CHAPTER II

LITERATURE REVIEW

2.1 Research Related to Time-varying Risk Premium

Early studies, for example, Mankiw and Summers (1984), Campbell (1987), and Engle, Lilien, and Robins (1987), have found that risk premium changes over time. Risk premium is defined as the difference of the expected return between risky assets and risk-free assets. In theory, risk premium is positively correlated to an increase in risk of assets to compensate risk averse investors for holding risky assets. As the degree of uncertainty in assets returns varies over time, risk premium for holding assets must also be time-varying.

The increasing evidence of time variation in expected returns and risks motivate many studies to reexamine the financial models to allow expected returns to vary over time. Engle, Lilien, and Robins (1987) introduce the ARCH-M model, which extends the ARCH model to allow the conditional variance to affect the mean. In this way, changing conditional variance directly affects the expected return. This model determines whether time-varying risk premium exists and how significant they are. They find that time-varying risk premium is highly significant. The model explains the recent failures of the expectation hypothesis of term structure.

Ferson, Kandel, and Stambaugh (1987) present new tests of financial valuation model, in which the expected returns and conditional market betas are allowed to vary over time. The tests exploit the relation between expected excess returns and current market value. The single risk premium model is not rejected if the expected risk premium is time-varying and is not restricted to be a market factor.

Mayfield and Murphy (1996) demonstrate that time-varying risk premium can account for the rejection of the expectation theory of the term structure of interest rates. The results suggest that allowing the movements in risk premium greatly improves the ability to explain the term structure of interest rates.

There are investigations of the link between the asset returns and macroeconomic factors, for example, Chen, Roll, and Ross (1986), and McElroy and Burmeister (1988). The empirical studies find that macroeconomic fundamental is the one factor that cause risk premium to vary over time. For example, Elder (2002) studies whether macroeconomic factors explain the time-variation in risk premium of the term structure. The study employs a dynamic asset pricing model with time-varying risk premium and time-invariant reward-to-volatility measures. The results indicate that the risk premium of the short end of the term structure tends to increase during periods when expected volatility of macroeconomic factors is high.

2.2 Research Related to Macroeconomic Announcements

The impact of macroeconomic news on returns and volatility of assets is widely examined. As macroeconomic announcements may reveal new information that was not previously incorporated into asset prices, volatility tends to increase when market participants process the newly received information. In addition, the investors take positions to the market based on their expectations, the estimation for the upcoming scheduled news announcement will be important in determining the reaction of the market. The differences between the actual announcement and the expectation determine the response of the market to the new information. As a result, macroeconomic announcement would have an impact to asset return and volatility. There are many investigations in this field, which will be discussed as follows.

2.2.1 Stock Market

There is an extensive literature on the role of macroeconomic news releases in the stock markets. The effects of the unexpected component in scheduled macroeconomics announcements on stock price are investigated by Hardouvelis (1987), Wasserfallen (1989), McQueen and Roley (1993), and Bomfim (2003). The conclusion from the stock market is that macroeconomic announcements have little impact on stock price, except for monetary news.

Hardouvelis (1987) analyzes the response of stock price to the announcements of 15 representative macroeconomic variables. This paper focuses on the distinction between monetary and non-monetary news. The data is divided into two sub-periods when the Federal Reserve switched from non-borrowed to borrowed reserves targeting on October 1982. The results show that monetary announcements have a significant impact on the stock price during the first sub-period but a much weaker during the second sub-period. And the stock price responses to non-monetary announcements are very weak; however, three of the 11 macroeconomic variables (trade deficit, unemployment rate, personal income) do show statistically significant responses.

Wasserfallen (1989) investigates the effect of the unexpected variations in many macroeconomic variables on aggregate stock price indices in Great Britain, West Germany and Switzerland. The results show that a very small fraction of observed variations in equity returns can be explained by macroeconomic factors. Therefore, the European stock markets do not behave differently than their counterparts in the United States.

McQueen and Roley (1993) allow the response of stock prices to macroeconomic news to vary over different states of business cycle. Apart from some types of monetary information, there is little empirical evidence to support the hypothesis that stock prices respond to macroeconomic news. But if the same type of news is considered good in some states of the economy and bad in others, the response coefficient on the surprise in previous studies will be biased estimates. By allowing the response to vary over different states of the economy, they can test the good news/bad news story and provide unbiased estimates of the effects of fundamental information about the economy. They find that news of higher-than-expected real activity when the economy is already strong results in lower stock prices, whereas the same surprise in a weak economy is associated with higher stock prices.

As monetary news have a significant impact on the stock market, Bomfim (2003) emphasizes the potential impact of the unanticipated monetary policy on the volatility of

stock returns. The study examines the days around regularly scheduled meetings and the days of the actual decisions involving the target federal funds rate. The results suggest that the stock market tends to be relatively quiet on the days preceding announcements and such decisions tend to boost stock returns volatility. Furthermore, positive surprises tend to have a larger effect on volatility than the negative surprises.

2.2.2 Bond Market

The responses of the bond market to macroeconomic news have also received attention. The evidence on the bond market is different from the stock market. Macroeconomic announcement have a significant impact on the treasury bond market. While firm-specific news is the main source of information in the stock markets, macroeconomic announcements are most important in the treasury bond markets. In addition, the studies on bond market do not focus only on the price movements, but also consider volatility and speed of the adjustment.

Jones, Lamont, and Lumsdaine (1998) investigate the response of the treasury bond prices to scheduled US government releases of the producer price index (PPI) and employment data. They examine whether shocks to bond volatility on macroeconomic announcement days are as persistent as shocks on non-announcement days. If announcement shocks do not persist, it would suggest that the market prices quickly incorporate public information and the trading process does not inherently generate persistent volatility in response to news. They also test whether the treasury bonds earn higher expected returns when exposed to greater macroeconomic risks. The results show that shocks to volatility that occur on the announcement days have no subsequent impact on daily volatility. Furthermore, macroeconomic risk on announcement days is compensated by higher expected excess returns. They conclude that the releases of public information do not generate autocorrelated volatility and the market quickly incorporates public information into prices.

Balduzzi, Elton, and Green (2001), Kim and Sheen (2001) use intraday information to investigate the price adjustment mechanism, which are different from the

previous studies mentioned earlier that focuses on inter-daily movements. Balduzzi, Elton, and Green (2001) study the response of the US treasury bonds to economic announcements using data on scheduled economic announcements and consensus forecasts to calculate the surprise component in the announcement, together with intraday price information. They determine which announcements significantly affect the US treasury bond prices, and also the size and sign of the price response, as well as how quickly news is incorporated into prices. They also investigate the effects of different announcements on trading activity using trading volume and bid-ask spreads. They find a significant impact of news releases on the prices of at least one of the following instruments: a three-month bill, a two-year note, a 10-year note, and a 30-year bond. These effects vary significantly according to maturity. The study also shows that public news explains a substantial fraction of price volatility in the aftermath of announcements and tends to be incorporated very quickly into prices (one minute or less). In addition, bid-ask spreads tend to revert quickly to their normal levels.

Kim and Sheen (2001) study the response of 10-year government bond futures to the Australian scheduled information release. They find that the price and volatility adjustments to new information were completed during the first minute following each news announcement. This suggests market efficiency of the Australian futures market. The trading volumes, on the other hand, continue to respond to news for 1 hour following the news release.

2.2.3 Foreign Exchange and Future Markets

Apart from stock and bond markets investigations, there are some evidences on the exchange rate and interest rate, such as Hardouvelis (1988), Ederington and Lee (1994). Hardouvelis (1988) studies the response of exchange rates and interest rates to the US macroeconomic news announcements. He examines the instantaneous response of exchange rate at the moment of news hitting the market. This methodology is possible to identify the exact type of economic news and how they affect exchange rate. It also discards the simultaneity bias when two or more news occurred at the same time. The

study finds that monetary news carries most of the explanatory power, while only some non-monetary variables show significant effects. These non-monetary variables are news about the trade deficit, domestic inflation, and variables that reflect the state of the business cycle. The results also show that an appreciation (depreciation) of the dollar is accompanied by an increase (decrease) in nominal interest rates, which is consistent with the models that stress price rigidity and the absence of purchasing power parity. Evidently, exchange rate movements were primarily driven by expectations of future changes in real interest rates rather than the expected rate of inflation. Monetary news carries most of the explanatory power.

Ederington and Lee (1993) study similar to Balduzzi, Elton, and Green (2001), Kim and Sheen (2001). They use the intraday data to investigate the impact of scheduled macroeconomic news on interest rate and foreign exchange futures markets (the Treasury bond, Eurodollar, and deutsche mark futures markets). They also explore the speed at which the market adjusts to these news releases focusing on both market efficiency and volatility. They find that the observed intraday and day-of-week volatility patterns in interest rate and exchange rate futures markets are mainly due to the timing of major macroeconomic announcements. Most of the price adjustment to these information releases occurs within one minute of the release and trading profits based on the initial reaction basically disappear within this period. But volatility remains considerably higher than normal for another fifteen minutes or so and slightly higher for several hours.

However, the most studies examine the return and volatility characteristics of financial markets separately. Arshanapalli, Switzer, and Vezina (2003) argue that the study on macroeconomic announcements should incorporate return and volatility characteristics of stock and bond markets jointly. They view that a change in the stock market risk premium due to a change in macroeconomic environment not only impacts the demands for stocks but also affect the demands for bonds. They investigate the sources of time-varying risk premium in the US stock and bond markets simultaneously using multivariate GARCH model. The study examines the effects of macroeconomic

news on volatility risk of each market as well as covariance risk, together with finding whether such news induces time-varying risk premium in either markets. The multivariate GARCH model relates the change in risk premium to both volatility risk and covariance risk of each market. The results indicate that both stocks and bonds earn higher returns when exposed to macroeconomic risks. But these assets are not rewarded by the same risk factors. Stocks exhibit a change in risk premium to variance risk on macroeconomic announcement days, while bonds exhibit a significant change in risk premium to covariance risks. In addition, some new releases seem to be sources of time-varying conditional volatility for both stock and bond returns, but none of the announcements generate significant changes in the covariance between stocks and bonds. Christiansen and Ranaldo (2005) also study the impact of macroeconomic announcements on realized variance and realized correlation of bond and stock returns, as comovement across assets is central issue in asset allocation, risk management and hedging. The results indicate that macroeconomic announcements have a significant impact on realized bond-stock correlation. This evidence holds both in terms of news surprise and scheduled announcement time. In addition, they provide further evidence on the time-varying comovement between bond and stock returns. They find that realized correlation strongly depends on economic and market conditions and that different news items have different impacts.

2.3 Research Conducted in Thailand

For Thailand cases, there is little evidence of macroeconomic news on the stock and bond markets. The investigations related to news mainly focus on the foreign exchange market. Klinboon (1997) analyzes the efficiency of the foreign exchange market by examining the relationship between the spot and forward exchange rates and whether the deviations in actual and expected interest differentials, which reflect news, could be significant in determining the spot rates. The results show that the foreign exchange market was inefficient and the forward rate is not unbiased estimator of the future spot exchange rate. Further, both of the news and the forward rate in previous periods were not influential in the spot rate.

The studies of macroeconomic news in Thailand include Chinprateep (1998) and Chantaraprapab (2000). Chinprateep (1998) examines the influences of macroeconomic news releases on exchange rate and interest rate using monthly data. The study employs the model similar to Hardouvelis (1988), which estimates the market expectation and the unexpected component using two methods; the autoregressive and vector autoregressive models. The results show that monetary news has the strongest effect on exchange rate and interest rate, whereas only some non-monetary news has significant effects. Furthermore, the results indicate that depreciation (appreciation) of the Baht is accompanied by a decrease (increase) in nominal interest rates. These findings are consistent with the study in the US by Hardouvelis (1988).

Chantaraprapab (2000) extends the previous studies by including the US macroeconomic news into the model of the Baht/U.S. dollar exchange rate determination. The study investigates the response of macroeconomic announcements on exchange rates. The results indicate that macroeconomic news does have an impact on exchange rate; however, the impact could be seen quantitatively small. Exchange rates are more likely to react to news about the state of the economy rather than inflation in the past.

In addition, there are some investigations of news impact on the stock market, but do not focus on scheduled macroeconomic announcements. Deerungroj (1999) investigates whether the asymmetric effects of news exists in the SET index, the individual firms, or beta. The news in this study are defined as the deviations from mean returns of both the market and individual firms, called standardized residual processes with zero means and unit variances. The results indicate that the asymmetric effect appears at the market level, but it is absent in the firm-specific level and in beta.

Another study on news and stock market is investigated by Rimdusit (2000). The study examines the effect of political news on stock volatility and exchange rate volatility, using daily data of the SET index, the SET 50 index and the Baht/US dollar exchange rate. These variables are tested in two methods. The first method is non-

parametric, Wilcoxon test, used to compare the volatility of event day and non-event day. Another method is the model of GARCH (1,1) and GARCH-M to test how good and bad political news affect stock and exchange rate return and whether political news affect stock and exchange rate volatility. The results show that political news affects stock prices as well as exchange rate. Stock prices and exchange rate on the event day are more volatile than non-event day.

2.4 Development of Empirical Model Related to Macroeconomic News

Early studies have investigated macroeconomic news effects on asset prices using ordinary least squares (OLS) estimation. Hardouvelis (1987), (1988), Wassafallen (1989), McQueen and Roley (1993) examines the impact of an unexpected component of news releases on asset prices based on the OLS estimates, i.e.

$$\Delta P_t = a_0 + \sum a_i x_{it}^{u} + \varepsilon_t \quad ; x_{it}^{u} = \text{unexpected component of economic variables}$$

They compute an unexpected component from the difference between the actual macroeconomic series and a survey forecast of the announced series, which provided by Money Market Services (MMS). Recent study of Balduzzi, Elton, and Green (2001) also investigates the impact of macroeconomic announcements on price, trading volumes, and bid-ask spreads of the US treasury bonds using the surprise component from MMS. The MMS data are most commonly used in studies on economic announcement. The properties of the MMS forecast have been investigated and concluded that the MMS forecasts are more accurate than the forecasts produced by autoregressive models by the virtue of lower mean squared errors. However, this procedure is limited for Thailand cases as there is no survey forecast provider in Thailand.

Another way to examine news effect is based on dummy variables on macroeconomic announcement days using OLS regression. For example, Ederington and Lee (1993) focus on the impact of news releases on volatility as follows;

$IR_t - RI = a_t + \sum a_i D_{it} + \varepsilon_t$; D_{it} = dummy variables, where $D_{it} = 1$ if announcement i is made on day t and $D_{it} = 0$ otherwise

They argue that the use of the surprise component can capture the impact of announcements on the level of rates; however, it neither describes the effect on the market volatility nor allows us to capture the relative importance of various announcements. A more complex approaches, as in Jones, Lamont, and Lumsdaine (1998), Bomfim (2003), Kim, Mckenzie, and Faff (2003) are based on GARCH model specification, which is most commonly used model of financial asset return volatility. These studies focus on the news effects on asset volatility by including announcement dummy variables in the variance equation, i.e.

$$R_t = \mu + \varepsilon_t$$

$$h_t = \alpha_0 + \alpha_1 \varepsilon^2_{t-1} + \beta\, h_{t-1} + \alpha_2 D_t ;\ D_t = \text{dummy variables}$$

However, there is little evidence on the investigation of macroeconomic news on risk premium. In addition to the study of volatility, Jones, Lamont, and Lumsdaine (1998) also test whether bonds earn positive risk premiums on macroeconomic announcement dates by adding dummy variables of release dates to the mean equation. They conclude that the results corroborate the basic ARCH-M hypothesis: higher conditional volatility is accompanied by higher expected returns. But this approach is still unable to capture the direct effect between risk premium and volatility and may lead to misspecification. For example, in case that there is no significant impact of macroeconomic news on risk premium under this methodology, it is possible that positive risk premium on announcement dates may be offset by the negative effect on such dates.

Meanwhile, the ARCH-M model, proposed by Engle, Lilien, and Robins (1987), extends the ARCH model by allowing the conditional variance to affect mean. In this way, time-varying risk premium can be captured, where the risk is due to unanticipated movements measured by the conditional variance. As a result, changing conditional variance directly affect the expected return. This resolves many of the empirical

paradoxes. For example, the variables which apparently were useful in forecasting excess returns are correlated with risk premium and lose their significance when a function of conditional variance is included.

This paper therefore employs the bivariate GARCH-M model similar to Arshanapalli, Switzer, and Vezina (2003). The bivariate GARCH-M model allows the conditional return of one asset to be a function of its own variance as well as its covariance with another asset, which seems to be extended further from the univariate GARCH-M model. In addition, this model can capture the effect of variance and covariance risk separately.

To consider the significance of contemporaneous effect of macroeconomic announcements on the stock and bond markets, this paper firstly examines the impact of macroeconomic announcements on the stock and bond markets separately, using the univariate GARCH-M model. Subsequently, this study applies the bivariate GARCH-M model to investigate the impact of macroeconomic news on stock and government bond simultaneously and then compare to test of the news effect on each market separately. If the results indicate the difference in the size/direction of the news effect, it would mean that the bivariate GARCH-M estimation is more appropriate methodology as it considers the contemporaneous effect between the stock and bond markets.

In addition, this study employs the Ordinary Least Square estimation to test the impact of macroeconomic announcements on variance and covariance of bond and stock. This paper also examines whether shock to volatility on macroeconomic announcements have a subsequent impact on daily volatility, similar to Jones, Lamont, and Lumsdaine (1998). If announcement shocks do not persist, it would suggest that the market prices quickly incorporate public information.