EFFECT OF FREE FLOAT ON STOCK PERFORMANCE WITH DIVERGENCE OF OPINION HYPOTHESIS

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ผลกระทบของปริมาณผู้ถือหุ้นรายย่อยต่อประสิทธิภาพของหุ้นในสมมุติฐานของความแตกต่างของความคิดเห็น

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ยุทธวีร์ ชีนบรรลือสุข : ผลกระทบของปริมาณผู้ถือหุ้นรายย่อยต่อประสิทธิภาพของหุ้นในสมมุติฐานของความแตกต่างของความคิดเห็น (EFFECT OF FREE FLOAT ON STOCK PERFORMANCE WITH DIVERGENCE OF OPINION HYPOTHESIS) อ.ที่ปรึกษาวิทยานิพนธ์หลัก: อ. ดร.นราพงศ์ ศรีวิศาล, 91 หน้า.

วิทยานิพนธ์ฉบับนี้ตรวจสอบผลกระทบของปริมาณผู้ถือหุ้นรายย่อยต่อประสิทธิภาพของหุ้นภายใต้สมมุติฐานว่านักลงทุนมีความคิดเห็นที่แตกต่างต่อมูลค่าหุ้น การศึกษานี้มีจุดประสงค์เพื่อนำเสนอหลักฐานเชิงประจักษ์ของผลกระทบของปริมาณผู้ถือหุ้นรายย่อยในมุมมองที่แตกต่าง และเพื่อช่วยในการพิจารณาว่าผลกระทบของปริมาณผู้ถือหุ้นรายย่อยต่อประสิทธิภาพของหุ้นควรพิจารณาควบคู่กับผลกระทบที่เกิดจากความแตกต่างทางความคิดเห็นด้วยหรือไม่ การศึกษานี้ตรวจสอบจากหุ้นในตลาดของไทยและอเมริกาในช่วงปี ค.ศ. 2000-2014 ผู้แต่งใช้ค่าการแผ่กระจายของการทำนายค่ากำไรต่อหุ้นของนักวิเคราะห์และความผันผวนเฉพาะตัวของแต่ละหุ้นเป็นตัวแทนของระดับความแตกต่างทางความคิดเห็นของนักลงทุน ซึ่งการใช้ตัวแทนที่หลากหลายทำให้ผลลัพท์ในภาพรวมมีความแม่นยำมากขึ้น ผลการศึกษาแสดงให้เห็นว่าระดับความแตกต่างทางความคิดเห็นของนักลงทุนมีผลกระทบต่อความไวของการตอบสนองของหุ้นต่อปริมาณผู้ถือหุ้นรายย่อย ยิ่งความคิดเห็นมีระดับของความแตกต่างมากเท่าไหร่ ผลกระทบเชิงลบของปริมาณผู้ถือหุ้นรายย่อยต่อราคาหุ้นก็ยิ่งมากเท่านั้น ซึ่งสอดคล้องกับการคาดคะเนของการศึกษานี้ ผลการศึกษายังแสดงให้เห็นอีกว่าปริมาณผู้ถือหุ้นรายย่อยมีความสัมพันธ์กับความผันผวนของผลตอบแทนหุ้นในเชิงลบซึ่งก็สอดคล้องกับการคาดคะเนของการศึกษานี้อีกเช่นกัน อย่างไรก็ตามเมื่อผู้แต่งทำการทดสอบหาความสัมพันธ์ของปริมาณผู้ถือหุ้นรายย่อยต่อผลตอบแทนในอนาคตของหุ้น ผลลัพท์ที่เกิดขึ้นแสดงให้เห็นได้ว่ามันมีความสัมพันธ์ในเชิงลบซึ่งเป็นผลลัพท์ที่ขัดแย้งต่อแนวคิดของการศึกษานี้ ถึงอย่างนั้นก็ตามความสัมพันธ์ที่เป็นลบนี้สอดคล้องกับมุมมองที่ว่าปริมาณผู้ถือหุ้นรายย่อยคือตัวแทนของระดับสภาพคล่องของหุ้น การเพิ่มขึ้นของปริมาณผู้ถือหุ้นรายย่อยบ่งบอกถึงการเพิ่มขึ้นของระดับสภาพคล่องของหุ้นซึ่งส่งผลให้ความเสี่ยงทางสภาพคล่องของหุ้นลดลง ถ้าความเสี่ยงชนิดนี้สะท้อนอยู่ในราคาหุ้น หุ้นเหล่านั้นก็ควรที่จะให้ผลตอบแทนในอนาคตที่ต่ำลง ผู้แต่งค้นพบหลักฐานที่สนับสนุนแนวคิดนี้และมันแสดงให้เห็นว่าผลลัพท์ของความสัมพันธ์ในเชิงลบระหว่างปริมาณผู้ถือหุ้นรายย่อยและผลตอบแทนในอนาคตของหุ้นที่เห็นในการศึกษานี้อาจสะท้อนถึงผลกระทบของสภาพคล่องได้มากกว่าผลกระทบที่คาดคะเนไว้ ด้วยเหตุนี้ เราสามารถสรุปเชื่อมโยงผลลัพท์ที่ขัดแย้งและสรุปได้ว่าผลกระทบของปริมาณผู้ถือหุ้นรายย่อยตามที่คาดคะเนไว้เกิดขึ้นจริง นัยยะหลักของการศึกษานี้คือนักลงทุนควรพิจารณาผลกระทบของปริมาณผู้ถือหุ้นรายย่อยควบคู่ไปกับผลกระทบของความแตกต่างทางความคิดเห็น นอกจากนั้นหุ้นที่มีระดับของความแตกต่างทางความคิดเห็นที่มากควรถูกผู้คุมกฎดูแลตรวจสอบอย่างระมัดระวังเพราะหุ้นเหล่านั้นสามารถแสดงถึงความผันผวนที่มากเกินปกติถ้ามีการเปลี่ยนแปลงของปริมาณผู้ถือหุ้นรายย่อยเกิดขึ้น

ภาควิชา การธนาคารและการเงิน ลายมือชื่อนิสิต
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YUDHAVEE CHUENBUNLUESOOK: EFFECT OF FREE FLOAT ON STOCK PERFORMANCE WITH DIVERGENCE OF OPINION HYPOTHESIS. ADVISOR: PROF. NARAPONG SRIVISAL, Ph.D., 91 pp.

This research investigates the effect of free float on stock performance under an assumption that investors have divergence of opinion. The objective of this study is to provide an empirical evidence of free float effect in a different viewpoint and to answer whether effect of free float on stock performance should be considered together with the effect of opinion divergence. This research examines both Thai and U.S. markets during 2000 to 2014. The author uses multiple proxies of investors' degree of opinion divergence, namely dispersion of analysts' earnings forecasts and idiosyncratic volatility, to ensure the robustness of the results. The empirical results reveal that investors' degree of opinion divergence affects the sensitivity of stock price to free float. The more opinions diverge, the larger the negative effect of free float on stock price. This evidence is consistent with the prediction of this research. The results also display a negative relationship between free float and stock future volatility, which is, again, consistent with the prediction. However, when the author conducts tests on free float and future return of stocks, the results show that free float is negatively related to stock future return, which appears to be against the research's prediction. Nonetheless, this negative relation is in line with the view that that free float is a proxy for stock liquidity. The increase of free float implies the increase of asset's liquidity and hence the decrease in liquidity premium. If this type of risk reflects in a stock price, such stocks should yield lower future returns. The author finds the supportive evidence to this argument and it reveals that the results of relationship between free float and stock future return might be dominated by the liquidity effect. As a result, we can reconcile the conflicting results and conclude that the predicted effect of free float holds true. The main implication is that investors should consider the free float effect to the stock price along with the opinion divergence effect. Moreover, stocks with high degree of opinion divergence should be prudently monitored by regulators because such stocks could exhibit an excessively high volatility if there is a change of free float.

Department:	Banking and Finance	Student's Signature	
Field of Study:	Finance	Advisor's Signature	
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CONTENTS

CHAPTER I

INTRODUCTION

1.1 Background and Problem Reviews

Investors and academic researchers have recently started to concern the effect of free float since the collapse of internet bubble in the late 1990s. A growing literatures in finance suggest that free float is the main catalyst of the event due to a significant increase of floating shares of many firms during that time. If we consider free float as the stock supply, it is economically reasonable to hypothesize that the increase of free float will cause the equilibrium prices of stocks lower, the opposite is true for the case of decreasing free float. This implies that a dramatic change of free float is likely to cause a dramatic change of stock prices. However, this point of view does not yet consider a demand component of investors. If investors have divergence of opinion as argued by Miller (1977)[1], the demand curve of stocks will be downward sloping. The more opinions diverge, the steeper the demand curve of a stock and the higher equilibrium price. Hence, this logic suggests that the equilibrium prices of stocks are affected by both free float and investors' degree of opinion divergence. This research attempts to investigate the effect of free float to the stock performance in such a framework.

Free float represents a part of company's market capitalization that is tradable without any restrictions. In other words, it is a part of company's stocks that can be freely traded. Strategic shareholders must be excluded from the free float stocks because they are defined as shareholders who held stocks for the purpose of controlling the company or business strategy. Strategic shareholders also include insiders, government, corporations, employers or other individuals with “controlling interest”. Shareholders who hold shares more than five percent in proportion are excluded from the free float as well. Salmon (1989)[2] defines free float as the number that is obtained from deduction of non-tradable shares from the total number of shares of the company. Non-tradable shares can be defined as closely-held shares and restricted stocks. Closely-held shares are stocks owned by insiders, major shareholders and employees, while restricted stocks refer to insider shares that cannot be traded because of a temporary restriction such as the lock-up period after an initial public offering.

During the collapse of internet bubble in the late 1990s, several researchers found that free float of internet companies increased substantially and was credited to be the cause of crisis. The concerns about free float have encouraged a number of large stock index companies to revise their indexes to be adjusted by free float because it can reflect the extent of tradable shares more accurately. Liam, Lin and Michayluk (2011)[3] have provided evidences to support the notion that free-float adjusted methodology can help reducing price distortions which is created by unbalanced demand and supply for low free float stocks. Many investment banks have also come to realize the importance of free float in recent years. For instance, Morgan Stanley Capital International’s indexes used to ignore the concept of free float, leading them to suffer negative effect during East Asia financial crisis. Hence, they have changed the methodology of calculating the weights of its indexes[1]. FTSE indexes is another one which encountered the same experience and revised their methodology (Aggarwal, Klapper and Wysocki, 2005[4]).

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[1] The details of MSCI’s methodology of construction index are available on the official web site www.msci.com

Weights of the stocks constituted in the indexes have been adjusted by free float since the start of 2001 to reflect government holdings and restricted ownership to ensure a more accurate representation of freely tradable stocks in the market. Free float-adjusted methodology is also used with Tokyo Stock Price Index. Tokyo Stock Exchange (TSE) announced an initiative to implement free-float adjustment of the TOPIX in February 2004 (Ide 2004[5]).

Stock prices of companies with low free float tend to be easily manipulated. Major shareholders can quickly change the stock price to conduct the market value of that particular firm to their target. On the other hand, companies, especially large companies, with higher free float are less likely to be exposed to such situation. Bostanci and Kilic (2010)[6] explain that a low amount of floating shares implies thin market. Hence, there are two types of possible effect of free float. First, low free float ratio will discourage investors to invest in that particular stock. The intuition is that low free float companies have weak corporate governance structure and investors are not willing to risk with the possibility of expropriation. Second, lower free float indicates lower liquidity which can harm the value of stocks because investors dislike illiquidity, this is also argued by Weill (2008)[7]. However, divergence of opinion hypothesis proposed by Miller (1977) can be used as an alternative explanation for effect of free float to stock performance if we consider free float as a stock supply while assuming that rational investors have a different assessment of value estimates.

In economics sense, determining the equilibrium price of an asset needs two components, which are supply and demand. Free float can be simply used as a proxy for stock supply. However, to determine the proxy for investors' demand appears to pose a challenges. There are many researchers attempt to determine the characteristic of stock demand curve, one of those is Miller (1977) who proposed the mispricing theory in a demand-supply viewpoint under short-sale constraints which includes divergence of opinions hypothesis into the picture. He argues that when investors have divergence of opinions and bind by short-sale constraints, pessimistic investors will not sell the stocks causing stock prices to be upwardly biased. In other words, stock prices are more likely to reflect the valuation of the optimistic participants when there are trading frictions that prevent pessimists to trade against them. The key point of his model is that the slope of demand curve depends on the degree of opinion divergence amongst investors. Demand curve will be steeper when the degree of opinion divergence is greater. The opposite is true for the case of lower degree of opinion divergence[2]. Many researches have been motivated by Miller's theory, and Miller conjecture, perhaps not surprisingly, leads to the critiques on Capital Asset Pricing Model (CAPM) for unrealistic assumption which plays on paradigm of homogeneous expectations. Hence, divergence of opinion has been incorporated in many models such as Capital Asset Pricing Model to relax the homogeneous expectations assumption. Researchers found that opinion divergence can change the equilibrium of the stock prices and several researches have interestingly shown that opinion divergence has a predictive power for future stock returns which are considered as anomalies from the CAPM viewpoint (Fama and French 1996)[8]. For example, Goetzmann and Massa (2001)[9] showed that heterogeneous beliefs can affect aggregate market returns. Diether, Malloy and Scherbina (2002) revealed that opinion divergence causes stock

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[2] See model proposed by Chen et al. (2001) for example.

prices to be upwardly biased which is strongly supportive to Miller's predictions. To conclude, Miller's logic implies that the greater the opinion divergence, the higher the equilibrium prices of the stocks relative to its true value and hence the lower future returns.

Miller's predictions offer an intuitively appealing idea and have received a great deal of attention, yet the evidence for Miller's theory seems to be meager and inconclusive. More importantly, most of the researches tested the theory by mainly studying on the opinion divergence which reflected in the slope of the demand curve of stocks, but there were a few researches that attempt to test the theory by investigating the impact of free float, which is reflected in stock supply, to the stock performance. This is the main motivation of this research to fill this gap.

The intuition that free float can affect asset prices relies on a few simple assumption. Greenwood (2006)[10] explained that when risk averse investors estimate the asset values differently and bind by short-sale constraints, assets will be allocated to the most bullish investors and prices will be consequently set by them. Under such context, the most bearish investors (i.e. pessimists) will not be willing to participate in the market because the asset prices are overvalued regarding to their estimates. If free float decreases, more of the pessimistic investors will be forced out and the assets will be priced by only the most bullish investors. In extreme case, if free float is reduced to zero and investors are unable to go short due to short-sale constraints, the particular asset will be priced by estimation of the most optimistic investors in the market alone. Theoretically, the greater the opinion divergence about the value estimates of assets, the larger the free float effects on the asset prices. To conclude, when investors have heterogeneous expectations in the market (i.e. downward sloping demand curve), the amount of floating shares tend to have a negative relation with the stock prices which implies that lower free float tends to increase the equilibrium prices of stock relative to its true value and hence lower future returns.

According to Miller (1977), the broader the array of value estimates made by all investors in the market, the steeper the demand curve will be. If we assume that the stock supply is constant, the movement in price will be caused by shifts of the demand curve only. This implies that the stocks with the highest steep of demand curve will exhibit a greatest fluctuation in price. As discussed in the next section, several authors mainly studied on opinion divergence effect and found their results consistent to Miller (1977)'s prediction. However, it is critically important to note that the essence of this research does not center around the opinion divergence effect in stock performance but rather on the free float which is the part of the stock supply. In other words, the author examines free float effect in the Miller's framework and assumes that a demand component is fixed by an attempt to control investors' degree of opinion divergence in proposed regression model.

A major challenge in controlling opinion divergence is determining proxies that can effectively capture the degree of investors' opinion divergence. Academic researchers have used a variety of opinion divergence proxies to test Miller's prediction. For instance, Chen, Hong, and Stein (2001)[11] used breadth of ownership, Diether, Malloy and Scherbina (2002) used dispersion of analysts' earnings forecast, and Baker, Coval, and Stein (2004) used idiosyncratic volatility. In addition, Berkman et al. (2008) note that multiple proxies of opinion divergence should be employed. Hence, it is essential that the author adopts multiple proxies of divergence of opinion to obtain robust results. In this study, the author employs two proxies namely dispersion in analysts' earnings forecast and idiosyncratic volatility.

This study attempts to provide empirical results of free float effect on future returns and volatility of stocks in Thai market and U.S. market. Due to entirely different settings between both markets, the author aims to examine whether free float effect on stock performance is common across both markets. The author also examines the effect of free float changes on stock prices when each stock has different degree of opinion divergence, which is another gap in this research. Moreover, Miller (1977) explains that short selling allows investor to effectively introduce the additional stocks into the market, which implies more supply of the stocks. That is, short sales move the supply curve to the right and lower the price of an asset. Thus, to effectively investigate the free float effect, the author had to add a value of outstanding short position for each stock in proposed regression model to separate its effect from free float effect on stock performance. The author believes that this research is the first to include value of outstanding short position to investigate free float effect under the assumption that investors have a divergence of opinion.

The effect of free float on liquidity is the most popular subject for the researchers. Nevertheless, few researches have been investigated directly on the effect of free float to the stock returns and volatility, especially under the framework of divergence of opinion hypothesis. As discussed above, this valuation effect of divergence of opinion can also be related to free float which reflected in the stock supply. With free float as a direct proxy of a stock supply and divergence of opinion as a proxy for slope of a demand curve, the author can investigate the effect of free float in the different viewpoint from other researches. To be specific, this research combines free float effect with the divergence of opinion hypothesis proposed by Miller (1977) to investigate the effect of free float in a new perspective. To the best of author’s knowledge, this is the first of the study that directly investigate the effect of free float on stock performance with such a framework.

1.2 Research Questions

1. Is free float effect on the stock performance consistent with the Miller (1977)’s theory?
2. Is free float effect necessarily considered together with the degree of investors’ opinion divergence?

1.3 Objectives

This thesis aims to fill three gaps in the literatures. First, this research will provide the empirical evidences of free float effect on stock performance where the author investigates the empirical effects based on Miller’s framework by controlling the opinion divergence level of investors. Several previous works have been mainly focusing on the free float effect on liquidity or stock performance but fail to consider under the assumption that investors’ opinions toward the stock values diverge. In such a context, this study can show free float effect in the different viewpoint from other researches. Second, this study will investigate the impact of free float changes on stock prices where stocks have different degrees of opinion divergence. Several previous works usually study on the effect of each particular level of free float to stock performance, but ignore the impact of its effect if there is some change of free float.

More importantly, this study will help explaining how degree of opinion divergence among investors affects the relationship between free float and stock performance. This study will provide a more complete picture to investors of how free float affects the stock performance. Third, the empirical evidences in this study will help explaining the feasibility of the Miller's theory by testing Miller's theory in a new aspect. As previously discussed, many researches mainly focus on the opinion divergence effect on asset prices, but there are a few researches that focus on stock supply components in such a context.

CHAPTER II

LITERATURE REVIEW

Since the author’s research is related to two areas of literatures, namely free float and divergence of opinion hypothesis. Hence, the author would like to discuss the literatures related in each area separately.

2.1 The Effect of Free Float on Stock Price

One of the most prominent collapses of stock market is the dot-com bubble in the late 1990s. Many academic researchers have pointed out that the main catalyst of that particular phenomenon is a dramatic expansion in the publicly tradable shares (i.e. floating shares) of internet companies. At that time, several internet companies recently issued initial public offerings (IPO) which means there was a large number of stocks of these companies that have been locked up and were not tradable for at least six months after the IPO date[3]. Expectedly, when these IPO shares expired, there would be a significant growth of free float in the market. Ofek and Richardson (2003) found that, from the beginning of November 1999 to the end of April 2000, the value of unlocked shares in the Internet sector rose from 70 billion dollars to over 270 billion dollars. They also reported that at around the time when internet-company stocks collapsed, the floating shares of the Internet sector significantly increased as large number of lock-ups expired.

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[3] Lock-ups are necessary for shares IPOs. The economics rationales are that locking up shares can help to mitigate moral hazard problem or to signal the firm quality. Recently, it appears to be the standard that shares of IPOs have to be locked up for approximately 80%.

Internet bubble during the late 1990s motivated several researches to study free float effects on stock prices. One of those is from Hong, Scheinkman and Xiong (2006)[12]. They argued that free float is an important component on stock prices by forming a discrete-time, multi-period model to observe the relationship between free float and stock price bubbles. They explained that investors have to trade with the limited float because of insider lock-up restrictions, but investors will anticipate an increase in free float over time because they expect that insider will sell their shares after IPOs shares expire. Their empirical evidences suggest that stock prices and return volatility tend to decline after locked-up shares expire. To be precise, they find that on the lock-up expiration date, approximately sixty-percent of IPOs shares exhibit negative abnormal returns and volatility is diminished. Interestingly, they state that stock price is still likely to decline at that particular date even if investors know it in advance. Moreover, the bubble are more likely to happen when investors have heterogeneous beliefs and are bind by short-sale constraints. Which means their analysis based on combined effects of heterogeneous beliefs and short-sale constraints as well. Their main prediction is that a limited float stock (i.e. low free float stock) with downward sloping demand curve will exhibit a largest bubble and subsequently leads to the lowest future returns and volatility. Their results appear to be supportive with this prediction even controlling for firm size[4]. As a result, they concluded that free float is essential to the behavior of stock prices. If considering in Miller's framework, Hong, Scheinkman and Xiong (2006)'s results seem to be consistent to what Miller would predict.

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[4] They explain that stocks with lower ratio of free float to firm size may be easier to arbitrage, and those stocks may be less mispriced. However, their results show that this is not the case.

Beside IPO shares, the announcement of seasoned equity offering (SEOs) can offer an experiment for examining the free float effect on stock prices. A large number of researches report a significant drop of stock prices around the announcement of SEOs in several countries. However, there is no consensus about why this occurs. Typically, asymmetric information model proposed by Myers and Majluf (1984)[13] can help explaining this empirical regularity. Nonetheless, some academic researchers argue that the negative reaction of stock prices to SEOs is a result of shift in supply curve that make the stock prices subsequently move along the downward sloping demand curve. Barclay and Litzenburger (1988)[14] are the first who investigate the feasibility of two different perspectives. However, they find inconclusive results.

Greenwood (2006) also provides the evidences suggesting that firms have strong incentive to reduce free float for influencing stock prices. He explaines that when investors are risk averse and have opinion divergence, a decrease in free float would increase the stock prices. On the other hand, when free float expands, stock prices will fall. He investigates the impact of float manipulation on the stock prices by testing on a series of over 2000 stock split events in Japan in which firms effectively reduced their free float between 0.1 and 99.9 percent for periods of one to three months. In his research, a stock split can serve as a measure of the degree to which free float is reduced because investors who are entitled for additional shares do not immediately obtain new shares on ex-dates, but rather obtain additional shares on pay-dates. Hence, between these two days investors still hold the old shares and the effective free float decrease in that period. Empirical evidences in his research suggested that firms tend to issue equity during periods that floating shares are low because that particular periods tend to offer higher stock prices. This suggests that firms have a strong incentive for float manipulation. Moreover, he continues to note that when there is a great degree of opinion divergence amongst investors, firms have even more incentive to reduce the amount of floating shares to make the price higher. Hence, firms that have just been listed in an equity market tend to limit their float during IPOs (Ofek and Richardson (2003)[15]), and as long as firms have benefits from high stock prices, firms will attempt to impede investors to push prices back to fundamental value. This implication appears to support several evidences discussed above that the expansion of free float in the late 1990s was the cause of internet bubble collapse, and perhaps it was the reason why several equity markets set minimum standard for free float to reduce the ability of float manipulation[5]. However, it is important to note that Greenwood (2006)'s research exploits an unusual institutional mechanism for stock splitting events in Japan as a form of natural experiment to understand the consequences of float manipulation for stock prices, which means he only examines specific events. Hence, it seems that he fails to explain a general relationship between free float and stock prices in a broad view.

A partial spin-off, in which a parent company creates a new subsidiary and subsequently issues IPOs[6], can be regarded as a float manipulation as well. For example, Lamont and Thaler (2003)[16] report that several subsidiaries were overvalued because they traded with a low free float. Hence, this evidence suggests that lower free float tends to make stock prices higher which is consistent with what Greenwood (2006) documents, and perhaps all previously discussed results can help explaining many mispricing phenomena that are associated with low free float asset.

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[5] This can also explain why free float of Google was only 8.9% in May 2005.

[6] Frequently, a small amount of these particular shares are offered to the public.

2.2 Free Float and Liquidity

It is widely known that free float has an impact on the companies' stock liquidity. It leads to liquidity risk and subsequently affect the stock valuation. Chan, Chan and Fong (2004)[17] employed the event-study technique to investigate the impact of free float on market liquidity caused by Hong Kong government intervention in August 1998. At that time, Hong Kong government attempted to drive currency speculators out of the financial market by buying stocks worth HK$118.1 billion in shares of the 33 Hang Seng Index (HSI) constituent stocks, which represent 7.3 percent of all stocks in the index. Since Hong Kong government promised not to sell the shares after intervention, this caused a dramatic decrease of floating shares in the market. Hence, this government intervention offered an opportunity to observe the relationship between free float and market liquidity. They used price impact of trades as a proxy for market liquidity and found that government intervention had significantly affected the market liquidity. Similarly, Liam, Lin and Michayluk (2011) studied the impact of changing to float-weighted index on the price impact. They used free float as a measure for liquidity risk and their empirical results showed that there is a significant relationship between free float and returns.

Many studies suggest that free float should be included in an asset pricing model. For example, Weill (2008) was the first who introduced liquidity asset pricing model namely Float-adjusted Return Model (FARM). The idea of this model is derived from Search Theory which states that if the assets are harder to find, the buyers and sellers have to pay more premium than assets that is easier to find. He uses free float as a proxy for liquidity[7] (i.e. difficulty of finding), and explains that lower free float implied higher liquidity risk and hence higher expected return. Similarly, Zhang, Tian and Wirjanto (2009)[18] employ Float-Adjusted Return Model (FARM) and empirically test the model with Chinese Stock Exchange. They discover that cross-sectional variation in free float could explain cross-sectional variation in stock returns when controlling for market risk, size and book-to-market equity. Moreover, Hamon and Jacquillat (1999)[19] found that free float is crucial to asset pricing in non-US market because it reduces bias from family controlled or cross-holding companies. Benic and Franic (2008)[20] suggested that Croatian stock market and regional markets should take free float into account to compare the liquidity level and premium between different markets. Most studies employing free float as a factor in asset pricing model find a significant relationship between free float and asset returns, and these evidences could serve as an alternative explanation of how free float affect stock performance.

2.3 Divergence of Opinion Hypothesis

Miller (1977) offers an intuitively appealing idea for pricing asset theory. He proposes that even the reasonable investors might differ in their estimate of value, which challenges the key assumption of standard capital asset model at that time. He assumes that investors aimed to maximize their return of investment but made different estimates of expected of returns from their investment, which effectively created opinion divergence in the market. As illustrated in Figure 1, curve ABC represents the

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[7] Typically, bid-ask spread, trading volume, or turnover have been used as a proxy for liquidity. However, Weill (2008) is the first one who proposed that free float could also be used as a proxy for liquidity as well. Some evidence appear to be supportive to his proposition. For example, MSCI and NYSE have changed their indexes to be float-adjusted to reflect the level of liquidity and investability more effectively.

demand curve generated from value estimates of investors, and the vertical line represents the supply of the stocks, which assume to be N shares available (he assumes that investors are able to purchase only one share because of limited funds. Hence, N shares mean N investors). In this case, the equilibrium price of the stock is R, which is determined by the intersection of the demand and supply curve. If the stock price is lower than R, there would be more investors desire to buy the stock and bid the price back to R. On the other hand, if the stock price is higher than R, some investors who formerly hold the stock would see it overvalued and sell the stocks, driving the price back down to R.

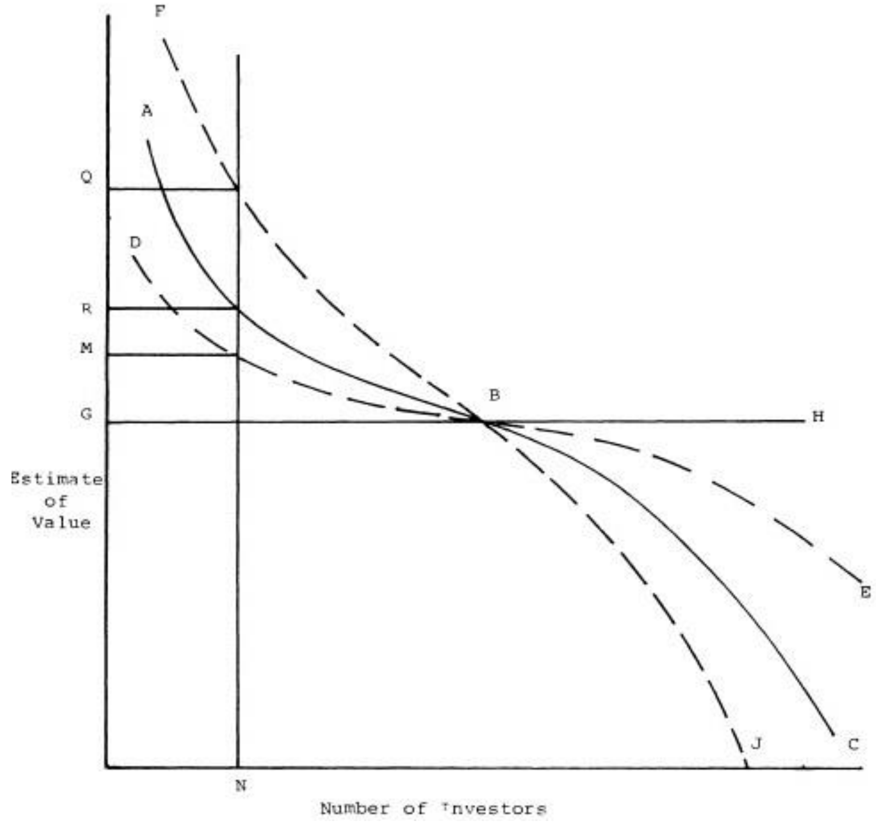

Figure 1: The effect of opinion divergence on the equilibrium price of an asset (Sourced from Miller (1977))

When assuming that the entire stock supply can be absorbed by minority of the investors (which is the realistic assumption to make) and investors are bind by short-sale constraints, the stocks will always be overvalued because the stock price is always set above the average estimates of all investors in the market (point B). Miller's theoretical model implies that when opinion divergence is greater, the slope of demand curve will be greater and subsequently make the stock price higher relative to its true value. The opposite is true for the case of lower opinion divergence.

For example, curve FBJ represents a greater opinion divergence and the higher equilibrium price. In contrast, curve DBE represents a lower opinion divergence and the lower equilibrium price. Considering an extreme case, curve GBH represents the market where there is no disagreement at all, and the price effectively reflects average estimates of all investors in the market. Interestingly, most of the researches citing Miller's paper mainly studied on the opinion divergence effect which is reflected in the slope of the demand curve while they seem to ignore the effect of supply component.

The implication from Miller's theoretical model is that prices will reflect the opinions of investors that have the most optimistic valuation. Put differently, stocks will be willingly held by optimists because they have the highest valuation. With this logic, this price-optimism model then suggests that the greater level of investors' opinion divergence of stock's value, the higher the market price relative to the true value of the stock, and the lower its future returns. The optimistic investors tend to suffer losses in expectations because the average value estimate of all investors in the market is considered to be the best estimate of the stock value, while the optimistic investors have a stock value estimates that are higher than the average estimate of all investors in the market.

Miller’s conjecture appears to be realistic in some situations. For example, a case occurred in 1971 where engineers at Atlantic Richfield noted that there is a winner's curse in drilling rights. They explained that those who won auctions were the one who were the most likely to have value estimates higher than the average. Not unexpectedly, the petroleum engineers noted that oil companies suffered surprisingly low returns in early Outer Continental Shelf (OCS) oil lease auctions. OCS auctions were common value auctions, which mean the value of oil in the ground is basically identical amongst bidders[8]. However, bidders have different information about oil’s value and each bidder estimates its value differently based on information they have at the time that they bid. Even though their value estimates may be correct, bidders still have to anticipate the adverse selection problem because there is an important fact related to the probability of winning the auction. That is, the winner of the auction has the highest estimate. Therefore, bidders who disregard the adverse selection effect in such auctions are likely to suffer a winner’s curse, which results in below normal or even negative profits.

Miller (1977) explains that when there are some circumstances that can make asset returns to deviate from expectations, there will be different of opinions in estimating the asset values, and this can subsequently lead to the puzzling results such as high risk stocks having low returns. For example, Haugen and Hines (1975)[21] used a large sample of portfolio and showed that the average portfolio returns exhibited a

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[8] This kind of auction includes Treasury bill auctions and initial public offerings.

statistically significant, negative correlation with the variance of the portfolio monthly returns over the most five year periods[9]. Moreover, Soldofsky and Miller (1969)[22] documents that the stocks in the riskiest classes tend to have lower future return than stocks with less risky classes. Apparently, this is completely conflicting to the finance theory, which theorizes that the investors should have a higher rate of returns when holding the stocks in riskier classes. Miller (1977) argues that divergence of opinion hypothesis might help explaining these several puzzling results that had been reported during that time if the riskiest classes of stocks were also those with the greatest divergence of opinion. This may also help explaining the several cross-sectional studies that have been found in the preference for volatility of stock prices. If based on divergence of opinion hypothesis, we can plausibly explain that the stocks that exhibit more price volatility are the ones that have the greatest level of opinion divergence. This explanation seems to be found in empirical evidence from researches of Harris and Raviv (1993)[23]. They developed theoretical models related to investors' opinion divergence and return volatility, and observe that there is a positive empirical relation between them. Miller (1977) continues to note that his conjecture seemed to be reasonable and it appeared that numerous academic papers employed opinion divergence hypothesis to explain why extremely volatile assets have low returns, such as IPOs[10]. In Miller's 2001 article in the Journal of Portfolio Management, he noted that

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[9] Haugen and Hines (1975) also found that the average portfolio returns have a negative correlation with a systematic risk (i.e. beta).

[10] Potentially, divergence of opinion hypothesis can explain why it is unclear how long term investors in Thailand are compensated for all the risk and volatility. According to Morningstar data, the MSCI Thailand index generated an annualized total return of -3.26% over the last 15 years with an annual volatility of 42.42%. Several studies have shown similar statistics over many extended time periods that indicate that the long-run returns are not worth the risk.

"An implication of this theory is that investors can improve their return relative to risk by exploiting the flatness of the security line."

Even though heterogeneous expectation (i.e. opinion divergence) assumption is completely different from homogeneous expectation assumption and despite a strong magnitude of influential arguments suggesting to include heterogeneity in finance for pricing assets, the homogeneous representative agent paradigm is still the foremost structural approach to asset pricing model[11]. Anderson, Ghysels and Juergens (2005)[24] suggest that there were several reasons to explain why heterogeneity seems to be overlooked. First, it is relatively complicated to develop testable predictions for asset pricing models with heterogeneous agents in many contexts. Second, despite some academic researchers recently making a progress to some extent (e.g. Constantinides and Duffies (1996)[25]), there is still not enough tangible data to signify heterogeneous expectations. Third, and probably the most important, Sharpe (1964)[26], and Linter (1965)[27] argue that many of these formulations of heterogeneous agent models are observationally equivalent to representative agent model. Moreover, a representative agent has a similar form of a utility function to heterogeneous agent[12]. As a result, they conclude that there is no necessity to explicitly consider heterogeneous agents because researchers can employ a representative agent instead.

However, there are some academic researchers who disagree with Linter (1965)'s conclusions. For example, Mayshay (1982)[28] argues that the investors'

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[11] The same argument was presented in Browning, Hansen and Heckman (1999) and Anderson, Ghysels and Juergens (2005)

[12] An economics model can assume to have a representative agent if all agents in one particular type are identical. In case that the agents in any particular types are different, we can still assume to have a representative agent if the summation of their choices is mathematically equivalent to the act of one individual or many identical individuals.

divergence of opinion not only exists, but is an important ingredient in determining asset prices. He explained that opinion divergence associates with endogenous limitations on the active investors that participate in the market. Investors do not choose only the size of their positions in each asset, but also choose which assets to invest, while traditional asset pricing model ignores this fact. Nonetheless, the traditional models come to an agreement that when investors are bind by short-sale constraints, an asset-pricing model with opinion divergence assumption might be contrast to a model with opinion divergence assumption. However, Mayshar (1983) continues to argue that even though investors are not bind by short-sale constraints, investors still endogenously choose to invest or not to invest an asset. As a result, this will subsequently create an uncompleted sub-market as if investors are still bind by short-sale constraints.

Berkman et al. (2008)[29] highlight that testing Miller (1977)'s conjecture on the role of difference of opinion is important as it challenges traditional asset pricing models such as the CAPM. Perhaps not surprisingly, there are several researches that motivated by Miller (1977)'s theory and include investors' opinion divergence in their asset pricing models to relax the standard assumption of homogeneous expectations[13], and those researches reported the empirical evidences that when asset pricing model includes opinion divergence assumption in place of homogeneous expectation, the equilibrium price is changed. For instance, Goetzmann and Massa (2001) show that

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[13] Harris and Raviv (1993) were the first to explicitly model investors who were dogmatic about their beliefs. However, their model attempts to explain trading volume rather that stock prices.

aggregate market returns are affected by investors' opinion divergence, while Chen, Hong and Stein (2001)[30] make a cross-sectional asset pricing predictions.

Many studies found strongly supportive evidence to Miller (1977)'s conjecture. Diether, Malloy and Scherbina (2002) find a negative relationship between level of investors' divergence of opinion and stock future returns. They conduct tests by controlling Fama-French factors including momentum factor developed by Carhart (1997)[31]. Their research employ dispersion in analysts' earnings per share forecasts as a proxy for degree of investors' opinion divergence and find that the stocks with higher dispersion in analysts' earnings forecast tend to offer a lower future returns than otherwise similar stocks. To be precise, they document that stock portfolio in the highest quintile sorted by analysts' earnings forecast dispersion significantly underperformed a stocks portfolio in lowest quintile by 9.48 percent per year. They also document that opinion divergence effect was likely to be stronger in the stocks with small size and the stocks that have poor returns over the past 12 months. Beside their supportive evidences to Miller (1977)'s conjecture, they also find the evidences that are contrary to the claim that dispersion in analysts' earnings forecast can be considered as a proxy for asset risk. They suggest that opinion divergence has a predictive power for future stock returns and these patterns are considered anomalies because they are not explained by the CAPM (Fama and French 1996). For example, in running the four-factor regression model, using Fama-French factors and momentum, they find a large negative unexplained return for stocks in the highest dispersion quintile which suggest that stocks in the highest dispersion quintile appear to behave like small distressed losers.

In a similar vein, Ackert and Athanasakkos (1997)[32] also employ dispersion of analysts' earnings forecasts as a proxy for investors' divergence of opinion and document that high analysts' earnings forecast dispersion could forecast lower stock returns. This empirical evidence is clearly consistent with Miller' price-optimism model which states that the greater level of investors' opinion divergence about the stock value, the higher its market price and lower future return. Likewise, Diche (2002)[33] also reports the similar results. He documented that portfolio with high dispersion in analysts' earnings forecasts yield a return of only 0.8 percent per month while a portfolio with low dispersion in analysts' earnings forecasts yield a return of about 1.74 percent per month.

There are several proxies of investors' opinion divergence that appear to be applicable in testing Miller's theory. For example, Chen, Hong, and Stein (2001) expand a pricing asset model with divergence of opinion hypothesis, but they employed different proxy of opinion divergence unlike the researches discussed above. They employ breadth of mutual fund ownership as a proxy of investors' divergence of opinion and find that a decrease in the breadth of mutual fund ownership tended to make stock prices rise and overvalued relative to fundamentals. They therefore provide empirical evidences suggesting that a decrease in breadth of mutual fund ownership predicts a lower future return, which is consistent with the Miller (1977)'s predictions. In addition, Lee and Swaminathan's (2000)[34] employ different proxy for investors' opinion divergence which is a stock turnover of each stock. They explained that a stock turnover is basically the trading volume which indicates a level of disagreement in the market. Strictly speaking, disagreement amongst investors is the main motivation for investors to trade. Hence, higher disagreement of investors should imply higher stock turnover. They find that stocks with higher stock turnover can predict lower future return and their empirical results appear to be consistent with Miller (1977)' theory as well.

Several researches seem to find consistent evidences to Miller (1977)'s theory. However, Diamond and Verrecchia (1987)[35] and Hong and Stein (2000) propose theoretical models which appear to prominently compete against Miller (1977)'s theory. Diamond and Verrecchia (1987) challenge Miller (1977) by arguing that future asset returns will be independent of the current level of investors' opinion divergence about the stock values, and asset prices will be unbiased when there is a divergence in opinions about the correct asset values. They formed a theoretical model and assumed that market makers are rational. Market makers always correctly set bid and ask prices which conditioned on the possibility that some informed pessimists (i.e. informed investors with low valuation) are bind by short-sale constraints. Their theoretical model implies that stock prices will be unbiased and publicly available information cannot be used to make trading profits. However, the drawback of their conjecture is that their theoretical model depends on the existence of market makers who have perfect knowledge of their economics environment and have unlimited computational abilities which can perform Bayesian updating in the short period of time between two consecutive trades. This assumption can be unrealistic in practice. Moreover, some equity markets are not a quote driven market, meaning bid and ask prices are not set by market makers. Thus, their model is not likely to be applicable in some environment. Similarly, Hong and Stein (2000) achieved a similar outcome that offered unbiased prices. They introduce competitive, risk-neutral, and perfectly rational arbitrageurs who are not bind by short-sale constraints. These arbitrageurs will correctly estimate the expected stock value based on the activities of informed overconfident short-sale-constrained investors in price auction. Consequently, the market will show the asset prices that are equal to their estimate of expected stock value. However, this assumption is questionable in several academic literatures. For example, Shleifer and Vishny (1997)[36] and Gromb and Vayanos (2001)[37] document theoretical details to explain why arbitragers are likely to fail to capitalize on arbitrage opportunities.

CHAPTER III

HYPOTHESIS DEVELOPMENT

This section shall explain the development of each hypothesis. This research develops hypotheses to investigate free float effect on stock performance in Miller's framework and to provide an empirical support of opinion divergence hypothesis. The author describes the hypothesis first and followed with the explanations.

Hypothesis 1: Free float has a positive relationship with stock future returns when investors' degree of opinion divergence is controlled.

Weill (2008) suggests that higher free float implies lower liquidity risk. In other words, when trading assets that have higher floating shares, it will have lower liquidity premium which implies lower future return. The opposite is true for the case of lower free float. Hence, this logic suggests that free float should have a negative relationship with stock future returns. However, this argument does not assume that investors have divergence of opinion as argued by Miller (1977). Thus, this research hypothesis will be against the proposition from Weill (2008).

In Miller (1977)'s model, stock prices will reflect an optimistic valuation if investors are bind by short-sale constraints. Optimists will hold the stocks because they have the highest estimates. However, they suffer losses in expectation because the best value estimate is the average opinion. This implies that the greater the divergence of opinion, the higher the stock prices relative to the true value and the lower its future returns.

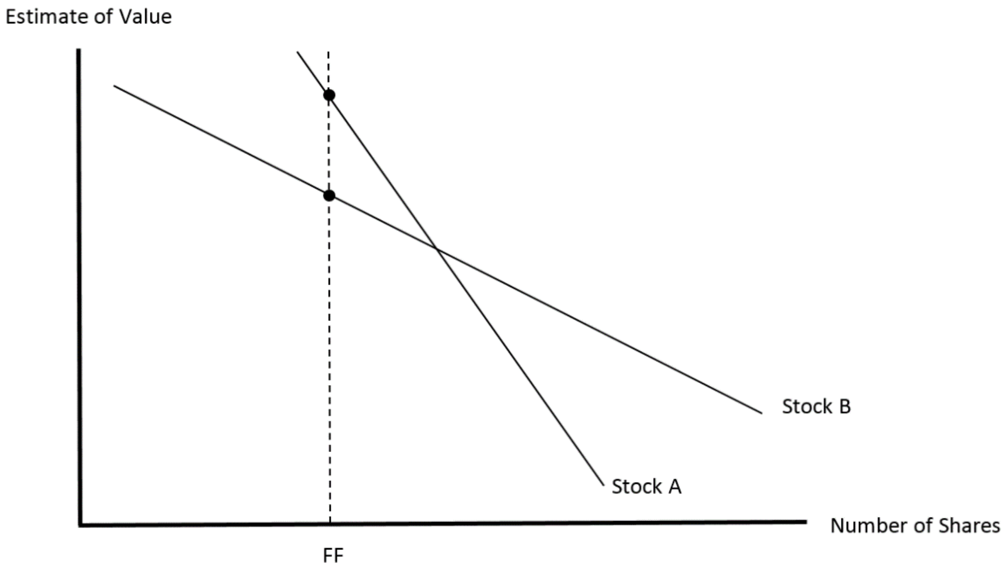

Figure 2: The effect of investors' degree of opinion divergence on equilibrium price of stocks.

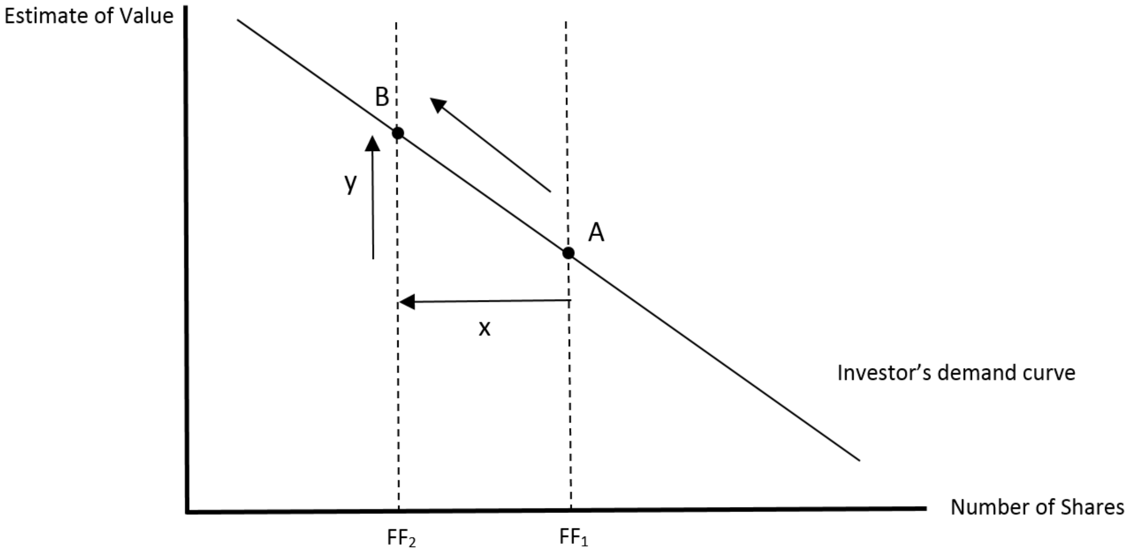

Figure 3: The effect of change of free float on equilibrium price of stocks.

The Miller (1977)'s theory is illustrated in figure 2. If stock A and stock B are identical but stock A has a greater degree of opinion divergence than stock B (i.e. demand curve of stock A is steeper than demand curve of stock B), stock A will have a higher price relative to the true value and have lower future return than stock B[14]. As previously discussed, many studies reveal strongly supportive evidences to the Miller's conjecture. For example, Diether, Malloy and Scherbina (2002)[38] find a negative relationship between level of investors' divergence of opinion and stock future returns. They document that the stocks with higher dispersion in analysts' earnings forecast tend to offer a lower future returns than otherwise similar stocks. Ackert and Athanasakkos (1997) also report that high degree of divergence of opinion could forecast low stock future returns.

This logic leads to the first research hypothesis which designed to examine free float effect on stock future return based on the Miller's framework. Greenwood (2006) explains that a decrease in supply of stock on the market moves the vertical supply curve to the left, make the prices higher and cause the stocks to be more overvalued, which potentially implied lower future return. This is illustrated is Figure 3, when free float level moves from FF_1 to FF_2 which decreases by x, the price will increase by y and this potentially leads to lower future return for this stock. The intuition is that when floating shares decrease, there will be less tradable shares in the market that can be allocated to investors, and prices will reflect the more optimistic valuation of investors. In this case, the stock price ultimately moves to point B which is the new equilibrium price for the market and the stock price will be higher relative to the true value and hence lower future return. Since this research investigates free float effect in Miller's framework as previously discussed. We should observe the positive relationship

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[14] The case that both stocks are undervalued is also true in this logic because stock A will still have a higher price relative to the price of stock B. Since we assume that both stocks are identical, stock A will yield a lower expected return than stock B.

between free float and future returns of stocks when degree of opinion divergence is controlled.

Hypothesis 2: Free float has a negative relationship with a future return volatility when investors' degree of opinion divergence is controlled.

A company's free float is important to potential investors because it offers insight into the company's stock volatility. Therefore, this hypothesis is designed to investigate free float effect on volatility to achieve a more complete picture to investors of how free float affects the stock performance.

Miller (1977)'s theory suggests that asset prices will be mispriced if there is a divergence of opinion among investors. Moreover, the mispricing will be more severe if there is a greater degree of opinion divergence amongst investors. Stock with greater divergence of opinion will have a higher price relative to its true value and tends to have lower future return because it is likely to correct its error in the future. Hence, mispriced stocks tend to be more volatile than stocks that are non-mispriced. Since this research investigates effect of free float which is reflected in the stock supply, the author then expects stocks with lower free float will be more volatile than stock with higher free float. As illustrated in Figure 4, if stock A and stock B are identical but stock A has lower amount of floating shares than stock B, the equilibrium price of stock A will be at point *a* which is higher than equilibrium price of stock B. This suggests that stock A is overvalued more severely and tends to correct to its true value more aggressively than stock B. Hence, the author expects stock A to have more volatility in the future than stock B. To be precise, if there are mispriced stocks, free float should have a significant relationship with stock return volatility in a negative direction.

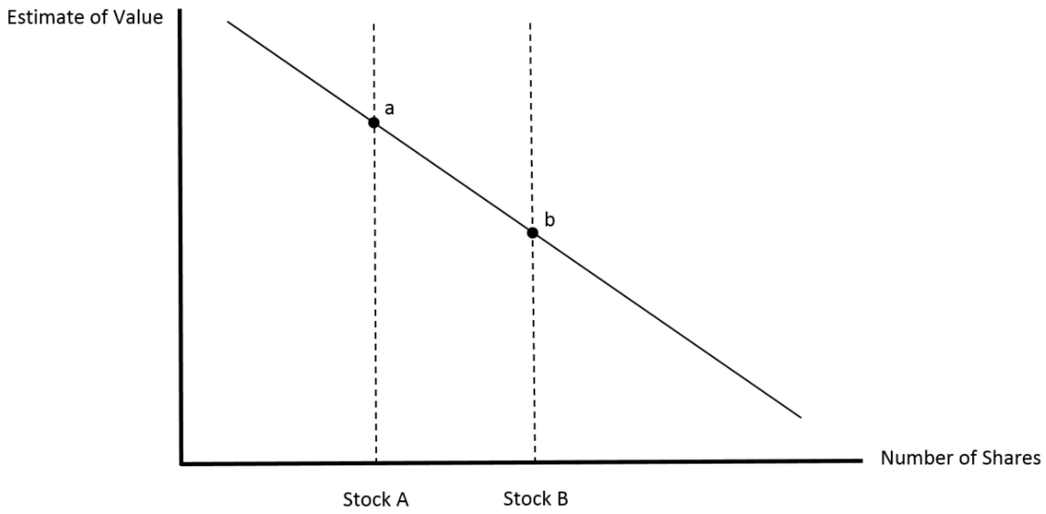

Figure 4: The effect of different level of free float on stock prices.

Alternative explanation for logic of this hypothesis is that when stocks have higher floating shares, there will be a larger number of traders trading on those particular stocks. Consequently, trading with small position will not be likely to affect the prices of the stocks much. On the other hand, the stocks with lower floating shares are more likely to exhibit more share price volatility because it takes smaller trade position to move the price significantly. Hence, stocks with higher free float tend to have lower volatility and vice versa.

Hypothesis 3: Relationship between stock price and free float will be stronger when opinion divergence is greater and vice versa.

Since free float reflects the stock supply for investor, the change of free float is likely to change the equilibrium price of the stock. However, the effect of free float may vary if there is a different degree of opinion divergence as stated by Greenwood (2006) who argues that firms will have more incentive to lessen a number of floating shares when there is a high degree of opinion divergence among investors. Hence, this hypothesis is designed to investigate such phenomenon and simultaneously answer the second research question.

According to Miller's conjecture, the demand curve slope is steeper as the opinion divergence of investors widens. Therefore, free float effect should be stronger for these stocks. In other words, the greater the opinion divergence, the larger the effects of free float on stock prices. This is illustrated in Figure 5, when stock A have greater degree of opinion divergence than stock B (i.e. demand curve of stock A is steeper than demand curve of stock B), the equal increment of free float ($FF_2 - FF_1$) will cause stock A to drop more than stock B (i.e. length of a is greater than the length of b). The opposite is true for the case of decreasing free float. Hence, the author includes the interaction term in the regression model to test this hypothesis and expect its coefficient to be negatively significant. The mathematical details will be further discussed in the later section.

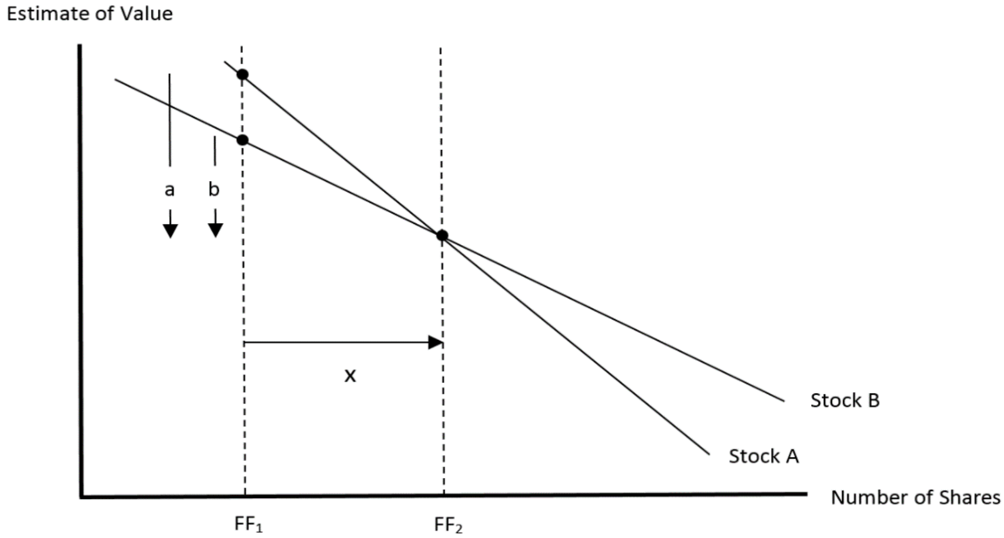

Figure 5: The effect of free float on stock prices when there are different degrees of opinion divergence.

CHAPTER IV

DATA AND SUMMARY STATISTICS

The sample includes all ordinary common stocks listed on the SET index and S&P 500 index in 2000 to 2014. However, since some of the data needed to be used in this research for stocks in SET index are available in Datastream after 2001, the author then only investigates the sample for Thai stocks in 2001 to 2013. The author studies Thai market and U.S. market for two reasons. First, Thai equity market is significantly different from U.S. market. With 537 listed stocks on Thai market and a market capitalization of $458 billion[15]. Thai market is considerably smaller than U.S. market. Moreover, Thailand is a developing country with a relatively undeveloped capital market characterized by limited products and less stringent investor protection. Unlike the large developed capital markets, such as U.S. market, that are dominated by institutional players, Thai market could be driven by retail sentiment or global macroeconomics factors the country nor its locally listed business have much control over. Hence, the different size and unique features of Thai market provide an entirely different setting than U.S. market. Second, the author aims to provide out of empirical evidences on whether free float effect on stock performance is common across both markets or only specific to each market. The empirical results in this study can help explaining whether the different structure of both markets can influence effect of free float on stock performance. The following details shall explain all the data and their description and followed by the methodology.

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[15] Sourced from The Stock Exchange of Thailand (SET) website as of 2014.

4.1 Free Float Ratio

Since Thomson Reuters is capable of providing first class strategic holding information through the free float datatypes available in Thomson Reuters Datastream Products, the free float data in this research are then retrieved from Thomson Reuters Datastream for both Thai market and U.S. market.

Free float is calculated by determining the types of ownership and no holdings will be identified as strategic investors if they are less than five percent of a company's share capital. According to Thomson Reuters Datastream, the data is derived from multiple sources such as SEC filings, annual and interim reports, stock exchanges, official regulatory bodies, third party vendors, company websites, and direct contact with company investor relation departments. Moreover, Datastream updates value of free float on the 10th and 30th of each month. This means the data of monthly free float reported in Datastream clearly reflect the most recent free float level of each firms. Hence, this suggests that there is unlikely to have an issue of measurement error problem in the obtained empirical evidences.

Free float data used in this research is defined as the total amount of shares available to ordinary investors, expressed as a percentage of total number of shares outstanding. Note that the total number of shares are subtracted by the strategic holdings[16]. Specifically, the formula is as followed:

$$Free\ Float\ Ratio\ (FFR) = \frac{Total\ Amount\ of\ shares\ available\ to\ ordinary\ investors}{Total\ number\ of\ shares\ outstanding} \times 100$$

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[16] Strategic holders are defined as the holders who invest for strategic reasons. When those holders are identified as strategic, they will be defined as such in other companies they own shares even they hold shares less than five percent.

4.2 Short Sale Ratio

The mispricing theory proposed by Miller (1977) explains that when investors can short sell, investors effectively create a stock in a company. Short sale investors agree to pay dividends to the owner of that particular stocks, and have to redeem the borrowed share when stock owners demand. Practically, from the stock owner's viewpoint, the stocks are created in the similar means of the stock issuing from listed companies and still satisfies his or her need to hold the company's stocks[17]. As a result, stock supply in the market increases by the amount of short interest (i.e. amount of the outstanding short position) and also subsequently moves the vertical supply curve to the right and ultimately lower the equilibrium price. Also, the joint effect of opinion divergence and short-sale constraints on asset prices was emphasized by Scheinkman and Xiong (2003)[39]. Hence, to effectively investigate the free float effect on stock performance, the author has to add the amount of outstanding short position into the proposed regression model. The data of outstanding short position are retrieved from Bloomberg database.

The short sale value in this research is defined as total value of outstanding short position expressed as a percentage of total number of floating shares. Specifically, the formula is as follows:

$$\textit{Short Sale Ratio (SSR)} = \frac{Total\ value\ of\ outstanding\ short\ position}{Total\ amount\ of\ shares\ available\ to\ ordinary\ investors} \times 100.$$

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[17] Miller (1977) interestingly stated that the procedure of stock creation from short selling is precisely equivalent to the effect of a bank on the supply of the money. The bank lends the money to the third party while the owners do not care whether their deposited money is loaned out. The owners of the money still possess that money since they can reclaim it upon demand.

4.3 Opinion Divergence Proxies

As suggested by Diether, Malloy and Scherbina (2002), the dispersion in analysts' earnings forecasts are biased toward the stocks with large size. As a result, the analysts' earnings forecasts for small stocks is usually thin or, in some cases, even nonexistent[18]. In addition, Berkman et al. (2008) emphasize that multiple proxies are essential because they found that controlling the level of opinion divergence poses a challenge due to the means of determining proxies that can effectively capture the level of investors' opinion divergence. Hence, the author adopts multiple proxies for opinion divergence in this research, namely dispersion in analysts' earnings forecast and idiosyncratic volatility to improve the robustness of results. In the following, the author discusses each proxy of opinion divergence separately.

4.3.1 Dispersion in Analysts' Earnings Forecast

Dispersion in analysts' earnings forecasts used as a proxy for opinion divergence is suggested by Diether, Malloy and Scherbina (2002). They argued that dispersion in analyst forecast reflects the extent of disagreement among analysts and investors. Prices will reflect optimistic views when investors with the lowest valuations do not trade. The friction that prevents the revelation of negative opinions may include the incentive structure of the analysts that impede them to issue very negative forecasts even when they are sufficiently pessimistic. Forecast consensus tends to be upwardly biased when there is a large divergence of opinion because the analysts are reluctant to share their negative opinions, which results in overvaluation of stocks.

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[18] As an example, Diether, Malloy and Scherbina (2002)'s sample covers only 45% of total stocks listed in CRSP.

Dispersion in analysts' earnings forecasts is defined as the ratio of monthly standard deviation of analyst earnings per share forecasts to the absolute value of the mean of the analysts' forecasts. Standard deviation in monthly analyst earnings forecasts and the mean monthly analyst forecasts are retrieved from the Thomson Reuters Datastream, and earnings forecasts with a mean of zero are excluded from the estimation sample of *DISP*. Furthermore, the author also uses the stocks that have a minimum of two analyst forecasts in a month to include into the sample as suggested by Diether, Malloy and Scherbina (2002). Specifically, the formula for dispersion of analysts' earnings forecasts is as follows:

$$DISP = \frac{Std(Forecast)}{|Mean(Forecast)|}.$$

The stocks that have higher earnings could potentially have higher levels of standard deviation of earnings forecasts. Hence, to make the number comparable across stocks, the monthly standard deviation of analysts' earnings forecasts are then scaled by the absolute value of the mean of analysts' earnings forecasts.

4.3.2 Idiosyncratic Volatility

A number of researches have been used idiosyncratic volatility as a proxy for several economics effect as well as divergence of opinion. Baker, Coval and Stein (2004)[40] explained that if investors are risk averse and have heterogeneous expectations (i.e. opinion divergence), an increase in idiosyncratic volatility will cause the demand curve to be steeper. The intuition is that idiosyncratic volatility reduces the size of trading positions, as a result of the willingness of investors to take a position with any given valuation are diminished. Additionally, Wurgler and Zhuravskaya (2002)[41] also obtained empirical results that are fairly supportive to the validation of using idiosyncratic volatility as a proxy for slope of demand curve (i.e. opinion divergence). They showed that when firm’s stocks with higher idiosyncratic volatility were included to S&P 500 index, the impact on stock prices was stronger than stocks with lower idiosyncratic volatility.

Similar supportive empirical evidences were from Eastley et al. (1998)[42], they interestingly showed that stocks with higher idiosyncratic volatility are more likely to offer a lower future return than stocks with lower idiosyncratic volatility. Thus, their empirical results seemed to support the validation of idiosyncratic volatility and the divergence of opinion hypothesis proposed by Miller (1977). Similarly, Guo and Savickas (2008)[43] also found that the idiosyncratic volatility has a negative relationship with the future stock returns. They indicated that the possible explanation for this empirical result is that the idiosyncratic volatility is a measure of divergence of opinion, which, as argued by Miller (1977), could lead a stock to be overvalued and the investors will subsequently suffer capital losses if they are bind by short-sale constraints.

Another supportive evidences with different viewpoint are from Shleifer and Vishny (1997). They documented that idiosyncratic volatility can discourage arbitrage activities because when the traded stocks have higher idiosyncratic volatility, arbitragers will effectively take higher risks, particularly in terms of short sales which theoretically have an unlimited potential losses. As a consequence, the greater divergence of opinion and the higher difficulty of arbitrage lead the stock prices to be more upwardly biased. Gromb and Vayanos (2001) were also provide a similar results of the explanations why arbitrageurs may fail to exploit the arbitrage opportunity.

In this research, idiosyncratic volatility is defined as the standard deviation of the residuals on the contemporary three factors (*MKT*, *SMB*, and *HML*) of Fama-French (1993)[44] estimated from the time-series regression of the daily returns on stock *i* in month *t*. The author excludes the sample that have less than 18 daily return observations as suggested by Hwang and Qian (2011)[45]. Specifically, the author determine idiosyncratic volatility with respect to the Fama-French model using the following regression:

$$r_i = \alpha_i + \beta_i MKT + s_i SMB + h_i HML + \varepsilon_{i,}$$

Where r_i is the daily excess return of stock *i*. The idiosyncratic volatility of stock *i* is determined by measuring the standard deviation of the residuals ε_i as follows:

$$IDV = \sqrt{\frac{1}{T}\sum_{t=1}^{T} \varepsilon_{it}^2}.$$

4.4 Fama-French Three-Factor Construction

As argued by Fama and French (1996), many of the CAPM average-return anomalies are related, and they are captured by the three-factor model in Fama-French. Hence, these valuables, namely *MKT*, *SMB* and *HML*, are used as a control valuable in the regression model.

As guided by Fama and French (1992)[46], the author uses market capitalization (firm's shares outstanding multiply by the stock price) measured in June of year *t* as a proxy for size of each firm. Besides, net tangible assets[19] divided by market capitalization, both measured at the end of December of each year *t-1*, is used as a proxy

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[19] Net tangible assets is defined as the book value of stockholders' equity, plus balance sheet deferred taxed and investment tax credit, minus the book value of preferred stock.

for book-to-market equity. The author then sorts the stocks into six portfolios by, first, categorizing all stocks into big stock portfolio and small stock portfolio by using the median size as a breakpoint. After that, each of portfolio then splits into another three portfolios that sorted on book-to-market values by using the breakpoints for the bottom 30%, middle 40%, and top 30%. As a result, there will be six portfolios, namely *S/L*, *S/M*, *S/H*, *B/L*, *B/M*, and *B/H*, formed from the intersection of two size portfolios (*S* and *B*) and three book-to-market portfolios (*H*, *M*, and *L*). Returns of each portfolio are measured from July of year *t* to June of year *t+1*, and then the portfolios will be reformed when that period ends.

To calculate *SMB*, which is the size premium, the author uses the following equation:

$$SMB = \frac{1}{3}(r^{S/L} + r^{S/M} + r^{S/H}) - \frac{1}{3}(r^{B/L} + r^{B/M} + r^{B/H}).$$

To calculate *HML*, which is the value premium, the author uses the following equation:

$$HML = \frac{1}{2}(r^{S/H} + r^{B/H}) - \frac{1}{2}(r^{S/L} + r^{B/L}),$$

Where that $r^{S/L}$, $r^{S/M}$, $r^{S/H}$, $r^{B/L}$, $r^{B/M}$, and $r^{B/H}$ are the equal weighted average return of portfolios containing small size and low book-to-market stocks, small size and medium book-to-market stocks, small size and high book-to-market stocks, big size and low book-to-market stocks, big size and medium book-to-market stocks, and big size and high book-to-market stocks respectively.

Finally, *MKT* is calculated by determining the value-weight return of market portfolio minus the one-month Treasury bill rate.

Table 1 Summary statistics of independent variables

Panel A: Thai market (2001-2013)					
Variables	Observations	Mean	Std.Dev.	Min	Max
FFR (%)	47493	73.4071	28.1781	1	100
SSR (%)	82817	0.0381	1.1621	0	31.4425
DISP (%)	17201	2.727	1.1481	0	6.8
IDV (%)	59116	2.0468	1.9970	0.0733	93.4792
MKT (%)	82836	1.1175	6.9492	-36.0561	21.1
SMB (%)	82836	0.3391	5.3065	-18.2576	19.5455
HML (%)	82836	0.1279	5.2209	-15.7487	23.0446
Number of firms	531				
Panel B: U.S. market (2000-2014)					
Variables	Observations	Mean	Std.Dev.	Min	Max
FFR (%)	70714	77.5425	20.9531	0	100
SSR (%)	89460	3.4904	4.316	0	62.3291
DISP (%)	80959	7.51	4.919	0	45
IDV (%)	89460	1.36419	1.109751	0	36.0434
MKT (%)	89460	0.3331	4.5555	-17.23	11.35
SMB (%)	89460	0.3564	3.5068	-16.41	22.02
HML (%)	89460	0.4538	3.3094	-12.61	13.89
Number of firms	497				

Note: This table reports summary statistics of each variables in both markets. Every data except short sale volume was retrieved from Thomson Reuters Datastream. Short sale volume was retrieved from Bloomberg database and used to calculate the SSR variable. Panel A reports summary statistics of each variables from Thai market where the sample period is 2001 to 2013. While Panel B reports summary statistics of each variable from U.S. market where the sample period is 2000 to 2014. *FFR* is free float ratio determined by the total amount of shares available to ordinary investors, expressed as a percentage of total number of shares outstanding. *SSR* is short-sale ratio defined as total value of outstanding short position expressed as a percentage of total number of floating shares. *DISP* is dispersion in analysts' earnings forecasts defined as the ratio of monthly standard deviation of analyst earnings per share forecasts to the absolute value of the mean of the analysts' forecast. *IDV* is idiosyncratic volatility determined by calculating the standard deviation of residuals on the contemporary three factors (*MKT*, *SMB*, and *HML*) of Fama-French (1993) estimated from the time-series regression of the daily returns on stock *i* in month *t*. *MKT* is the excess return of market portfolio. *SMB* is the average return of small-stock portfolios minus average return of big-stock portfolios. *HML* is the average return of value-stock portfolios minus the average return of growth-stock portfolios. All variables are monthly variables and are measured at the end of each month.

4.5 Summary Statistics

Panel A and B of table 1 report summary statistics of each variables from Thai market and U.S. market respectively. There are seven variables in the table for both markets: (1) *FFR* which is free float ratio determined by the total amount of shares available to ordinary investors, expressed as a percentage of total number of shares outstanding (2) *SSR* which is short-sale ratio defined as a total value of outstanding short position expressed as a percentage of total number of floating shares (3) DISP which is dispersion in analysts' earnings forecasts defined as the ratio of monthly standard deviation of analyst earnings per share forecasts to the absolute value of the mean of the analysts' forecast (4) *IDV* which is idiosyncratic volatility determined by calculating the standard deviation of residuals on the contemporary three factors (*MKT*, *SMB,* and *HML*) of Fama-French (1993) estimated from the time-series regression of the daily returns on stock *i* in month *t* (5) *MKT* which is the excess return on the market portfolio (6) *SMB* which is the average return of small-stock portfolios minus the average return of big-stock portfolios (7) *HML* which is the average return of value-stock portfolios minus the average return of growth-stock portfolios.

The sample periods between both markets are slightly different due to the data scarcity in Thai market. The author finds that the most appropriate sample period for Thai market is 2001 to 2013 because there are stocks that have some specific data available after year 2001, while there is no such problem in U.S. market. For both markets, free float, mean value of EPS estimate, standard deviation of EPS estimate, monthly stock price, and daily stock price can be directly retrieved from Thomson

Reuters Datastream[20]. However, the short sale volume which needed to be used to calculate the *SSR* is not available in Thomson Reuters Datastream. Hence, only short sale data are sourced from the Bloomberg database.

The author keeps only those observations for which data are available in the sample period in both markets. For example, Panel A shows that the number of observations of *DISP* in Thai market is considerably lower than other variables. This is due to a large amount of missing values when the data were retrieved from the database of Datastream. Hence, the author treats such data as a missing value and excludes it from the used sample. This is the reason why the number of observations for each variable are not identical. However, in the U.S. market, there is less problematic of missing value issue. Hence, the number of observations is quite comparable.

As expected, the mean values of *SSR* between both markets are noticeably different. This is due to the different level of short-sale constraints between both markets[21]. The correlation between dispersion in analysts' earnings forecasts and idiosyncratic volatility for Thai market and U.S. market are 0.0694 and 0.0852 respectively. This is evidence for positive correlation between both proxies of investors' degree of opinion divergence: Stocks with higher dispersion in analysts' earnings forecasts are also likely to be the stocks that have more idiosyncratic volatility.

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[20] Stock closing prices used in this research are not adjusted for the dividend amount.

[21] According to the Stock Exchange of Thailand's circular, Kor Tor.(Wor) 53/2540, from January 1st 1998, only the stocks in SET50 index are shortable. While there are less stringent rules in the U.S. market.

CHAPTER V

METHODOLOGY

This research employs all data based on monthly basis as suggested by Dimson (1979)[47]. The reason is that the model specification requires monthly data because when using data with smaller time-frame, there will be a concern on the factors that should be included in the regression model. Dimson (1979) states that the more frequent data, the more frequency of trading. Investors may not possibly capture only relevant information on that time during high frequency data. As a result, the model regression have to necessarily include the lag or lead terms of the variables in the model. Hence, using all data based on monthly basis can avoid this issue.

For first and second hypothesis, the author examines free float effect on stock performance using values of investors' opinion divergence, as proxied by dispersion in analysts' earnings forecast and idiosyncratic volatility, that are measured at the end of each month and linked with stock performance data (i.e. returns, volatility) in the following *k* (*k* is equal to 1, 2, 3, 6 and 12) month(s). Specifically, cross-sectional data of next *k* month's stock performance is regressed on free float ratio and opinion divergence proxies in the previous one month. The *k*-period performance of stocks are controlled by Fama-French (1993) three-factor model to ascertain the robustness of the results. That is, three factors (i.e. *MKT*, *SMB*, and *HML*) in the same period of stock performance also used to ascertain the robustness of any relationship between free float ratio and next *k* month's stock performance. The intuition for using different periods of *k* for measuring future stock performance is that the speed of price adjustment may vary. Hence, using different period of *k* can offer a more precise picture of how free float affects the future stock performance. Moreover, short sale ratio in the previous one month is also included as one of the control variables because, as explained by Miller (1977), it is one of the stock supply components. The testing strategy is illustrated in Figure 6.

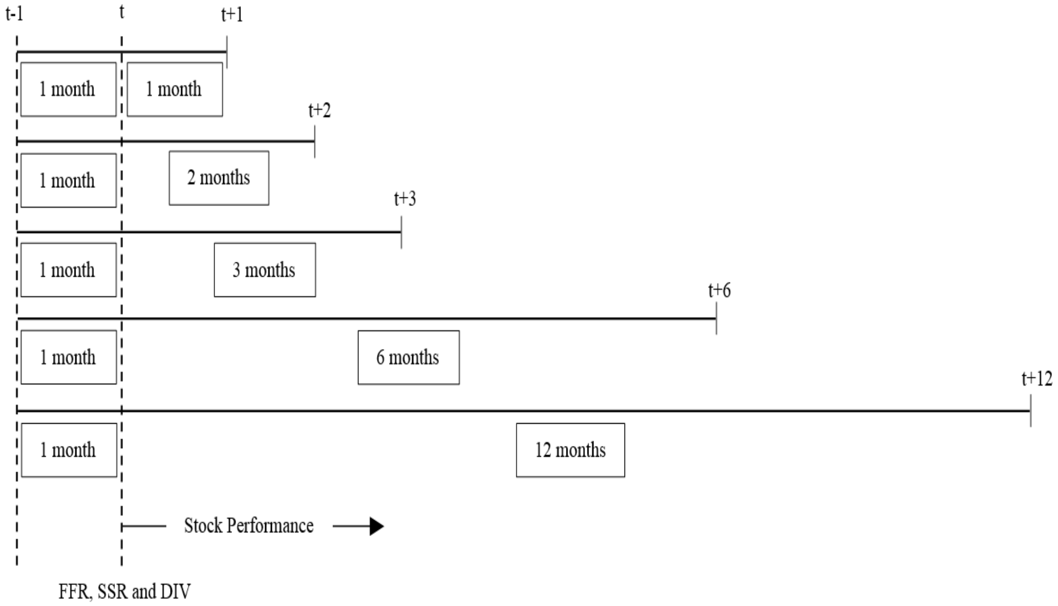

Figure 6: Testing strategy for hypothesis 1 and 2.

To test the first hypothesis, the author uses the following designated regression model:

$$FR_{i,t+k} = \beta_0 + \beta_1(FFR_{i,t}) + \beta_2(DIV_{i,t}) + \beta_3(FFR_{i,t}.DIV_{i,t}) + \beta_4 SSR_{i,t} + \beta_5(SSR_{i,t}.DIV_{i,t}) + b_1 MKT_{t+k} + s_1 SMB_{t+k} + h_1 HML_{t+k} + \varepsilon_{i,t}.$$

Where *FR* is the future return of stock *i* in each *t+k* period(s), *FFR* is a percentage of free float ratio measured at month *t*, *DIV* is a degree of opinion divergence based on two proxies (i.e. *DISP* and *IDV*) measured at month *t*, *SSR* is a percentage of short sale ratio measured at month *t*, *MKT* is return of market portfolio minus risk-free rate, *SMB* is excess return of small stocks over big stocks, and *HML* is excess return of value stocks over growth stocks. The Fama-French three factors are used in the same *k* periods with future return (*FR*). Since Greenwood (2006) stated that the effect of free float will vary with different degree of opinion divergence (i.e. the greater degree of opinion divergence, the stronger the free float effects on the stock prices), the author adds an interaction term of *FFR* and *DIV* into the regression model to avoid the biased estimators issue. Moreover, since short sale ratio (*SSR*) is also one of the stock supply components, the interaction term of *SSR* and *DIV* is also necessary.

The formula of future return is as follows:

$$Future\ return\ (FR) = \log(P_{t+k} / P_t).$$

Where P_{t+k} is the stock price of the future *k* period(s) and P_t is the stock price of the current period.

If Miller's argument holds, a decrease of free float will make stock prices higher relative to the true value, and hence lower future return. The opposite is true for the case of increasing free float. Hence, β_1 should be statistically significant in positive direction. In other words, the null hypothesis is $\beta_1 = 0$ and the alternative hypothesis is $\beta_1 > 0$.

To test the second hypothesis, the author uses the following designated regression model:

$$FV_{i,t+k} = \alpha_0 + \alpha_1(FFR_{i,t}) + \alpha_2(DIV_{i,t}) + \alpha_3(FFR_{i,t}.DIV_{i,t}) + \alpha_4 SSR_{i,t} + \alpha_5(SSR_{i,t}.DIV_{i,t}) + b_2MKT_{t+k} + s_2SMB_{t+k} + h_2HML_{t+k} + \varepsilon_{i,t}.$$

Where *FV* represents the future volatility of stock *i* in each *k* period(s). The author also includes short sale ratio (*SSR*) into the regression model which is similar to the hypothesis 1 because Miller (1977) predicts that short sales will result in an increase of volatility of stock return. An opening of a short position increases the supply of shares, while the closing of a short position decreases the supply of shares. The net effect of short sales transactions leads to stock price declines and increases return volatility. Hence, to effectively observe the free float effect, *SSR* and its interaction term are necessary. Other variables in this regression model are identical to the first model that used to test the first hypothesis.

The formula of stock return volatility is as follows:

$$FV = \sqrt{\frac{\sum_{i=1}^{n}(r_i - m)^2}{n-1}}.$$

Where r_i represents the daily return of stock *i*, *m* is the average daily return in each particular month, and *n* is the number of daily return observed in each month.

Miller (1977) suggests that equilibrium prices of stocks will reflect the most optimistic valuation of investors which will subsequently make stocks to be mispriced. The stocks with higher equilibrium prices tend to have lower future return because such stocks are likely to correct its error. Since a change of free float will move the supply curve and hence equilibrium prices of stocks, stocks with lower free float then should have higher volatility because such stocks tend to have higher prices relative to the true value and expected to correct its error more aggressive than stock with higher free float. The opposite is true for stock with higher free float. Thus, α_1 should be statistically significant in negative direction. In other words, the null hypothesis is $\alpha_1 = 0$ and the alternative hypothesis is $\alpha_1 < 0$.

For third hypothesis, the author examines the effect of free float change on stock prices with two different proxies for investors' degree of opinion divergence. All the data are examined in the same period, which is one month period. The periods where free float ratio did not change are necessarily excluded from the sample. Again, *SSR* is included into the regression model for the same reason discussed above. Hence, the author uses the following designated regression model to test the third hypothesis:

$$CR_{i,t} = \mu_0 + \mu_1(FFR_{i,t} - FFR_{i,t-1}) + \mu_2(DIV_{i,t-1}) + \mu_3[(FFR_{i,t} - FFR_{i,t-1}).DIV_{i,t-1}] + \mu_4(SSR_{i,t} - SSR_{i,t-1}) + \mu_5[(SSR_{i,t} - SSR_{i,t-1}).DIV_{i,t-1}] + \beta_3 MKT_t + s_3 SMB_t + h_3 HML_t + \varepsilon_{i,t}.$$

Where *CR* is the current return of stock *i*, $FFR_t - FFR_{t-1}$ is the difference of free float between month *t* and month *t-1*. Other variables are still used as same reason as regression model discussed above except that *DIV* is measured at month *t-1,* this is to ensure that stocks have acknowledged the degree of opinion divergence before they come to realize the return at month *t*.

Note that current return (CR) is basically the price difference. The reason the author uses current return instead is that it will make the number comparable across stocks. The formula of current return is as follow:

$$\text{Current return (CR)} = \log(P_t / P_{t-1}).$$

Where P_t is the stock price at the end of month *t* and P_{t-1} is the stock price at the end of month *t-1*.

If the Miller's argument holds and hence free float effect is larger when opinion divergence is greater, the coefficient of interaction term of $FFR_t - FFR_{t-1}$ and DIV should negatively contribute in explaining price differences. In other words, the null hypothesis is $\mu_3 = 0$ and the alternative hypothesis is $\mu_3 < 0$.

CHAPTER VI

EMPIRICAL RESULTS

In the overall, this study finds that free float is negatively related to future return in each *k*-month period (k = 1, 2, 3, 6, and 12). These evidences suggest that the predicted effect of free float on future return is not consistent to the prediction in hypothesis 1 that is derived from Miller's framework. However, these evidences appear to be consistent to the Weill (2008)'s proposition which argues that free float alters the liquidity risk of stock, and future return should be negatively related to free float.

The results from hypothesis 3 show that lower free float stock tend to offer a higher equilibrium price. The opposite is true for the case of higher free float stock. More importantly, there are evidences which suggest that free float effect should be considered together with the effect of opinion divergence. Hence, if considering the effect of free float in a viewpoint of hypothesis 3 and assuming that there is a divergence of opinion among investors, two identical stocks with different level of free float should yield different equilibrium price and hence different future return. This logic implies the positive relationship between free float and stock future return. Therefore, the overall results seem to be conflicting and inconclusive. However, the author finds the evidence that the liquidity effect might dominate the results of hypothesis 1 and make the predicted effect of free float unobservable.

Section 6.1, 6.2, and 6.3 shall describe the empirical results in full detail. Section 6.4 describes the robustness test. Lastly, section 6.5 offers the potential explanation and the author's conjecture regarding the empirical results.

6.1 Hypothesis 1: The Effect of Free Float on Stock Future Returns

This section displays the results in respect of hypothesis 1. Table 2 and 4 display the results using dispersion in analysts' earnings forecasts as a proxy for investors' degree of opinion divergence from Thai market and U.S. market respectively. While table 3 and 5 display the results using idiosyncratic volatility as a proxy for investors' degree of opinion divergence from Thai market and U.S. market respectively.

The future returns of stocks are measured in the 1, 2, 3, 6 and 12 month(s) period after the date that given independent variables are measured and are reported in the 1st, 2nd, 3rd, 4th, and 5th column respectively. The sample size reported in table 2 and 3 are smaller than those reported in table 4 and 5 due to the limited availability of some of the variables. The adjusted R-squared from all regression results are approximately 0.3 to 0.4 which stay in an acceptable range.

From table 2, the coefficient estimates of *FFR* from all periods of future return are not statistically significant. However, table 4 reveals a negative coefficient estimates and are statistically significance at the 1% level, which implies that there is a relationship between future return in all periods and *FFR*. However, these evidences are inconsistent with the prediction from hypothesis 1 and cannot be used to support the Miller's conjecture. Turning to table 3 and 5, seven out of ten coefficient estimates from both tables are statistically significant in a negative direction at the 5% level and 1% level respectively. Again, the evidences are also inconsistent with the prediction from hypothesis 1.

These results can be interpreted as evidence that stocks with higher free float are more prone to yield lower returns despite the fact that they have a higher stock supply in the market. The coefficient estimates suggest that an increase in the value of *FFR* by one percent leads to a decrease of approximately 0.076%[22] of the annualized future return in average. As a result, the regression results seem to suggest that the Miller's theory may not hold true. Additionally, the results from both markets display the similar pattern. This implies that the different structure of equity market does not influence the effect of free float on stock returns.

In a broad view, the empirical results on this section shows that even when the degree of opinion divergence is controlled, the evidences still show the negative relationship between free float and stock future returns. However, this pattern of relationship appears to be consistent with what Weill (2008) suggests. Since the author's research mainly focuses the effect of free float in Miller's framework, the previous discussion then does not highlight the proposition from Weill (2008)'s research in an adequate detail. As previously discussed, the obtained evidences are inconsistent with the prediction of research hypothesis and suggest that free float could be a liquidity proxy as proposed by Weill (2008). As a result, it is worthwhile to discuss it here.

Weill (2008) have been studying the impact of liquidity on cross-sectional returns by using free float as a proxy for stock liquidity and estimate it as a linear model[23], which known as Float- adjusted return model (FARM). In other words, FARM is a deterministic relationship between stock expected returns and free float. According

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[22] 0.076% is calculated from the average of the annualized values of all coefficient estimates that are statistically significant.

[23] Linear models are widely used in the asset pricing model. When researchers investigate the stock returns, the first step they would do is to control for various risk factors, such as three factors of Fama and Frence (1993). After that, they will test with the additional independent variables, such as proxy of liquidity risk, to investigate its statistical significance.

to Weill (2008), the liquidity premium of an asset is inversely proportional to its free float. This implies that the higher the free float, the lower the liquidity premium of an asset and hence the lower future return. The opposite is true for the case of lower free float stock.

From Weill (2008)'s argument, we can conclude that stocks with higher free float imply stocks with lower liquidity risk. If this type of risk is priced in the market, then this group of stocks will yield lower expected returns. Since free float can, in theory, affect stock returns in both positive and negative ways due to supply change (Miller's theory) and liquidity premium (Weill's theory) respectively, it is possible that the net effect is either positive or negative, depending on which effect dominates. If liquidity effect dominates, this may explain that why free float is negatively related to future return as shown in the empirical evidences. This will be discussed in more detail in section 6.5.

Interestingly, a larger quantity of shareholders may also mean a larger demand from investors. Since free float reflects the quantity of shareholders, higher free float may be associated with higher demand in addition to higher supply. If the demand increases more with free float relative to supply shift, the increase of free float will make the equilibrium price higher instead of lower. This rationale may serve as an alternative explanation of the negative relationship between free float and stock future returns that the author documents herein, and it is inconclusive whether the Miller's theory may or may not hold true.

Table 2 Regression results regarding the effect of free float on stock future returns in Thai market based on using dispersion in analysts' earnings forecasts as a proxy for investors' degree of opinion divergence.

Variables	(1) One-month period return	(2) Two-month period return	(3) Three-month period return	(4) Six-month period return	(5) Twelve-month period return
FFR	-0.000534	-0.000575	-0.000121	0.00213	0.0104
	(0.00293)	(0.00428)	(0.00534)	(0.00797)	(0.0125)
DISP	-0.140	-0.204	-0.260	0.492	3.048***
	(0.215)	(0.322)	(0.402)	(0.591)	(0.877)
FFR.DISP	0.000434	-0.000704	-0.000633	-0.0125*	-0.0367***
	(0.00248)	(0.00368)	(0.00459)	(0.00675)	(0.01000)
SSR	0.0180	0.0385	0.0287	0.0926	0.229*
	(0.0309)	(0.0449)	(0.0558)	(0.0844)	(0.125)
SSR.DISP	-0.0324	0.0263	0.0832	-0.172	-0.676***
	(0.0569)	(0.0827)	(0.103)	(0.151)	(0.222)
MKT	1.153***	1.209***	1.200***	1.175***	1.100***
	(0.0135)	(0.0124)	(0.0119)	(0.0114)	(0.0126)
SMB	0.357***	0.313***	0.310***	0.270***	0.160***
	(0.0198)	(0.0188)	(0.0183)	(0.0193)	(0.0197)
HML	0.163***	0.0683***	-0.00240	-0.146***	-0.204***
	(0.0161)	(0.0156)	(0.0158)	(0.0159)	(0.0182)
Constant	-0.725***	-1.665***	-2.705***	-6.307***	-12.17***
	(0.249)	(0.366)	(0.459)	(0.696)	(1.140)
Observations	15,306	15,168	15,028	14,625	13,853
Adjusted R-squared	0.355	0.411	0.425	0.461	0.422

Note: The sample period is 2001 to 2013. *FFR* is free float ratio determined by the total amount of shares available to ordinary investors, expressed as a percentage of total number of shares outstanding. *DISP* is dispersion in analysts' earnings forecasts defined as the ratio of monthly standard deviation of analyst earnings per share forecasts to the absolute value of the mean of the analysts' forecast. *SSR* is short-sale ratio defined as total value of outstanding short position expressed as a percentage of total number of floating shares. *MKT*, *SMB* and *HML* are controlled variables which calculated by method used in Fama-French (1993) three factor model. Note that three factors are determined in the same period of each future return. Hence, there will be different controlled variables for different dependent variables. Standard errors are heteroscedasticity robust and are reported in parentheses. Significance at the 1%, 5% and 10% level are denoted by ***, **, and *, respectively.

Table 3 Regression results regarding the effect of free float on stock future returns in Thai market based on using idiosyncratic volatility as a proxy for investors' degree of opinion divergence

Variables	(1) One-month period return	(2) Two-month period return	(3) Three-month period return	(4) Six-month period return	(5) Twelve-month period return
FFR	0.000679	-0.00187	-0.00425	-0.0165**	-0.0233**
	(0.00252)	(0.00361)	(0.00447)	(0.00657)	(0.00981)
IDV	0.197***	0.190**	0.0306	-0.366**	-0.369
	(0.0664)	(0.0955)	(0.118)	(0.172)	(0.249)
FFR.IDV	-0.00335***	-0.00415***	-0.00406***	-0.00367*	-0.00811**
	(0.000861)	(0.00123)	(0.00152)	(0.00221)	(0.00319)
SSR	-0.125	-0.244	-0.156	-0.413	-0.598
	(0.106)	(0.152)	(0.189)	(0.295)	(0.431)
SSR.IDV	0.0444	0.0891*	0.0624	0.157*	0.248*
	(0.0324)	(0.0464)	(0.0575)	(0.0876)	(0.127)
MKT	0.972***	1.010***	1.010***	1.008***	0.978***
	(0.00922)	(0.00831)	(0.00796)	(0.00758)	(0.00816)
SMB	0.522***	0.496***	0.493***	0.470***	0.323***
	(0.0141)	(0.0132)	(0.0127)	(0.0132)	(0.0135)
HML	0.256***	0.197***	0.136***	0.0207*	-0.0729***
	(0.0118)	(0.0113)	(0.0112)	(0.0114)	(0.0128)
Constant	-0.431**	-0.779***	-0.986***	-1.856***	-4.286***
	(0.199)	(0.287)	(0.358)	(0.536)	(0.838)
Observations	45,138	44,650	44,161	42,708	39,852

Adjusted R-squared	0.217	0.269	0.286	0.325	0.310

Note: The sample period is 2001 to 2013. *FFR* is free float ratio determined by the total amount of shares available to ordinary investors, expressed as a percentage of total number of shares outstanding. *IDV* is idiosyncratic volatility determined by calculating the standard deviation of residuals on the contemporary three factors (*MKT*, *SMB*, and *HML*) of Fama-French (1993) estimated from the time-series regression of the daily returns on stock *i* in month *t*. *SSR* is short-sale ratio defined as total value of outstanding short position expressed as a percentage of total number of floating shares. *MKT*, *SMB* and *HML* are controlled variables which calculated by method used in Fama-French (1993) three factor model. Note that three factors are determined in the same period of each future return. Hence, there will be different controlled variables for different dependent variables. Standard errors are heteroscedasticity robust and are reported in parentheses. Significance at the 1%, 5% and 10% level are denoted by ***, **, and *, respectively.

Table 4 Regression results regarding the effect of free float on stock future returns in U.S. market based on using dispersion in analysts' earnings forecasts as a proxy for investors' degree of opinion divergence

Variables	(1) One-month period return	(2) Two-month period return	(3) Three-month period return	(4) Six-month period return	(5) Twelve-month period return
FFR	-0.00636***	-0.0144***	-0.0243***	-0.0618***	-0.141***
	(0.00151)	(0.00215)	(0.00263)	(0.00376)	(0.00550)
DISP	-0.122	-0.00855	0.275	-0.217	0.469
	(0.292)	(0.414)	(0.503)	(0.706)	(0.976)
FFR.DISP	0.000303	0.00223	0.00235	0.00914	-0.00363
	(0.00327)	(0.00463)	(0.00563)	(0.00790)	(0.0109)
SSR	0.0443***	0.0945***	0.142***	0.272***	0.589***
	(0.00702)	(0.00998)	(0.0122)	(0.0172)	(0.0242)
SSR.DISP	0.0133	-0.0334*	-0.0759***	-0.127***	-0.0414
	(0.0142)	(0.0202)	(0.0246)	(0.0345)	(0.0477)
MKT	1.081***	1.126***	1.144***	1.170***	1.123***
	(0.00793)	(0.00760)	(0.00748)	(0.00722)	(0.00684)
SMB	0.159***	0.111***	0.0570***	-0.0973***	-0.243***
	(0.0143)	(0.0156)	(0.0150)	(0.0148)	(0.0147)
HML	0.133***	0.109***	0.0744***	0.123***	0.136***
	(0.0138)	(0.0124)	(0.0124)	(0.0130)	(0.0141)
Constant	0.319**	0.671***	1.186***	3.319***	8.388***
	(0.127)	(0.181)	(0.221)	(0.316)	(0.470)
Observations	68,781	68,289	67,796	66,318	63,367
Adjusted R-squared	0.271	0.310	0.323	0.365	0.367

Note: The sample period is 2000 to 2014. *FFR* is free float ratio determined by the total amount of shares available to ordinary investors, expressed as a percentage of total number of shares outstanding. *DISP* is dispersion in analysts' earnings forecasts defined as the ratio of monthly standard deviation of analyst earnings per share forecasts to the absolute value of the mean of the analysts' forecast. *SSR* is short-sale ratio defined as total value of outstanding short position expressed as a percentage of total number of floating shares. *MKT*, *SMB* and *HML* are controlled variables which calculated by method used in Fama-French (1993) three factor model. Note that three factors are determined in the same period of each future return. Hence, there will be different controlled variables for different dependent variables. Standard errors are heteroscedasticity robust and are reported in parentheses. Significance at the 1%, 5% and 10% level are denoted by ***, **, and *, respectively.

Table 5 Regression results regarding the effect of free float on future stock returns in U.S. market based on idiosyncratic volatility as a proxy for investors' degree of opinion divergence

Variables	(1) One-month period return	(2) Two-month period return	(3) Three-month period return	(4) Six-month period return	(5) Twelve-month period return
FFR	-0.00212	-0.00488	-0.00256	-0.0184***	-0.0688***
	(0.00257)	(0.00364)	(0.00445)	(0.00632)	(0.00902)
IDV	0.336***	0.698***	1.507***	3.466***	6.675***
	(0.121)	(0.171)	(0.209)	(0.293)	(0.409)
FFR.IDV	-0.00239	-0.00581***	-0.0133***	-0.0246***	-0.0436***
	(0.00148)	(0.00209)	(0.00255)	(0.00358)	(0.00498)
SSR	0.0439***	0.0650***	0.0866***	0.102***	0.357***
	(0.0118)	(0.0168)	(0.0205)	(0.0290)	(0.0408)

SSR.IDV	-0.00404	0.00291	0.00805	0.0316***	0.0224
	(0.00486)	(0.00690)	(0.00839)	(0.0118)	(0.0165)
MKT	1.087***	1.135***	1.155***	1.182***	1.126***
	(0.00795)	(0.00764)	(0.00752)	(0.00723)	(0.00683)
SMB	0.164***	0.106***	0.0435***	-0.142***	-0.336***
	(0.0143)	(0.0157)	(0.0151)	(0.0150)	(0.0150)
HML	0.158***	0.136***	0.112***	0.170***	0.181***
	(0.0138)	(0.0124)	(0.0124)	(0.0131)	(0.0141)
Constant	-0.193	-0.328	-1.011***	-1.746***	-0.701
	(0.217)	(0.308)	(0.376)	(0.534)	(0.759)
Observations	70,219	69,724	69,229	67,744	64,780
Adjusted R-squared	0.270	0.309	0.323	0.368	0.373

Note: The sample period is 2000 to 2014. *FFR* is free float ratio determined by the total amount of shares available to ordinary investors, expressed as a percentage of total number of shares outstanding. *IDV* is idiosyncratic volatility determined by calculating the standard deviation of residuals on the contemporary three factors (*MKT*, *SMB*, and *HML*) of Fama-French (1993) estimated from the time-series regression of the daily returns on stock *i* in month *t*. *SSR* is short-sale ratio defined as total value of outstanding short position expressed as a percentage of total number of floating shares. *MKT*, *SMB* and *HML* are controlled variables which calculated by method used in Fama-French (1993) three factor model. Note that three factors are determined in the same period of each future return. Hence, there will be different controlled variables for different dependent variables. Standard errors are heteroscedasticity robust and are reported in parentheses. Significance at the 1%, 5% and 10% level are denoted by ***, **, and *, respectively.

6.2 Hypothesis 2: The Effect of Free Float on Stock Future Volatility

This section presents the results regarding hypothesis 2. Table 6 and 8 present the results using dispersion in analysts' earnings forecasts as a proxy for investors' degree of opinion divergence from Thai market and U.S. market respectively. While table 7 and 9 present the results using idiosyncratic volatility as a proxy for investors' degree of opinion divergence from Thai market and U.S. market respectively. The future return volatility of stocks are measured in the same period of future returns as discussed in hypothesis 1, which are 1, 2, 3, 6 and 12 month(s) period after the date that given independent variables are measured and are reported in the 1st, 2nd, 3rd, 4th, and 5th column respectively. Since some of the data regarding the stock daily prices in Thai market are missing, there are some part of data in the sample that cannot be calculated for monthly return volatility. This is the reason why the sample size of table 6 and 7 are much smaller than those reported in table 8 and 9. Table 9 shows the impressive values of adjusted R-squared which stay in the range of 0.44 to 0.56. The regression results in

Table 7 and 8 also show the acceptable values of adjusted R-squared. However, the adjusted R-squared values reported in table 6 are considerably low.

From all tables, the results using both proxies of divergence of opinion display the same pattern. To be exact, the coefficient estimates of *FFR* from all period of future volatility are negative and statistically significant at the 1% level. Thus, the regression results are supportive of hypothesis 2.

The coefficient estimates imply that an increase in the value of *FFR* by one percent leads to a decrease of approximately 0.178%[24] of the annualized volatility. Moreover, since the regression results display the same pattern for both markets, this implies that the different structure of equity market does not influence the effect of free float on stock volatility. This evidence also offers the similar implication to the results from hypothesis 1.

Although the results from this section are consistent with hypothesis 2, we cannot state that they are also consistent with the predicted effect of free float. The reason is that the prediction of hypothesis 2 is based on hypothesis 1. Hypothesis 1 predicts that stock with lower free float is likely to yield a lower future return because, based on Miller's theory, this particular stock is mispriced and overvalued. This logic leads to hypothesis 2 which predicts that this type of stock is more likely to correct its price to the true value more aggressively and should yield a higher volatility than stocks with higher free float, and therefore we should observe the negative relationship between free float and future return volatility. Specifically, hypothesis 2 provides

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[24] 0.178% is calculated from the average of the annualized value all coefficient estimates that are statistically significant.

further evidence in support of hypothesis 1. Although we observe that free float is negatively related to future volatility, but because of inconsistent results from hypothesis 1, this evidence then does not imply that the stock with lower free float corrects its price more aggressive and subsequently display a higher volatility.

However, there is an alternative explanation for the pattern of these results. Hong, Scheinkman and Xiong (2006) explain that when free float increases, stock return volatility tends to decrease. The intuition can be explained as follows: suppose there are two groups of investors that have the different opinion toward the asset price, one is pessimist and one is optimist, and each group hold same amount of floating shares. When new information arrive at the market, the optimistic group is likely to buy all shares from the pessimistic group. Hence, the stock price at that particular time will be priced only by the optimist's belief. However, if that is not the case and if both groups are still hold the stocks, then the asset price will depend on the average of the belief of both groups. Clearly, the variance of the average of both groups' belief is less than the variance of an optimist's belief alone. Since it is less likely that one group will hold all the shares when free float increases, this intuition suggests that when free float is higher, the return volatility will be lower. Hence, the results seems to be consistent with Hong, Scheinkman and Xiong (2006) rather than the prediction from hypothesis 2.

Table 6 Regression results regarding the effect of free float on stock future return volatility in Thai market based on using dispersion in analysts' earnings forecasts as a proxy for investors' degree of opinion divergence

Variables	(1) One-month period volatility	(2) Two-month period volatility	(3) Three-month period volatility	(4) Six-month period volatility	(5) Twelve-month period volatility
FFR	-0.0174***	-0.0171***	-0.0184***	-0.0173***	-0.0160***
	(0.00351)	(0.00320)	(0.00305)	(0.00280)	(0.00271)
DISP	0.107***	0.133***	0.131***	0.129***	0.143***

	(0.0258)	(0.0241)	(0.0229)	(0.0208)	(0.0190)
FFR.DISP	-0.00526*	-0.00804***	-0.00699***	-0.00640***	-0.00732***
	(0.00297)	(0.00275)	(0.00261)	(0.00237)	(0.00217)
SSR	0.0130***	0.00873***	0.00582*	0.00310	0.00207
	(0.00370)	(0.00336)	(0.00318)	(0.00297)	(0.00272)
SSR.DISP	0.00302	0.00414	0.00263	-0.00283	-0.00574
	(0.00682)	(0.00618)	(0.00587)	(0.00530)	(0.00483)
MKT	-0.0351***	-0.0202***	-0.0145***	-0.00779***	-0.00464***
	(0.00162)	(0.000928)	(0.000681)	(0.000402)	(0.000273)
SMB	-0.0285***	-0.0179***	-0.0154***	-0.0146***	-0.00857***
	(0.00237)	(0.00140)	(0.00104)	(0.000677)	(0.000428)
HML	-0.0234***	-0.0110***	-0.00586***	-0.000665	0.000676*
	(0.00193)	(0.00117)	(0.000899)	(0.000558)	(0.000396)
Constant	2.302***	2.366***	2.411***	2.457***	2.496***
	(0.0298)	(0.0274)	(0.0262)	(0.0244)	(0.0248)
Observations	15,303	15,168	15,028	14,625	13,853
Adjusted R-squared	0.046	0.047	0.048	0.052	0.049

Note: The sample period is 2001 to 2013. *FFR* is free float ratio determined by the total amount of shares available to ordinary investors, expressed as a percentage of total number of shares outstanding. *DISP* is dispersion in analysts' earnings forecasts defined as the ratio of monthly standard deviation of analyst earnings per share forecasts to the absolute value of the mean of the analysts' forecast. *SSR* is short-sale ratio defined as total value of outstanding short position expressed as a percentage of total number of floating shares. *MKT*, *SMB* and *HML* are controlled variables which calculated by method used in Fama-French (1993) three factor model. Note that three factors are determined in the same period of each future return volatility. Hence, there will be different controlled variables for different dependent variables. Standard errors are heteroscedasticity robust and are reported in parentheses. Significance at the 1%, 5% and 10% level are denoted by ***, **, and *, respectively.

Table 7 Regression results regarding the effect of free float on future return volatility in Thai market based on using idiosyncratic volatility as a proxy for investors' degree of opinion divergence

Variables	(1) One-month period volatility	(2) Two-month period volatility	(3) Three-month period volatility	(4) Six-month period volatility	(5) Twelve-month period volatility
FFR	-0.0810***	-0.0722***	-0.0690***	-0.0729***	-0.0805***
	(0.00386)	(0.00353)	(0.00336)	(0.00312)	(0.00307)
IDV	0.171***	0.187***	0.185***	0.138***	0.0939***
	(0.0112)	(0.0103)	(0.00977)	(0.00900)	(0.00870)
FFR.IDV	0.0435***	0.0375***	0.0349***	0.0359***	0.0358***
	(0.00143)	(0.00130)	(0.00123)	(0.00113)	(0.00108)
SSR	0.0334**	0.0194	0.0129	0.000422	-0.00163
	(0.0152)	(0.0139)	(0.0133)	(0.0131)	(0.0126)
SSR.IDV	-0.00872*	-0.00547	-0.00414	-0.000982	-0.000760
	(0.00463)	(0.00424)	(0.00404)	(0.00389)	(0.00372)
MKT	-0.0394***	-0.0221***	-0.0162***	-0.00927***	-0.00737***
	(0.00132)	(0.000760)	(0.000560)	(0.000337)	(0.000239)
SMB	-0.0231***	-0.0132***	-0.0107***	-0.00694***	-0.00544***
	(0.00203)	(0.00121)	(0.000897)	(0.000587)	(0.000397)
HML	-0.0166***	-0.00793***	-0.00343***	0.00146***	0.00269***
	(0.00169)	(0.00103)	(0.000792)	(0.000507)	(0.000376)
Constant	2.018***	2.091***	2.157***	2.341***	2.604***
	(0.0307)	(0.0284)	(0.0272)	(0.0256)	(0.0263)
Observations	44,729	44,538	44,110	42,684	39,842
Adjusted R-squared	0.278	0.292	0.294	0.300	0.289

Note: The sample period is 2001 to 2013. *FFR* is free float ratio determined by the total amount of shares available to ordinary investors, expressed as a percentage of total number of shares outstanding. *IDV* is idiosyncratic volatility determined by calculating the standard deviation of residuals on the contemporary three factors (*MKT*, *SMB*, and *HML*) of Fama-French (1993) estimated from the time-series regression of the daily returns on stock *i* in month *t*. *SSR* is short-sale ratio defined as total value of outstanding short position expressed as a percentage of total number of floating shares. *MKT*, *SMB* and *HML* are controlled variables which calculated by method used in Fama-French (1993) three factor model. Note that three factors are determined in the same period of each future return volatility. Hence, there will be different controlled variables for different dependent variables. Standard errors are heteroscedasticity robust and are reported in parentheses. Significance at the 1%, 5% and 10% level are denoted by ***, **, and *, respectively.

Table 8 Regression results regarding the effect of free float on future return volatility in U.S. market based on using dispersion in analysts' earnings forecasts as a proxy for investors' degree of opinion divergence

Variables	(1) One-month period volatility	(2) Two-month period volatility	(3) Three-month period volatility	(4) Six-month period volatility	(5) Twelve-month period volatility
FFR	-0.0263***	-0.0221***	-0.0178***	-0.00311***	0.0335***
	(0.00233)	(0.00217)	(0.00207)	(0.00193)	(0.00186)
DISP	-0.240***	-0.198***	-0.170***	-0.100***	-0.0209
	(0.0451)	(0.0418)	(0.0397)	(0.0363)	(0.0329)
FFR.DISP	0.0567***	0.0511***	0.0466***	0.0387***	0.0240***
	(0.00505)	(0.00468)	(0.00445)	(0.00406)	(0.00369)
SSR	0.0743***	0.0754***	0.0749***	0.0737***	0.0711***
	(0.00108)	(0.00101)	(0.000961)	(0.000884)	(0.000815)
SSR.DISP	0.00978***	0.00717***	0.00645***	0.00399**	0.00290*
	(0.00220)	(0.00204)	(0.00194)	(0.00178)	(0.00161)
MKT	-0.0754***	-0.0643***	-0.0594***	-0.0421***	-0.0296***
	(0.00122)	(0.000767)	(0.000591)	(0.000371)	(0.000231)
SMB	0.0183***	0.0326***	0.0408***	0.0500***	0.0434***
	(0.00221)	(0.00158)	(0.00119)	(0.000762)	(0.000496)
HML	-0.0668***	-0.0393***	-0.0335***	-0.0270***	-0.0162***
	(0.00213)	(0.00126)	(0.000977)	(0.000671)	(0.000474)
Constant	1.865***	1.894***	1.908***	1.831***	1.651***
	(0.0196)	(0.0183)	(0.0174)	(0.0163)	(0.0159)
Observations	68,781	68,289	67,796	66,318	63,367
Adjusted R-squared	0.154	0.206	0.251	0.319	0.375

Note: The sample period is 2000 to 2014. *FFR* is free float ratio determined by the total amount of shares available to ordinary investors, expressed as a percentage of total number of shares outstanding. *DISP* is dispersion in analysts' earnings forecasts defined as the ratio of monthly standard deviation of analyst earnings per share forecasts to the absolute value of the mean of the analysts' forecast. *SSR* is short-sale ratio defined as total value of outstanding short position expressed as a percentage of total number of floating shares. *MKT*, *SMB* and *HML* are controlled variables which calculated by method used in Fama-French (1993) three factor model. Note that three factors are determined in the same period of each future return volatility. Hence, there will be different controlled variables for different dependent variables. Standard errors are heteroscedasticity robust and are reported in parentheses. Significance at the 1%, 5% and 10% level are denoted by ***, **, and *, respectively.

Table 9 Regression results regarding the effect of free float on future return volatility in U.S. market based on using idiosyncratic volatility as a proxy for investors' degree of opinion divergence

Variables	(1) One-month period volatility	(2) Two-month period volatility	(3) Three-month period volatility	(4) Six-month period volatility	(5) Twelve-month period volatility
FFR	-0.0646***	-0.0637***	-0.0521***	-0.0457***	-0.0183***
	(0.00326)	(0.00302)	(0.00287)	(0.00266)	(0.00259)
IDV	0.416***	0.370***	0.382***	0.299***	0.249***
	(0.0154)	(0.0142)	(0.0134)	(0.0123)	(0.0117)
FFR.IDV	0.0593***	0.0582***	0.0523***	0.0534***	0.0456***
	(0.00188)	(0.00174)	(0.00164)	(0.00150)	(0.00143)
SSR	0.0439***	0.0483***	0.0481***	0.0498***	0.0546***
	(0.00151)	(0.00140)	(0.00132)	(0.00122)	(0.00117)

SSR.IDV	-0.0665***	-0.0665***	-0.0593***	-0.0549***	-0.0616***
	(0.00618)	(0.00572)	(0.00541)	(0.00497)	(0.00472)
MKT	-0.0607***	-0.0518***	-0.0499***	-0.0387***	-0.0292***
	(0.00101)	(0.000633)	(0.000485)	(0.000304)	(0.000196)
SMB	0.00241	0.00694***	0.0209***	0.0325***	0.0290***
	(0.00182)	(0.00130)	(0.000974)	(0.000630)	(0.000430)
HML	-0.0422***	-0.0269***	-0.0199***	-0.0228***	-0.0161***
	(0.00176)	(0.00103)	(0.000800)	(0.000550)	(0.000404)
Constant	1.190***	1.303***	1.294***	1.401***	1.414***
	(0.0276)	(0.0256)	(0.0243)	(0.0224)	(0.0218)
Observations	70,219	69,724	69,229	67,744	64,780
Adjusted R-squared	0.440	0.477	0.512	0.554	0.557

Note: The sample period is 2000 to 2014. *FFR* is free float ratio determined by the total amount of shares available to ordinary investors, expressed as a percentage of total number of shares outstanding. *IDV* is idiosyncratic volatility determined by calculating the standard deviation of residuals on the contemporary three factors (*MKT*, *SMB*, and *HML*) of Fama-French (1993) estimated from the time-series regression of the daily returns on stock *i* in month *t*. *SSR* is short-sale ratio defined as total value of outstanding short position expressed as a percentage of total number of floating shares. *MKT*, *SMB* and *HML* are controlled variables which calculated by method used in Fama-French (1993) three factor model. Note that three factors are determined in the same period of each future return volatility. Hence, there will be different controlled variables for different dependent variables. Standard errors are heteroscedasticity robust and are reported in parentheses. Significance at the 1%, 5% and 10% level are denoted by ***, **, and *, respectively.

6.3 Hypothesis 3: The Sensitivity of Price to Free Float When Degree of Opinion Divergence among Investors is Different

This section presents the results regarding hypothesis 3, which focuses how the change of free float affects the stock price when there are different levels of divergence of opinion among investors. Table 10 and 11 display the results from Thai market and U.S. market respectively. Panel A from both tables report the results based on dispersion in analysts' earnings forecasts as a proxy for investors' degree of opinion divergence. While panel B from both tables report the results based on idiosyncratic volatility as a proxy for investors' degree of opinion divergence. Current returns are used as a price difference to regress on the independent variables.

A number of observations in Thai market, as reported in table 10, are substantially low when compared to a number of observations in U.S. market. This is due to the lack of the change of free float among Thai firms. Furthermore, as previously discussed, there are a large amount of data, such as mean values of analysts' earnings forecasts, which are found as a missing value when they were retrieved. Thus, the author has to exclude the part of data that are imperfect from the sample. As a result, the number of observations from panel A and B of table 10 remains 806 and 2114 respectively. The adjusted R-squared values from all regression results stay in an acceptable range.

From table 10, panel A reveals that the coefficient estimate of the interaction term of $FFR_t - FFR_{t-1}$ and $DISP$ is -0.108 and statistically significant at the 5% level. While panel B shows the negative coefficient estimate of interaction term but is not significant at any conventional level. Panel A and B from table 11 also display the negative coefficient estimates which are -0.0543 and -0.0215 and both are statistically significant at the 5% and 1% level respectively.

These results suggest that the increase of free float makes the stock price lower, which is sensible in term of economics theory. Furthermore, the results also suggest that the increase of degree of opinion divergence is likely to make the negative effect of free float on stock price larger. This evidence is consistent with the prediction of hypothesis 3 and also in line with the Greenwood (2006)'s argument which states that firms have a strong incentive for float manipulation when there is a great degree of opinion divergence in the market. However, the interesting fact is that the coefficient estimates of $FFR_t - FFR_{t-1}$ as shown in table 10 and 11 are not statistically significant at any conventional level except the estimate on panel B of table 11, this result can be interpreted as evidence that the effect of free float on stock price, based on Miller's framework, will not occur if there is no divergence of opinion among investors. This implication is theoretically reasonable if consider the effect on demand-supply viewpoint. Based on Miller's framework, the demand curve of investors will be horizontal line when the investors' opinions do not diverge. This implies that the shift of supply curve (or the change of free float) cannot affect the equilibrium price of the asset. For example, figure 7 shows that when the level of free float at FF_1 decreases to FF_2, the equilibrium price of the asset still stay at the same level.

Since Hong, Scheinkman and Xiong (2006) suggest that stocks with lower free float are more prone to bubble, the evidences from this research somehow add more potential fact from their suggestion by stating that such stocks are even more prone to bubble if there is a higher degree of opinion divergence. Additionally. This evidence also effectively answers the second research question of this thesis because the results from hypothesis 3 suggest that if investors want to analyze the effect of free float on stock price, they should consider the degree of opinion divergence of that stock together with the free float effect.

Finally, since the results based on both markets exhibit the similar pattern, this implies that the structure of market does not influence the effect of free float on stock price, which is coherent with the results from hypothesis 1 and 2.

Table 10 Regression results regarding the effect of free float on current returns of stocks in Thai market based on using both proxies for investors' degree of opinion divergence (i.e. dispersion in analysts' earnings forecasts and idiosyncratic volatility)

Panel A		Panel B	
Variables	Current Return	Variables	Current Return
$FFR_t - FFR_{t-1}$	0.00611	$FFR_t - FFR_{t-1}$	0.00698
	(0.0147)		(0.0137)
$DISP$	-0.0910	IDV	0.392***
	(0.728)		(0.117)
$(FFR_t - FFR_{t-1}).DISP$	-0.108**	$(FFR_t - FFR_{t-1}).IDV$	-0.00613
	(0.0470)		(0.00615)
$SSR_{i,t} - SSR_{i,t-1}$	-0.211	$SSR_{i,t} - SSR_{i,t-1}$	-1.282*
	(0.285)		(0.669)
$(SSR_{i,t} - SSR_{i,t-1}).DISP$	0.867**	$(SSR_{i,t} - SSR_{i,t-1}).IDV$	0.573**
	(0.372)		(0.286)
MKT	1.326***	MKT	1.228***

	(0.0787)		(0.0561)
SMB	0.741***	*SMB*	0.836***
	(0.0900)		(0.0713)
HML	0.221***	*HML*	0.290***
	(0.0607)		(0.0531)
Constant	-1.271***	Constant	-1.598***
	(0.398)		(0.357)
Observations	806	Observations	2,114
Adjusted R-squared	0.370	Adjusted R-squared	0.235

Note: The sample period is 2001 to 2013. $FFR_t - FFR_{t-1}$ is a difference of free float ratio in each period, where free float ratio is determined by the total amount of shares available to ordinary investors, expressed as a percentage of total number of shares outstanding. *DISP* is dispersion in analysts' earnings forecasts defined as the ratio of monthly standard deviation of analyst earnings per share forecasts to the absolute value of the mean of the analysts' forecast. *IDV* is idiosyncratic volatility determined by calculating the standard deviation of residuals on the contemporary three factors (*MKT*, *SMB*, and *HML*) of Fama-French (1993) estimated from the time-series regression of the daily returns on stock *i* in month *t*. $SSR_{i,t} - SSR_{i,t-1}$ is a difference of short-sale ratio in each period, where short-sale ratio is defined as total value of outstanding short position expressed as a percentage of total number of floating shares. *MKT*, *SMB* and *HML* are controlled variables which calculated by method used in Fama-French (1993) three factor model. Standard errors are heteroscedasticity robust and are reported in parentheses. Significance at the 1%, 5% and 10% level are denoted by ***, **, and *, respectively.

Table 11 Regression results regarding the effect of free float on current returns of stocks in U.S. market based on using both proxies for investors' degree of opinion divergence (i.e. dispersion in analysts' earnings forecasts and idiosyncratic volatility)

Panel A		Panel B	
Variables	Current Return	Variables	Current Return
$FFR_t - FFR_{t-1}$	0.00668	$FFR_t - FFR_{t-1}$	0.0321***
	(0.00630)		(0.0110)
DISP	-0.00596	*IDV*	-0.627***
	(0.106)		(0.0603)
$(FFR_t - FFR_{t-1}).DISP$	-0.0543**	$(FFR_t - FFR_{t-1}).IDV$	-0.0215***
	(0.0239)		(0.00667)
$SSR_{i,t} - SSR_{i,t-1}$	0.187***	$SSR_{i,t} - SSR_{i,t-1}$	0.256***
	(0.0531)		(0.0776)
$(SSR_{i,t} - SSR_{i,t-1}).DISP$	-0.279***	$(SSR_{i,t} - SSR_{i,t-1}).IDV$	-0.0568*
	(0.0832)		(0.0295)
MKT	1.099***	*MKT*	1.071***
	(0.0144)		(0.0144)
SMB	0.177***	*SMB*	0.184***
	(0.0271)		(0.0269)
HML	0.159***	*HML*	0.148***
	(0.0278)		(0.0276)
Constant	0.0489	Constant	0.952***
	(0.0611)		(0.104)
Observations	19,879	Observations	20,341
Adjusted R-squared	0.267	Adjusted R-squared	0.266

Note: The sample period is 2000 to 2014. $FFR_t - FFR_{t-1}$ is a difference of free float ratio in each period, where free float ratio is determined by the total amount of shares available to ordinary investors, expressed as a percentage of total number of shares outstanding. *DISP* is dispersion in analysts' earnings forecasts defined as the ratio of monthly standard deviation of analyst earnings per share forecasts to the absolute value of the mean of the analysts' forecast. *IDV* is idiosyncratic volatility determined by calculating the standard deviation of residuals on the contemporary three factors (*MKT*, *SMB*, and *HML*) of Fama-French (1993) estimated from the time-series regression of the daily returns on stock *i* in month *t*. $SSR_{i,t} - SSR_{i,t-1}$ is a difference of short-sale ratio in each period, where short-sale ratio is defined as total value of outstanding short position expressed as a percentage of total number of floating shares. *MKT*, *SMB* and *HML* are controlled variables which calculated by method used in Fama-French (1993) three factor model. Standard errors are heteroscedasticity robust and are reported in parentheses. Significance at the 1%, 5% and 10% level are denoted by ***, **, and *, respectively.

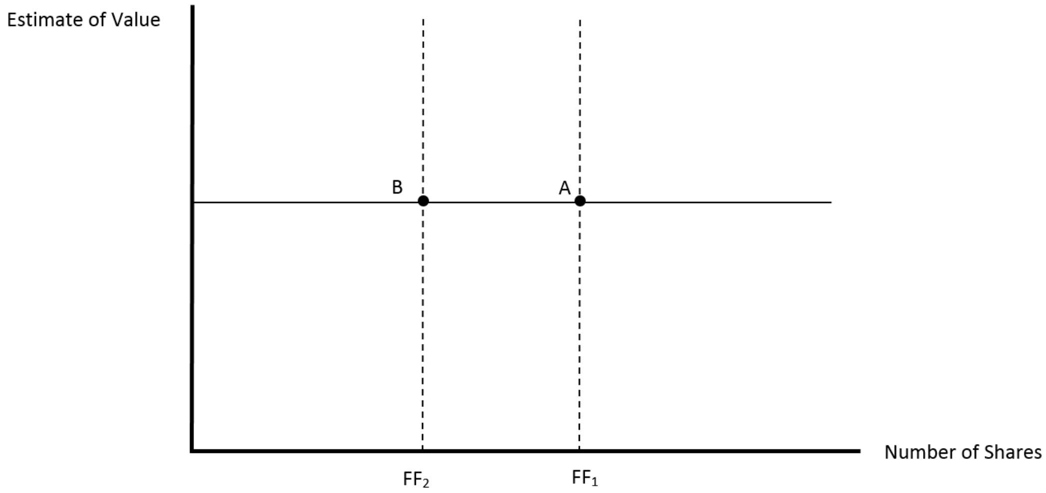

Figure 7: The effect of free float on a stock price when there is no divergence of opinion in the market.

6.4 Robustness Test

Although three factors proposed by Fama and French (1993) are widely used as a risk factor to explain the cross-sectional returns of stocks, these factors are still unable to explain the returns of portfolio which sorted on momentum (Fama and French (1996)). This is the motivation to include the momentum factor into the regression model to ascertain the robustness of results and to establish that the results are not driven by momentum.

The momentum risk factor was proposed by Carhart (1997) which is based on the evidences shown by Jegadeesh and Titman (1993)[48] who have suggested that buying on good performing portfolios and selling on bad performing portfolios can earn an abnormal returns. To define a momentum measure, the author uses the same method as suggested by Carhart (1997). That is, equal weighted average returns of each stock are computed from month *t-2* to month *t-12* and sorted into three portfolios based on breakpoint of bottom 30%, middle 40%, and top 30%. Moreover, each portfolio is then sorted into another two portfolios based on firm size by using the median size as a breakpoint. Firm size is measure by the values of market capitalization of each firm at the end of month *t-1*. As a result, there will be six portfolios which contain the small size and loser momentum stocks, small size and medium momentum stocks, small size and winner momentum stocks, big size and loser momentum stocks, big size and medium momentum stocks, and big size and winner momentum stocks. These portfolios are defined as *S/D*, *S/M*, *S/U*, *B/D*, *B/M*, and *B/U*, respectively.

The author constructs the momentum factor (*MOM*) for month *t* by computing the equal weighted average returns of the two best performing portfolios minus the equal weighted average returns of the two worst performing portfolios. The equation is as follows:

$$MOM = \frac{1}{2}(r^{S/U} + r^{B/U}) - \frac{1}{2}(r^{S/D} + r^{B/D}),$$

Where $r^{S/U}$, $r^{B/U}$, $r^{S/D}$, and $r^{B/D}$ are the equal weighted average returns of *S/U*, *B/U*, *S/D*, and *B/D* portfolio that formed on month *t* respectively. The summary statistics of momentum factor (*MOM*) are shown in table 12. Panel A displays the statistics based on Thai market, while panel B displays the data statistics based on U.S. market.

After including momentum factor as the additional control variable, the author also conducts the fixed effect model to all three proposed regression models to ensure the reliability of the results. By using fixed effect model, the results will not suffer from unobserved heterogeneity and the estimators will not be influenced by any time invariant components. The unobserved time- invariant individual effect is basically eliminated by demeaning the variables using ‘within’ transformation.

The empirical results obtained from using fixed effect model and including momentum factor (*MOM*) still offer a similar results to section 6.1 as shown in table 13, 14 15, and 16 which present the results regarding hypothesis 1. Interestingly, the results in table 13 shows the positive coefficient estimates of *FFR* that are statistically significant at the 5% level. These results seems to be consistent with the prediction based on Miller's framework. However, the remaining coefficient estimates still confirm the negative values and exhibit the statistical significance which are the same with the results from section 6.1. The positive coefficient estimates from table 13 may imply that the effect of free float based on Miller's framework might hold true, despite the fact that the overall results still lean toward to the suggestion from Weill (2008).

Turning to table 17, 18, 19, and 20 which report the results regarding hypothesis 2 when using fixed effect model and including momentum factor. The results from all tables still exhibit the same pattern to section 6.2 which are the negative coefficient estimate of *FFR* and statistically significant at the 1% level. This evidence strongly confirms that stocks with higher free float are more likely to yield a lower expected volatility. The opposite is true for the case of stocks with lower free float.

Table 21 and 22 show the results regarding hypothesis 3. The results still display the similar pattern to section 6.3 and confirm the negative coefficient estimates of interaction term of $FFR_t – FFR_{t-1}$ and divergence of opinion proxy (i.e. *DISP* and *IDV*). From panel A and B of both tables, the results show that the coefficient estimate are all negative, which are -0.123, -0.0058, -0.0542, and -0.0218 except that the estimate from panel B of table 21 that is not statistically significant at any conventional level. In addition, the three of four coefficient estimates of $FFR_t – FFR_{t-1}$ are not statistically significant. This evidence still offer the same implication with section 6.3 which states that the free float effect, based on Miller’s framework, is not likely to take place when investors’ opinions do not diverge.

As a final point, since the results from table 13 to table 22 reveal the similar patterns of evidences to section 6.1, 6.2, and 6.3, this evidence is then in line with the previous discussion which suggests that the different structure of both markets does not influence the effect of free float on stock performance.

Table 12 Summary statistics of momentum factor (*MOM*) in both Thai and U.S. markets

Panel A: Thai market (2001-2013)

Variables	Observations	Mean	Std.Dev.	Min	Max
MOM (%)	82836	0.8771	15.7397	-111.1653	89.9769
Number of firms	531				

Panel B: U.S. market (2000-2014)

Variables	Observations	Mean	Std.Dev.	Min	Max
MOM (%)	89460	0.1691	5.7240	-34.58	18.38
Number of firms	497				

Note: Panel A reports summary statistics of momentum factor from Thai market where the sample period is 2001 to 2013. While Panel B reports summary statistics of momentum factor from U.S. market where the sample period is 2000 to 2014. *MOM* is determined by the same method proposed by Carhart (1997). The variable is measured at the end of each month.

Table 13 Regression results from a fixed effect model regarding the effect of free float on future stock returns in Thai market based on using dispersion in analysts’ earnings forecasts as a proxy for investors’ degree of opinion divergence

Variables	(1) One-month period return	(2) Two-month period return	(3) Three-month period return	(4) Six-month period return	(5) Twelve-month period return
FFR	0.00185	0.00348	0.00898	0.0222**	0.0326**
	(0.00321)	(0.00468)	(0.00589)	(0.00871)	(0.0131)
DISP	-0.101	-0.101	-0.0870	0.832	3.572***
	(0.218)	(0.324)	(0.401)	(0.574)	(0.810)
FFR.DISP	0.000228	-0.000548	-0.000371	-0.0114*	-0.0333***
	(0.00250)	(0.00369)	(0.00456)	(0.00654)	(0.00922)
SSR	0.0177	0.0315	0.00717	0.00494	-0.0801
	(0.0317)	(0.0458)	(0.0566)	(0.0837)	(0.119)
SSR.DISP	-0.0302	0.0379	0.103	-0.119	-0.495**
	(0.0573)	(0.0827)	(0.102)	(0.145)	(0.204)
MKT	1.152***	1.203***	1.196***	1.168***	1.074***

	(0.0135)	(0.0124)	(0.0120)	(0.0112)	(0.0115)
SMB	0.351***	0.307***	0.296***	0.231***	0.0914***
	(0.0197)	(0.0186)	(0.0180)	(0.0186)	(0.0183)
HML	0.164***	0.0743***	0.00503	-0.133***	-0.180***
	(0.0160)	(0.0156)	(0.0156)	(0.0153)	(0.0168)
MOM	-0.00755	-0.00968*	-0.00295	0.00682	-0.00961
	(0.00479)	(0.00562)	(0.00609)	(0.00675)	(0.00696)
Constant	-1.242***	-2.638***	-4.658***	-10.88***	-18.72***
	(0.311)	(0.456)	(0.622)	(1.070)	(1.819)
Observations	15,306	15,168	15,028	14,625	13,853
Number of firms	242	241	239	233	224

Note: The sample period is 2001 to 2013. *FFR* is free float ratio determined by the total amount of shares available to ordinary investors, expressed as a percentage of total number of shares outstanding. *DISP* is dispersion in analysts' earnings forecasts defined as the ratio of monthly standard deviation of analyst earnings per share forecasts to the absolute value of the mean of the analysts' forecast. *SSR* is short-sale ratio defined as total value of outstanding short position expressed as a percentage of total number of floating shares. *MKT*, *SMB*, *HML* and *MOM* are controlled variables which calculated by method used in Fama-French (1993) and Carhart (1997). Note that four factors are determined in the same period of each future return. Hence, there will be different controlled variables for different dependent variables. Standard errors are heteroscedasticity robust and are reported in parentheses. Significance at the 1%, 5% and 10% level are denoted by ***, **, and *, respectively.

Table 14 Regression results from a fixed effect model regarding the effect of free float on future stock returns in Thai market based on using idiosyncratic volatility as a proxy for investors' degree of opinion divergence

Variables	(1) One-month period return	(2) Two-month period return	(3) Three-month period return	(4) Six-month period return	(5) Twelve-month period return
FFR	0.000534	-0.00239	-0.00350	-0.0174**	-0.0327***
	(0.00256)	(0.00387)	(0.00477)	(0.00714)	(0.0105)
IDV	0.203***	0.241**	0.0706	-0.342*	-0.364
	(0.0668)	(0.0980)	(0.120)	(0.175)	(0.249)
FFR.IDV	-0.00330***	-0.00353***	-0.00274*	0.00155	0.00172
	(0.000869)	(0.00128)	(0.00157)	(0.00230)	(0.00325)
SSR	-0.131	-0.301*	-0.237	-0.665**	-1.125***
	(0.107)	(0.155)	(0.191)	(0.296)	(0.420)
SSR.IDV	0.0455	0.0992**	0.0758	0.201**	0.342***
	(0.0325)	(0.0467)	(0.0577)	(0.0871)	(0.123)
MKT	0.972***	1.014***	1.021***	1.022***	0.973***
	(0.00922)	(0.00834)	(0.00805)	(0.00757)	(0.00789)
SMB	0.523***	0.492***	0.482***	0.465***	0.322***
	(0.0141)	(0.0133)	(0.0128)	(0.0131)	(0.0131)
HML	0.256***	0.193***	0.129***	0.00869	-0.0701***
	(0.0118)	(0.0113)	(0.0112)	(0.0113)	(0.0123)
MOM	-0.000536	0.0142***	0.0292***	0.0418***	0.0225***
	(0.00324)	(0.00378)	(0.00409)	(0.00452)	(0.00468)
Constant	-0.443**	-0.983***	-1.453***	-3.075***	-5.514***
	(0.202)	(0.318)	(0.393)	(0.646)	(1.104)
Observations	45,138	44,650	44,161	42,708	39,852
Number of firms	493	493	491	484	475

Note: The sample period is 2001 to 2013. *FFR* is free float ratio determined by the total amount of shares available to ordinary investors, expressed as a percentage of total number of shares outstanding. *IDV* is idiosyncratic volatility determined by calculating the standard deviation of residuals on the contemporary three factors (*MKT*, *SMB*, and *HML*) of Fama-French (1993) estimated from the time-series regression of the daily returns on stock *i* in month *t*. *SSR* is short-sale ratio defined as total value of outstanding short position expressed as a percentage of total number of floating shares. *MKT, SMB HML* and *MOM* are controlled variables which calculated by method used in Fama-French (1993) and Carhart (1997). Note that four factors are determined in the same period of each future return. Hence, there will be different controlled variables for different dependent variables. Standard errors are heteroscedasticity robust and are reported in parentheses. Significance at the 1%, 5% and 10% level are denoted by ***, **, and *, respectively.

Table 15 Regression results from a fixed effect model regarding the effect of free float on future stock returns in U.S. market based on using dispersion in analysts' earnings forecasts as a proxy for investors' degree of opinion divergence

Variables	(1) One-month period return	(2) Two-month period return	(3) Three-month period return	(4) Six-month period return	(5) Twelve-month period return
FFR	-0.00642***	-0.0148***	-0.0260***	-0.0696***	-0.165***
	(0.00151)	(0.00221)	(0.00276)	(0.00400)	(0.00587)
DISP	-0.110	0.0414	0.375	-0.0184	0.718
	(0.292)	(0.416)	(0.507)	(0.708)	(0.958)
FFR.DISP	3.25e-05	0.00205	0.00254	0.0106	0.00177
	(0.00327)	(0.00465)	(0.00567)	(0.00790)	(0.0107)
SSR	0.0420***	0.0914***	0.138***	0.261***	0.633***
	(0.00703)	(0.0110)	(0.0144)	(0.0220)	(0.0318)
SSR.DISP	0.0128	-0.0318	-0.0712***	-0.111***	0.00855
	(0.0142)	(0.0203)	(0.0247)	(0.0345)	(0.0467)
MKT	1.058***	1.112***	1.136***	1.171***	1.130***
	(0.00855)	(0.00839)	(0.00807)	(0.00763)	(0.00674)
SMB	0.168***	0.115***	0.0573***	-0.0987***	-0.245***
	(0.0144)	(0.0156)	(0.0150)	(0.0147)	(0.0151)
HML	0.117***	0.102***	0.0713***	0.120***	0.125***
	(0.0139)	(0.0125)	(0.0124)	(0.0129)	(0.0136)
MOM	-0.0511***	-0.0278***	-0.0167**	0.00150	0.0200***
	(0.00708)	(0.00697)	(0.00689)	(0.00660)	(0.00615)
Constant	0.347***	0.737***	1.353***	3.954***	9.972***
	(0.127)	(0.189)	(0.241)	(0.373)	(0.614)
Observations	68,781	68,289	67,796	66,318	63,367
Number of firms	493	493	493	493	492

Note: The sample period is 2000 to 2014. *FFR* is free float ratio determined by the total amount of shares available to ordinary investors, expressed as a percentage of total number of shares outstanding. *DISP* is dispersion in analysts' earnings forecasts defined as the ratio of monthly standard deviation of analyst earnings per share forecasts to the absolute value of the mean of the analysts' forecast. *SSR* is short-sale ratio defined as total value of outstanding short position expressed as a percentage of total number of floating shares. *MKT*, *SMB*, *HML* and *MOM* are controlled variables which calculated by method used in Fama-French (1993) and Carhart (1997). Note that four factors are determined in the same period of each future return. Hence, there will be different controlled variables for different dependent variables. Standard errors are heteroscedasticity robust and are reported in parentheses. Significance at the 1%, 5% and 10% level are denoted by ***, **, and *, respectively.

Table 16 Regression results from a fixed effect model regarding the effect of free float on future stock returns in U.S. market based on using idiosyncratic volatility as a proxy for investors' degree of opinion divergence

Variables	(1) One-month period return	(2) Two-month period return	(3) Three-month period return	(4) Six-month period return	(5) Twelve-month period return
FFR	-0.00170	-0.00576	-0.00653	-0.0398***	-0.118***
	(0.00257)	(0.00372)	(0.00459)	(0.00658)	(0.00924)
IDV	0.334***	0.637***	1.345***	2.950***	5.446***
	(0.121)	(0.173)	(0.212)	(0.298)	(0.407)
FFR.IDV	-0.00287*	-0.00574***	-0.0120***	-0.0156***	-0.0247***
	(0.00148)	(0.00212)	(0.00259)	(0.00365)	(0.00496)
SSR	0.0433***	0.0608***	0.0775***	0.0772**	0.355***
	(0.0118)	(0.0178)	(0.0226)	(0.0331)	(0.0470)
SSR.IDV	-0.00379	0.00448	0.0120	0.0441***	0.0569***
	(0.00486)	(0.00706)	(0.00870)	(0.0123)	(0.0169)
MKT	1.064***	1.125***	1.155***	1.210***	1.148***
	(0.00863)	(0.00855)	(0.00826)	(0.00782)	(0.00676)
SMB	0.174***	0.110***	0.0446***	-0.140***	-0.300***
	(0.0144)	(0.0158)	(0.0151)	(0.0149)	(0.0153)
HML	0.142***	0.130***	0.111***	0.159***	0.158***

	(0.0140)	(0.0126)	(0.0124)	(0.0129)	(0.0137)
MOM	-0.0487***	-0.0181**	0.00112	0.0626***	0.0818***
	(0.00718)	(0.00716)	(0.00717)	(0.00716)	(0.00648)
Constant	-0.161	-0.158	-0.588	-0.357	2.426***
	(0.217)	(0.316)	(0.394)	(0.574)	(0.853)
Observations	70,219	69,724	69,229	67,744	64,780
Number of firms	495	495	495	495	493

Note: The sample period is 2000 to 2014. *FFR* is free float ratio determined by the total amount of shares available to ordinary investors, expressed as a percentage of total number of shares outstanding. *IDV* is idiosyncratic volatility determined by calculating the standard deviation of residuals on the contemporary three factors (*MKT*, *SMB*, and *HML*) of Fama-French (1993) estimated from the time-series regression of the daily returns on stock *i* in month *t*. *SSR* is short-sale ratio defined as total value of outstanding short position expressed as a percentage of total number of floating shares. *MKT*, *SMB HML* and *MOM* are controlled variables which calculated by method used in Fama-French (1993) and Carhart (1997). Note that four factors are determined in the same period of each future return. Hence, there will be different controlled variables for different dependent variables. Standard errors are heteroscedasticity robust and are reported in parentheses. Significance at the 1%, 5% and 10% level are denoted by ***, **, and *, respectively.

Table 17 Regression results from a fixed effect model regarding the effect of free float on future return volatility in Thai market based on using dispersion in analysts' earnings forecasts as a proxy for investors' degree of opinion divergence

Variables	(1) One-month period volatility	(2) Two-month period volatility	(3) Three-month period volatility	(4) Six-month period volatility	(5) Twelve-month period volatility
FFR	-0.0254***	-0.0263***	-0.0294***	-0.0343***	-0.0402***
	(0.00370)	(0.00329)	(0.00307)	(0.00265)	(0.00228)
DISP	0.0290	0.0477**	0.0435**	0.0379**	0.0528***
	(0.0243)	(0.0220)	(0.0204)	(0.0173)	(0.0140)
FFR.DISP	-0.00172	-0.00406	-0.00268	-0.00219	-0.00398**
	(0.00279)	(0.00251)	(0.00233)	(0.00197)	(0.00160)
SSR	0.000848	-0.00357	-0.00637**	-0.00854***	-0.0121***
	(0.00357)	(0.00314)	(0.00290)	(0.00252)	(0.00206)
SSR.DISP	-0.00329	-0.00169	-0.00320	-0.00823*	-0.0106***
	(0.00641)	(0.00562)	(0.00519)	(0.00437)	(0.00353)
MKT	-0.0350***	-0.0204***	-0.0151***	-0.00881***	-0.00385***
	(0.00150)	(0.000841)	(0.000609)	(0.000336)	(0.000200)
SMB	-0.0278***	-0.0168***	-0.0140***	-0.0129***	-0.00798***
	(0.00219)	(0.00126)	(0.000918)	(0.000562)	(0.000318)
HML	-0.0235***	-0.0107***	-0.00552***	-0.000141	-0.000871***
	(0.00178)	(0.00106)	(0.000794)	(0.000462)	(0.000291)
MOM	0.000278	-0.00127***	-0.00214***	-0.00441***	-0.00425***
	(0.000534)	(0.000381)	(0.000310)	(0.000203)	(0.000121)
Constant	2.424***	2.511***	2.580***	2.712***	2.807***
	(0.0485)	(0.0481)	(0.0483)	(0.0484)	(0.0511)
Observations	15,303	15,168	15,028	14,625	13,853
Number of firms	242	241	239	233	224

Note: The sample period is 2001 to 2013. *FFR* is free float ratio determined by the total amount of shares available to ordinary investors, expressed as a percentage of total number of shares outstanding. *DISP* is dispersion in analysts' earnings forecasts defined as the ratio of monthly standard deviation of analyst earnings per share forecasts to the absolute value of the mean of the analysts' forecast. *SSR* is short-sale ratio defined as total value of outstanding short position expressed as a percentage of total number of floating shares. *MKT*, *SMB*, *HML* and *MOM* are controlled variables which calculated by method used in Fama-French (1993) and Carhart (1997). Note that four factors are determined in the same period of each future return volatility. Hence, there will be different controlled variables for different dependent variables. Standard errors are heteroscedasticity robust and are reported in parentheses. Significance at the 1%, 5% and 10% level are denoted by ***, **, and *, respectively.

Table 18 Regression results from a fixed effect model regarding the effect of free float on future return volatility in Thai market based on using idiosyncratic volatility as a proxy for investors' degree of opinion divergence

Variables	(1) One-month	(2) Two-month	(3) Three-month	(4) Six-month	(5) Twelve-month

	period volatility	period volatility	period volatility	period volatility	period volatility
FFR	-0.0795***	-0.0677***	-0.0634***	-0.0669***	-0.0720***
	(0.00389)	(0.00357)	(0.00336)	(0.00298)	(0.00269)
IDV	0.158***	0.139***	0.118***	0.0631***	0.0117
	(0.0112)	(0.0101)	(0.00935)	(0.00820)	(0.00721)
FFR.IDV	0.0420***	0.0326***	0.0285***	0.0269***	0.0233***
	(0.00143)	(0.00128)	(0.00119)	(0.00104)	(0.00913)
SSR	0.0247	-0.00276	-0.0130	-0.0283**	-0.0307***
	(0.0151)	(0.0135)	(0.0125)	(0.0117)	(0.0102)
SSR.IDV	-0.00681	-0.000687	0.00144	0.00531	0.00556*
	(0.00459)	(0.00407)	(0.00377)	(0.00344)	(0.00297)
MKT	-0.0391***	-0.0224***	-0.0167***	-0.00976***	-0.00565***
	(0.00131)	(0.000728)	(0.000525)	(0.000299)	(0.000191)
SMB	-0.0233***	-0.0130***	-0.0107***	-0.00737***	-0.00526***
	(0.00200)	(0.00116)	(0.000835)	(0.000517)	(0.000318)
HML	-0.0170***	-0.00816***	-0.00401***	0.00128***	0.00124***
	(0.00167)	(0.000984)	(0.000734)	(0.000446)	(0.000298)
MOM	-0.00250***	-0.00218***	-0.00220***	-0.00337***	-0.00384***
	(0.000460)	(0.000330)	(0.000267)	(0.000179)	(0.000113)
Constant	2.054***	2.215***	2.327***	2.573***	2.854***
	(0.0310)	(0.0292)	(0.0283)	(0.0262)	(0.0263)
Observations	44,729	44,538	44,110	42,684	39,842
Number of firms	493	493	491	484	475

Note: The sample period is 2001 to 2013. *FFR* is free float ratio determined by the total amount of shares available to ordinary investors, expressed as a percentage of total number of shares outstanding. *IDV* is idiosyncratic volatility determined by calculating the standard deviation of residuals on the contemporary three factors (*MKT*, *SMB*, and *HML*) of Fama-French (1993) estimated from the time-series regression of the daily returns on stock *i* in month *t*. *SSR* is short-sale ratio defined as total value of outstanding short position expressed as a percentage of total number of floating shares. *MKT*, *SMB*, *HML* and *MOM* are controlled variables which calculated by method used in Fama-French (1993) and Carhart (1997). Note that four factors are determined in the same period of each future return volatility. Hence, there will be different controlled variables for different dependent variables. Standard errors are heteroscedasticity robust and are reported in parentheses. Significance at the 1%, 5% and 10% level are denoted by ***, **, and *, respectively.

Table 19 Regression results from a fixed effect model regarding the effect of free float on future return volatility in U.S. market based on using dispersion in analysts' earnings forecasts as a proxy for investors' degree of opinion divergence

Variables	(1) One-month period volatility	(2) Two-month period volatility	(3) Three-month period volatility	(4) Six-month period volatility	(5) Twelve-month period volatility
FFR	-0.0274***	-0.0190***	-0.0121***	-0.0160***	-0.0368***
	(0.00232)	(0.00206)	(0.00192)	(0.00168)	(0.00155)
DISP	-0.353***	-0.311***	-0.291***	-0.237***	-0.188***
	(0.0420)	(0.0371)	(0.0342)	(0.0292)	(0.0252)
FFR.DISP	0.0563***	0.0479***	0.0432***	0.0377***	0.0272***
	(0.00468)	(0.00414)	(0.00382)	(0.00326)	(0.00281)
SSR	0.0644***	0.0595***	0.0561***	0.0495***	0.0397***
	(0.00134)	(0.00120)	(0.00112)	(0.000969)	(0.000861)
SSR.DISP	0.0122***	0.0104***	0.0102***	0.00771***	0.00689***
	(0.00204)	(0.00181)	(0.00167)	(0.00142)	(0.00123)
MKT	-0.107***	-0.0958***	-0.0833***	-0.0582***	-0.0347***
	(0.00121)	(0.000740)	(0.000542)	(0.000314)	(0.000177)
SMB	0.0323***	0.0425***	0.0429***	0.0450***	0.0293***
	(0.00203)	(0.00138)	(0.00101)	(0.000607)	(0.000398)
HML	-0.0872***	-0.0532***	-0.0405***	-0.0223***	-0.0144***
	(0.00197)	(0.00110)	(0.000828)	(0.000530)	(0.000358)
MOM	-0.0690***	-0.0607***	-0.0521***	-0.0378***	-0.0221***
	(0.000999)	(0.000614)	(0.000462)	(0.000272)	(0.000162)
Constant	1.940***	1.987***	2.002***	1.896***	1.864***

	(0.0262)	(0.0250)	(0.0243)	(0.0233)	(0.0233)
Observations	68,781	68,289	67,796	66,318	63,367
Number of firms	493	493	493	493	492

Note: The sample period is 2000 to 2014. *FFR* is free float ratio determined by the total amount of shares available to ordinary investors, expressed as a percentage of total number of shares outstanding. *DISP* is dispersion in analysts' earnings forecasts defined as the ratio of monthly standard deviation of analyst earnings per share forecasts to the absolute value of the mean of the analysts' forecast. *SSR* is short-sale ratio defined as total value of outstanding short position expressed as a percentage of total number of floating shares. *MKT*, *SMB*, *HML* and *MOM* are controlled variables which calculated by method used in Fama-French (1993) and Carhart (1997). Note that four factors are determined in the same period of each future return volatility. Hence, there will be different controlled variables for different dependent variables. Standard errors are heteroscedasticity robust and are reported in parentheses. Significance at the 1%, 5% and 10% level are denoted by ***, **, and *, respectively.

Table 20 Regression results from a fixed effect model regarding the effect of free float on future return volatility in U.S. market based on using idiosyncratic volatility as a proxy for investors' degree of opinion divergence

Variables	(1) One-month period volatility	(2) Two-month period volatility	(3) Three-month period volatility	(4) Six-month period volatility	(5) Twelve-month period volatility
FFR	-0.0597***	-0.0495***	-0.0339***	-0.0108***	-0.0129***
	(0.00329)	(0.00297)	(0.00279)	(0.00252)	(0.00232)
IDV	0.384***	0.338***	0.335***	0.239***	0.170***
	(0.0152)	(0.0137)	(0.0128)	(0.0114)	(0.0102)
FFR.IDV	0.0524***	0.0451***	0.0369***	0.0310***	0.0239***
	(0.00185)	(0.00167)	(0.00156)	(0.00140)	(0.00125)
SSR	0.0472***	0.0488***	0.0459***	0.0432***	0.0375***
	(0.00165)	(0.00151)	(0.00142)	(0.00128)	(0.00118)
SSR.IDV	-0.00584***	-0.00532***	-0.00368***	-0.00200***	-0.00156***
	(0.000627)	(0.000567)	(0.000530)	(0.000473)	(0.000426)
MKT	-0.0822***	-0.0752***	-0.0677***	-0.0505***	-0.0335***
	(0.00106)	(0.000669)	(0.000497)	(0.000299)	(0.000170)
SMB	0.0124***	0.0171***	0.0259***	0.0347***	0.0239***
	(0.00177)	(0.00123)	(0.000906)	(0.000569)	(0.000383)
HML	-0.0578***	-0.0387***	-0.0275***	-0.0210***	-0.0145***
	(0.00172)	(0.000981)	(0.000746)	(0.000494)	(0.000344)
MOM	-0.0440***	-0.0414***	-0.0347***	-0.0251***	-0.0169***
	(0.000883)	(0.000560)	(0.000431)	(0.000274)	(0.000163)
Constant	1.258***	1.386***	1.401***	1.490***	1.598***
	(0.0286)	(0.0260)	(0.0246)	(0.0225)	(0.0214)
Observations	70,219	69,724	69,229	67,744	64,780
Number of firms	495	495	495	495	493

Note: The sample period is 2000 to 2014. *FFR* is free float ratio determined by the total amount of shares available to ordinary investors, expressed as a percentage of total number of shares outstanding. *IDV* is idiosyncratic volatility determined by calculating the standard deviation of residuals on the contemporary three factors (*MKT*, *SMB*, and *HML*) of Fama-French (1993) estimated from the time-series regression of the daily returns on stock *i* in month *t*. *SSR* is short-sale ratio defined as total value of outstanding short position expressed as a percentage of total number of floating shares. *MKT*, *SMB*, *HML* and *MOM* are controlled variables which calculated by method used in Fama-French (1993) and Carhart (1997). Note that four factors are determined in the same period of each future return volatility. Hence, there will be different controlled variables for different dependent variables. Standard errors are heteroscedasticity robust and are reported in parentheses. Significance at the 1%, 5% and 10% level are denoted by ***, **, and *, respectively.

Table 21 Regression results from a fixed effect model regarding the effect of free float on current returns of stocks in Thai market based on using different proxies for investors' degree of opinion divergence (i.e. dispersion in analysts' earnings forecasts and idiosyncratic volatility)

Panel A		Panel B	
Variables	Current Return	Variables	Current Return
$FFR_t - FFR_{t-1}$	0.0112	$FFR_t - FFR_{t-1}$	0.00618

	(0.0142)		(0.0137)
DISP	0.267	*IDV*	0.387***
	(0.762)		(0.117)
$(FFR_t - FFR_{t-1}).DISP$	-0.123***	$(FFR_t - FFR_{t-1}).IDV$	-0.00588
	(0.0461)		(0.00615)
$SSR_{i,t} - SSR_{i,t-1}$	-0.249	$SSR_{i,t} - SSR_{i,t-1}$	-1.292*
	(0.272)		(0.669)
$(SSR_{i,t} - SSR_{i,t-1}).DISP$	0.804**	$(SSR_{i,t} - SSR_{i,t-1}).IDV$	0.577**
	(0.357)		(0.286)
MKT	1.339***	*MKT*	1.231***
	(0.0771)		(0.0561)
SMB	0.723***	*SMB*	0.846***
	(0.0872)		(0.0718)
HML	0.192***	*HML*	0.286***
	(0.0590)		(0.0532)
MOM	-0.0618*	*MOM*	-0.0394
	(0.0334)		(0.0294)
Constant	-1.225**	Constant	-1.541***
	(0.519)		(0.360)
Observations	806	Observations	2,114
Number of firms	174	Number of firms	450

Note: The sample period is 2001 to 2013. $FFR_t - FFR_{t-1}$ is a difference of free float ratio in each period, where free float ratio is determined by the total amount of shares available to ordinary investors, expressed as a percentage of total number of shares outstanding. *DISP* is dispersion in analysts' earnings forecasts defined as the ratio of monthly standard deviation of analyst earnings per share forecasts to the absolute value of the mean of the analysts' forecast. *IDV* is idiosyncratic volatility determined by calculating the standard deviation of residuals on the contemporary three factors (*MKT*, *SMB*, and *HML*) of Fama-French (1993) estimated from the time-series regression of the daily returns on stock *i* in month *t*. $SSR_{i,t} - SSR_{i,t-1}$ is a difference of short-sale ratio in each period, where short-sale ratio is defined as total value of outstanding short position expressed as a percentage of total number of floating shares. *MKT*, *SMB*, *HML* and *MOM* are controlled variables which calculated by method used in Fama-French (1993) and Carhart (1997). Standard errors are heteroscedasticity robust and are reported in parentheses. Significance at the 1%, 5% and 10% level are denoted by ***, **, and *, respectively.

Table 22 Regression results from a fixed effect model regarding the effect of free float on current returns of stocks in U.S. market based on using different proxies for investors' degree of opinion divergence (i.e. dispersion in analysts' earnings forecasts and idiosyncratic volatility)

Panel A		Panel B	
Variables	Current Return	Variables	Current Return
$FFR_t - FFR_{t-1}$	0.00607	$FFR_t - FFR_{t-1}$	0.0316***
	(0.00630)		(0.0110)
DISP	-0.00863	*IDV*	-0.681***
	(0.106)		(0.0610)
$(FFR_t - FFR_{t-1}).DISP$	-0.0542**	$(FFR_t - FFR_{t-1}).IDV$	-0.0218***
	(0.0239)		(0.00666)
$SSR_{i,t} - SSR_{i,t-1}$	0.194***	$SSR_{i,t} - SSR_{i,t-1}$	0.255***
	(0.0531)		(0.0776)
$(SSR_{i,t} - SSR_{i,t-1}).DISP$	-0.283***	$(SSR_{i,t} - SSR_{i,t-1}).IDV$	-0.0511*
	(0.0832)		(0.0295)
MKT	1.066***	*MKT*	1.019***
	(0.0169)		(0.0171)
SMB	0.204***	*SMB*	0.225***
	(0.0280)		(0.0278)
HML	0.154***	*HML*	0.141***
	(0.0278)		(0.0276)
MOM	-0.0562***	*MOM*	-0.0849***
	(0.0148)		(0.0149)
Constant	0.0816	Constant	1.077***
	(0.0617)		(0.106)
Observations	19,879	Observations	20,341

Number of firms	493	Number of firms	495

Note: The sample period is 2000 to 2014. $FFR_t - FFR_{t-1}$ is a difference of free float ratio in each period, where free float ratio is determined by the total amount of shares available to ordinary investors, expressed as a percentage of total number of shares outstanding. *DISP* is dispersion in analysts' earnings forecasts defined as the ratio of monthly standard deviation of analyst earnings per share forecasts to the absolute value of the mean of the analysts' forecast. *IDV* is idiosyncratic volatility determined by calculating the standard deviation of residuals on the contemporary three factors (*MKT*, *SMB*, and *HML*) of Fama-French (1993) estimated from the time-series regression of the daily returns on stock *i* in month *t*. $SSR_{i,t} - SSR_{i,t-1}$ is a difference of short-sale ratio in each period, where short-sale ratio is defined as total value of outstanding short position expressed as a percentage of total number of floating shares. *MKT*, *SMB*, *HML* and *MOM* are controlled variables which calculated by method used in Fama-French (1993) and Carhart (1997). Standard errors are heteroscedasticity robust and are reported in parentheses. Significance at the 1%, 5% and 10% level are denoted by ***, **, and *, respectively.

6.5 Potential Explanations

As mentioned in section 6.1, even when the author controls the investors' degree of opinion divergence, the empirical evidences still suggest that free float is negatively related to stock future returns, which is inconsistent with the prediction from hypothesis 1. Nonetheless, these evidences appear to be consistent with the proposition from Weill (2008) who argues that free float can be used as a liquidity proxy. The Float-adjusted return model (FARM) proposed by Weill (2008) suggests that free float and liquidity risk have an inverse relation, which means stocks with lower free float tend to have higher liquidity risk. If this type of risk is reflected in stock prices, such stocks should offer higher liquidity premium and hence higher expected return. The opposite is true for the case of stock with higher free float. This logic implies the negative relation between free float and stock future returns. Therefore, the evidences from section 6.1 seem to suggest that free float does not affect the stocks in the manner that derived from Miller's framework.

However, the results from hypothesis 3, as discussed in section 6.3, offer two facts to this research. First, the results show that the coefficient estimates of interaction term of $FFR_t - FFR_{t-1}$ and proxy of degree of opinion divergence (i.e. *DISP* and *IDV*) are all negative and three out of four estimates are statistically significant. This evidence implies that the degree of opinion divergence is one of the factors that affects the sensitivity of stock price to free float. To be precise, the greater the degree of opinion divergence, the greater the negative effect of free float on stock price. Second, since most of the coefficient estimates of $FFR_t - FFR_{t-1}$ are not statistically significant at any conventional level, the effect of free float, based on Miller's framework, will not be likely to occur if there is no divergence of opinion among investors[25]. These two facts imply that if we assume that the opinions among investors diverge, free float will be negatively related to stock prices. If we differentiate the regression model of hypothesis 3 with respect to $FFR_t - FFR_{t-1}$, we will obtain the following equation that can mathematically explain the logic:

$$dCR_{i,t} / d(FFR_{i,t} - FFR_{i,t-1}) = \mu_3 DIV_{i,t-1}{}^{26}.$$

Since the results from section 6.3 indicate that the estimate value of μ_3 is negative and statistically significant, the equation then puts forward to the evidence that if there is a divergence of opinion among investors (i.e. the values of *DIV* exist and are greater than zero) and the difference of free float between month *t* and month *t-1* increases further by one unit, the current return of stock will decrease by the absolute value of $100.\mu_3 DIV_{i,t-1}$ percent. In other words, the stock price at month *t* will decrease by $100.(1-exp(-\mu_3 DIV_{i,t-1}))$ percent[27]. The opposite is true for the case that the difference of free float decreases. This suggests that free float tends to work as a stock supply and

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[25] See Figure 7 for example.

[26] In fact, the differentiated equation is $dCR_{i,t} / d(FFR_{i,t} - FFR_{i,t-1}) = \mu_1 + \mu_3 DIV_{i,t-1}$. However, the empirical results suggest that $\mu_1 = 0$ because most of the coefficient estimates of $FFR_{i,t} - FFR_{i,t-1}$ are not statistically significant. Hence, the author assumes that μ_1 is zero in this case.

[27] To recall, *CR* represents the stock current returns which computed from the log of price at the end of month *t* divided by price at the end of month *t-1* (i.e. $\log(P_{i,t}/P_{i,t-1})$). Hence, when *CR* decreases by the absolute value of $\mu_3 DIV_{i,t-1}$, it implies that difference of stock price will change by $P_t.(1-exp(-\mu_3 DIV_{i,t-1}))$. In other words, the stock price at month *t* will decrease by $100.(1-exp(-\mu_3 DIV_{i,t-1}))$ percent.

the effect of free float based on Miller’s framework may exist because if we assume that there are two identical stocks with different level of free float, the stock with lower free float should exhibit higher equilibrium price and yield a lower future return, which is predicted by hypothesis 1.

Although the evidences from section 6.1 and 6.3 seem to be conflicting, there is a possibility that the effect of free float based on Miller’s framework still exists because it might be the case that we cannot observe such pattern of evidences for the reason that it is somehow dominated by the liquidity effect. The negative coefficient estimates in section 6.1 do not necessarily suggest that the predicted effect does not exist because evidences from hypothesis 3 indicate that the increase of free float tends to make the stock prices lower, and if higher free float stock is compared to the identical stock with lower free float, the stock with higher free float should exhibit a lower equilibrium price and hence higher expected return. However, as explained by Weill (2008), the change of free float also changes the liquidity risk of stock. Hence, if the liquidity effect dominates the predicted effect of free float, we will observe the negative relationship between free float and stock future return despite the fact that the predicted effect still hold true. In addition, as shown in table 13 from section 6.4, when the author controls the momentum factor and runs the regression with fixed-effect model for robustness checking, there are two coefficient estimates of *FFR* in six-month future returns and twelve-month future return that appear to become positive and statistically significant, this may further implies that the predicted effect of free float does exist but the remaining coefficient estimates become negative because they are dominated by the liquidity effect.

To reconcile the inconclusive results, the author uses turnover of stocks as a proxy for liquidity, as suggested by Pastor and Stambaugh (2003)[49], to observe its relationship with free float and stock future return. By using stock turnover as a liquidity proxy, the author finds supportive evidences for the conjecture discussed above. Turnovers of each stock are retrieved from Thomson Reuters Datastream and is defined as a ratio of total amount of share traded to total number of shares outstanding[28]. The formula is as follows:

$$Turnover\ Ratio\ (TOV) = \frac{Total\ Amount\ of\ shares\ traded}{Total\ number\ of\ shares\ outstanding} \times 100.$$

Table 23 presents the summary statistics of turnover ratio where Panel A and B report the data regarding Thai market and U.S. market respectively.

According to Weill (2008), higher free float implies higher liquidity (or lower liquidity risk), which implies that turnover should be positively related to free float. Based on this logic, the author determines their relationship by running a pooled cross-sectional regression of the monthly turnover (*TOV)* on monthly free float (*FFR)*. The equation is as follows:

$$TOV_{i,t} = \alpha_i + \beta_i FFR_{i,t} + \varepsilon_i.$$

Where *TOV* represents the turnover ratio of each stock *i* which is measured at the end of month *t*, and *FFR* represents the free float ratio which is measured at the same date of *TOV*.

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[28] The turnover data are already adjusted for capital events or corporate actions. For stocks that are traded in more than one exchange, only default turnover based on primary market are retrieved.

Table 24 reports the regression results regarding the relationship between *TOV* and *FFR*, where panel A and B report the results based on Thai market and U.S. market respectively. The coefficient estimates in both panels are 0.262 and 0.0538 and both are statistically significant at the 1% level. The adjusted R-squared values for the regression are 1.1% and 2.1% in panel A and B respectively. The results suggests that stock turnover and free float is positively related. In other words, stock with higher free float is likely to offer a higher liquidity to investors. The opposite is true for the case of stock with lower free float. Hence, the evidence is consistent with argument from Weill (2008).

Additionally, the author also computes the correlation matrix between stock turnovers (*TOV*) and stock future return in each *k* month(s) period which is displayed in table 25. Panel A and B in table 25 report the correlation matrix based on Thai market and U.S. market respectively. In panel A, the results show that correlation coefficients of stock turnover and stock future return in all periods are negative. Similarly, panel B shows that four out of five correlation coefficients between stock turnover and stock future return are negative except for twelve-period future return. These evidences indicate that stock future return is negatively related to the stock turnover, which is the same direction of relation between free float and stock future return as reported in section 6.1. Hence, the evidences from table 24 and 25 seem to suggest that free float is linked with the level of stock's liquidity and the results from section 6.1 are likely to reflect the liquidity effect on stock future return.

If considering on all evidences that are previously discussed, free float seems to affect stock liquidity and stock equilibrium price simultaneously. Hence, the author's conjecture is that the predicted effect of free float in hypothesis 1 might still be valid but we cannot observe such pattern of evidences because the liquidity effect dominates the results. If this conjecture is true, the results shown in section 6.1 will be unsurprised because the regression model of hypothesis 1 is not designed for distinguishing between predicted effect and liquidity effect. Since the liquidity effect of free float on stock performance is beyond the scope of this paper, this will remain an important topic for future research.

Lastly, since hypothesis 2 is based on the logic of hypothesis 1 and the results from hypothesis 1 is inconclusive, the results from hypothesis 2 then remain questionable. However, the predicted effect of free float on return volatility based on hypothesis 2 suggests the same prediction from Hong, Scheinkman and Xiong (2006) which states that free float is negatively related to return volatility[29]. Therefore, in whatever circumstances, free float tends to exhibit a negative relation with return volatility regardless of whether the free float effect derived from which predictions. The empirical results from section 6.2 strongly confirms such relation.

Table 23 Summary statistics of turnover ratio (*TOV*) in both Thai and U.S. markets

Panel A: Thai market (2001-2013)

Variables	Observations	Mean	Std.Dev.	Min	Max
TOV (%)	24048	23.8897	318.2678	0.0001	20133.96
Number of firms	531				

Panel B: U.S. market (2000-2014)

Variables	Observations	Mean	Std.Dev.	Min	Max
TOV (%)	81503	22.2669	23.87	0.0069	1045.032
Number of firms	497				

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[29] See section 6.2 for the full detail.

Note: Panel A reports summary statistics of turnover ratio from Thai market where the sample period is 2001 to 2013. While Panel B reports summary statistics of turnover ratio from U.S. market where the sample period is 2000 to 2014. *TOV* is determined by computing the ratio of the number of share traded to the number of shares outstanding. The variable is measured at the end of each month

Table 24 Regression results regarding the relationship between turnover ratio (*TOV*) and free float (*FFR)*

Panel A: Thai market (2001-2013)		Panel B: U.S. market (2000-2014)	
Variables	*TOV*	Variables	*TOV*
FFR	0.262*** (0.0475)	*FFR*	0.0538*** (0.00414)
Constant	0.351*** (0.0400)	Constant	0.189*** (0.00332)
Observations	20,237	Observations	69,924
Adjusted R-squared	0.011	Adjusted R-squared	0.021

Note: Panel A shows the results from Thai market where the sample period is 2001 to 2013. Panel B shows the results from U.S. market where the sample period is 2000 to 2014. Standard errors are reported in parentheses. Significance at the 1%, 5% and 10% level are denoted by ***, **, and *, respectively.

Table 25 Correlation matrices of turnover ratio (*TOV*) and *k*-period future returns from both Thai and U.S. markets

Panel A: Thai market (2001-2013

Correlation Matrix

	TOV	One-month period return	Two-month period return	Three-month period return	Six-month period return	Twelve-month period return
TOV	1.0000					
One-month period return	-0.0093	1.0000				
Two-month period return	-0.0129	0.7493	1.0000			
Three-month period return	-0.0191	0.6089	0.8493	1.0000		
Six-month period return	-0.0237	0.4483	0.6292	0.7561	1.0000	
Twelve-month period return	-0.0026	0.2783	0.3944	0.4885	0.7054	1.0000

Panel B: U.S. market (2000-2014)

Correlation Matrix

	TOV	One-month period return	Two-month period return	Three-month period return	Six-month period return	Twelve-month period return
TOV	1.0000					
One-month period return	-0.0174	1.0000				
Two-month period return	-0.0178	0.7208	1.0000			

Three-month period return	-0.0211	0.5791	0.8257	1.0000		
Six-month period return	-0.0021	0.4277	0.6066	0.7327	1.0000	
Twelve-month period return	0.0127	0.2941	0.4124	0.5040	0.7092	1.0000

Note: Panel A reports results regarding Thai market where the sample period is 2001 to 2013. While Panel B reports results regarding U.S. market where the sample period is 2000 to 2014.

CHAPTER VII

CONCLUSION

This research is basically build on the literatures regarding free float and divergence of opinion hypothesis. Several previous works have been mainly focusing on free float effect on liquidity or stock performance but fail to consider under the assumption that investors have a divergence of opinion. Hence, empirical results in this research can provide effect of free float on stock performance in the different viewpoint. Many researches related to divergence of opinion hypothesis mainly studied on the opinion divergence effect on asset prices, but there are a few researches that focus on stock supply components in such a framework. The objective of this study is to provide empirical evidences in regard to the effect of free float on stock performance (i.e. stock returns and stock return volatility) when the investors' degree of opinion divergence is controlled, and also to provide evidences in regard to effect of free float change on stock prices when divergence of opinion varies. Lack of free float analysis on this framework is the gaps filled in this research.

The author develops three research hypotheses to investigate free float effect with divergence of opinion hypothesis. First, based on Miller (1977)'s theory, when supply of a stocks decrease, stock prices will be higher relative to its true value and hence lower future returns. The opposite is true for the case of increasing stock supply. Hence, the author expects that free float will have a positive relationship with stock future returns. Second, since mispriced stocks tend to correct to its true value, the author expects that stocks with lower free float (i.e. stock with higher equilibrium prices) should have more volatility than stock with higher free float because such stocks are likely to correct its error more aggressively. To be precise, the author expects that free float will have a negative relationship with future return volatility. Note that the predictions from hypothesis 1 and hypothesis 2 are based on the logic of Miller (1977)'s logic. Thus, if this logic holds true, the results from both hypotheses should be simultaneously consistent to the predictions. Third, since a slope of demand curve depends on the degree of investors' opinion divergence, free float effect on stock prices should be vary among stocks with different degree of opinion divergence. Hence, the author expects that the effect of free float will be larger when stocks have higher degree of opinion divergence and vice versa. This research adopts multiple proxies of divergence of opinion namely dispersion in analysts' earnings forecast and idiosyncratic volatility to ascertain the robustness of results as suggested by Berkman et al. (2008).

The empirical results from hypothesis 1 show that even when the author controls the investors' degree of opinion divergence, free float and stock future return still exhibit the negative relation and most of coefficient estimates are significant at the 1% level. This is true in both Thai and U.S. markets. This evidence is inconsistent to the prediction from hypothesis 1 and possibly implies that Miller (1977)'s theory might not hold true. However, the results from hypothesis 2 shows that free float is negatively related to future volatility and display the statistical significance to most of coefficient estimates in both Thai and U.S. markets, which is consistent to the prediction. Nonetheless, since hypothesis 1 and 2 are derives from the Miller (1977)'s theory, the inconsistent results from hypothesis 1 might suggest that the logic of price correction when stock is mispriced is unable to explain the negative relation between free float and future volatility. Hence, such results from hypothesis 2 are likely to lean toward the intuition proposed by Hong, Scheinkman and Xiong (2006). They explain that the increase of floating shares implies the lower probability of optimistic investors to be able to hold all the shares available in the market. If optimists cannot buy all shares in the market, asset price will reflect the average of different opinions. Hence, the price variance will be lower when compared to the case that the asset is prices by the opinions of optimist alone. For that reason, free float then should be negatively related to stock future volatility.

The results from hypothesis 3 show that divergence of opinion affects the sensitivity of stock price to free float in the negative direction. Three out of four coefficient estimates of the interaction term of difference of free float and investors' degree of opinion divergence are statistically significant in both Thai and U.S. markets. This evidence is consistent with the prediction and effectively answer the second research question. However, the interesting fact is that most of the coefficient estimates of difference of free float alone does not exhibit a statistical significance. This evidence suggests that the effect of free float will only occur if the opinions among investors diverge. This logic is sensible in a viewpoint of economics theory because if there is no divergence of opinion, demand curve of investors will be horizontal line. Therefore, the shift of supply curve is unable to affect the equilibrium price of an asset. As a result, the evidences from hypothesis 3 seem to support Miller (1977)'s theory.

Overall, the results seem to be conflicting. If free float affects stocks in a manner that derived from the mispriced theory, the results from hypothesis 1 should show a positive relation between free float and stock future return. However, the author finds that these evidences are in line with the proposition from Weill (2008) who suggests that free float should be used as a proxy for asset liquidity. He explains that higher free float means higher liquidity and hence lower liquidity risk. Therefore, stock with higher free float should offer lower expected return. As a result, this logic argues that free float should be negatively related to stock future return. The author finds the supportive evidence to this logic by using stock turnover as a proxy for stock liquidity and determines the relationship between free float and stock turnover by running the pooled cross-sectional regression. The results indicate the positive relation between free float and stock turnover in which the coefficient estimates are statistically significant at the 1% level from both Thai and U.S. market. This evidence informs that free float is positively related to liquidity as suggested by Weill (2008).

Based on all of the evidences discussed above, free float therefore seems to affect stock liquidity and equilibrium price simultaneously. Hence, the author conjectures that the predicted effect of free float in hypothesis 1 is valid but such evidences are unobservable because the liquidity effect dominates the results. If this conjecture is true, the inconsistent results from hypothesis 1 will be expectable because the regression model is not designed to exclude the liquidity effect from free float. Since the liquidity effect of free float on stock performance under the divergence of opinion hypothesis is beyond the scope of this paper, this serves as an important topic for future study.

The main implication of this study is that when investors aim to analyze the effect of free float on stock price, they should also consider the effect of opinion divergence along with its effect. Moreover, this is also important to the regulators because the implication suggests that a dramatic change of free float of the stocks that have a significantly high degree of opinion divergence implies the dramatic change of the equilibrium price. Regulators should be careful with such stocks and design some specific regulation to control the level of free float to mitigate its effect.

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