

# Investor Sentiment and Excess Returns-Empirical Evidences from Taiwan Stock Market

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## Abstract

Under the efficient markets hypothesis (EMH), investors are assumed to be rational and value securities rationally. However, More and more empirical evidences show that investors are not rational all the time. Based upon the study of Lee *et al*(2002), investor sentiment has effects on excess returns of risky assets. We employed the generalized autoregressive conditional heteroscedasticity (GARCH) in-mean model to test the extent to which investor sentiment has impact on Taiwan stock market.

**Keywords:** Behavioral finance, Investor sentiment

## 1. Introduction

Theoretically investors are considered rational under the efficient markets hypothesis (EMH). Rational investors make decisions smartly based on relevant information about the value of securities. Moreover, the prices of securities can quickly and correctly react to the news and then approach to their true values. Sometimes investors do not make decisions rationally, that is to say, most of them trade in a similar way. Consequently, security prices go far above or below their fundamental values, and arbitrageurs would trade against irrational investors to make profits. Finally arbitrageurs would drive prices of securities close to fundamental values. However, the deviation of prices would not last for a long time and the prices finally converge to their intrinsic values. To sum up, in the efficient market, the rational investment behavior keeps the prices of securities incorporated to the relevant information and close to their true values.

However, the EMH has dominated the field of finance for nearly thirty years and it still has to face many empirical findings challenging the theoretical statements. For example, the prominent market crash on October 17 of 1987 in U.S.A. obviously violates the framework of EMH. Observers could not find any apparent news about the markets at that day. Moreover,

based on the study of Cutler *et al* (1991), after World War II in the United States the top fifty one-day volatile of the market index are not found any relevant announcements on most of those days. Furthermore, Wurgler and Zhuravskaya (1999) examine that the prices increase 3.5% on average between 1976 and 1996 when securities are included into the index. Inclusion into the index is obviously not news but stale information that should not makes any price movements under EMH.

Such empirical phenomena against EMH are called as “financial anomalies” or “financial puzzles”. In early papers irrational investor are not being paid much attention. Friedman (1953) and Fama (1965) conclude that irrational trading could be ignored. Because some irrational investors, much more optimistic or pessimistic, would pull the prices of securities away from the fundamental value, at that time rational arbitrageurs would meet them in the market and trade against them to make profit. Finally prices would converge to fundamental values. Besides, Kyle (1985) and Black (1986) call such people who act based on heuristics rather than rationality as “investor sentiment”, “unsophisticated” or “noise trader”.

However, more and more studies show the evidences that irrational investment behavior has influences on the price formation of securities. For example, De Long *et al* (1990) propose a model suggesting that noise traders have influences on price formation of assets and interpret that irrational investors bear noise trader risks and have higher average returns than rational arbitrageurs. Besides, Lee *et al* (2002) employ a generalized autoregressive conditional heteroscedasticity (GARCH) in-mean model (Bollerslev, 1986, 1987; Engle *et al*, 1987) to prove that there are effects of investor sentiment on financial markets in Dow Jones Industries Index, S&P500, and NASDAQ. Their findings show that the conditional volatility and excess returns are affected by investor sentiment. Hence, they also infer that noise

traders' beliefs cause higher market volatility and investors gain much more excess returns.

## 2. The model and data

This study tests the extent to which investor sentiment has impact on Taiwan stock market by GARCH in-mean model of Lee *et al* (2002). We would test the impact of investor sentiment on TAIEX, Taiwan Stock Exchange Capitalization Weighted Stock. TAIEX is the value-weighted index including all listed stocks and is used to evaluate the overall performance of the stock market.

The model and notation are as follows:

$$R_{it}-R_{ft}=\gamma_0+\gamma_1\Box S_t+\gamma_2 h_{it}+\varepsilon_{it} \dots\dots\dots(1)$$

$$h_{it}=\alpha_0+\alpha_1 \varepsilon_{it-1}^2+\alpha_2 \varepsilon_{it-1}^2 (I_{t-1})+\beta_1 h_{it-1} +\psi_1(\Box S_{t-1})^2 D_{t-1}+\psi_2(\Box S_{t-1})^2(1-D_{t-1}) \dots\dots\dots(2)$$

where:

$R_{it}$ : weekly return on market index

$R_{ft}$ : the risk-free interest rate

$h_{it}$ : conditional volatility of market returns

$\Box S_t$ : a measure of noise trader risk

$(\Box S_t = \Box SI_t = SI_t - SI_{t-1}; SI_t$ : sentiment index at t period)

$\varepsilon_{it}$ : residual ;  $\varepsilon_{it} \sim N(0, h_{it})$

$I_{t-1}$ : dummy variable for positive or negative shock

$(I_{t-1}=0, \text{ if } \varepsilon_{t-1} \leq 0, I_{t-1}=1, \text{ if } \varepsilon_{t-1} > 0)$

$D_{t-1}$ : dummy variable for magnitude in investor sentiment

$(D_{t-1}=0, \text{ if } \Box S_{t-1} \leq 0, D_{t-1}=1, \text{ if } \Box S_{t-1} > 0)$

$(1-D_{t-1})$ : dummy variable for direction of shifts in investor sentiment

In the model of Lee *et al* (2002), investor sentiment is used as the sentiment index provided by Investors' Intelligence of New Rochelle in New York. The sentiment index is based on investment recommendations from 135 investment advisory services every week. It can reflect the fluctuations of professional investor sentiment. Unfortunately, there is not similar technical index as sentiment index in Taiwan. However, based upon the finding of Lee and Swaminathan (2000), investor expectations affect not only a stock's returns but also its trading activity. Moreover, past turnover is a measure of fluctuating investor sentiment. Hence, we take trading volume as a proxy for investor sentiment into the model.

The market index, TAIEX, and trading volume are from Securities & Futures Institute and Securities & Futures Institute. The T-Bill yield<sup>1</sup>, obtaining from

<sup>1</sup> 31-90-day T-Bill yield

Central Bank of China (Taiwan), is used as a source for the risk-free interest rate in getting the weekly excess returns. The sample period is from Jan 4, 1990 to Dec 31, 2003.

## 3. The Empirical Results

Table 1

Conditional volatility, excess return, and investor sentiment, Jan 4,1990-Dec 31, 2003 on TAIEX (Trading volume is proxy for investor sentiment.)

Parameter	Estimate	Statistic
$\gamma_0$	-0.065	-26.473***
$\Box S_t$	0.078	15.108***
$h_{it}$	3.424	2.779***
$\alpha_0$	0.0001	3.245***
$\varepsilon_{it-1}^2$	0.123	3.556**
$\varepsilon_{it-1}^2 (I_{t-1})$	-0.040	-1.378
$h_{it-1}$	0.858	27.022***
$(\Box S_{t-1})^2 D_{t-1}$	0.0001	0.373
$(\Box S_{t-1})^2 (1-D_{t-1})$	-0.001	-2.221**

\* significant at 10% level, \*\*\*significant at 5% level ,  
\*\*\* significant at 1% level

From results of Table 1 , we have some findings as followings. First , the conditional volatility and excess returns show positive and significant relationships ( $\gamma_2 > 0$ ). Investors can reward more returns when taking higher risk. Moreover, the investor sentiment has positive and significant influence on excess returns ( $\gamma_1 > 0$ ). The more change in investor sentiment, the higher the excess returns. Finally, the coefficient of  $(\Box S_{t-1})^2(1-D_{t-1})$  is negative and significant( $\psi_2 < 0$ ).  $\psi_2$  shows that bearish shifts in investor sentiment have positive impact on excess returns.

## 4. Discussions

First, the conditional volatility and excess returns show positive and significant relationships ( $\gamma_2 > 0$ ). Investors can reward more returns when taking higher risk. The result seems consistent with CAMP and may imply that the volatility from investor sentiment is systematic risk, not idiosyncratic risk.

Second, the investor sentiment has positive and significant influence on excess returns ( $\gamma_1 > 0$ ). The more change in investor sentiment, the higher the excess returns. The result suggests that investor sentiment affects conditional volatility and excess

returns. This finding supports the conclusion of Lee *et al* (2002). Moreover, it suggests trading volume is suitable to be proxy of investor sentiment and consists with the results of Lee and Swaminathan (2000).

Finally, the coefficient of  $(\Delta S_{t-1})^2(1-D_{t-1})$  is negative and significant ( $\psi_2 < 0$ ).  $\psi_2$  shows that bearish shifts in investor sentiment have negative impact on excess returns. Moreover, trading volume is proxy for investor sentiment. The result implies that bearish shifts in trading volume can earn higher returns. It seems consistent with Momentum Life Cycle (MLC) proposed by Lee and Swaminathan (2000).

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