A case of the swiss stock market

Finance, Market



1. Introduction

1. 1. Background to the Study

There is a general consensus among financial economists that the distribution of stock returns can be completely described by two moments: (i) the conditional mean; and (ii) the conditional variance (volatility). The conditional mean is the lower moment, which is difficult to predict. In contrast, the conditional variance represents a higher moment, which can be predicted with accurate forecasting techniques (Mandelbrot, 1963; Fama, 1965). Considerable research has been devoted towards the modelling of the conditional mean. However, little attention has been devoted towards modelling the conditional variance or volatility. It was not until the October 1987 stock market crash when researchers and financial market regulators began devoting attention to the modelling of stock market volatility (McMillan et al., 2000). One may be forced to question why there is such an interest in understanding the volatility of stock markets. It is important to note that while stock returns themselves cannot be predicted, their volatility can be predicted. Volatility is a measure of financial risk (Yul, 2002). Tests of market efficiency, which rely on stock returns, must account for heteroskedasticity to be able to arrive at appropriate asymptotic distributions of the test statistic. Furthermore, empirically relevant pricing models typically relate risk premium to the second moments of returns and other processes. Therefore being able to determine the future volatility of the returns on a particular stock can enable investors and regulators to understand the risk inherent in investing in the stock. As such better investment decisions can be made. Volatility is not limited to the equity

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market. In recent years, bond and foreign exchange markets are becoming increasingly volatile thus raising important issues with regards to public policy regarding financial and economic stability (Yul, 2002). Developing accurate models of volatility is a critical input to the process of pricing of financial securities and their derivatives (Bollerslev, 1997). The Black-Scholes Option Pricing Model for example relies heavily on volatility as a key input to the pricing of stock options (Bodie et al., 2007). In addition to its importance in pricing financial assets, volatility is also important for the management of financial risk (Anderson et al., 1999).

Most work on modelling of volatility has been on forecasting the volatility. Most models that attempt to forecast volatility tend to focus on how past stock return volatility can affect future volatility. This has been the case, despite the potential impact that trading volume can have on the volatility of stock prices. Like any asset, demand and supply affects the price of a stock. Subsequently, the level of demand and supply is determined by trading volumes. The higher the trading volume, the higher should be the demand and supply (Yul, 2002). One should therefore expect the price of stock to change much more often if its trading volume is high as opposed to one with a low trading volume. Brailsford (1994) suggests that trading volume should have a positive impact on the volatility of stock returns. Despite the potential impact of trading volume on stock return volatility, substantial effort has not been devoted towards understanding the relationship and its implications of for stock market investments. The objective of this paper is to investigate the relationship between trading volume and stock return volatility in the Swiss Stock market.

1. 2. Objective of the study

This study seeks to analyse the impact of trading volume on stock return volatility in the Swiss Stock market. The study aims at achieving this objective by using a regression model that models changes in volatility as a function of trading volume.

1. 3. Research Questions

Based on the research objective, the following research questions would be answered in the course of this study:

What is the impact of trading volume on the volatility of the Swiss Stock market

What is the impact of trading volume on the returns of the Swiss Stock market

How does the relationship differ across daily, weekly, and monthly stock returns

What is the implication of these findings to investors and stock market regulators

1. 4. Limitations of the Study

The study is limited only to the Swiss Stock market, which means that results cannot easily be generalised to other stock markets. Moreover, the study employs regression analysis, which depends on a number of underlying assumptions such as normality of stock returns; no autocorrelations in stock returns and constant variance across returns. However, in reality, these assumptions may be violated, as such results obtained using regression analysis may be misleading. Finally, the study focuses only on trading volume as a factor that determines stock return volatility. It therefore ignores the possibility that other variables may be at work.

2. Literature Review

Volatility is a topic that has gained tremendous attention from both financial and economic researchers. Most researchers focus on developing models for predicting volatility (e. g., Engle, 1982; Engle and Bollerslev, 1986; Bollerslev, 1990). Some studies have focused on understanding the forecast accuracy of volatility prediction models (e. g., McMillan, 2000; Yu, 2002; Anderson et al., 2003; Anderson et al., 2007). A few studies have focused on the study of the term structure of volatility. Amongst these studies, Peters (1994) suggests that volatility follows a random walk (Brownian motion) and scales with the square root of time. In contrast, Balaban (1995) provides evidence from the Turkish stock market that volatility moves at a faster rate than the square root of time indicating that volatility does not follow a random walk process. Yilmaz (1997) provides results that are somewhat consistent with Peters (1994) in that although the term structure of volatility is not totally consistent with Brownian motion, it exhibits a random walk with the square root of time.

Recent studies have focused on understanding the link between trading volume and stock returns, as well as between trading volume and stock return volatility. Two main hypotheses have been developed and tested in the literature : (i) the " Mixture of Distribution Hypothesis (MDH)"; and (ii) " the Sequential Arrival Information Hypothesis". Both hypotheses provide support for a positive and contemporaneous link between trading volume and absolute return and assume that there are asymmetric effects of price increases and decreases for future contracts (Karpoff, 1987). According to the MDH the value of consequential price change and trading volume are independently distributed from each other (Clark, 1973). This hypothesis has been tested across a number of different stock markets. For example, Lee and Nam (2000) provide evidence in support of the hypothesis using data from the Korean stock market. Likewise positive results have been obtained for the Polish stock market (Bohl and Henke, 2003). In contrast, Luckey (2005) provide evidence that is mixed using data from the Irish stock market.

Ragunathan and Pecker (1997) investigated the relationship between trading volume and price changes in the Australian stock market. The evidence suggests that trading volume has a positive relationship with stock return volatility. This is evidenced from the fact that there is an asymmetric volatility response to unanticipated changes in trading volume. Positive unanticipated changes in trading volume resulted in an average increase in volatility at 76 percent whereas negative unanticipated changes resulted in a smaller volatility response. The foregoing suggests that investors tend to be more responsive to upward movements in stock prices than to downward movements. When the price of a stock increases unexpectedly, most investors tend to believe that the price will continue to rise. By so doing, the volume of trade increases which results to an increase in the volatility of stock returns. There is a strand of research that focuses entirely on the relationship between trading volume and stock returns. Most studies employ Granger Causality tests to determine the link between trading volume and

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stock returns. For example Campbell et al. (1993) observe that price changes that are influenced by high volume tend to be reversed and that the reversal is less severe on days when trading volume is low compared to days when trading volume is high. Blume et al. (1994) argues that past price and trading volume can be used to forecast future prices. Chorida and Swaminathan (2000) analyse the relationship between volume and shortterm returns and conclude that trading volume plays a significant role in propagating a wide range of market information. Some studies have employed the stochastic time-series model for conditional heteroskedasticity to understand whether trading volume contains information about stock returns.

Lamoureux and Lastrapes (1990) employ this model to determine whether there are residual GARCH effects after the conditional volatility specification has been expanded to account for the contemporaneous trading volume. Chen et al. (2001) argues that incorporating the contemporaneous trading volume into the GARCH specification does not result in the elimination of the persistence in volatility. Braisford (1996) observe that regardless of the direction the volatility response was significant across three different measures of trading volume. This shows that there is a strong link between return volatility and trading volume.

3. Methodology and Data Description

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3. 1. Research Methods

3. 1. 1. Linear and Non-Linear Trend in Trading Volume

There have been observations of linear and non-linear trends in trading volume time-series data by Chen et al (2001). This means that to achieve accurate results with the data, the time series need to be detrended using the following model:

= raw trading volume at time t;

and are linear and quadratic time trends, respectively.

3. 1. 2. Unit Root Testing

Most time series models rely on the assumption that time series data is stationary. However, there are situations where this assumption is violated and conducting analysis with non-stationary time-series can result to misleading findings. In order to ensure that the data in this study is stationary, the Augmented Dickey-Fuller Unit root test will be employed. The model for conducting this test can be stated as follows:

3. 1. 3. Trading Volume and Stock Returns

In order to determine whether the stylised facts about stock returns and trading volume fit the data for the Swiss stock market, the contemporaneous correlation will be tested using the following regressions:

- = detrended trading volume
- = stock return.

3. 1. 4. Trading Volume and Stock Returns Fluctuations

In order to test the relationship between trading volume and stock returns this paper employs the analysis used in Chen et al (2001). A Bivariate autoregression models are specified which enable one to determine the Granger Causality between trading volume and returns. The models are stated as follows:

Where = detrended trading volume at time t;

= stock return at time t.

3. 1. 5. Trading Volume and Conditional Volatility

To measure the link between trading volume and volatility, the EGARCH model will be used. Specifically, the following EGARCH (1, 1) specification will be used:

Given that the flow of information to the market cannot be easily observed, trading volume is used as a substitution for information flow. Systematic changes in trading volume could occur as a result of new information into the market:

3. 2. Data Description

The data used for this study will be collected from the Thomson Financial DataStream Database. The data will include trading volume data and stock price data over the five-year period January 2007 to December 2011. The data will observed over three frequencies of observation: (i) daily, weekly, and monthly. The data will be for all listed companies in the Swiss stock market.

4. Conclusion

In conclusion, this research proposal sets the precedence for a research project that would investigate the impact of stock market volatility within Swiss stock markets. A review of existing literature has shown varying findings for stock markets around the world, and the researcher hopes that by conducting a quantitative analysis based on existing findings; using preexisting research methods, such as those of Chen et al (2001), the findings would help stock market investors and regulators better understand how to deal with stock market volatility and better predict earning potentials. This study is however without its limitations, one of which is the difficulties inherent in generalising the results across other stock markets.

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