
	(-0.65)	(1.56)	(-6.2)	(1.02)	(-0.99)	(2.02)	(2.73)	(5.12)	(-1.36)
ln(FCFTA)	0.016	-0.281*	0.05	-0.164	-0.327**	-0.789**	0.229**	-0.242**	0.252**
	(0.12)	(-1.96)	(0.67)	(-1.86)	(-4.12)	(-5.74)	(2.96)	(-4.72)	(3.53)
ln(EBITS)	0.209*	-0.032	-0.317**	0.072	-0.2**	-0.882**	-0.376**	-0.004	-0.033
	(2.2)	(-0.37)	(-5.52)	(1.08)	(-3.55)	(-5.19)	(-5.71)	(-0.08)	(-0.58)
ln(CACL)	0.637**	0.372	-1.184**	-0.279*	-0.184	0.564*	0.067	0.01	0.064
	(3.16)	(1.95)	(-6.87)	(-2.19)	(-1.63)	(2.14)	(0.92)	(0.14)	(0.49)
ln(IRSEA)	-0.261**	0.053	-0.116	-0.132	-0.096	-0.033	-0.177*	-0.205**	-0.06
	(-2.66)	(0.57)	(-1.89)	(-1.6)	(-1.54)	(-0.29)	(-2.37)	(-4.13)	(-0.88)
ln(PRICE)	-0.282*	-0.404**	0.043	0.148**	0.014	-0.084	-0.179*	0.185**	-0.028
	(-2.48)	(-4.58)	(0.69)	(2.72)	(0.25)	(-0.47)	(-1.96)	(5.02)	(-0.42)
ln(SIZE)	-1.38**	-1.069**	-1.342**	-1.347**	-1.446**	-1.077**	-1.507**	-1.506**	-1.392**
	(-16.46)	(-11.9)	(-31.48)	(-21.91)	(-31.08)	(-7.81)	(-24.42)	(-43.31)	(-32.34)
Adj-R2	62.90%	47.80%	62.40%	43.40%	65.00%	67.00%	61.10%	54.80%	80.10%

This table presents the estimation of the models:

$$\ln(TO) = a + b_1\ln(TLTA) + b_2\ln(FCFTA) + b_3\ln(EBITS) + b_4\ln(CACL) + b_5\ln(IRSEA) + b_6\ln(PRICE) + b_7\ln(SIZE) \quad (4\text{-}20)$$

$$\ln(IL) = a + b_1\ln(TLTA) + b_2\ln(FCFTA) + b_3\ln(EBITS) + b_4\ln(CACL) + b_5\ln(IRSEA) + b_6\ln(PRICE) + b_7\ln(SIZE) \quad (4\text{-}21)$$

where TO denotes turnover rate. IL refers to the illiquidity level (trading cost) measured by the Amihud's (2002) measure . TLTA refers to the financial leverage ratio which is the total liabilities to total assets. FCFTA refers to the free cash flow from operations to total assets. EBITS refers to the earnings before interests and taxes (EBIT) to total sale. CACL refers to the current assets to current liabilities. IRSEA refers to the Southeast Asia Index returns. PRICE is the daily average trading price in a month and SIZE is the monthly market capitalizations. All variables are natural log scaled. The estimate period is from January 1996 to December 2007. Significance at the 1% and 5% levels is indicated by ** and * respectively.

7.3.2 The regressions by sector over three economic states

The investigation of the explanatory ability of bankruptcy explanatory variables to determine liquidity by sectors in different economic states is presented in this section. The sample of Indonesian stocks is divided into three sub-periods: pre-crisis, crisis, and post-crisis. The pre-crisis period is from January 1996 to June 1997, the crisis period is from July 1997 to December 1999, and the post-crisis period is from January

2000 to December 2007. Then, the cross-sectional analyses of Model (4-20) and Model (4-21) by sector are examined in each sub-period.

Table 7-6: The determinants of turnover by sector in three economic states

Variables	Agriculture	Basic Ind.	Cons.&Prop.	Consumer	Manufact.	Mining	Miscell.	Trade&Ser.	Utility
Panel A: Pre-crisis									
Constant	11.87	14.664	4.375**	8.737**	3.422	-9.54	2.91	2.994**	4.29**
	(0.92)	(1.48)	(2.71)	(4.24)	(1.7)	(-0.54)	(1.84)	(2.8)	(3.38)
ln(TLTA)	-4.76	-45.23*	1.669	0.909	1.241	2.374	1.115	-0.937*	0.08
	(-0.66)	(-2.26)	(1.86)	(1)	(1.92)	-0.96	(1.49)	(-2.18)	(0.16)
ln(FCFTA)	-0.894	-0.366	0.303	0.92**	-0.406	-0.564	-0.554	0.212	0.193
	(-0.79)	(-0.25)	(1.16)	(3.74)	(-1.14)	(-1.1)	(-1.07)	(1.1)	(0.75)
ln(EBITS)	1.299	10.651*	-0.009	-0.211	0.206	-1.027	0.326*	0.155	0.013
	(1.26)	(2.42)	(-0.07)	(-0.78)	(1.58)	(-0.29)	(2.28)	(1.28)	(0.08)
ln(CACL)	8.392	-19.88*	1.152	-0.625	-0.132	-0.495	0.104	-0.417	0.369
	(1.04)	(-1.98)	(1.68)	(-0.33)	(-0.32)	(-0.71)	(0.15)	(-1.55)	(0.63)
ln(IRSEA)	-0.013	0.15	-0.022	0.408	0.064	0.191	0.166	0.214	0.175
	(-0.08)	(0.42)	(-0.15)	(1.69)	(0.38)	-0.66	(0.81)	(1.62)	(1.27)
ln(PRICE)	-3.562*	-2.718**	-1.377**	-1.512**	-1.591**	1.034	-0.915**	-1.21**	-1.078**
	(-2.29)	(-2.62)	(-7.83)	(-5.47)	(-9.43)	-0.23	(-4.17)	(-10.18)	(-7.13)
ln(SIZE)	0.935	3.25**	0.497**	0.504*	0.827**	0.172	0.091	0.728**	0.113
	(1.09)	(2.86)	(4.25)	(2.11)	(6.48)	-0.04	(0.4)	(5.52)	(1.33)
Adj-R2	88.80%	42.50%	53.20%	54.80%	67.40%	10.00%	32.60%	32.70%	58.20%
Panel B: Crisis									
Constant	0.985	-5.621*	0.66	0.477	4.327**	-1.16	3.602**	1.285*	2.07*
	(0.27)	(-2.2)	(0.56)	(0.5)	(3.53)	(-0.39)	(3.19)	(2.1)	(2.09)
ln(TLTA)	0.785	2.713*	-0.895	0.537	1.981**	2.05	2.532**	0.017	-0.799
	(0.94)	(2.54)	(-1.55)	(1.06)	(3.76)	(0.7)	(4.47)	(0.06)	(-1.26)
ln(FCFTA)	-1.797*	0.709	-0.198	0.782**	1.413**	-0.123	0.077	0.383**	-0.287
	(-2.57)	(1.86)	(-1.34)	(3.4)	(5.89)	(-0.19)	(0.31)	(3.97)	(-0.92)
ln(EBITS)	-0.311	-0.818**	0.465**	-0.231	-0.048	4.42*	0.062	0.112	-0.029
	(-1.6)	(-4.12)	(4.09)	(-1.58)	(-0.52)	(2.37)	(0.49)	(1.03)	(-0.23)
ln(CACL)	-0.993	0.967	-0.476	1.99**	0.193	-6.218**	0.928*	-0.222	-0.075
	(-1.84)	(1.85)	(-0.83)	(4.01)	(0.79)	(-4.68)	(2.57)	(-1.44)	(-0.24)
ln(IRSEA)	0.476**	0.18	0.166	-0.027	0.193	-0.031	0.131	0.225**	-0.064
	(4.35)	(1.06)	(1.71)	(-0.18)	(1.9)	(-0.25)	(0.99)	(2.64)	(-0.46)
ln(PRICE)	-1.645**	0.085	-1.013**	-0.83**	-1.087**	0.287	-1.638**	-0.905**	-1.304**
	(-4.61)	(0.34)	(-5.64)	(-7.38)	(-9.11)	(0.44)	(-6.01)	(-10.71)	(-5.55)
ln(SIZE)	1.051**	0.63**	0.732**	0.791**	1.097**	0.959	1.205**	0.84**	0.453**
	(10.99)	(3.04)	(8.83)	(4.11)	(11.54)	(1.5)	(5.58)	(8.98)	(4.03)
Adj-R2	71.50%	30.30%	58.50%	37.60%	50.30%	67.10%	49.80%	32.80%	25.40%
Panel C: Post Crisis									
Constant	-2.899*	-8.914**	2.36**	-3.898**	-2.043**	1.575	-2.876**	-1.634**	-2.865**
	(-2.55)	(-7.7)	(3.96)	(-5.01)	(-3.34)	(1.55)	(-4.24)	(-3.8)	(-5.32)
ln(TLTA)	1.183**	-2.094**	1.464**	0.153	-0.034	-0.148	-0.477**	-0.398**	0.025
	(5.03)	(-6.96)	(7.79)	(0.74)	(-0.21)	(-0.39)	(-3.8)	(-3.49)	(0.1)
ln(FCFTA)	0.148	-0.389*	0.488**	0.085	0.353**	0.54**	-0.115	0.324**	-0.21**
	(1.01)	(-2.21)	(5.79)	(0.74)	(3.84)	(3.88)	(-1.29)	(5.23)	(-3.22)
ln(EBITS)	-0.214	-0.133	0.92**	-0.196*	0.103	1.222**	0.091	-0.052	0.04
	(-1.83)	(-1.06)	(12.39)	(-2.13)	(1.32)	(5.59)	(0.97)	(-0.9)	(0.45)
ln(CACL)	-0.828**	-0.715**	1.524**	0.847**	-0.082	-0.395	-0.218**	0.218**	-0.026
	(-4.13)	(-2.94)	(8.35)	(6.19)	(-0.63)	(-1.32)	(-2.73)	(2.75)	(-0.2)
ln(IRSEA)	0.001	-0.057	0.106	-0.063	0.041	0.177	0.158	0.067	0.02
	(0)	(-0.49)	(1.39)	(-0.56)	(0.52)	(1.37)	(1.66)	(1.06)	(0.28)
ln(PRICE)	-1.209**	-0.141	-0.792**	-0.635**	-0.671**	-0.243	-0.824**	-0.789**	-0.66**
	(-9.82)	(-1.34)	(-10.63)	(-9.45)	(-10.54)	(-1.12)	(-7.5)	(-18.8)	(-9.87)
ln(SIZE)	1.788**	0.325**	0.535**	0.486**	0.817**	0.132	0.847**	0.636**	0.664**
	(16.27)	(2.58)	(9.97)	(6.18)	(13.93)	(0.8)	(11.04)	(15.74)	(12.32)
Adj-R2	56.50%	11.60%	41.40%	16.00%	25.50%	37.70%	16.40%	22.70%	40.50%

This table presents the estimation of the models:

$$\ln(TO) = a + b_1 \ln(TLTA) + b_2 \ln(FCFTA) + b_3 \ln(EBITS) + b_4 \ln(CACL) + b_5 \ln(IRSEA) + b_6 \ln(PRICE) + b_7 \ln(SIZE) \quad (4\text{-}20)$$

where TO denotes turnover rate. TLTA refers to the financial leverage ratio which is the total liabilities to total assets. FCFTA refers to the free cash flow from operations to total assets. EBITS refers to the earnings before interests and taxes (EBIT) to total sales. CACL refers to the current assets to current liabilities. IRSEA refers to the Southeast Asia Index returns. PRICE is the daily average trading price in a month and SIZE is the monthly market capitalizations. All variables are natural log scaled. The pre-crisis period is from January 1996 to June 1997. The crisis period is from July 1997 to December 1999. The post-crisis period is from January 2000 to December 2007. Significance at the 1% and 5% levels is indicated by ** and * respectively.

The results of the cross-sectional analysis of turnover on bankruptcy explanatory variables by sector in different economic states are presented in Table 7-6. Turnover is used as a proxy for liquidity. The evidence from the pre-crisis period illustrated in Panel A of Table 7-6 illustrates that at least one out of the four bankruptcy risk variables is significant in determining turnover at a significance level of at least 5% in four sectors; namely, Basic Industry, Consumer Goods, Miscellaneous Industry, and Trading & Service. Additionally, stock price is able to determine turnover in the pre-crisis period at a significance level of at least 5% in all sectors excluding the Mining sector, and size determines turnover at a significance level of at least 5% in five of the nine sectors.

The tests of the crisis period in Panel B of Table 7-6 show that at least one out of the four bankruptcy explanatory variables explains turnover at a significance level of least 5% in all sectors except the Utility Infrastructure sector. In addition, stock price and size are generally significant in determining turnover at the 1% level in all sectors except the Basic Industry and Mining sectors.

In Panel C of Table 7-6, the evidence from the post-crisis period demonstrates a significant relationship between all bankruptcy explanatory variables and turnover at the 1% level in the Construction & Property sector. Construction & Property stocks with higher leverage (TLTA), productivity in asset management (FCFTA), profitability (EBITS), or ability to repay short term debts (CACL) will have higher turnover (higher liquidity). Additionally, at least one out of the four bankruptcy explanatory variables explains turnover at a significance level of least 5% in the rest of the sectors. Furthermore, stock price and size are generally significant in determining

turnover at the 1% level in all sectors; however, this is not case in the Basic Industry and Mining sectors.

Table 7-7: The determinants of IL by sector in three economic states

Variables	Agriculture	Basic Ind.	Cons.&Prop.	Consumer	Manufact.	Mining	Miscell.	Trade&Ser.	Utility
Panel A: Pre-crisis									
Constant	-38.13*	-8.65	-15.134**	-13.288**	-7.075**	-27.73	-10.866**	-10.295**	-11.644**
	(-2.06)	(-0.71)	(-10.93)	(-8.15)	(-3.14)	(-1.37)	(-7.42)	(-10.07)	(-8.39)
ln(TLTA)	-6.24	8.83	-1.868*	-0.116	-0.158	-4.203	1.407*	1.305**	-0.253
	(-0.6)	(0.36)	(-2.44)	(-0.17)	(-0.23)	(-1.49)	(2.07)	(3.22)	(-0.46)
ln(FCFTA)	-0.82	2.357	-0.176	-0.474*	0.933*	0.591	0.586	0.473**	-0.003
	(-0.5)	(1.44)	(-0.79)	(-2.46)	(2.34)	(1)	(1.24)	(2.58)	(-0.01)
ln(EBITS)	0.589	-3.017	0.395**	0.293	-0.569**	-2.269	-0.528**	-0.087	-0.244
	(0.39)	(-0.55)	(3.22)	(1.43)	(-4.05)	(-0.55)	(-4.05)	(-0.75)	(-1.42)
ln(CACL)	7.29	-1.28	-2.618**	-0.096	-0.295	0.869	0.893	0.254	-0.406
	(0.62)	(-0.1)	(-4.38)	(-0.07)	(-0.65)	-1.01	(1.41)	(1)	(-0.65)
ln(IRSEA)	-0.155	-0.498	-0.032	-0.002	-0.316	-0.353	-0.245	-0.341**	-0.174
	(-0.66)	(-1.43)	(-0.25)	(-0.01)	(-1.77)	(-1.06)	(-1.32)	(-2.72)	(-1.16)
ln(PRICE)	1.215	-0.06	0.865**	0.31	-0.435*	1.523	0.157	0.313**	-0.148
	(0.55)	(-0.05)	(5.78)	(1.47)	(-2.32)	(0.3)	(0.77)	(2.8)	(-0.9)
ln(SIZE)	0.751	-1.531	-1.255**	-1.159**	-1.242**	-0.426	-1.254**	-1.508**	-0.904**
	(0.61)	(-1.13)	(-12.52)	(-6.36)	(-8.18)	(-0.09)	(-6.06)	(-11.96)	(-9.95)
Adj-R2	46.00%	31.70%	73.00%	47.50%	53.30%	15.30%	48.50%	44.70%	79.50%
Panel B: Crisis									
Constant	-16.932**	-11.01**	-8.015**	-11.142**	-15.657**	-7.212	-13.393**	-12.29**	-11.409**
	(-4.37)	(-4.93)	(-6.54)	(-10.93)	(-12.42)	(-1.61)	(-11.58)	(-18.69)	(-12.54)
ln(TLTA)	-1.32	-1.777	-0.804	0.244	-1.163*	4.346	-0.922	-0.126	-0.178
	(-1.52)	(-1.94)	(-1.3)	(0.46)	(-2.18)	(0.99)	(-1.54)	(-0.41)	(-0.3)
ln(FCFTA)	1.212	-1.729**	0.716**	0.037	-1.698**	-0.093	0.098	-0.269**	0.385
	(1.73)	(-5.13)	(4.63)	(0.13)	(-6.86)	(-0.1)	(0.38)	(-2.61)	(1.44)
ln(EBITS)	0.821**	0.508**	-0.424**	0.163	0.021	-2.644	-0.266*	-0.285*	-0.048
	(3.89)	(3.08)	(-3.54)	(0.98)	(0.23)	(-0.95)	(-2.04)	(-2.41)	(-0.44)
ln(CACL)	2.358**	0.311	-0.201	-1.258*	0.21	5.517**	-0.974**	0.052	-0.421
	(3.99)	(0.7)	(-0.33)	(-2.39)	(0.86)	(2.79)	(-2.61)	(0.31)	(-1.44)
ln(IRSEA)	-0.114	-0.208	-0.005	-0.106	-0.091	0.011	-0.176	-0.211*	0.081
	(-0.96)	(-1.42)	(-0.05)	(-0.66)	(-0.86)	(0.06)	(-1.25)	(-2.3)	(0.63)
ln(PRICE)	1.147**	-0.35	-0.334	0.082	0.29*	-1.588	0.7*	0.095	0.314
	(2.88)	(-1.65)	(-1.78)	(0.67)	(2.4)	(-1.62)	(2.5)	(0.99)	(1.52)
ln(SIZE)	-1.252**	-1.535**	-1.184**	-1.273**	-1.738**	-0.407	-1.953**	-1.449**	-1.293**
	(-12.67)	(-9.27)	(-13.2)	(-6.14)	(-18.55)	(-0.43)	(-8.77)	(-14.08)	(-13.07)
Adj-R2	76.60%	67.60%	65.10%	33.10%	73.90%	76.30%	59.30%	45.80%	77.80%
Panel C: Post Crisis									
Constant	-8.53**	-6.138**	-11.862**	-10.005**	-10.76**	-15.594**	-7.626**	-11.382**	-9.668**
	(-6.28)	(-5.34)	(-19.06)	(-13.82)	(-17.32)	(-14.13)	(-11.59)	(-25.82)	(-16.7)
ln(TLTA)	-0.384	0.668*	-1.269**	0.466*	-0.157	0.259	0.403**	0.511**	-0.263
	(-1.37)	(2.18)	(-6.31)	(2.2)	(-0.96)	(0.64)	(3.29)	(4.42)	(-0.94)
ln(FCFTA)	0.077	0.037	-0.094	-0.005	-0.26**	-0.84**	0.246**	-0.3**	0.277**
	(0.44)	(0.21)	(-1.07)	(-0.04)	(-2.78)	(-5.52)	(2.86)	(-4.66)	(4.03)
ln(EBITS)	0.313*	-0.05	-0.309**	0.085	-0.108	-0.85**	-0.173	0.128*	0.238*
	(2.2)	(-0.4)	(-3.8)	(0.98)	(-1.35)	(-3.63)	(-1.87)	(2.19)	(2.57)
ln(CACL)	0.82**	0.621**	-1.303**	-0.149	-0.158	0.223	0.075	-0.071	0.32*
	(3.36)	(2.59)	(-6.72)	(-1.05)	(-1.18)	(0.7)	(0.96)	(-0.87)	(2.33)
ln(IRSEA)	-0.275*	0.11	-0.109	-0.054	-0.054	-0.059	-0.102	-0.14*	-0.046
	(-1.97)	(0.97)	(-1.37)	(-0.51)	(-0.68)	(-0.42)	(-1.09)	(-2.16)	(-0.61)
ln(PRICE)	-0.143	-0.502**	0.077	0.122	0.036	0.07	-0.27*	0.213**	0.158*
	(-0.94)	(-4.76)	(1)	(1.88)	(0.55)	(0.3)	(-2.5)	(4.94)	(2.18)
ln(SIZE)	-1.701**	-1.049**	-1.444**	-1.448**	-1.546**	-1.164**	-1.617**	-1.587**	-1.73**
	(-12.41)	(-8.26)	(-25.95)	(-19.58)	(-25.46)	(-6.57)	(-21.59)	(-38.69)	(-29.93)
Adj-R2	65.30%	48.80%	63.60%	46.30%	65.50%	69.20%	63.80%	57.30%	87.30%

This table presents the estimation of the models:

$$\ln(IL) = a + b_1 \ln(TLTA) + b_2 \ln(FCFTA) + b_3 \ln(EBITS) + b_4 \ln(CACL) + b_5 \ln(IRSEA) + b_6 \ln(PRICE) + b_7 \ln(SIZE) \quad (4\text{-}21)$$

where IL refers to the illiquidity level (trading cost) measured by the Amihud's (2002) measure. TLTA refers to the financial leverage ratio which is the total liabilities to total assets. FCFTA refers to the free cash flow from operations to total assets. EBITS refers to the earnings before interests and taxes (EBIT) to total sales. CACL refers to the current assets to current liabilities. IRSEA refers to the Southeast Asia Index returns. PRICE is the daily average trading price in a month and SIZE is the monthly market capitalizations. All variables are natural log scaled. The pre-crisis period is from January 1996 to June 1997. The crisis period is from July 1997 to December 1999. The post-crisis period is from January 2000 to December 2007. Significance at the 1% and 5% levels is indicated by ** and * respectively.

Subsequently, Table 7-7 presents the ability of bankruptcy explanatory variables to determine Amihud's (2002) illiquidity across nine sectors in three sub-periods. The pre-crisis results, which are presented in Panel A of Table 7-7, show that there is no industry in which all four bankruptcy explanatory variables are significant; however, at least one out of the four bankruptcy explanatory variables is significantly able to explain Amihud's (2002) illiquidity in five sectors; namely, the Construction & Property, Consumer Goods, Manufacturing, Miscellaneous Industry, and Trading & Service sectors.

Panel B of Table 7-7 presents the results from the crisis period. In any sector, Amihud's (2002) illiquidity cannot be explained by all four bankruptcy explanatory variables; however, it is explained by at least one out of the four bankruptcy explanatory variables in all sectors. Nonetheless, this is not the case in the Utility Infrastructure sector, in which no bankruptcy explanatory variable determines Amihud's (2002) illiquidity. Notably, firm size is significant in explaining Amihud's (2002) illiquidity at the 1% level in all sectors excluding the Mining sector.

Panel C of Table 7-7 demonstrates that some bankruptcy explanatory variables are significant in determining Amihud's (2002) illiquidity in all sectors at the 5% level, although some of the bankruptcy explanatory variables are insignificant. Additionally, there are inverse relationships between firm size and Amihud's (2002) illiquidity at the 1% significance level in any sector. Bigger firms will have lower illiquidity (higher liquidity).

The results of the economic state-based analysis by sector in Table 7-6 and Table 7-7 are consistent with the findings from the whole period in Table 7-5 that the

significance of bankruptcy explanatory variables in determining alternative liquidity measures can change significantly depending on the sector of the stocks.

7.3.3 The regressions by sector over two market states

The investigations of bankruptcy explanatory variables' abilities to explain liquidity by sector in different market states are presented in Table 7-8. Following Lakonishok and Shapiro (1986), an up-market month refers to a month when the rate of returns on the market is greater than the risk-free rate, and a down-market month refers to a month when rate of returns on the market is lower than the risk-free rate. The stocks are sorted into two groups: up- and down- markets.

Panel A of Table 7-8 illustrates the ability of bankruptcy explanatory variables to determine turnover by sector in market states. Turnover is used as a proxy for liquidity. Interestingly, the turnover of Construction & Property stocks is determined by all four bankruptcy explanatory variables in both the up- and down-markets at significance levels of at least 5% and 1% respectively. Additionally, at least one out of the four bankruptcy explanatory variables explains liquidity in other sectors in both up- and down-markets. Firms' stock prices and sizes explain turnover in most sectors in both up- and down-markets at the 1% significance level. Furthermore, the coefficient difference tests generally show that the explanatory ability of all four bankruptcy explanatory variables to explain turnover in up-markets are similar to those in down-markets at the 5% significance level in almost all sectors. There are very few observations; only one of the four bankruptcy explanatory variables differently explains turnover between up- and down-markets at a significance level of at least 5% in the Consumer Goods and Mining sectors

Table 7-8: The determinants of liquidity by sectors in two market states

Panel A: Model (4-20)									
Variables	Agri	Bas. Ind.	Con.&Prop.	Consu.	Manu.	Mining	Miscell.	Trade	Utility
					Down -Market (1)				
Constant	0.888	-6.387**	1.607	-0.013	-0.478	0.92	-1.1	-0.602	0.314
	(0.5)	(-3.58)	(1.89)	(-0.01)	(-0.55)	(0.62)	(-1.12)	(-1.02)	(0.41)
ln(TLTA)	1.089**	-0.562	0.961*	0.953*	0.469	0.506	-0.24	-0.277	-0.204
	(2.61)	(-0.7)	(2.55)	(2.55)	(1.55)	(0.97)	(-0.98)	(-1.35)	(-0.54)
ln(FCFTA)	0.324	0.325	0.312*	0.655**	0.405**	-0.244	-0.132	0.418**	0.059
	(1.48)	(1.16)	(2.4)	(3.55)	(2.92)	(-0.97)	(-0.83)	(4.79)	(0.43)
ln(EBITS)	-0.062	-0.353*	0.782**	0.119	0.082	1.175**	0.245*	0.101	0.225*
	(-0.43)	(-2.06)	(8.43)	(0.89)	(0.87)	(4.37)	(2.12)	(1.15)	(2.57)
ln(CACL)	-0.052	-0.409	1.05**	0.9**	0.349	-0.113	-0.267	-0.159	0.12
	(-0.16)	(-0.88)	(3.11)	(3.33)	(1.65)	(-0.28)	(-1.76)	(-1.28)	(0.56)
ln(IRSEA)	0.505**	-0.06	0.008	-0.323*	0.145	-0.164	-0.026	-0.145	-0.183
	(3.58)	(-0.31)	(0.07)	(-1.96)	(1.33)	(-0.95)	(-0.18)	(-1.65)	(-1.63)
ln(PRICE)	-1.119**	-0.303	-0.876**	-0.815**	-0.916**	-0.801**	-1.18**	-0.899**	-0.961**
	(-5.92)	(-1.73)	(-7.8)	(-7.57)	(-9.15)	(-2.59)	(-6.17)	(-12.62)	(-7.79)
ln(SIZE)	1.345**	0.619**	0.615**	0.492**	1.051**	0.388	0.972**	0.709**	0.465**
	(10.88)	(3.26)	(7.94)	(3.59)	(12.14)	(1.66)	(7.16)	(10.03)	(6.03)
Adj-R2	59.10%	7.40%	48.20%	25.10%	41.90%	45.90%	21.40%	26.30%	32.50%
					Up-market (2)				
Constant	-1.487	-7.029**	2.6**	-1.058	-0.667	3.35**	-0.857	-0.047	-0.932
	(-1.23)	(-6.1)	(4.39)	(-1.43)	(-1.08)	(3.23)	(-1.28)	(-0.11)	(-1.84)
ln(TLTA)	1.064**	-1.607**	1.249**	0.271	0.114	0.285	-0.346*	-0.332**	-0.329
	(4.22)	(-5.24)	(6.24)	(1.22)	(0.69)	(0.75)	(-2.53)	(-2.74)	(-1.35)
ln(FCFTA)	0.274	-0.147	0.457**	0.327**	0.449**	0.547**	-0.039	0.318**	-0.177*
	(1.83)	(-0.81)	(5.16)	(2.84)	(4.77)	(3.72)	(-0.42)	(5.03)	(-2.41)
ln(EBITS)	-0.095	-0.175	0.756**	-0.2*	0.114	0.742**	0.141	0.025	0.272**
	(-0.88)	(-1.55)	(11.04)	(-2.31)	(1.63)	(3.72)	(1.66)	(0.44)	(3.63)
ln(CACL)	-0.657**	-0.552*	1.146**	0.837**	-0.122	-0.336	-0.281**	0.052	-0.119
	(-3.11)	(-2.38)	(5.92)	(5.65)	(-0.94)	(-1.12)	(-3.21)	(0.64)	(-0.85)
ln(IRSEA)	0.148	0.067	0.181*	0.198	0.137	0.218	0.288**	0.274**	0.141
	(1.36)	(0.59)	(2.46)	(1.79)	(1.84)	(1.69)	(3.11)	(4.45)	(1.92)
ln(PRICE)	-1.017**	-0.241*	-0.871**	-0.748**	-0.752**	-0.904**	-0.986**	-0.862**	-0.631**
	(-8.48)	(-2.26)	(-11.69)	(-10.62)	(-11.92)	(-4.55)	(-9.03)	(-20.02)	(-9.39)
ln(SIZE)	1.379**	0.462**	0.596**	0.475**	0.826**	0.629**	0.862**	0.707**	0.414**
	(15.36)	(4.15)	(11.83)	(6.03)	(15.42)	(4.11)	(11.71)	(17.37)	(8.75)
Adj-R2	52.90%	8.90%	40.10%	17.10%	28.90%	41.60%	18.50%	24.80%	30.10%
					Comparing coefficients ofDown & Up market (3)=(1)-(2)				
Constant	2.375	0.642	-0.993	1.046	0.188	-2.43	-0.243	-0.555	1.246
	(1.11)	(0.3)	(-0.96)	(0.85)	(0.18)	(-1.34)	(-0.2)	(-0.77)	(1.36)
ln(TLTA)	0.024	1.045	-0.288	0.683	0.355	0.222	0.107	0.056	0.125
	(0.05)	(1.22)	(-0.67)	(1.57)	(1.03)	(0.34)	(0.38)	(0.23)	(0.28)
ln(FCFTA)	0.05	0.472	-0.145	0.328	-0.044	-0.791**	-0.092	0.1	0.236
	(0.19)	(1.41)	(-0.92)	(1.51)	(-0.26)	(-2.72)	(-0.5)	(0.93)	(1.52)
ln(EBITS)	0.033	-0.178	0.026	0.319*	-0.032	0.433	0.104	0.077	-0.047
	(0.18)	(-0.87)	(0.23)	(2.01)	(-0.27)	(1.29)	(0.73)	(0.73)	(-0.4)
ln(CACL)	0.605	0.143	-0.095	0.063	0.471	0.223	0.014	-0.211	0.239
	(1.54)	(0.28)	(-0.24)	(0.21)	(1.89)	(0.44)	(0.08)	(-1.42)	(0.93)
ln(IRSEA)	0.357*	-0.126	-0.173	-0.521**	0.008	-0.381	-0.314	-0.419**	-0.324*
	(2.01)	(-0.56)	(-1.34)	(-2.63)	(0.06)	(-1.77)	(-1.84)	(-3.91)	(-2.41)
ln(PRICE)	-0.102	-0.062	-0.005	-0.067	-0.164	0.104	-0.194	-0.037	-0.33*
	(-0.45)	(-0.3)	(-0.03)	(-0.52)	(-1.39)	(0.28)	(-0.88)	(-0.44)	(-2.35)
ln(SIZE)	-0.034	0.157	0.019	0.017	0.225*	-0.241	0.11	0.002	0.051
	(-0.22)	(0.71)	(0.2)	(0.11)	(2.21)	(-0.86)	(0.71)	(0.02)	(0.56)

Table continued

Table 7-8 (Continued)

Panel B: Model (4-21)									
Variables	Agri	Bas. Ind.	Con.&Prop.	Consu.	Manu.	Mining	Miscell.	Trade	Utility
					Down -Market (1)				
Constant	-11.183**	-8.501**	-11.083**	-11.409**	-11.339**	-12.573**	-10.896**	-11.449**	-11.086**
	(-5.27)	(-5.31)	(-12.66)	(-12.92)	(-12.51)	(-6.98)	(-11.17)	(-19.9)	(-13.55)
ln(TLTA)	-0.159	0.544	-1.533**	-0.054	-0.134	0.628	0.431	0.388	-0.334
	(-0.32)	(0.75)	(-3.77)	(-0.15)	(-0.42)	(0.99)	(1.72)	(1.93)	(-0.8)
ln(FCFTA)	-0.177	-0.65*	0.066	-0.211	-0.397**	-0.388	0.016	-0.27**	0.128
	(-0.66)	(-2.54)	(0.49)	(-1.2)	(-2.72)	(-1.29)	(0.1)	(-3.13)	(0.86)
ln(EBITS)	0.164	0.07	-0.358**	-0.016	-0.161	-1.277**	-0.327**	-0.092	-0.026
	(0.95)	(0.47)	(-3.62)	(-0.13)	(-1.66)	(-3.92)	(-2.84)	(-1.05)	(-0.3)
ln(CACL)	0.186	0.673	-1.575**	-0.279	-0.264	0.633	0.108	0.038	-0.169
	(0.47)	(1.56)	(-4.39)	(-1.08)	(-1.18)	(1.3)	(0.71)	(0.31)	(-0.71)
ln(IRSEA)	-0.308	-0.032	-0.031	0.001	-0.197	0.093	-0.145	-0.207*	-0.059
	(-1.73)	(-0.18)	(-0.28)	(0.01)	(-1.7)	(0.44)	(-1)	(-2.42)	(-0.48)
ln(PRICE)	-0.201	-0.418**	-0.117	0.082	-0.026	-0.287	0.166	0.079	0.065
	(-0.88)	(-2.59)	(-1.01)	(0.84)	(-0.24)	(-0.77)	(0.87)	(1.11)	(0.51)
ln(SIZE)	-1.229**	-1.005**	-1.163**	-1.291**	-1.497**	-0.986**	-1.619**	-1.451**	-1.334**
	(-7.93)	(-6.13)	(-14.34)	(-10.35)	(-16.92)	(-3.52)	(-11.75)	(-20.81)	(-17.03)
Adj-R2	52.90%	48.50%	61.10%	43.00%	65.90%	70.50%	54.30%	53.90%	76.90%
					Up-market (2)				
Constant	-7.819**	-7.404**	-11.81**	-11.62**	-11.389**	-15.691**	-8.567**	-11.914**	-9.743**
	(-6.01)	(-6.51)	(-19.81)	(-17.46)	(-18.26)	(-14.33)	(-13.55)	(-28.55)	(-16.51)
ln(TLTA)	-0.056	0.432	-1.068**	0.283	-0.142	0.566	0.299*	0.55**	-0.255
	(-0.2)	(1.41)	(-5.17)	(1.3)	(-0.85)	(1.43)	(2.31)	(4.62)	(-0.95)
ln(FCFTA)	0.084	-0.142	0.048	-0.156	-0.302**	-0.865**	0.294**	-0.239**	0.31**
	(0.52)	(-0.8)	(0.54)	(-1.51)	(-3.18)	(-5.51)	(3.31)	(-3.77)	(3.81)
ln(EBITS)	0.266*	-0.072	-0.313**	0.103	-0.213**	-0.863**	-0.401**	0.01	-0.044
	(2.24)	(-0.67)	(-4.41)	(1.3)	(-3.02)	(-4.12)	(-4.93)	(0.18)	(-0.53)
ln(CACL)	0.831**	0.346	-1.097**	-0.268	-0.148	0.52	0.06	0.001	0.208
	(3.55)	(1.54)	(-5.52)	(-1.81)	(-1.12)	(1.66)	(0.71)	(0.01)	(1.34)
ln(IRSEA)	-0.224	0.074	-0.137	-0.184	-0.067	-0.071	-0.173*	-0.191**	-0.038
	(-1.86)	(0.67)	(-1.85)	(-1.83)	(-0.89)	(-0.52)	(-1.96)	(-3.15)	(-0.46)
ln(PRICE)	-0.322*	-0.407**	0.104	0.173**	0.023	0.019	-0.284**	0.221**	-0.066
	(-2.43)	(-3.84)	(1.39)	(2.63)	(0.35)	(0.09)	(-2.71)	(5.13)	(-0.84)
ln(SIZE)	-1.453**	-1.101**	-1.396**	-1.367**	-1.434**	-1.08**	-1.475**	-1.519**	-1.41**
	(-14.41)	(-10.06)	(-27.7)	(-19.12)	(-25.89)	(-6.73)	(-21.1)	(-37.79)	(-26.25)
Adj-R2	65.90%	47.30%	62.80%	43.10%	64.50%	66.10%	63.00%	54.80%	81.20%
					Comparing coefficients ofDown & Up market (3)=(1)-(2)				
Constant	-3.364	-1.097	0.727	0.21	0.049	3.118	-2.329*	0.465	-1.342
	(-1.35)	(-0.56)	(0.69)	(0.19)	(0.04)	(1.48)	(-2)	(0.65)	(-1.33)
ln(TLTA)	-0.104	0.112	-0.465	-0.337	0.008	0.062	0.132	-0.163	-0.08
	(-0.18)	(0.14)	(-1.02)	(-0.81)	(0.02)	(0.08)	(0.47)	(-0.7)	(-0.16)
ln(FCFTA)	-0.261	-0.509	0.018	-0.055	-0.095	0.476	-0.279	-0.031	-0.183
	(-0.84)	(-1.63)	(0.11)	(-0.27)	(-0.55)	(1.41)	(-1.53)	(-0.29)	(-1.07)
ln(EBITS)	-0.102	0.142	-0.045	-0.119	0.052	-0.414	0.074	-0.102	0.018
	(-0.49)	(0.78)	(-0.37)	(-0.81)	(0.43)	(-1.07)	(0.53)	(-0.98)	(0.15)
ln(CACL)	-0.645	0.326	-0.478	-0.011	-0.116	0.114	0.048	0.037	-0.377
	(-1.39)	(0.67)	(-1.17)	(-0.04)	(-0.45)	(0.2)	(0.28)	(0.25)	(-1.33)
ln(IRSEA)	-0.084	-0.106	0.107	0.185	-0.13	0.163	0.028	-0.016	-0.021
	(-0.39)	(-0.5)	(0.81)	(1.04)	(-0.94)	(0.65)	(0.17)	(-0.15)	(-0.14)
ln(PRICE)	0.121	-0.012	-0.221	-0.09	-0.049	-0.307	0.45*	-0.142	0.131
	(0.46)	(-0.06)	(-1.6)	(-0.77)	(-0.39)	(-0.72)	(2.07)	(-1.71)	(0.88)
ln(SIZE)	0.225	0.097	0.233*	0.076	-0.062	0.094	-0.143	0.068	0.076
	(1.22)	(0.49)	(2.44)	(0.52)	(-0.6)	(0.29)	(-0.93)	(0.84)	(0.8)

Following Lakonishok and Shapiro (1986), an up-market month refers a month when the rate of returns on the market is greater than the risk-free rate and a down-market month refers to a month when rate of returns on the market is lower than the risk free rate. The stocks are sorted into two groups: up- and down- markets. Then, the cross-sectional regressions of following models are computed.

$$\ln(TO) = a + b_1 \ln(TLTA) + b_2 \ln(FCFTA) + b_3 \ln(EBITS) + b_4 \ln(CACL) + b_5 \ln(IRSEA) + b_6 \ln(PRICE) + b_7 \ln(SIZE) \quad (4\text{-}20)$$

$$\ln(IL) = a + b_1 \ln(TLTA) + b_2 \ln(FCFTA) + b_3 \ln(EBITS) + b_4 \ln(CACL) + b_5 \ln(IRSEA) + b_6 \ln(PRICE) + b_7 \ln(SIZE) \quad (4\text{-}21)$$

where TO denotes turnover rate. IL refers to the illiquidity level (trading cost) measured by the Amihud's (2002) measure . TLTA refers to the financial leverage ratio which is the total liabilities to total assets. FCFTA refers to the free cash flow from operations to total assets. EBITS refers to the earnings before interests and taxes (EBIT) to total sales. CACL refers to the current assets to current liabilities. IRSEA refers to the Southeast Asia Index returns. PRICE is the daily average trading price in a month and SIZE is the monthly market capitalizations. All variables are natural log scaled. The estimate period is from January 1996 to December 2007. Significance at the 1% and 5% levels is indicated by ** and * respectively.

The explanatory ability of bankruptcy explanatory variables to determine Amihud's (2002) illiquidity by sector in up- and down-markets is presented in Panel B of Table 7-8. Generally, Amihud's (2002) illiquidity is explained by one of the four bankruptcy explanatory variables at a significance level of at least 5% in almost all sectors in both up- and down-markets. However, there is no sector in which all four bankruptcy explanatory variables determine trading costs. Additionally, firm size is strongly significant at a significance level of 1% in explaining Amihud's (2002) illiquidity of all sectors in both up- and down-markets. The tests of explanatory differences show that the explanatory ability of all four bankruptcy explanatory variables to explain Amihud's (2002) illiquidity in up-markets is similar to that in down-markets at the 5% significance level in all sectors.

The results of the market state-based analysis by sector of Table 7-8 suggest that the significance of bankruptcy explanatory variables in determining alternative liquidity measures can change significantly depending on the sector of the stocks; and that the ability of bankruptcy explanatory variables to determine liquidity (turnover or trading costs) in up- and down- markets is similar.

7.4 Summary of findings

In general, during periods of turmoil, exchange markets suffer from decreases in market liquidity and many companies face financial difficulties and a higher bankruptcy risk. This may be explained by the inventory paradigm; liquidity depends on factors that influence the holding inventory risk. Hence, one would expect that the higher bankruptcy risk of firms would drive the holding inventory risk higher and then this would lead to lower market liquidity. Among the wealth of literature on the

determinants of liquidity, surprisingly, there are few published studies on the relationship between bankruptcy explanatory variables and liquidity. This chapter employs data from five markets in Southeast Asia between 1996 and 2007 to examine whether the bankruptcy explanatory variables of firms are able to determine liquidity. Turnover and Amihud's (2002) measure are employed as proxies for liquidity.

The empirical results mainly show that bankruptcy explanatory variables positively explain liquidity, even after controlling for regional index returns, stock price, and firm size. Firms with lower financial leverage (TLTA), lower asset efficiency (FCFTA), lower short-term repayable debt (CACL), or lower profitability (EBITS) have lower liquidity (lower turnover and higher Amihud's (2002) illiquidity).

The negative (positive) and significant relationship between bankruptcy risk (firm performance) and liquidity is consistent with the view of Agrawal et al. (2004), who explained that this results from an increase of the adverse selection problem. Moreover, the results also be explained by the inventory paradigm of Demsetz (1968), Stoll (1978), and Ho and Stoll (1981). Moreover, the evidence of a direct relationship between TLTA and liquidity supports the view of Modigliani and Miller (1958), who stated that a higher leverage amount could increase the growth of firms. The empirical results of economic state-based analysis supported the findings over the whole period. In general, financial leverage (TLTA), efficiency (FCFTA), short-term repayable debt (CACL), and profitability (EBITS) positively relate to liquidity. Interestingly, all seven independent variables can explain both turnover and trading costs in Indonesia in the crisis period and in Singapore in the post-crisis period at a significant level of at least 10%.

This chapter contributes to current knowledge by investigating the relationship between bankruptcy risk and liquidity in different economic states market states and sectors. The results of the market state-based analysis are in line with the findings over the whole period and the economic state-based analysis. In general, bankruptcy explanatory variables can explain liquidity in both up- and down-markets. There is a direct relationship between liquidity and financial leverage (TLTA), asset efficiency (FCFTA), short-term repayable debt (CACL) and profitability (EBITS). Moreover, the ability of bankruptcy explanatory variables to determine liquidity (turnover or trading costs) is similar between up- and down- markets.

The explanatory ability of bankruptcy explanatory variables to determine liquidity variations by sector were further examined. The stocks of the Indonesian stock market were employed as a case study. The Indonesian stocks were divided into nine sectors: (1) Agriculture, (2) Basic Industry, (3) Construction & Property, (4) Consumer Goods, (5) Manufacturing, (6) Mining, (7) Miscellaneous Industry, (8) Trading & Service, (9) Utility Infrastructure. The empirical results mainly showed that bankruptcy explanatory variables are significantly able to explain liquidity and the significance of bankruptcy explanatory variables in determining alternative liquidity measures can change significantly depending on the sector. The results of the economic and market state-based analyses by sector are consistent with the findings by sector over the whole period that the significance of bankruptcy explanatory variables for determining alternative liquidity measures can change significantly depending on the sector. Additionally, the general evidence from the market state-based analysis by sector showed that the ability of bankruptcy explanatory variables to determine liquidity (turnover or trading costs) in up- and down-markets in the same industry is similar. Next, Chapter 8 gives the conclusion of this study.

Chapter 8

CONCLUSION

8.1 Introduction

This thesis provides an investigation on the relationship among bankruptcy risk, liquidity and returns in Southeast Asian markets. Although there are many previous studies investigating this issue, most of them are focused on the United States and other developed markets. Additionally, the available empirical evidence is still inconclusive. The three objectives of the research carried out in this study are: (1) to examine the relationship between bankruptcy risk and equity returns in five markets of Southeast Asia, (2) to examine the relationship between liquidity and equity returns in five markets of Southeast Asia and (3) to investigate the ability of bankruptcy explanatory variables of firms to determine liquidity in five markets of Southeast Asia.

The data in this study consisted of non-financial sector firms in the Southeast Asian markets of Indonesia, Malaysia, the Philippines, Singapore, and Thailand for the period 1996 to 2007. These markets are a good sample since they were affected by the East Asian financial crisis 1997. All the data were collected from the DATASTREAM database. Altman's Z-score (1968), Ohlson's O-score (1980) and Vassalou and Xing's DLI (2004) were used as proxies for bankruptcy risk to address the relationship between bankruptcy risk and returns. The proxies of liquidity in this study are the turnover rate and Amihud's (2002) measure. Financial leverage (TLTA), lower asset productivity (FCFTA), lower short-term repayable debt (CACL), or lower profitability

(EBITS) were used as bankruptcy explanatory variables in the investigation of the effect of bankruptcy explanatory variables of firms on determining liquidity.

The portfolio analysis was used to investigate the effects of bankruptcy risk and liquidity on equity returns. The regression analysis was used to examine the relationship among bankruptcy risk, liquidity, and returns. Analyses also conducted in sub-samples divided by economic state, market state, or sector. This chapter presents a summary of the study and gives a discussion of the findings of the thesis. The summary of results is presented in the following section. Then, Section 8.3 presents the limitations of the research and, finally, an outline of future research based on this study is discussed in Section 8.4.

8.2 Summary of results

The published studies on the relationship among bankruptcy risk, liquidity, and equity returns have mainly used data from the United States and other develop markets. There is only a small amount of published evidence on this topic in ASEAN-5. The results of previous research are still inconsistent; for instance, Amihud and Mendelson (1986) Dichev (1998), Vassalou and Xing (2004), and Agrawal et al. (2004).

The results relating to the relationship between bankruptcy risk and equity returns show that there is a negative and significant relationship between bankruptcy risk and returns in ASEAN-5 markets when Altman's (1968) Z- and Ohlson's (1980) O-scores are used as proxies for bankruptcy risk in portfolio analysis. This supports the mispricing view of Dichev (1998), Griffin and Lemmon (2002) and Zaretzky and Zumwait (2007), who stated that the relationship between bankruptcy risk and returns

is negative because the market does not fully impound the available financial distress information.

However, the results mainly find a positive and significant relationship between bankruptcy risk and equity returns when Vassalou and Xing's (2004) DLI is used as a bankruptcy risk measure in the portfolio analysis and in the cross-sectional analysis results on the relationship between bankruptcy risk and equity returns. ASEAN-5 stocks with a higher bankruptcy risk earn higher returns, even after controlling for size and book-to-market equity ratio. This is consistent with Vassalou and Xing (2004) and Chava and Purnanandam (2010) who studied the United States market.

The different results of the portfolio and cross-sectional analyses suggest that the relationship between bankruptcy risk and equity returns can change significantly depending on how the bankruptcy risk is measured and the methodology which is used. In addition, the explanatory evidence of the economic states-based analyses confirms this contribution and provides a further suggestion that the relationship between bankruptcy risk and equity returns can change significantly depending on economic states.

The empirical results of both the portfolio and regression analyses of the relationship between liquidity and returns show that, in general, liquidity is positively and significantly related to equity returns in ASEAN-5 markets. Stocks with higher liquidity have higher equity returns. The positive and significant relationship between liquidity and returns liquidity is consistent with the studies of Chordia et al. (2001b), Jun et al. (2003) and Dey (2005). Furthermore, the empirical results generally demonstrated that the positive and significant relationship between liquidity and

returns existed in all ASEAN-5 markets in all economic states. In addition, the results of the market state-based analysis mainly show consistency with the evidence from the whole period and economic state-based analyses. Except for a very few observations, ASEAN-5 stocks with higher liquidity have higher returns.

Noticeably, the relationship between liquidity and returns in ASEAN-5 markets is contrary to many empirical studies on developed markets; for instance, Liu (2006), Korajczyk and Sadka (2008) and Chang et al. (2010). The inconsistency between the ASEAN-5 results and main results from developed market may be explained by the view of Harvey (1995) and Bekaert and Harvey (1995) that emerging equity markets have a lower degree of integration with the global economy and thus risk perceptions in developed and emerging markets are different.

The empirical results on the effect of bankruptcy explanatory variables in determining the liquidity of stocks in ASEAN-5 generally showed that there is a negative (positive) and significant relationship between bankruptcy risk (firm performance) and liquidity even after controlling for regional index returns, stock price and firm size. Firms with lower financial leverage (TLTA), lower asset productivity (FCFTA), lower short-term repayable debt (CACL), or lower profitability (EBITS) have lower liquidity (lower turnover and higher Amihud's (2002) illiquidity).

The empirical evidence from ASEAN-5 in the sub–samples divided by economic and market states contributes to the literature by providing evidence consistent with the empirical results in the whole period of this study. It is consistent with the evidence of Agrawal et al. (2004), who found that firms with poorer financial performance will have lower liquidity and pointed out that the significant negative (positive) and

significant relationship between bankruptcy risk (firm performance) and liquidity is due to an increase of the adverse selection problem. Moreover, the evidence of a negative (positive) and significant relationship between bankruptcy risk (firm performance) and liquidity is also explained by the inventory paradigm of Demsetz (1968), Stoll (1978) and Ho and Stoll (1981). However, the evidence for a direct relationship between financial leverage and liquidity is consistent with the view of Modigliani and Miller (1958), which stated that a higher leverage amount could increase the growth of a firm.

Furthermore, the evidence of a relationship between bankruptcy risk and liquidity in sub-samples divided by sectors generally shows that bankruptcy explanatory variables are significantly able to explain liquidity. However, the significance of bankruptcy explanatory variables in determining alternative liquidity measures can change significantly depending on the sectors of the stocks. Additionally, the evidence from market states-based analysis by sector showed that, in almost all industries, the ability of bankruptcy explanatory variables to determine liquidity (turnover or trading costs) in up- and down- markets in the same industry is similar.

8.3 Limitations of research

There are some limitations to this study. First, this study employed accounting-based variables that are derived from financial statements, such as Altman's (1968) Z-score, Ohlson's (1980) O-score and bankruptcy explanatory variables, since they are commonly used to examine the relationship between bankruptcy risk and returns in previous research for instance, Dichev (1998), Griffin and Lemmon (2002) and Zaretzky and Zumwalt (2007). However, these variables, calculated from data from

financial statements, are naturally backward-looking since financial statements tend to present a firm's past performance rather than its future prospects. Therefore, an accounting statement-based data might not represent the current and future bankruptcy possibility of firms. This may cause errors in the empirical evidence.

Second, there is a limitation to the bankruptcy prediction model originally developed by the ASEAN-5 data, since the proxies for bankruptcy risk used in this study, i.e., Altman's (1968), Ohlson's (1980) and Vassalou and Xing's (2004) were developed using United States data. Although they have been examined for their accuracy in predicting in other markets, including some of the ASEAN-5 markets (for instance, Iwan,2005; Pongsatat et al., 2004; and Bystrom et al., 2005), these variables cannot perfectly predict the bankruptcy possibilities of firms in ASEAN-5. Hence the empirical evidence of this study might be in error due to the use of imperfect bankruptcy risk prediction models.

Third, there is a limitation in the data collection from ASEAN-5 markets. Since this study is based on a large sample containing different countries, some alternative data used as proxies for interested variables are difficult to collect; for instance, the bid-ask midpoint for every 6-seconds trading interval (i.e., Attig et al., 2006) and the most recent bid-price and ask-price as quoted at least 5 seconds before the trade (i.e., Lee and Ready, 1991). Therefore, this affects the data collection and variable selection conclusions of the tested models in this study and may affect the empirical results.

8.4 Future research

The guidelines for future research that could improve on this study are as follows. First, due to the small amount of evidence from emerging markets in the previous

literature, and the inconclusiveness of previous and present empirical evidence, a future study could be conduct in other emerging markets in regions other than Southeast Asia. This would provide validation of the relationship among bankruptcy risks, liquidity and equity returns in emerging markets.

Second, since there is a lack of bankruptcy prediction models originating from Southeast Asian data future research could develop a measure of bankruptcy risk for Southeast Asia to examine the relationship among bankruptcy risk, liquidity and returns. This would raise the accuracy of predictions about the bankruptcy possibilities of firms and reduce examination errors.

Finally, the data used in this study are based on accounting statement and market-based data due to the availability and accessibility of such data in ASEAN-5. However, some possible variables based on non-accounting statement-based variables such as the percentage of shares held by insiders (i.e., Ascioglu et al., 2005), the fees paid by a firm to its auditor (i.e., Ascioglu et al., 2005), the judicial system (i.e., Lesmond, 2005), which would be relevant to this study, have not been included because of the difficulties of collecting such data. Therefore, if there is an increased accessibility of these variables in the future, the inclusion of the non-accounting statement-based variables would be useful for improving the quality of future studies and may provide validation of existing evidence.

Appendices

Appendix 1: Basic ASEAN indicators at 2008

Country	Land area		Population	
	Thousand km^2	%	Million	%
Brunei	5.77	0.13	0.40	0.07
Cambodia	181.04	4.08	14.66	2.51
Indonesia	1,860.36	41.94	228.52	39.15
Lao PDR	236.80	5.34	5.76	0.99
Malaysia	330.25	7.45	27.86	4.77
Myanmar	676.58	15.25	58.51	10.02
Philippines	300.00	6.76	90.46	15.50
Singapore	0.71	0.02	4.84	0.83
Thailand	513.12	11.57	66.48	11.39
Viet Nam	331.21	7.47	86.16	14.76
ASEAN	4,435.83	100.00	583.65	100.00
ASEAN-5	3,004.44	67.73	418.17	71.65

Source: Association of Southeast Asian nations (2009b), retrieved at 31 October 2009. ASEAN-5 comprises Indonesia, Malaysia, the Philippines, Singapore, and Thailand.

Appendix 2: ASEAN Economic statistics in 2008

Country	GDP Growth (%)	Inflation rate (%)	Exchange rate per US$	Currency
Brunei	0.4	2.6	1.39	Dollar (B $)
Cambodia	6.0	7.5	4,121.00	Riel
Indonesia	6.1	11.1	10,950.00	Rupiah (Rp)
Lao PDR	8.4	8.5	8,531.00	Kip
Malaysia	4.6	4.4	3.55	Ringgit (RM)
Myanmar	4.5	n.a	5.39*	Kyat
Philippines	3.6	8.0	48.09	Peso (PhP)
Singapore	1.1	4.9	1.44	Dollar (S $)
Thailand	2.6	0.4	33.36	Baht
Viet Nam	6.3	19.9	16,977.00	Dong
ASEAN	4.4	n.a.	n.a.	n.a.
ASEAN-5	3.6	n.a.	n.a.	n.a.

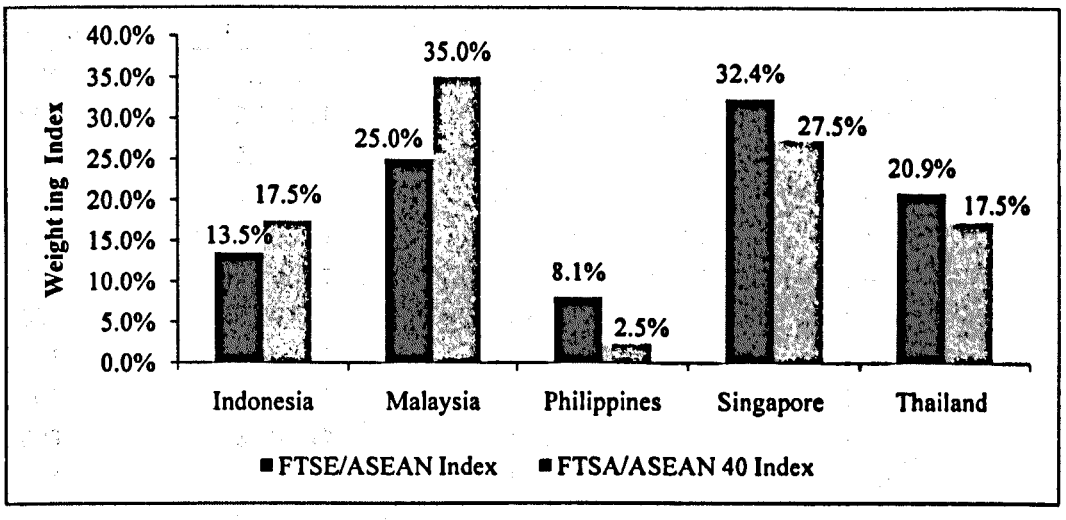
Source: Association of Southeast Asian nations (2009b), retrieved at 31 October 2009. ASEAN-5 comprises Indonesia, Malaysia, the Philippines, Singapore, and Thailand. * This number is retrieved from DATASTREAM at 10 February 2010.

Appendix 3: The characteristics of ASEAN-5 exchanges in 2008

	End 2008		
Markets	Listing	Market Cap (in billion USD)	Value of Share Trading (in billion USD)
Indonesia SE	396	99	109
Bursa Malaysia	976	189	94
Philippine SE	246	52	17
Singapore Ex	767	265	260
Thailand SE	525	103	116

Source: World Federation of Exchanges (2008), retrieved at 31 October 2009

Appendix 4: Country weighting on FTSE/ASEAN and FTSE/ASEAN 40



Source: FTSE Group (2009), date as at 28 October 2009

Appendix 5: Rate of currency depreciation between June-October 1997 (local currency per US dollar)

Currency	Jun-97	Jul-97	Aug-97	Sep-97	Oct-97	Rate of dep. (%) June-Oct 97
Indonesian Rupiah	2,446.59	2,518.30	2,800.37	3,055.30	3,616.30	47.81
Malaysian Ringgit	2.52	2.57	2.74	3.01	3.29	30.79
Philippines peso	26.38	27.67	29.33	32.39	34.46	30.66
Singapore dollar	1.43	1.45	1.50	1.52	1.56	9.15
Thai Baht	25.78	30.32	32.48	36.30	37.40	45.06

Source: DATASTREAM, date as at 28 October 2009

Appendix 6: Local currency per US dollar, 1994-2008

Year end	Indonesia	Malaysia	Philippines	Singapore	Thailand
1994	2,190.15	2.56	24.60	1.47	25.01
1995	2,291.31	2.54	26.11	1.42	25.14
1996	2,356.60	2.52	26.28	1.41	25.49
1997	4,005.70	3.48	35.38	1.60	40.66
1998	7,908.27	3.80	40.64	1.64	36.95
1999	7,192.67	3.80	40.43	1.67	38.77
2000	9,297.37	3.80	49.25	1.74	43.30
2001	10,407.90	3.80	51.84	1.83	44.30
2002	9,054.67	3.80	53.24	1.77	43.37
2003	8,482.47	3.80	55.26	1.72	39.73
2004	9,128.20	3.80	56.28	1.66	40.25
2005	9,999.60	3.78	54.63	1.69	40.99
2006	9,124.87	3.63	49.77	1.56	36.53
2007	9,246.30	3.36	43.11	1.45	33.87
2008	11,059.90	3.57	48.44	1.49	34.80

Source: DATASTREAM, date as at 28 October 2009

Appendix 7: Local currency rate per US dollar, 1994-2008 (quarterly)

Year end	Indonesia	Malaysia	Philippines	Singapore	Thailand
Q1 1994	2,128.71	2.73	27.65	1.59	25.40
Q2 1994	2,152.63	2.63	27.19	1.55	25.20
Q3 1994	2,171.52	2.57	26.23	1.50	24.99
Q4 1994	2,190.15	2.56	24.60	1.47	25.01
Q1 1995	2,209.48	2.55	25.17	1.44	24.95
Q2 1995	2,231.86	2.46	25.84	1.40	24.63
Q3 1995	2,261.79	2.46	25.73	1.41	24.94
Q4 1995	2,291.31	2.54	26.11	1.42	25.14
Q1 1996	2,318.17	2.55	26.19	1.41	25.26
Q2 1996	2,344.08	2.50	26.19	1.41	25.30
Q3 1996	2,350.33	2.50	26.21	1.41	25.33
Q4 1996	2,356.60	2.52	26.28	1.41	25.49
Q1 1997	2,403.27	2.49	26.33	1.42	25.86
Q2 1997	2,437.23	2.51	26.37	1.43	25.90
Q3 1997	2,791.32	2.78	29.80	1.49	33.03
Q4 1997	4,005.70	3.48	35.38	1.60	40.66
Q1 1998	9,433.36	4.00	40.69	1.68	47.09
Q2 1998	10,460.80	3.85	39.38	1.64	40.33
Q3 1998	12,252.10	4.06	42.86	1.73	41.06
Q4 1998	7,908.27	3.80	40.64	1.64	36.95
Q1 1999	8,775.70	3.80	38.70	1.70	37.06
Q2 1999	7,921.20	3.80	37.99	1.71	37.15
Q3 1999	7,531.03	3.80	39.24	1.69	38.27
Q4 1999	7,192.67	3.80	40.43	1.67	38.77
Q1 2000	7,390.93	3.80	40.65	1.70	37.60
Q2 2000	8,286.93	3.80	41.88	1.72	38.61
Q3 2000	8,711.87	3.80	44.99	1.73	40.94
Q4 2000	9,297.37	3.80	49.25	1.74	43.30

Source: DATASTREAM, date as at 28 October 2009

Appendix 8: Inflation rate, 1994-2008 (quarterly)

Country	Indonesia	Malaysia	Philippines	Singapore	Thailand
Q1 1994	7.6	4.0	7.8	4.3	4.6
Q2 1994	9.1	4.5	10.0	4.5	4.3
Q3 1994	8.5	4.5	10.0	4.7	4.8
Q4 1994	9.2	4.0	9.3	4.3	5.5
Q1 1995	9.2	3.9	7.9	3.0	5.4
Q2 1995	9.7	4.2	6.7	3.3	5.3
Q3 1995	10.1	4.8	7.8	3.4	5.5
Q4 1995	8.7	3.9	8.4	3.3	5.7
Q1 1996	9.1	4.1	8.8	2.4	5.8
Q2 1996	8.4	4.2	9.0	2.5	6.2
Q3 1996	8.7	3.9	8.7	1.9	5.7
Q4 1996	8.4	3.8	9.0	2.0	5.9
Q1 1997	7.5	3.6	7.0	2.6	5.6
Q2 1997	6.0	3.8	7.0	2.1	5.3
Q3 1997	6.1	3.2	5.8	2.0	6.8
Q4 1997	9.8	4.5	8.5	2.0	7.7
Q1 1998	13.3	9.5	10.5	2.4	8.5
Q2 1998	50.0	8.0	6.5	2.5	10.8
Q3 1998	90.8	8.5	9.5	2.0	11.3
Q4 1998	78.6	9.0	10.0	0.9	9.3
Q1 1999	47.1	4.7	9.3	1.5	8.2
Q2 1999	18.0	4.9	9.1	1.4	5.2
Q3 1999	13.2	3.7	4.8	2.3	3.8
Q4 1999	6.0	3.3	6.8	0.6	1.8
Q1 2000	4.5	3.6	7.4	1.7	1.5
Q2 2000	6.1	3.3	6.5	1.6	2.5
Q3 2000	5.9	3.5	5.8	1.8	3.2
Q4 2000	7.8	3.6	5.8	1.7	2.8

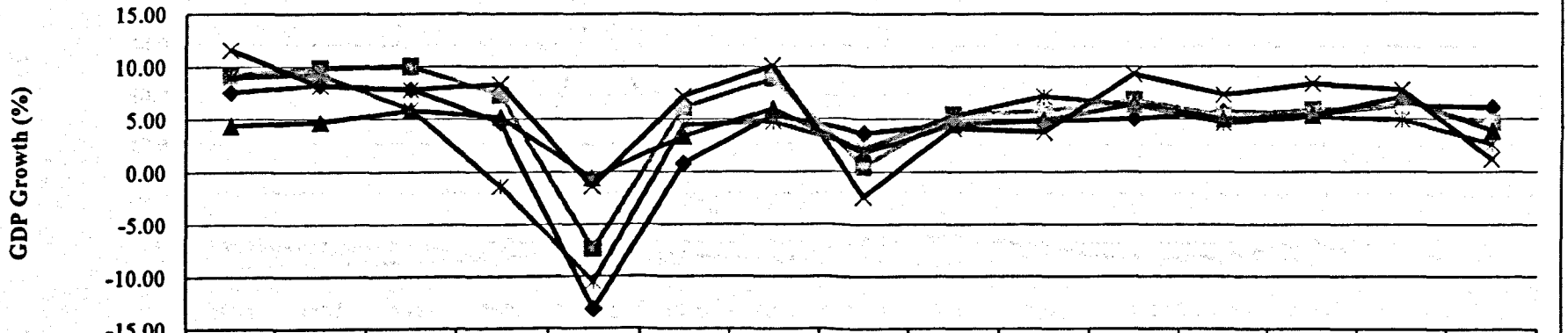
Source: DATASTREAM, date as at 28 October 2009

Appendix 9: Local stock market index level, 1996-2008

	Indonesia	Malaysia	Philippines	Singapore	Thailand
Year end	JSX Composite	KL Composite	PSE Index	ST Index	SET
1994	469.64	971.21	2,785.81	1,234.61	1,360.09
1995	513.85	995.17	2,594.18	1,258.04	1,280.81
1996	637.43	1,214.69	3,170.00	1,136.36	831.57
1997	401.71	589.39	1,869.23	941.47	365.82
1998	398.04	574.56	1,968.78	795.99	355.81
1999	676.92	812.33	2,142.97	1,580.04	481.92
2000	416.32	679.64	1,494.50	1,173.37	269.19
2001	392.04	691.64	1,168.08	937.44	303.85
2002	424.95	648.43	1,018.41	758.58	356.48
2003	691.90	792.72	1,442.37	1,005.13	764.23
2004	1,000.23	910.13	1,822.83	1,145.52	668.10
2005	1,162.64	899.79	2,096.04	1,295.86	713.73
2006	1,805.52	1,096.24	2,982.54	1,697.84	679.84
2007	2,745.83	1,447.04	3,621.60	1,948.60	858.10
2008	1,355.41	881.63	1,872.85	1,002.68	449.96

Source: DATASTREAM, date as at 28 October 2009

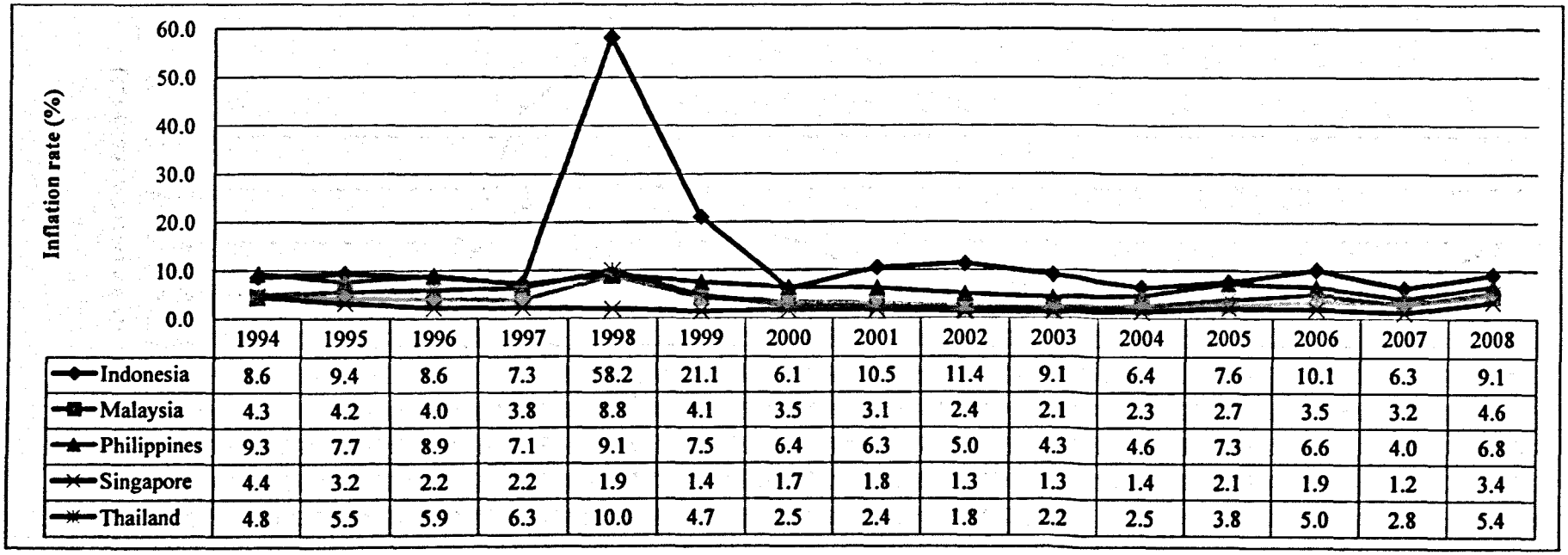
Appendix 10: Appendix 10: Real GDP growth rate, 1994-2008 (percentages)



	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Indonesia	7.54	8.22	7.82	4.70	-13.13	0.79	5.35	3.64	4.50	4.78	5.03	5.69	5.50	6.28	6.06
Malaysia	9.21	9.83	10.00	7.32	-7.36	6.14	8.86	0.52	5.39	5.79	6.78	5.33	5.85	6.18	4.63
Philippines	4.39	4.68	5.85	5.19	-0.58	3.40	5.97	1.76	4.45	4.93	6.38	4.95	5.34	7.08	3.84
Singapore	11.57	8.15	7.79	8.34	-1.38	7.20	10.06	-2.37	4.11	3.77	9.30	7.31	8.35	7.77	1.15
Thailand	8.99	9.24	5.90	-1.37	-10.51	4.45	4.75	2.17	5.32	7.14	6.34	4.60	5.23	4.93	2.59

Source: DATASTREAM, date as at 28 October 2009

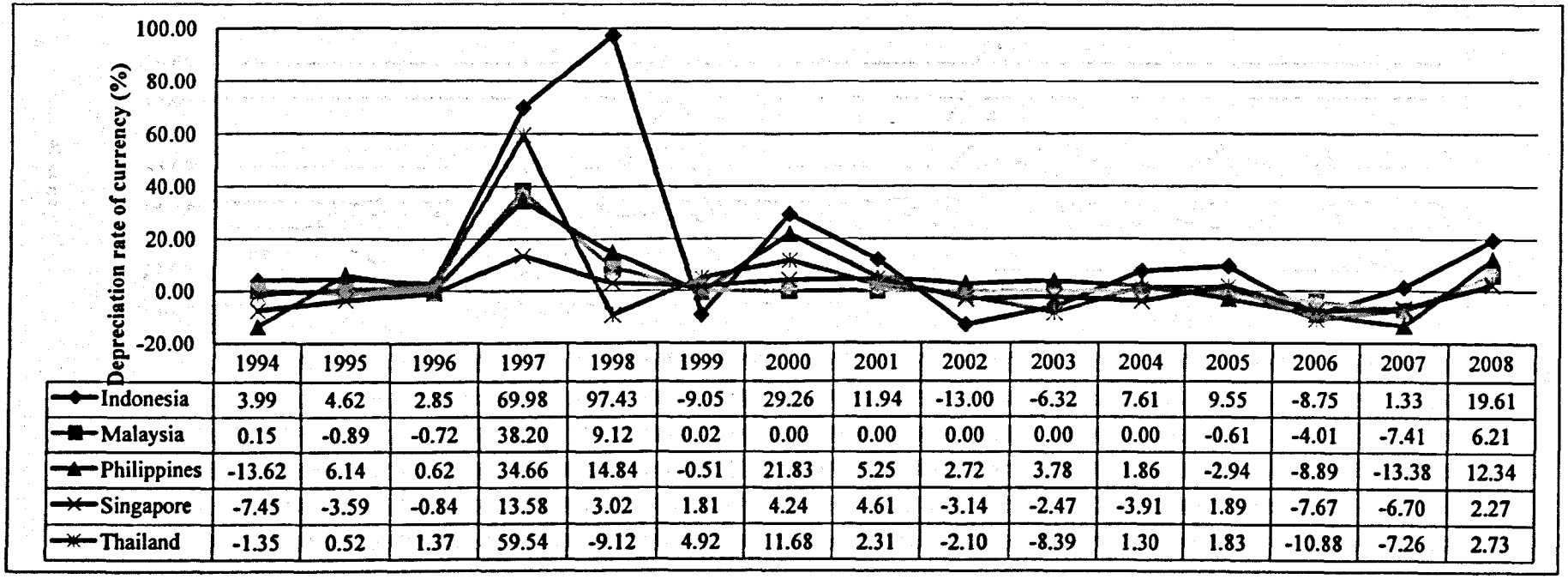
Appendix 11: Inflation rate, 1994-2008 (percentages)



	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Indonesia	8.6	9.4	8.6	7.3	58.2	21.1	6.1	10.5	11.4	9.1	6.4	7.6	10.1	6.3	9.1
Malaysia	4.3	4.2	4.0	3.8	8.8	4.1	3.5	3.1	2.4	2.1	2.3	2.7	3.5	3.2	4.6
Philippines	9.3	7.7	8.9	7.1	9.1	7.5	6.4	6.3	5.0	4.3	4.6	7.3	6.6	4.0	6.8
Singapore	4.4	3.2	2.2	2.2	1.9	1.4	1.7	1.8	1.3	1.3	1.4	2.1	1.9	1.2	3.4
Thailand	4.8	5.5	5.9	6.3	10.0	4.7	2.5	2.4	1.8	2.2	2.5	3.8	5.0	2.8	5.4

Source: DATASTREAM, date as at 28 October 2009

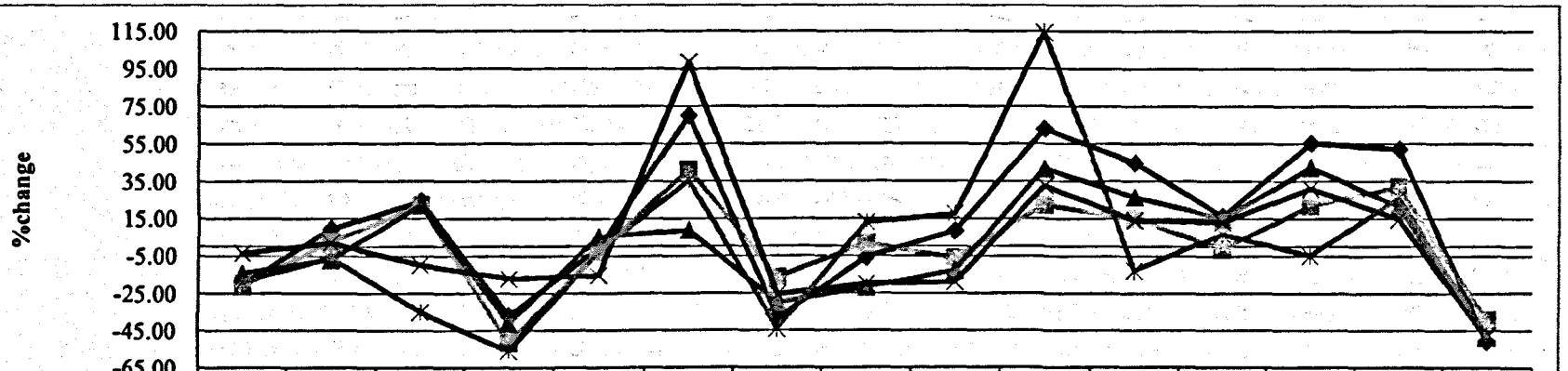
Appendix 12: Rate of currency depreciation, 1994-2008



	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Indonesia	3.99	4.62	2.85	69.98	97.43	-9.05	29.26	11.94	-13.00	-6.32	7.61	9.55	-8.75	1.33	19.61
Malaysia	0.15	-0.89	-0.72	38.20	9.12	0.02	0.00	0.00	0.00	0.00	0.00	-0.61	-4.01	-7.41	6.21
Philippines	-13.62	6.14	0.62	34.66	14.84	-0.51	21.83	5.25	2.72	3.78	1.86	-2.94	-8.89	-13.38	12.34
Singapore	-7.45	-3.59	-0.84	13.58	3.02	1.81	4.24	4.61	-3.14	-2.47	-3.91	1.89	-7.67	-6.70	2.27
Thailand	-1.35	0.52	1.37	59.54	-9.12	4.92	11.68	2.31	-2.10	-8.39	1.30	1.83	-10.88	-7.26	2.73

Source: calculated by change of the end of year currency rate collected from DATASTREAM date as at 28 October 2009

Appendix 13: The percentage change of stocks market index, 1994-2008



	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Indonesia	-20.23	9.41	24.05	-36.98	-0.91	70.06	-38.50	-5.83	8.39	62.82	44.56	16.24	55.30	52.08	-50.64
Malaysia	-21.15	2.47	22.06	-51.48	-2.52	41.38	-16.33	1.77	-6.25	22.25	14.81	-1.14	21.83	32.00	-39.07
Philippines	-14.07	-6.88	22.20	-41.03	5.33	8.85	-30.26	-21.84	-12.81	41.63	26.38	14.99	42.29	21.43	-48.29
Singapore	-3.63	1.90	-9.67	-17.15	-15.45	98.50	-25.74	-20.11	-19.08	32.50	13.97	13.12	31.02	14.77	-48.54
Thailand	-19.18	-5.83	-35.07	-56.01	-2.74	35.44	-44.14	12.88	17.32	114.38	-12.58	6.83	-4.75	26.22	-47.56

Source: calculated by change of the end of year stock market index rate collected from DATASTREAM, date as at 28 October 2009

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