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THE STOCK MARKET'S REACTION TO MONETARY POLICY AND MACROECONOMIC CYCLICAL VARIATION : EMPIRICAL EVIDENCE FROM THAILAND

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การดำเนินนโยบายการเงินของธนาคารกลางสามารถกระทบภาคเศรษฐกิจได้โดยผ่านช่องทางกลไกการส่งผ่านนโยบายการเงินที่สำคัญสองช่องทางได้ ได้แก่ช่องทางสินเชื่อ โดยเมื่อธนาคารกลางเปลี่ยนแปลงการดำเนินนโยบายการเงิน ไม่ว่าจะเป็นแบบผ่อนคลายหรือเข้มงวด โดยการเปลี่ยนแปลงอัตราดอกเบี้ยนโยบาย และทำให้อัตราดอกเบี้ยที่แท้จริงในตลาดเงินเกิดการเปลี่ยนแปลง และกระทบถึงต้นทุนการกู้ยืมและการเข้าถึงสินเชื่อของหน่วยธุรกิจรวมไปถึงผลตอบแทนของธุรกิจ และช่องทางมูลค่าสินทรัพย์ โดยการทำให้เกิดการเปลี่ยนแปลงของมูลค่าสินทรัพย์จากการที่ประชาชนจะหันไปออมในสินทรัพย์ที่ให้ผลตอบแทนสูงกว่า ส่งผลให้ราคาสินทรัพย์เกิดการเปลี่ยนแปลง วิทยานิพนธ์นี้ทำการทดสอบถึงการตอบสนองของตลาดหลักทรัพย์แห่งประเทศไทยและบริษัทต่างๆในตลาดหลักทรัพย์ฯต่อการเปลี่ยนแปลงนโยบายการเงินที่ตลาดไม่ได้คาดการณ์ล่วงหน้า โดยพิจารณาผลกระทบเพิ่มเติมในช่วงที่วัฏจักรเศรษฐกิจอยู่ในภาวะฉดฉอย ซึ่งผลการศึกษาพบว่าการตอบสนองของตลาดหลักทรัพย์ฯต่อการเปลี่ยนแปลงอัตราดอกเบี้ยนโยบายที่ตลาดไม่ได้คาดการณ์ล่วงหน้านั้นไม่ได้มีนัยสำคัญทางสถิติ แต่กลับมีผลอย่างมีนัยสำคัญหากการเปลี่ยนแปลงดอกเบี้ยโดยไม่ได้คาดการณ์นี้เกิดขึ้นในช่วงที่ระบบเศรษฐกิจอยู่ในช่วงฉดฉอย ซึ่งสอดคล้องกับทฤษฎีการส่งผ่านนโยบายการเงินผ่านทางช่องทางสินเชื่อ เมื่อทำการทดสอบแยกเป็นระดับรายบริษัท ได้พบว่าอัตราดอกเบี้ยที่ตลาดไม่ได้คาดการณ์ล่วงหน้ากลับมีผลอย่างมีนัยสำคัญต่อผลตอบแทนรายบริษัท ซึ่งเป็นไปได้ว่าเป็นผลที่เกิดมาจากปัจจัยอิทธิพลคงที่ (Fixed effects) นอกจากนี้พบว่าผลตอบแทนของบริษัทที่มีฐานะทางการเงินไม่มั่นคงต่างก็ได้รับผลกระทบอย่างมีนัยสำคัญต่อการเปลี่ยนแปลงโดยที่ตลาดไม่ได้คาดการณ์ของอัตราดอกเบี้ยเช่นกัน แต่อย่างไรก็ตามการศึกษานี้ไม่พบว่า ผลตอบแทนของบริษัทต่างๆตอบสนองอย่างมีนัยสำคัญต่อการเปลี่ยนแปลงอัตราดอกเบี้ยที่ตลาดไม่ได้คาดการณ์ในช่วงภาวะเศรษฐกิจฉดฉอย ทั้งนี้ผลตอบแทนของบริษัทนั้นๆ จะตอบสนองอย่างมากต่อลักษณะฐานะทางการเงินของบริษัทตนโดยเฉพาะบริษัทที่มีฐานะทางการเงินไม่มั่นคง อย่างไรก็ตามการศึกษานี้พบว่าทิศทางของผลตอบแทนของตลาดหลักทรัพย์ฯหรือบริษัทต่างๆเป็นไปในทางตรงกันข้ามกับการเปลี่ยนแปลงอัตราดอกเบี้ยนโยบายที่ตลาดไม่ได้คาดการณ์ล่วงหน้า ซึ่งสนับสนุนสมมติฐานของกลไกการส่งผ่านนโยบายการเงินผ่านทางช่องทางมูลค่าสินทรัพย์

ภาควิชา...การธนาคารและการเงิน..... ลายมือชื่อนิสิต.....รภัสสรณ์ วรทัต.....

สาขาวิชา.....การเงิน..... ลายมือชื่อ อ. ที่ปรึกษาวิทยานิพนธ์หลัก.....

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KEYWORDS : STOCK'S RETURN / MONETARY POLICY / MACROECONOMIC CYCLICAL VARIATION / THE CREDIT CHANNEL / THE ASSET PRICE CHANNEL

RAPASSORN VARADAT: THE STOCK MARKET'S REACTION TO MONETARY POLICY AND MACROECONOMIC CYCLICAL VARIATION: EMPIRICAL EVIDENCE FROM THAILAND.

THESIS ADVISOR: PORNPITCHAYA KUWALAIRAT, PH.D., 49 pp.

The monetary policy can affect the economy through the monetary transmission mechanism. Two channels that the monetary policy can affect the economy via stock prices are through a credit channel in which the change in short term policy rate will affect the companies' cost of borrowings as well as abilities to access source of funds and a further result in companies' return and through an asset price channel in which the change in policy rate can affect demand for stocks and further the stock return. This study analyzes the impact of unanticipated changes in monetary policy in Thailand on the monthly SET index return and firm individual stock return during business cycles. I find that response of monthly SET index return to monetary surprise is not statistically significant; in contrast the reaction of most individual firms' returns give significant result. These findings prove that there are some firms that react strongly negative to monetary surprise. Reactions of these firms lead to significant response in firm-level data. I also find evidence supporting a credit channel of monetary policy transmission for overall stock price but I do not find significant cyclical variation in the impact of monetary policy on individual firm's returns. Notwithstanding, the behavior of countercyclical demand for credit can help to explain the result. However, both SET index returns and unexpected changes in policy rate have a negative relationship as stated in the asset price channel of monetary policy transmission. Moreover, I find a strong negative response of stock return of firms which are classified to be financially constrained firms but a little evidence which show that stock returns of those firms are more affected to monetary shocks compare to firms with non-financially constrained firms.

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Field of Study : Finance Advisor's Signature .....

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CHAPTER I

INTRODUCTION

1.1 Background and problem reviews

According to Bank of Thailand and The Federal Reserve statements[1], goals of monetary policy under inflation targeting framework are the same which mainly are price stability, maximum employment and moderate long-term interest rates in each country in turn to create sustainable output in economy. In order to do that, monetary authorities have to set the country's monetary policy to help promote these objectives. The central bank will set the policy rate at a level that they believe it is suitable to economic circumstance and consistent with its objective as well as to signal the future direction of monetary policy to economic participants. A change in policy rate and a change in expectations about the future interest rate can build up a chain of circumstances that will affect market interest rate, the foreign exchange and asset prices and the real sector of the economy. By mean of studying the link between monetary policy and asset prices is hence important for understanding the policy transmission mechanism.

This paper is an empirical study of relationship between the most important financial market, a stock market and monetary policy. From theory of monetary policy transmission, there are a great number of ways[2] that the action from the central bank will significantly influence a real sector. However, there are two important channels which stock prices respond to monetary policy. First, through the asset price channel, when the monetary authorities decide to use an expansionary policy, downward adjustments in short-term money market rates occur. People will reallocate their savings towards non-interest bearing assets such as real estate and equity. This situation causes demand for

[1] Statements published in Bank of Thailand website; www.bot.or.th and The Federal Reserve website; http://www.federalreserve.gov

[2] According to Bank of Thailand, The impact of monetary policy through the real sector is transferred by 5 main channels including: 1. Interest rate channel 2.Asset price channel 3. Exchange rate channel 4. Credit channel 5. Expectations channel. Through these channels, adjustments in consumption and investment would take place and ultimately affect production and inflation.

stocks to rise, and a further result in higher stock prices. According to wealth effect theory, Mishkin (2004) states that even if no cash is realized, people will feel like they are wealthier, thus they will tend to consume more and dampen savings as a consequence. This idea is the same as the life-cycle hypothesis of Modigliani (1971) which states that the consumption is determined by consumers' lifetime resources. This hypothesis also introduces wealth as an additional factor of the consumption function and consumption can be financed either through income or through the sale of assets. Nonetheless, the important component of wealth is financial wealth, which mainly derived from common stock. Hence, an increase of stock prices, which possibly come from an activated expansionary policy, should improve consumption. Furthermore, higher stock prices also increase market value of firms, thus making it more worthwhile to invest. Hence, if demand for stock keeps growing, consumption and investment then keeps developing, finally they will be large part that contributes economic growth. Up to the present, we can see that asset price channel is a very important way to connect people to a monetary policy action and there is a negative relationship between policy rate and stock price. Therefore, stock prices will play an important role, and thus an announcement of any policy changes will certainly affect economic activities of the real sector.

Another important monetary transmission mechanism is credit channel. Bernanke and Gertler (1995) argue that the direct effects of monetary policy on interest rates are enlarged by external finance premium which is the difference in cost between funds raised externally and funds generated internally. The premium is defined as the difference between the cost to a borrower when they borrow money from financial markets and the opportunity cost of internal funds. The size of the external finance premium reflects imperfections in the credit markets. It is the fact that because of asymmetric information between lender and borrower, the more tightened credit market conditions, the larger external finance premium. In addition, two linkages of credit channel that act like a conduit which contain an effect of a central bank action to credit market, are the balance sheet channel and the bank lending channel. The balance sheet channel will focus on financial position of borrower. It stresses an effect of changes in monetary policy; both contractionary and expansionary policy, on borrowers' financial statement such as

balance sheets and income statement. A lender will look closer to borrowers' net worth, cash flow and liquid asset to see ability to pay back of borrower. Thus, the greater net worth, the lower the external finance premium should be. Mishkin (2001) also states that the lower the firms' net worth, the more severe is the adverse selection and moral hazard problems in lending to these firms. On the other hand, the bank-lending channel aspect focuses on lenders' financial status and assumes that banks play a special role in provisioning external funds to the economy. The supplies of loans are affected by macroeconomic cycles and monetary policy as well. In recessions, banks and other financial institutions may tighten credit standard because of higher cost of funds, reduce a supply of loans to dependent borrowers, especially low-graded or riskier borrowers and increase the external finance premium. Consistent with Melzer (2007), they state that because of a reduction in bank reserves caused by the restrictive monetary policy, banks not only sell securities but also cut the loan supply as banks view loans and securities as imperfect substitutes, and these will lead bank-dependent borrowers reduce their investment expenditure. Those actions will worsen situation of firms in recessions because they will probably not have enough fund to run the business or invest in an important project, which that project might generate revenue for them in the future. Moreover, this will also decrease aggregate spending because of a significant fall in investment spending. Up to the present, we will see that macroeconomic cycles are keys in this transmission. This is proved by study of Basistha and Kurov (2008) using U.S. data, in which they argue that there is significant cyclical variation in the impact of monetary policy on stock price. Moreover, their results show that when economy is in recession and tight credit conditions, the response of stock prices to unexpected change in monetary policy is more than twice larger than that in expansions. In addition, this result is considered worthwhile and the central bank should consider these along with policymakers' judgment in forecasting and analyzing the effect of monetary policy in order to construct the appropriate monetary policy going forward.

Furthermore, when considering the firm specific characteristics, no matter what macroeconomics cycles they face, the response of stock returns to monetary policy partly should also depends on individual credit characteristic of firms. Thus, I use disaggregated

firm-level data to analyze the response of stock return to surprise in monetary policy in the cross-section of firms. Basistha and Kurov (2008) find that stocks which are issued by companies that are likely to be credit or financially constrained will react more strongly to monetary news –whether it is positive or negative news-, especially when economy is in contractions or in recessions and also that in tight credit market conditions than stocks of relative unconstrained firms. Theoretically, this result supports the credit channel hypothesis and Bernanke and Gertler (1995) which states that market in weakening economy and in tightening credit market constraints, which all lead to the fall in asset prices, can worsen borrowers' balance sheets and heighten the probability to default of any borrowers. These will give rise to the financial accelerator which is a mechanism through which small initial shocks can account for big fluctuations in output by means of amplifying the effect of negative monetary shock on the economy by inducing higher market borrowing interest rates. An initial adverse monetary shock, which will squeeze firms' cash-flows especially financially constrained firms, thereby increasing their need for external finance, incorporate with the deterioration of their financial position which makes it more difficult and more costly for them to raise external funds. Hence, these affect value of firms and finally results in a further contraction in aggregate spending and further a real sector of economy.

To sum up, I will examine effects of monetary policy while there are business cycle variations and tighten credit markets as well as firm-dependent variation amplified by the macro cycles. Blanchard (1981) states that the value of stock market is determined as a discount value of (real) firm's profit where the discount rate is the (real) market interest rate. Thus, change in monetary policy-both anticipated and unanticipated- affect (real) value of stock market by path of the (real) market interest rate and (real) profit. As Bernanke and Kuttner (2005) point out, estimating the response of stock prices to monetary policy actions is complicated by the fact that market participants are unlikely respond to the actions that were already anticipated. Because nowadays a great number of equity information are publicly published, so traders in equity markets should normally obtain that information, especially information about factors that tend to affect stock prices. Since policy rate is a well-known factor that can affect economy, most

participants will forecast and anticipate its movement. Therefore, any policy decision that is largely anticipated will be used to discounted into stock prices already and will be unlikely to affect stock prices much when it is truly announced.

In this paper, I will distinguish the effect of changes in monetary policy to markets from anticipated and unanticipated changes in monetary policy to measure its effect precisely. By means of doing this, I adapt the technique proposed by Bernanke and Kuttner (2005) which uses federal funds futures data to create a measure of unexpected changes in monetary policy. However findings of this study present that the response of monthly SET index return to monetary policy surprise is not statistically significant. Moreover, I do not find statistically significant impact of unanticipated monetary policy change on stock return when the credit market is constraint and during recession period. Literature reviews are presented in Section2. Section 3 describes data, measurement of all dependent and independent variables and model specification for this study. Sections 4 reports the empirical results. Section 5 provides a conclusion.

1.2 Objectives

To investigate the impact of changes in monetary policy on stock prices during macroeconomic cycles; both recessions and expansions and its effect on financially constrained firms, the purpose of this paper is aimed to answer the following questions:

1. To test whether unexpected changes in monetary policy announcement or policy surprises have a significant impact on stocks' returns.
2. To examine whether stock market reactions to monetary news are dependent to the state of economy.
3. To examine the effect of credit market conditions on the stock market reaction to monetary news.
4. To test the effect of macroeconomic cycles and firm-specific credit conditions on the response of disaggregated stock returns to unanticipated changes in monetary policy actions.

1.3 Hypothesis

In order to examine and analyze the effect of monetary surprises on stock price during in a variation in business cycle and in different credit market conditions. The hypotheses are as followed:

Hypothesis 1:

The effect of monetary policy to changes in stock return composes of two components, anticipated expectation in which market participants have already forecasted the monetary policy movement themselves and unanticipated expectation which is reflected as surprise to those participants. The monetary policy that has already been anticipated their direction will be used to discount in order to value stock prices and will unlikely to affect stock prices much at the time it is actually announced compare to policy that surprises market's expectation. Therefore, response of monthly SET index return to monetary surprise should be statistically significant. Moreover, from asset price channel theory, SET index return and unexpected changes in policy rate should have negative relationship. When there are negative shocks in policy rate (higher policy rates than that of market's expectation), SET index should move down and vice versa.

Hypothesis 2:

According to the credit channel hypothesis, stock market reactions to monetary news should be dependent to the state of economy. If there are negative surprises in policy rate during recession, firms which are borrowers will tend to have poor balance sheets because of lower income and higher floating rate debt as well as lower present value of collaterals. Moreover, financial intermediaries may also tighten credit standard because of higher cost of funds and reduce a supply of loans to dependent borrowers in this period. Banks might require higher premium from firms compare to rates that they use in expansion which will increase the external finance premium for firm. Stock investors might request higher rate of returns in order to compensate with credit risk and costs e.g. agency costs that lenders have to bear when they purchase firm's share.

Therefore, SET index returns should react more to monetary shocks in recessions relative to expansions.

Hypothesis 3:

As stated in the credit channel hypothesis, SET index returns should be more affected from changes in monetary news in tight credit market conditions as well as in economic downturn relative to loose credit market conditions. When an economy is in these periods, the lenders do not want to supply loan to borrowers. If they would extend loan to the firm, higher lending standard or credit worthiness of borrowers are required. It is all because a probability of default risk, the risk that firms or individuals will be unable to pay the contractual interest or principal back to lenders, should be greater in these periods relative to good or relaxed credit market condition period. Hence, the tighter credit market conditions, the more effects of SET index returns react to monetary policy shocks.

Hypothesis 4:

To see whether the reaction of stock returns to monetary policy actions is sensitive to financial characteristics of the firms, the disaggregated panel data on SET firm will be used to test this reaction. The firms with higher financial constraints should be more affected from unexpected changes in monetary policy than firms with relatively less constrained. According to credit channel theory, when there are negative policy shocks, market interest rates climb up, so supply of loan is hardly ever provided. If firms' balance sheet looks poor because of poor financial characteristics such as small firm sizes, low payout ratio, high trade credit and low interest coverage ratio, that firms should not be able to obtain loan or be able to obtain with higher cost of equity[3]. Therefore,

[3] By assume that financial constraints translate entirely into higher costs of external funds same as Kaplan and Zingales (1997) and Fazzari, et al. (1988) since there is a presence of asymmetric information between creditor and borrower as well as problems of contract enforcement, Schiantarelli (1995). Therefore, the Modigliani Miller Theorem (1958) can not hold. The MM theorem tells that a firm's capital structure is irrelevant to its value. , then internal and external funds are perfect substitute and firm investment decision are independent from its financing decisions. Because problems of information asymmetry and contract enforcement can lead to agency cost occurring to creditor side. Myers and Majluf (1984) points out that there is some obstacle to firms' equity financing and increase cost of equity. These occur because outside

stock returns of those firms should be more affected to monetary shocks compare to firms with better financial characteristics because of higher external finance premium. The worse financial characteristics, the more effects of stock return to negative monetary policy shocks.

1.4 Scope of the Study

In this paper, I will use monthly time series data from June 1st, 2000 to June 30th, 2009. I start collecting the data from June 1st, 2000 since it is the period that Bank of Thailand first adopts inflation targeting framework and this framework has been used up to present. I include all scheduled announcement, 82 announcements, of The Monetary Policy Committee (MPC) of the Bank of Thailand. In addition, Thailand surfaced both economic upturn as well as economic downturn during this time period. Therefore, effects of the monetary authorities' action to stock markets from 2000 to 2009 should be clearly revealed.

1.5 Benefit of the Study

Results about cyclical variation in the response of stocks to monetary news should be useful to both Thai policy makers and investors by helping them predict the effect of changes in monetary policy on the stock market. Furthermore, in the point of view of investors; retails, institutional and foreign investors, these results will be useful to them to be able to anticipate the effect of the central bank announcement during different economic conditions. Moreover, surfacing any economics cycles, investors will be able to predict, plan and make better investment decision. In addition, this can be another way to evaluate the effectiveness of monetary policy since the stock price movement do have an important impact on aggregate demand and thereby leading to an increase or decrease in output of economy. Therefore, it is essential for policy makers to clearly understand what

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investors; who have less information about firm information will demand some premium to induce them to purchase firm's shares in order to offset the agency cost e.g. monitoring cost and incentive fee or any costs that occur because of adverse selection and moral hazard problem.

determines the magnitude of the stocks' market reaction to the monetary authorities' action.

1.6 Contributions

This paper seeks to strengthen the international out-of-sample evidence of the validity of the credit channel of monetary policy transmission. In addition, these out-of-sample results I obtain, will be an additional evidence to investigate whether prior studies about reaction of stocks' market to changes monetary policy and credit channel and asset price channel theory of monetary policy can be applied to the Thailand which is an emerging market and has a bank-based financial system.

CHAPTER II

LITERATURE REVIEW

2.1 Channels of monetary policy transmissions

There are several channels that stock prices can be affected by monetary policy action. Basistha and Kurov (2008) states that there are two channels which stock prices respond to monetary news. Those transmissions are the credit channel and the interest rate channel. A cut in interest rate will lead to lower cost of borrowing for investment as well as lower cost of capital for firms, increasing the present value of future cash flows and hence higher stock prices. In addition, Ehrmann and Fratzscher (2004) examine the effects of US monetary policy on stock markets and focus on the relative contributions of the credit channel and the interest rate channel of monetary policy transmission. They find that, on average, an unexpected tightening of 50 basis points decreases returns by about 3% on the day of the monetary policy announcement. Furthermore, the effect of monetary policy on equity markets is stronger when unexpected changes in the fed funds target rate occur and at that time market surfaces a period of high volatility. The results show that a negative surprise has larger effects than a positive surprise. Moreover, by looking at firm-specific effects, they find that firms with financial constraint have strong significantly respond to monetary policy more than firms with less financial constraint. They also prove that firms with low cash flows, small size, poor credit ratings, low debt to capital ratios, high price-earnings ratios or a high Tobin's q (Tobin, 1969) are affected significantly more by US monetary policy.

Moreover, Bernanke and Gertler (1995) also explain about credit channel theory which includes both balance sheet channel and bank lending channel. The balance sheet channel of monetary policy arises because changes in Fed policy affect not only market interest rate but also the borrowers' financial position. The obvious evidence is that tightening policy will decrease firms' interest coverage ratio. In addition, for bank lending channel, an increase in the cost of funds to banks could make a supply of loan shrink, squeezing out bank-dependent borrowers and increasing the external finance premium.

Moreover, Bernanke and Gertler (1995) agree that monetary policy action can significantly affect the course of real economy in the short run. They also show that although unanticipated tightening in monetary policy has only transitory effects on interest rates, final demand drops earliest and sharpest, leads the decline in aggregate production or real GDP with sustained declines in real GDP and the price level.

Then, in order to clarify an effective of bank lending channel, Driscoll (2004) uses a panel of state-level data to examine whether changes in bank lending affect income as well as output of economy. He finds that this mechanism can partially work through a monetary policy transmission by a credit channel or an interest rate channel to a real sector.

Furthermore, the Federal Reserve can affect banks' lending decisions and banks play a role in economic fluctuations, but more broadly as part of the financial accelerator or broad credit channel mechanism. However, given United States are small open economies with fixed exchange rates, state-specific shocks to money demand are automatically accommodated, lead to changes in lending if banks rely on deposits as a source of fund. Using these shocks as an instrumental variable, he finds that shocks to money demand have strong significant effects on the supply of bank loans, but proportion of loans are small, thus their impact to output are often statistically insignificant.

2.2 Effects of monetary policy announcement to stock price.

Several studies have examined the stock market's reaction to economic news. Kuttner (2001) tries to understand clearly about the effect of changes in Federal Reserve policy on market interest rates by estimating the impact of monetary policy actions on bill, note, and bond yields, using Fed funds futures rates to disentangle expected from unexpected policy actions. The results have been shown that a relationship between surprise policy actions and market interest rates are very strong. However, the response of bond's rate to anticipated actions is generally small. On the other hand, the response to unanticipated movements is large and highly significant. In addition, surprise policy

actions-or unexpected changes in the target rate- have little effect on near-term expectations of future actions. Thus, these findings can both support and explain the failure of the expectations hypothesis on the short end of the yield curve.

Basistha and Kurov (2008) also find a much stronger response of stock returns to monetary shock or unexpected changes in the federal funds target rate in recessions and in tight credit market conditions than that in expansions or any good economics times. Moreover, using firm-level data, they show that firms that face financial constraints are more affected by monetary shocks in tight credit conditions than the relatively unconstrained firms. This is opposite to Andersen et al. (2007). Bernanke and Kuttner (2005) also find that the stock market reaction to monetary policy is primarily driven by the effect of unexpected changes in fed funds target rate on the equity risk premium. On average, using fed funds futures data to gauge policy expectations, a hypothetical unanticipated 25-basis-point cut in the federal funds rate target is associated with about a one percent increase in broad stock indices. Nevertheless, those reactions to monetary policy surprises tend to differ across industry-based portfolios, with the high-tech and telecommunications sectors exhibiting a response half again as large as that of the broad market indices. Instead, the impact of monetary policy surprises on stock prices seems to come either through its effects on expected future excess returns or on expected future dividends. Adapting a methodology from Campbell and Ammer (1993), who uses a vector autoregression (VAR) to calculate revisions in expectations of these key variables (Campbell and Ammer n.d.)s. They find that the effects of unanticipated monetary policy actions on expected excess returns account for the largest part of the response of stock prices. However, according to Kurov (2009), these results are consistent with investor overreaction or excess sensitivity of stock prices to monetary shocks. In other words, investor psychology may play a significant role in the response of equity investors to monetary news. Notwithstanding, the effect of monetary news on sentiment depends on market conditions which it is in bull or bear market. If it is in bear market periods, the monetary policy actions have a larger effect on stocks that are more sensitive to changes in investor sentiment and credit market conditions.

Nevertheless, although using estimator which is based on the heteroskedasticity that exists in high frequency data, Rigobon and Brian Sack (2002) also indicate that an increase in short-term interest rates which come from contractionary policy lead to a decline in stock prices. On the contrary, when central bank activates the expansionary policy, Thorbecke (1997) indicates that there are increases ex post stock returns. Results from estimating a multifactor model also indicate that exposure to monetary policy increases an asset's ex ante return.

However, there are some studies also analyze whether the stock markets' reaction to monetary policy action depends on the state of economy. Davig and Gerlach (2006) find that during the low-volatility regime, the S&P 500 index exhibits a significantly negative response to unexpected changes in the target federal funds rate which are less volatile. However, the model identifies a second regime from September 1998 to September 2002, in which the response of stock prices to policy shocks which are very volatile is insignificant. McQueen and Roley (1993) also find that when we surface an economic growth, the stock market will responds significantly to news about price level and real economic activities. However, Andersen et al. (2007) find no evidence of state-dependence in the stock market’s response to monetary news.

CHAPTER III

DATA AND METHODOLOGY

3.1 Data Measurement

1. Measures of the unexpected change in the target rate

In this study, I use concept of anticipated and unanticipated component of changes of monetary policy action as in Kuttner (2000). However, unexpected components can not be observed, so we need to replicate a proxy. In Thailand, we do not have any future contracts on interest rate as that of United States to construct a proxy for measuring surprise component of the target rate changes. Therefore, I use implied forward rates derived from 1 month THBFIX and 2 month THBFIX or THB-THBFIX-REUTERS [4] (Thai Baht Interest Rate Fixing) in each period to be a key variable in order to test the first hypothesis. According to SEC website[5], in the event that either: (a) such display rate does not appear; or (b) the Calculation Agent reasonably determines that such display rate is not representative, 1 month and 2 month THBFIX shall mean the rate determined by the Calculation Agent in its sole discretion (acting in good faith and in a commercially reasonable manner), as being the average of quotes it obtains from 5 domestic leading commercial banks (namely, Bangkok Bank, Kasikorn Bank, Siam Commercial Bank, Krung Thai Bank, and Bank of Ayudhya). Rate-quote calculation

[4] From the 2000 ISDA Definitions, THB-THBFIX-REUTER means that the rate for a Reset Date will be the synthetic rate for deposits in Thai Baht derived from the swap offered points for a period of the Designated Maturity which appears on the Reuters Screen THBFIX Page as of 11:00 a.m., Bangkok time on the day that is two Bangkok Banking Days preceding that Reset Date with the day count fraction of actual/365. Theoretically, this rate is the rate as determined by the Calculation Agent; BARCLAYS CAPITAL SECURITIES (THAILAND) LIMITED, two business days before the start of each interest period as being the rate displayed on Reuters THBFIX=TH (Implied offered side of on-shore USD/THB forward market).

[5] www.sec.or.th

which is calculated by each bank will be computed from Singapore Interbank Offered Rate or SIBOR in dollar term and then using swap rate to convert it into Thai baht. Moreover, THBFIX can be called Thai Baht implied interest rates or reference floating short-term interest rates[6] because simplicity, it is quoted everyday by banks which are leading dealers in Bangkok and Reuters further collects that information, then calculate and publish to public. This can be shown that this THBFIX has already carried dealers' expectation in short-term interest rate within itself. Furthermore, it contains credibility because its movement is dynamic; both up and down all the time it is quoted. Typically, this movement follows by circumstance in money market. Therefore, it is used as a reference rate or benchmark of interest rate in Thai bond market and the derivatives market[7] as well as lending market. From Fabozzi (2007), according to the pure expectations theory, forwards rate can represent expected future spot rates. Therefore, the entire term structure at given times reflects the market's current expectations of future short-term interest rates. Hence, implied forward derived from THBFIX should be qualified to be used as a proxy of market's expectation in future interest rate. In addition, I also use 1 and 2-month yields of Treasury bill[8] as an alternative; however, the result is the same as the finding from THBFIX.

Following Kuttner (2001), the month-t unexpected changes in policy rate will be computed from this following formula

$$\Delta i_t^u = \frac{1}{D}\sum_{d=1}^{D} i_{t,d} - f_{t-1,D}^{1} \qquad (1)$$

[6] This information is obtained from www.set.or.th

[7] Thai Baht P.M. Fixing (THB/USD) is used as reference data in the derivatives market.

[8] Problem using yields of Treasury bill as a proxy of market's expectation about future interest rate arises from there are no data of 1-month and 2-month yields but only 1-month and 3-month yields. Therefore, I have to interpolate 2-month Treasury yields from 1-month and 3-month Treasury yields in order to calculate 1-month implied forward rates whereas THBFIX rates are given both 1 and 2-month yields already. Relationships between policy rate and THBFIX rates as well as Treasury yields are plotted and shown in Figure 2 and Figure 3 in Appendices.

Where $f^{1}_{t-1,D}$ is the implied forward rate computing from the THBFIX-REUTERS rate on the last (Dth) day of month t-1, $i_{t,d}$ is the policy rate on day d of month t and D is the number of days in the month. The expected policy rate change is defined as

$$\Delta i^{e}_{t} = f^{1}_{t-1,D} - i_{t-1,D} \quad (2)$$

The implied forward interest rate $f^{1}_{t,d}$ is calculated from the following equations.

$$\left(1 + TF_{2t,d}\right)^{2} = \left(1 + TF_{1t,d}\right)\left(1 + f^{1}_{t,d}\right) \quad (3)$$

$$\left(1 + f^{1}_{t,d}\right) = \frac{\left(1+TF_{2t,d}\right)^{2}}{\left(1+TF_{1t,d}\right)} \quad (4)$$

$$f^{1}_{t,d} = \frac{\left(1+TF_{2t,d}\right)^{2}}{\left(1+TF_{1t,d}\right)} - 1 \quad (5)$$

Where TF_{2t} and TF_{1t} are the 2- month and 1-month THBFIX-REUTERS rate in month t respectively.

2. Measures of macroeconomic cycles

To investigate this hypothesis concerning the state-dependent in the stock market reaction to monetary policy news, a proxy for the state of economy is required. I adapt procedure of Sikamat and Buranathanung (2000), which use two criteria to define that economy is in downturn and recession possibly occur in next few months by using Leading Economic Indicator[9] (LEI) since this indicator can be used to analyze the economic trend and short-term economic forecasting. First, 6-month percent change computing from LEI has to decrease 2 percents or more in that month. Moreover, 6-

[9] According to BOT website; www.bot.or.th, the leading economic indicators as well as the coincident economic indicator(CEI) are especially useful in the determination of the turning points or the peaks and troughs of business cycles as well as the short–term (3 – 4 months) forecast of the economy. LEI is constructed from 7 components including authorized capital of newly registered companies, new construction area permitted, real exports, number of foreign tourists, SET index, real broad Money, and oil price inverse index (Oman). CEI is constructed from 5 components including real imports, manufacturing production index, real gross value added tax, volume sales of automobiles and real debit to demand deposit

month smoothed growth rate[10] will be used incorporate with 6 month percent change to consider the sign of recession in next two or three months. Second, half or more of its components have to decline in that period. Thus, a month which has two prior characteristics, there is a sign that recession can occur in next two or three months. Hence, I use this concept apply to Coincident Economic Indicator (CEI) to identify the current state of economy instead of LEI which is correlated with future economic activity. Since CEI is an economic indicator that its trend, phrase and turning points often vary directly, simultaneously, and correlated with the current level of economic activity which can be approximately measured by real GDP or Manufacturing Product Index[11], it can thus indicate the current state of the economy. I also use both prior criteria to examine recession in each month. Which month that has 2 percents or more decrease in 6-month smoothed growth rate and 6-month percent change, incorporates with a decrease in a half or more than a half of its components, that month will be categorized to be in recession. Finally, we can define when it is recession and expansion, then we will be able to specify recession dummy. If economy is in recession in that month, that month will have a dummy value of one, and zero otherwise.

3. Measures of credit market conditions

To test this hypothesis, I will use the default spread or the difference between the yield of a corporate BBB[12] bond and a Treasury yield[13] as a proxy for credit market

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[10] The Foundation for International Business and Economic Research (FIBER) uses a twelve- month moving average that convert to compound annualized rate (six -month smooth growth rate) to be a criterion of economic trends, If six -month smooth growth rate of LEI continually decrease three months in a row, these is a sign that economy is in downturn and recession possibly occur in next few months.

Six -month smooth growth rate of X can be computed from [{ (X/12-MA of X)12/6.5 } -1] *100 , where X is current month LEI. , 12MA of X is a twelve- month moving average of X.

[11] Sikamat and Buranathanung (2000)

[12] BBB rating or approximately Baa1 rating is the latest Thailand bond ratings from Moody's: www.moodys.com on January, 2009. Moreover, BBB rating is the lowest grade of corporate bond I can obtain from ThaiBMA.

[13] Less-than 3-year corporate BBB and Treasury yield are used to see effect of monetary policy in short run.

conditions. Getler and Lown (1999) show that the higher spread, the stronger effect of financial accelerator. Hence, this is a good measure of the external finance premium. It is true that corporate bonds are considered riskier than government bonds. As a result, interest rates or yields are almost always higher than that of government bond to compensate that risk even for top-flight credit quality companies. Furthermore, when corporate bonds are riskier than government bond, higher spreads follow. This shows a higher default risk in corporate bonds, and can be a reflection of the overall corporate economy (and therefore credit quality) and/or a broader weakening of macroeconomic conditions.

4. Measurement of firm financial constraints

Following Baristha and Kurov's study (2008), I use trade credit (computed as account payable divided by total liabilities), firm or asset size (THB million) and dividend payout ratio as measurement of firm financial constraints to separate the sample into unconstrained and constrained subsamples. I also use an average interest coverage ratio and total firm capitalization as financially constrained measurement which are proposed by Minton and Schrand (1999). I follow these general literatures in this area to cope with the error in variables critique of firm-specific financial constraints by using multiple financial constraint proxies. For every criterion of financially constrained firms, stocks in SET will be ranked into quartiles in each month based on each financial constrained measurement. Then, I will create mutually exclusive dummy variables for every firms listed in SET based on each criterion. These dummies are defined to be equal to one if that firm is classified as financially constrained firm, and zero otherwise. Therefore, the firm-specific credit characteristics can be treated as exogenous to monthly stock returns.

To classified financial constrained firm based on criteria of trade credit, the higher trade credit, the higher financial constraints, since trade credit is an alternative source of financing offered by the firm's suppliers so higher account payable means there are large proportion of this financing compare to total liabilities. Basistha and Kurov (2008) state that given the large discounts offered when firms pay bills to their suppliers quickly, the

implied annual interest rates on trade credit financing are often as high as 40%. This makes trade credit financing a costly source of fund. Hence, firms with high capability to access fund will not likely to use this alternative to finance their firms. Moreover, Petersen and Rajan (1997) find that firms use more trade credit when credit from financial institutions such as bank is unavailable. Moreover, suppliers tend to lend to constrained firms relative to unconstrained firm. Thus, firms which are ranked in the top quartile of high trade credit will be categorized into financially constrained firm.

Following Almeida, Campello, and Weisbach (2004), to sort out firms with financial constraint based on criteria of low payout ratio, in every month over the 2000 to 2009 period, firms which are ranked in the bottom quartiles of the pay out ratio distributions will be classified as financially constrained because low payout ratio can imply that company can not afford to pay dividend since the dividend payout ratio gives an intuition about how well earnings support the dividend payments as well as provides a credible signal of management's private information as stated in Minton and Schrand (1999). Moreover, Omran and Bolbol (2004) also find that low payout firms have a high leverage and lower cash to current liabilities ratio than all other firms. Therefore, firms with this characteristic are assigned to be financially constrained.

Firm size is another criterion that I use in this paper in order to classify financially constrained firms. Two alternative proxies of firm size have been used; total asset and market capitalization. Firm with small asset size compared to others will be ranked in the bottom quartile. Firm size is also a proxy for information asymmetry. Botosan (1997) states that greater information reduced transaction costs as well as agency cost which creates greater demand for a firm's stock. The higher demand leads to higher liquidity as well as firm's stock price and its value. Atiase (1985) and Collins et al.(1987) report that large firms have less information asymmetry than a small firm. Consistent with Gilchrist and Himmelberg (1995), who state that small firms are typically young, less well known for lenders so there is more asymmetric information. Borrower knows about firm characteristics more than lenders do. Because of problems of adverse selection and moral hazard arising from information asymmetry, it is more difficult to firms with small asset

sizes to obtain a loan from lenders. Therefore, I will assign firm in the bottom quartile group based on asset size as financially constrained firms.

Last, a criterion of interest coverage ratio is adopted to sort out constrained firms from unconstrained firms. The ratio measures the number of times a firm's EBIT could cover its interest payments. A lower interest coverage ratio indicates weaker solvency, offering lesser assurance that the firm can service its debt from operating earnings. Hence, by ranging the value of firms' interest coverage ratio from maximum to minimum, which one is in the lowest quartiles of this ratio, it will be classified as a financially constrained firm.

3.2 Model Specification and Hypothesis Testing

I will create multiple regressions and use the ordinary least squares method of estimation in order to look for estimators that reflect relationship between given dependent and independent variables so as to minimize the sum of squared errors. From the objectives, they are following regressions to investigate results.

1. To test whether changes in monetary policy announcement or policy surprises have a significant impact on stocks' returns.

$$R_t = \alpha + \beta \Delta i_t^u + \varepsilon_t \qquad (6)$$
$$(-)$$

Where R_t = the monthly SET Index return

Δi_t^u = the unexpected change in the target rate

According to asset price channel of monetary transmission, the coefficient estimate of the unexpected change in the target rate should be negative. When a positive surprise occurs, lower policy rate than market's expected rate, people will allocate their savings to stock as an alternative asset that can generate them high rate of return, so the demand for stocks will increase as well as their prices. The more surprise of lower (higher) policy rate, the more increase (decrease) in stock price. Consistent with Bernanke and Kuttner (2003) explain that an unanticipated tightening monetary policy

will tend to increase the riskiness of stocks and then reduce people's willingness to bear risk, hence when demand for stock declines, stock prices go down. Moreover, according to credit channel hypothesis, this sign should be negative also. When positive surprise occurs it means that interest payment of firms will decrease and strengthen their balance sheet. Therefore, riskiness of firms will drop. Firm can obtain a loan with lower cost of capital and be able to spend the money in profitable investment which can lead to higher future income. In the shareholders' point of view, this firm will be able to generate them higher dividend, so demand for firm's stock will increase as well as their price.

2. To examine whether stock market reactions to monetary news are dependent to the state of economy.

$$R_t = \alpha + \beta_1 \Delta i_t^u RE_t + \beta_2 \Delta i_t^u (1 - RE_t) + \varepsilon_t \quad (7)$$

(-) (-)

Where R_t = the monthly SET Index return

Δi_t^u = the unexpected change in the target rate

RE_t = the recession dummy which RE_t = 1, If economy is in recession.

RE_t = 0, otherwise

According to credit channel of monetary transmission, overall stock prices should react negatively to tightening monetary shocks because of firms' poor balance sheet and difficulty of bank lending in these periods incorporates with asymmetric information problems. These will make firms harder to borrow money in the same cost of capital since lenders will demand higher rate of return- higher cost of capital. The situation will be worse in recession, so the coefficient estimate of the unexpected change in target rate in recession should be negatively larger than that in expansion.

3.To examine the effect of credit market conditions on the stock market reaction to monetary news.

$$R_t = \alpha + \beta_1 \Delta i_t^u + \beta_2 \Delta i_t^u CMC_t + \varepsilon_t \quad (8)$$

(-) (-)

Where R_t = the monthly SET Index return

Δi_t^u = the unexpected change in the target rate

CMC_t = the difference between the yield of a corporate BBB bond and a Treasury yield used as a proxy for credit market conditions

The coefficient of the interactive term between monetary surprise and credit market conditions should be negative. When the spread between the yield of a corporate bond and government bond is widen. It reflects a higher default risk in corporate bonds as well as overall corporate economy and/or a broader weakening of macroeconomic conditions. Firm's assessment of fund is harder. This can affect in a decrease in operating cash flow of firm or firm's investment spending as well as firm future income. This leads to lower demand in stocks and finally lower stock prices.

4.To test for the credit channel effects, by using disaggregated panel data on SET index firms.

4.1 To examine the effect of firm-specific financial constraint and unexpected changes in policy rate and the effect of macroeconomic cycle and unexpected changes in policy rate on firm stock price.

$$R_{i,t} = \alpha_i + \beta_1 \Delta i_t^u + \beta_2 \Delta i_t^u FC_{i,t} + \beta_3 \Delta i_t^u RE_t + \beta_4 FC_{i,t} + \varepsilon_{i,t} \quad (9)$$

(-) (-) (-) (-)

Where, $R_{i,t}$ = the monthly stock$_i$ return

Δi_t^u = the unexpected change in the target rate

$FC_{i,t}$ = a dummy variable referred to firm-specific financial constraint which, $FC_{i,t} = 1$ If firm$_i$ is classified as a financially constrained firm on month t. $FC_{i,t} = 0$, Otherwise.

RE_t = the recession dummy which, RE_t= 1, If economy is in recession. $RE_t = 0$, Otherwise.

I have additional coefficients of β_2 , β_3 and β_4 to test validity of credit channel. The coefficient β_2 reflects additional response of financially constrained firm to policy surprises. Since financial constraints can prevent firms from undertaking profitable investment, this coefficient should have negative sign. When firms are classified as

financially constrained firms, cost of capital will be higher-because of firms' poor balance sheet- compare to firms without the constraints and firms will find it harder to obtain fund to run business. Accompanied with negative policy shocks, these financially constrained firms will look unattractive to invest, hence demand for these firms' stock will fall as well as their price. The coefficient β_3 shows the effect of macroeconomic cycle accompanied with policy shocks. The effect to stock price should be negative according to credit channel hypothesis, so β_3 should be negative which reflects a negative relationship between stock returns and interaction term of recession and policy surprise. The coefficient β_4 should also be negative since firms with financial constraint will have problem in funding. In stock market, demand for these financially constrained firms' stock will be decrease and their price will be fall eventually. In lending market, these firms should be more affected in funding and investing more than non-financially constrained firms.

4.2 To examine the effect of firm-specific financial constraint, macroeconomic cycle and the unexpected change in the policy rate on firm stock price

$$R_{i,t} = \alpha_i + \beta_1 \Delta i_t^u + \beta_2 \Delta i_t^u FC_{i,t} + \beta_3 \Delta i_t^u RE_t + \beta_4 FC_{i,t} + \beta_5 \Delta i_t^u FC_{i,t} RE_t + \varepsilon_{i,t} \quad (10)$$

(-) (-) (-) (-) (-)

Where, $R_{i,t}$ = the monthly stock$_i$ return

Δi_t^u = the unexpected change in the target rate

$FC_{i,t}$ = a dummy variable referred to firm-specific financial constraint which, $FC_{i,t} = 1$ If firm$_i$ is classified as a financially constrained firm on month t. $FC_{i,t} = 0$, Otherwise.

RE_t = the recession dummy which, RE_t= 1, If economy is in recession. $RE_t = 0$, Otherwise.

The coefficient β_5 is additional coefficient I put in this equation to see the effect of policy surprise depending on the interaction of firm–specific financial constraints and macroeconomic cycles on stock prices. The coefficient β_5 is expected to be negative

according to credit channel hypothesis and financial accelerator theory. If firms are classified as financially constrained firm in recession which is the period that aggregate demand is low, output is low, workers are unemployed, factories sit idle and firms' profit decrease, Mankiw (2003), these make firm difficult to raise fund. Announcement of restrictive policy surprise in recession will worsen firm's net worth. Poor firms' balance sheet accompanies with higher credit standard of lenders contribute more difficulty to firms to finance themselves. Moreover, in stock market demand for these firms' stock price should drop as well as their price.

CHAPTER IV

EMPIRICAL RESULTS AND RESULT DISCUSSION

This chapter exhibits the statistic results of all hypotheses and attempts to answer and explains the impact of changes in monetary policy on stock prices during macroeconomic cycles; both recessions and expansions and effect on financial constrained firms. Thus, I begin at the effects of monetary policy decisions on the stock market. Since expected changes in policy rates should not affect stock prices as much as unexpected changes because people will anticipate their directions and use them to evaluate stock prices beforehand. Therefore, a change in stock price should be mainly driven by unexpected change in policy rate. [14]

4.1 Response of monthly stock returns to unexpected changes in policy rate.

From Eq. (6), the results are reported and shown in Table 1. This finding explains that a hypothetical unexpected 100-basis point increase of policy rate, leads to -2.994 percent decrease in overall stock price. This gives us the correct direction as stated in the asset price channel theory although they are not consistent with the hypothesis that stock's return should react significantly to unexpected changes in monetary policy. The negative relationship between the unexpected change in policy action and monthly returns on SET index is also evidently shown in the scatter plot of figure 1.

[14] All variables used in calculation have already tested unit roots and took 1st and 2nd difference if there were unit roots. Regressors which are tested by Augmented Dickey-Fuller (ADF) and found that series were I(1), that regressions were run in first differences.

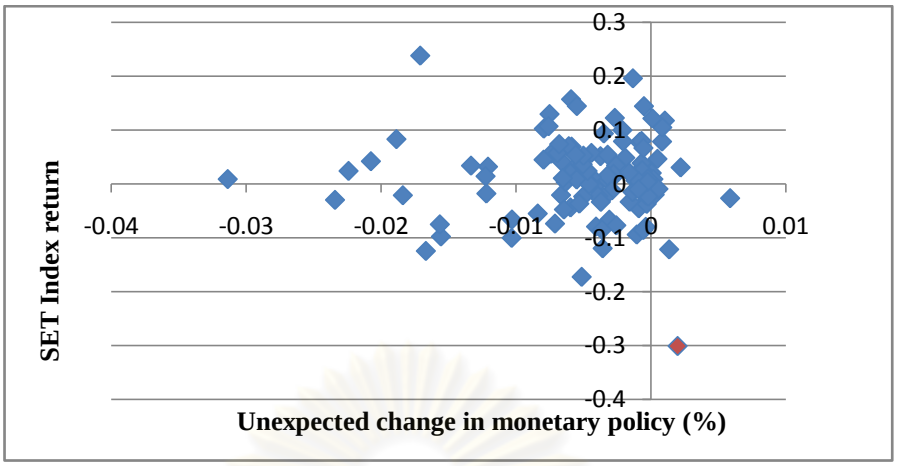

Figure1: Scatterplot of monthly stock returns and unexpected change in monetary policy.

I also estimate effect of both anticipated and unanticipated to SET return to see their individual effects precisely. Table 2 reports the results from regressions of the one-month SET return on the surprise and expected components of the one-month change in the policy rate, all expressed in percentage terms. There is a strong negative response to unexpected rate, and less response to the anticipated action but this result is not statistically significant. The magnitude of the response to surprise components is -3.002 which is greater than expected components of -0.003. Moreover, this negative response of stock return is consistent with hypothesis 1 which I have predicted in Section1.

However, the reason for insignificance in this stock market's reaction to policy surprise can be explained by a lag in monetary policy transmission mechanism. Table 3 provided the result of using distributed lag model to test effect of monetary surprise on the response of SET index return. With lag length equals to 3, I find that unexpected changes in monetary policy statistically and negatively affect stock's return after 2 months of policy announcement. The magnitude of response is -5.361 at 95 percent confident interval. This is consistent to Disyatat and Vongsinsirikil (2003) who state that interest rate pass-through in Thailand is generally lower than the developed countries. Moreover, financial system in Thailand is bank-based financial system- Thai firms are heavily rely on bank lending- opposite from U.S. market which is market-based system, Levine (2000). Demirguc-Kunt and Levine (1999) and Schmukler and Vesperoni (2001) indicate that the stock market plays an important and powerful role to financial market in

a market-based system. The direction of economy is dependent on movement of stock market. On the other hand, a bank-based financial system finds the economic environment dependent on how well or poorly the banking sector is doing. Lending from banks in this system plays an important role to financial market as well as direction of business in economy. Demirguc-Kunt and Levine (1999) state that stock markets also become more active and efficient than banks in market-based countries. According to the efficient market hypothesis (EMH), as new information about equity becomes available, the price of equity in higher efficient market will tend to quickly adjust by the change in market's perception relative to less-efficient market. Hence, this is possible explanation explains the difference between the result obtaining from stock market in Thailand which does not consistent with the finding from prior studies such as Basistha and Kurov (2008), which using U.S stock market as empirical evidence.

Table 1

Response of monthly stock returns to unexpected changes in policy rate.

	Full sample
	OLS
Intercept	0.014**
	(0.006)
Unexpected change	-2.994
	(2.45)
R^2	0.0162
N	105

The table reports coefficient for the following regression: $R_t = \alpha + \beta \Delta i_t^u + \varepsilon_t$, where R_t is the monthly SET Index return and Δi_t^u is the unexpected change in the target rate. The full sample is from June 2000 trough June 2009 and contains 105 observations. The regression is estimated using OLS with White Heteroskedasticity-Consistent Standard Errors & Covariance. Standard errors are shown in parentheses.

*,**,*** indicate that the coefficient is statistically significant at 10%, 5% and 1% levels, respectively.

Table 2

Response of monthly stock returns to expected and unexpected changes in policy rate.

	Full sample
	OLS
Intercept	0.014**
	(0.006)
Unexpected change	-3.002
	(2.479)
Expected Change	-0.003
	(0.011)
R^2	0.0163
N	105

The table reports coefficient for the following regression: $R_t = \alpha + \beta_1 \Delta i_t^u + \beta_2 \Delta i_t^e + \varepsilon_t$, where R_t is the monthly SET Index return and Δi_t^u is the unexpected change in the target rate. Δi_t^e is the expected change in the target rate. The full sample is from June 2000 trough June 2009 and contains 105 observations. The regression is estimated using OLS with White Heteroskedasticity-Consistent Standard Errors & Covariance. Standard errors are shown in parentheses.

*,**,*** indicate that the coefficient is statistically significant at 10%, 5% and 1% levels, respectively.

Table 3

An unrestricted finite distributed lag model of stock return's response to unexpected change in monetary policy with lag length n=3

	Full sample
	OLS
Intercept	0.016***
	(0.007)
Unexpected change	-3.503
	(2.422)
1-month lag in unexpected change	-0.594
	(2.443)
2-month lag in unexpected change	-5.361**
	(2.534)
3-month lag in unexpected change	-0.058
	(2.413)
R^2	0.054212
N	109

The table reports coefficient for the following regression: $R_{i,t} = \alpha + \beta_1 \Delta i_t^u + \beta_2 \Delta i_{t-1}^u + \beta_3 \Delta i_{t-2}^u + \beta_4 \Delta i_{t-3}^u + \varepsilon_{i,t}$, where $R_{i,t}$ is the quarterly stock$_i$ return, Δi_t^u is the unexpected change in the target rate in a month t. Δi_{t-1}^u is 1-month lag in unexpected change in target rate. Δi_{t-2}^u is 2-month lag in unexpected change in target rate. Δi_{t-3}^u is 3-month lag in unexpected change in target rate. N refers to number of observations. The sample period is from June 2000 through June 2009. The regression is estimated using OLS with White Heteroskedasticity-Consistent Standard Errors & Covariance. Standard errors are shown in parentheses.

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*,**,*** indicate that the coefficient is statistically significant at 10%, 5% and 1% levels, respectively.

4.2 Effect of business cycle on the response of monthly stock returns to unexpected changes in monetary policy

According to a credit channel of monetary transmission mechanism which states that effect of monetary policy action will be enlarged by higher external finance premium when economy is in recession and tight credit market conditions, this paper thus examines whether stock market's reaction to change in monetary policy is dependent to the state of economy and credit market constraint respectively. The results presented in Table 4 show that stock market tend to react more strongly to monetary policy surprised in recession relative to expansion at 10 percent significant level. The coefficients of the monetary surprise in expansion and recession are about -5.18 and -9.86 respectively. These imply that a hypothetical unexpected 1 percent or 100-basis point cut of policy rate when economy experiences expansion leads to a 5.18 percent increase in the SET index return. When economy is in recession, a cut of 100-basis point in policy rate will lead to an increase about 9.86 percent; which is almost double the magnitude of stock market's reaction in expansion, of SET index return. However, the difference between the regression coefficients representing SET response in recession and expansion is not statistically significant.

Table 4

Effect of business cycle on the response of monthly stock returns to unexpected changes in monetary policy

	Full sample
	OLS
Intercept	0.013
	(0.006)
Recession (β_1)	-9.862*
	(5.608)
Expansion (β_2)	-5.175*
	(2.948)
β1-β2	-4.686
	(6.291)
R^2	0.073
N	105

The table reports coefficient for the following regression: $R_t = \alpha + \beta_1 \Delta i_t^u RE_t + \beta_2 \Delta i_t^u (1 - RE_t + \varepsilon t$, where Rt is the monthly SET Index return and Δitu is the unexpected change in the target rate. RE_t is the recession dummy obtained from Coincident Economic Indicator which equals to 1 if economy is in recession. Otherwise equals to 0. The sample period is from June 2000 through June 2009 and contains 105 observations. The regression is estimated using OLS with White Heteroskedasticity-Consistent Standard Errors & Covariance. Standard errors are shown in parentheses.

*,**,*** indicate that the coefficient is statistically significant at 10%, 5% and 1% levels, respectively.

4.3 Effect of credit market conditions on the response of monthly stock returns to unexpected changes in policy

In addition to business cycle proxy, I also use measure of aggregate credit market conditions to show impact of frictions in credit markets posited by financial accelerator theory on stock market's return to unexpected change in monetary policy. The estimation results of Eq. (8) are reports in Table 5. The coefficient of the interaction term between policy surprise and the credit market condition is negative but not statistically significant, with the coefficient -0.427 as the magnitude of response. This magnitude does not generate larger effect of surprised policy in restrictive credit market compare to -1.367 a coefficient of measuring the effect of surprise policy only. Thus, I can conclude that although Thai economy is in tightening credit market, financial accelerator mechanism does not magnify effect of monetary surprise to overall stock return significantly. Nonetheless, I can not conclude that prior findings can completely support the credit channel theory although the result of Eq. (7) states that effect of monetary surprises are stronger in recession than that of expansion. This is because the level of significance is barely 10 percent which is not strong enough to guarantee the existence of credit channel, incorporating with no evidence of stronger response of SET index return to monetary shock in tight credit market conditions in Eq.(8) .

To sort out this issue, I perform a test for credit channel by using response of individual firm's stock return to unexpected changes in monetary policy instead of overall stock return like SET return. Moreover, I also hypothesize that response of stock returns to monetary policy should also depend on individual credit characteristic of firms. According to the credit channel of monetary policy transmission, stock returns of financially constrained firms should react more strongly to unexpected change in monetary policy especially when economy is in recession than returns of relative unconstrained firms. The pool OLS estimation using fixed effect technique with panel-corrected standard errors with results of Eq. (9) without the interaction of firm–specific financial constraints and macroeconomic cycles are reported in Table 6. Panel A, B, C, D and E are shown the disaggregated results from each criterion of financial constraints; low market capitalization, low total assets, high trade credit, low payout ratio and low

interest coverage ratio. In 3 out of 5 case reported[15], the unexpected changes in monetary policy give strong and significant negative effect to individual SET listed firm's stock returns consistent with the asset price channel theory. The coefficients are significant at 1 and 5 percent level. Using a reaction to monetary surprise of individual SET listed firms' returns in Panel E as an illustration, a surprise increasing in 100 basis point of policy rate will lead to 3.555 percent decline in those firms' stock price. The result is different from using overall stock return because in this section, I hypothesize that different firms' characteristics should give different responses to monetary surprises-some firms can give higher response relative to others- especially financial distressed firms.[16] This result tells that there are some firms that react strongly negative to monetary surprise thus these lead to significant response in firm-level data.

[15] Reactions firms' returns on unexpected changes in monetary policy in Panel A and Panel D are excluded. Although the coefficients give negative signs, those are not significant.

[16] Because fixed effects technique which are used in OLS estimation.

Table 5

Effect of credit market conditions on the response of monthly stock returns to unexpected changes in policy

	Full sample
	OLS
Intercept	0.016
	(0.007)
Unexpected change	-1.367
	(3.067)
Unexpected change×spread	-0.427
	(1.719)
R^2	0.0029
N	95

The table reports coefficient for the following regression: $R_t = \alpha + \beta_1 \Delta i_t^u + \beta_2 \Delta i_t^u CMC_t + \varepsilon_t$, where R_t is the monthly SET Index return and Δi_t^u is the unexpected change in the target rate. CMC_t is the difference between the yield of a corporate Baa1 bond and a Treasury yield which their maturities are less than 3 years, used as a proxy for credit market conditions. Higher spread implies tighter credit conditions. The sample period is from June 2000 through June 2009 and included 95 observations after adjustments. The regression is estimated using OLS with White Heteroskedasticity-Consistent Standard Errors & Covariance. Standard errors are shown in parentheses.

*,**,*** indicate that the coefficient is statistically significant at 10%, 5% and 1% levels, respectively.

4.4 Effect of the macroeconomic cycles and firm-specific credit characteristics on the response of monthly disaggregated stock returns to unexpected changes in monetary policy

I find that each firm credit characteristics are matter to their stock returns. The coefficient of firm-specific financial constraint dummies gives statistically significant negative sign. If firms are classified to be financially constrained firms; for example, financial distressed firms which are classified by low market capitalization and high trade credit, firms' return will decline about -0.122 and -0.067 percent respectively.

Another coefficient of interest is the estimates of the interactive term between unexpected changes in policy rates and firm-specific financial constraint dummies which state in Eq. (9) and (10) in Table 6. Ranging from panel A to panel E, these coefficients give negative sign which mean that policy surprises give negative effects to credit constrained firms consistent with credit channel hypothesis. However, only coefficients of financially constrained firms that classified by low total assets and high trade credit are negatively significant at 10 percent level.

In addition, the coefficient of interactive term between firm specific financial characteristics and recession dummies are also introduced in Table 6. However, I do not find any evidence to support that financially constrained firms react more to unexpected changes in monetary policy than relatively unconstrained firms in recession.

There is a reason which can explain the finding which states that the overall credit channel effect does not appear in a month-to-month sample in firm-level data. According to Bernanke and Gertler (1995), the countercyclical demand for credit can occur and perverse short-run movements in credit aggregate and lead to inconsistent result with the credit channel hypothesis. When restrictive monetary policy is applied, short-run interest rate as well as the external finance premium will increase. Firm's income and cash flow which tends to be squeezed during a period of monetary tightening or recession tends to drop more quickly than cost; such as employment compensation. Interestingly, cash squeeze does not occur immediately[17] hence it is possible that firms will increase their

[17] According to Bernanke and Gertler (1995), cash squeeze will peak about in six or nine month after tightening monetary policy.

borrowing in the early cycle in order to smooth the impact of cyclical variations in production; or to temporarily maintain their level of production (as well as employment). As point of Bernanke and Gertler (1995) and Blinder (1980) who state that firms often attempt to finance an inventory buildup following a monetary policy tightening which means that they may attempt to increase their borrowing- even they have to face higher lending rate- and further aggregate credit during tight credit market conditions or recession. Hence firms should not be affected much from changes in monetary policy as well as higher external finance premium in these periods.

Table 6

Effect of the macroeconomic cycles and firm-specific credit characteristics on the response of monthly disaggregated stock returns to unexpected changes in monetary policy

	Full Sample						
	OLS						
	Intercept	Unexpected change	Unexpected change * financial constraint	Unexpected change * cycle	Financial constraint	Unexpected change * financial constraint*cycle	R^2
Panel A. Market Capitalization							
Eq.(9)	0.081***	-1.570	-2.027	5.611	-0.122***	-	0.026
	(0.008)	(1.046)	(2.105)	(4.095)	(0.021)	-	-
Eq.(10)	0.081***	-1.549	-2.111	4.347	-0.121***	5.008	0.026
	(0.008)	(1.047)	(2.112)	(4.745)	(0.021)	(9.495)	-
Panel B. Total Asset							
Eq.(9)	0.036***	-2.016**	-3.800	6.469	-0.048*	-	0.023
	(0.009)	(0.989)	(2.588)	(4.103)	(0.025)	-	-
Eq.(10)	0.036***	-1.973**	-4.185*	3.393	-0.048**	12.818	0.024
	(0.009)	(0.990)	(2.604)	(4.710)	(0.025)	(9.640)	-
Panel C. Trade Credit							
Eq.(9)	0.054***	-1.778**	-8.007*	5.639	-0.067***	-	0.023
	(0.006)	(0.924)	(4.567)	(4.140)	(0.028)	-	-
Eq.(10)	0.054***	-1.798**	-7.343*	6.975	-0.070***	-7.780	0.023
	(0.006)	(0.924)	(4.663)	(4.556)	(0.028)	(11.061)	-
Panel D. Payout Ratio							
Eq.(9)	0.081***	-1.479	-2.300	5.639	-0.121***	-	0.026
	(0.008)	(1.043)	(2.117)	(4.095)	(0.021)	-	-
Eq.(10)	0.081***	-1.457	-2.394	4.260	-0.120***	5.520	0.026
	(0.008)	(1.043)	(2.123)	(4.736)	(0.021)	(9.527)	-

Panel E. Interest Coverage Ratio							
Eq.(9)	0.064***	-3.555***	-5.589*	6.133	-0.051***	-	0.026
	(0.008)	(1.054)	(2.104)	(4.095)	(0.017)	-	-
Eq.(10)	0.064***	-3.568***	-5.640*	6.902	-0.052***	-3.143	0.026
	(0.008)	(1.055)	(2.110)	(4.728)	(0.017)	(9.659)	-

The table reports coefficient for the following regressions Eq. (9): $R_{i,t} = \alpha + \beta_1 \Delta i_t^u + \beta_2 \Delta i_t^u FC_{i,t} + \beta_3 \Delta i_t^u RE_t + \beta_4 FC_{i,t} + \varepsilon_{i,t}$ and Eq.(10): $R_{i,t} = \alpha_i + \beta_1 \Delta i_t^u + \beta_2 \Delta i_t^u FC_{i,t} + \beta_3 \Delta i_t^u RE_t + \beta_4 FC_{i,t} + \beta_5 \Delta i_t^u FC_{i,t} RE_t + \varepsilon_{i,t}$, where $R_{i,t}$ is the monthly stock$_i$ return, Δi_t^u is the unexpected change in the target rate, $FC_{i,t}$ is a dummy variable referred to firm-specific financial constraint which, $FC_{i,t}$ equals to 1 if firm$_i$ is classified as a financial constrained firm on month t. $FC_{i,t}$ equals to 0 otherwise. RE_t is the recession dummy obtained from Coincident Economic Indicator which equals to 1 if economy is in recession. Otherwise equals to 0. The sample period is from June 2000 through June 2009. The regression is estimated using Panel Lease Squares method with fixed Effects. Fixed effects are considered, based on assumption that each firm has its own systematic baseline. Panel corrected standard error are shown in parentheses.

*,**,*** indicate that the coefficient is statistically significant at 10%, 5% and 1% levels, respectively.

CHAPTER V

CONCLUSION

There are two important channels which stock prices respond to monetary policy. First, through the asset price channel, the lower interest rate will tend to increase asset prices such as stocks and real estates since they are now relatively more attractive investment than others. Therefore, stock prices continually to rise. Another important monetary transmission mechanism is credit channel. It states that direct effects of monetary policy on interest rates are enlarged by external finance premium which is the difference in cost between funds raised externally and funds generated internally. The higher external finance premium, the higher imperfections arise from the information asymmetry in the credit markets. These lead to firms' higher cost of borrowing. Two linkages of credit channel that act like a conduit which contain an effect of a central bank action to credit market, are the balance sheet channel and the bank lending channel. The balance sheet channel will stress on the effect of change in monetary policy to financial position of borrower. The bank-lending channel focuses more on the bank's supply of loan. If there are negative surprises in policy rate during recession, firms which are borrowers should be more affected from changes in monetary policy action due to firms' poor balance sheets incorporating with banks' tighten credit standard and a fall in a supply of loans to dependent borrowers. Therefore, stock prices should react more to monetary shocks in recessions relative to expansions. Moreover, financially constrained firms should be more impacted from policy surprised components. Since financial constraints can prevent firms from obtaining loans and undertaking profitable investment. Therefore, stock returns of those firms should be more affected to monetary shocks compare to firms with better financial characteristics because of higher external finance premium. The worse financial characteristics, the more effects of stock return to negative monetary policy shocks.

This paper aims to investigate the impact of changes in monetary policy on stock prices during macroeconomic cycles; both recessions and expansions as well as during

tightening credit market and effect on financial constrained firms, by distinguish the effect to markets from anticipated and unanticipated changes in monetary policy to measure its effect precisely. I find that response of monthly SET index return to monetary surprise is not significant; in contrast to the reactions of most disaggregated firms' returns which give significant result. By using methodology of fixed effect, this finding proves that there are some firms that react strongly negative to monetary surprise thus these lead to significant response in firm-level data. Moreover, I find a little evidence supporting a credit channel of monetary policy transmission for overall stock price but I do not find significant cyclical variation in the impact of monetary policy on individual firm's returns. Notwithstanding, the behavior of countercyclical demand for credit can helps to explain the result that credit aggregate are slower to react to a change in monetary policy. However, both SET index return and unexpected change in policy rate have negative relationship as stated in the asset price channel of monetary policy transmission. Furthermore, I find a strong negative response to stock returns of firm which is classified as financially constrained firm relative to unconstrained firm, but a little evidence which show that stock returns of those firms are more affected to monetary shocks compare to firms with better financial characteristics.

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APPENDICES

APPENDIX A

Table 7

Summary Statistics

	Dependent Variable		Independent Variables	
	SET Index return	Disaggregate firm return	Unexpected changes in monetary policy	Credit market constraint
Descriptive Statistics				
Mean	0.016	0.056	-0.003	0.012
Median	0.012	0.000	-0.003	-0.099
Maximum	0.196	19.571	0.006	1.758
Minimum	-0.173	-0.990	-0.016	-1.840
Std. Dev.	0.067	0.501	0.003	0.998
Observations	95	11641	95	95

Summary Statistics for the financial constraint measures

	Interest coverage ratio	Market Capitalization (THB million)	Payout Ratio	Total asset (THB million)	Trade Credit
Panel A. Descriptive Statistics					
Mean	10.040	8480.879	32.770	11417.940	0.174
Median	4.370	1255.840	33.230	2480.557	0.195
Std. Dev.	17.907	39249.46	30.739	41597.760	4.124
Panel B. Correlation of Financial constraint dummy variables					
Low Interest Coverage Ratio	1				
Low Market Capitalization	0.265	1			
Low Payout	0.263	0.981	1		
Low Total Asset	0.134	0.514	0.520	1	
High Trade Credit	0.004	0.033	0.033	0.080	1

The sample period is from June 2000 through June 2009. The data are obtained from DATASTREAM. Interest coverage ratio computed as EBIT divided interest payments. Market capitalization computed as share price times the number of shares outstanding. Payout ratio is calculated as cash dividends plus stock repurchases divided by operating income. Trade credit is calculated as account payable divided by total liabilities. Financial firms are omitted in all calculation.

APPENDIX B

Table 8

Response of monthly stock returns to unexpected changes derived from T-Bill in policy rate.

	Full sample
	OLS
Intercept	0.013**
	(0.006)
Unexpected change	-2.450
	(3.692)
R^2	0.0372
N	102

The table reports coefficient for the following regression: $R_t = \alpha + \beta \Delta i_t^u + \varepsilon_t$, where R_t is the monthly SET Index return and Δi_t^u is the unexpected change in the target rate. The full sample is from June 2000 trough June 2009 and contains 102 observations. The regression is estimated using OLS with White Heteroskedasticity-Consistent Standard Errors & Covariance. Standard errors are shown in parentheses.

*,**,*** indicate that the coefficient is statistically significant at 10%, 5% and 1% levels, respectively.

APPENDIX C

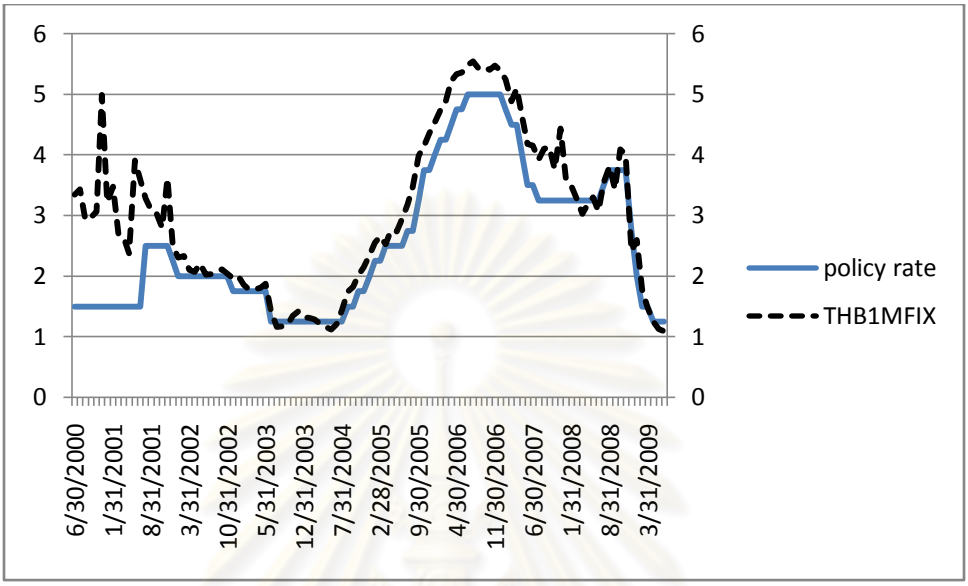

Figure 2: Relationship between policy rate (%) and 1-month THBFIX rates (%) from June 2000 to June 2009.

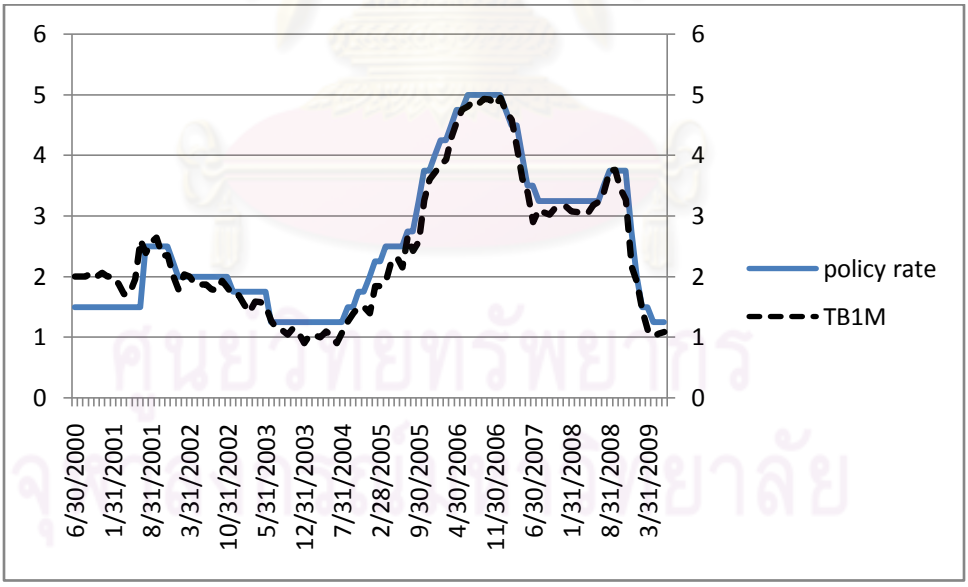

Figure 3: Relationship between policy rate (%) and yields of 1-month T-Bill (%) from June 2000 to June 2009.

Biography

My name is Rapassorn Varadat. I was born in July 30th, 1986 at Bangkok. In 2009, I graduated from Bachelor of Economics with second class honor, major in monetary economics, from Chulalongkorn University.