



How Investor Sentiment and Trading Behavior affect Stocks Return: Analyzing from Taiwan Index Series that Traded on The Main Market

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ABSTRACT

This research concerns how investor sentiment and trading behavior affect stock returns while applied in the different conditions from the same sample stocks. This research uses the daily stock price, the number of shares, and trading volumes of the company that includes in Taiwan 50 index on the study period 2016 to 2020. Then from 50 companies listed during the sample period, the researcher excludes those suffering from the suspension of trading or administrative issues, which leaves 43 companies, then the researcher tries to regrouping the samples into several categories. First, is all sample stocks from the 50 index series. Second, regrouping all sample stocks into three group sectors includes electronic, finance, and traditional sectors. Third, the researcher categorizes the same sample stocks into high, middle, and low foreign shareholding. The method of this quantitative causality research is multiple linear regression (MLR). Meanwhile, based on the research results it can be concluded that a large market capitalization on the criteria for grouping a company, can't be the only standard in determining the influence between variables, because there are other factors that can affect the results of the study.

Keywords: Investor sentiment, Stocks return, Taiwan index series, Trading behavior

INTRODUCTION

Taiwan is a developing country with fairly rapid development, which can be known from the market in some sectors in Taiwan that are very volatile. A small island that is so densely populated and with high mobility, resulting in the trading of the Taiwan capital market, is quite speculative and can affect the change in the stock price quite significantly. Although the business cycle in Taiwan also determines the price of stocks in a variety of sectors, in fact, deviations from the fundamental side also sometimes occur, which impact investor sentiment and behavior. Many research discusses sentiment investors, trading behavior, and how it affects the rate of return and market movement. On the other hand, the sentiment and behavior of investors are also largely influenced by the economic condition of a country, and the issue is occurring. This study will be more detailed in discussing the case relating to the change of investor sentiment and behavior, where we know that the company listed on the Exchange companies is divided into several sectors.

In contrast, different sectors have a difference of influence on the issue is happening. So that most likely, some sectors that are sensitive to the issues that occur become one consideration of the investors in managing their portfolio. Nevertheless, in this research considers the investor in choosing the stock became the focal point of the researcher in knowing whether the psychology also affects how the investor's pattern in determining the gap or opportunity to gain

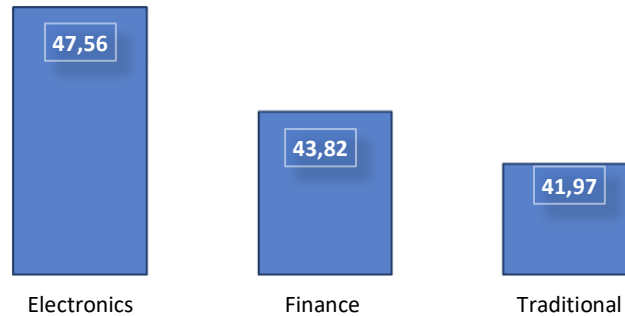
profit in investing or even the consequences of this investor's behavior can also move the market or we can call aggressive market. Psychological traits and personal characteristics thus encourage retail investors to become *noise traders*, trading according to historical noise rather than fundamental data, causing inefficiency in the trading process (Yu, Huang, & Hsu, 2014).

According to (Baker & Wurgler, 2006), define investor sentiment as optimism or pessimism about stocks in general and point out that sentiment-based mispricing is based on both an uninformed demand shock and a limited arbitrage. Based on research (Brown & Cliff, 2005), they argue that sentiment is most likely a very persistent effect so that demand shocks of uninformed noise traders may be correlated over time to give rise to strong and persistent mispricings. Investor behavior in the stock market refers to the research (Chiang, Tsai, & Lee, 2011), proving that buy-sell imbalance (BSI) can be present with signals of trading needs.

This research focuses on 50 sample companies as a benchmark for ETF that belongs to the category FTSE TWSE Taiwan 50 Index Series, exclude from the suspension of trading or administrative issues, and leaves 43 companies, then divided into 3 groups sector, to see the effect of each sector on the sentiment and trading behavior based on the sample of selected companies that have superior market capitalization. Where we know that the FTSE TWSE Taiwan Index Series consists of the companies that trade on the main market - Taiwan Stock Exchange. The FTSE TWSE Taiwan 50 Index consists of the largest 50 companies by full market value or in other statement a company will be inserted at the periodic review if it rises above the position stated below for the relevant index when the eligible securities for the FTSE TWSE Taiwan Index Series are ranked by market value (FTSE TWSE Taiwan 50 Index - Risen to 40th or above), and a company will be deleted at the periodic review if it falls below the position stated below for the relevant index when the eligible securities for the FTSE TWSE Taiwan Index Series are ranked by market value (FTSE TWSE Taiwan 50 Index - Fallen to 61st or below) based on the ground rules of FTSE russell (2020). As the previous descriptions for this research is use daily stock price of the company that includes in Taiwan index series that trade on the main market and trading volumes classified by the three investor groups from 2017 to 2020. From 50 companies listed during the sample period, the researcher excludes those suffering from the suspension of trading or administrative issues, which leaves us with 43 companies.

The use of the Taiwan 50 Index series because the researchers want to know how the index works in categorize stocks in the Taiwan stocks exchange. On the other hand, researchers want to know the sentiment and behavior of Investors in influencing the rate of return and aggressiveness of the market. This research use daily stock price, trading volume, and number of shares that retrieved from TEJ data stream to construct the component of sentiment. Referring to the research (Ryu, Kim, & Yang, 2017) to construct the comprehensive sentiment index for each company, researcher use the following four daily proxies capturing market sentiment and expectations: relative strength index (RSI), psychological line index (PLI), the logarithm of trading volume (LTV) and adjusted turnover rate (ATR). The following are the sentiment of several sector, which included the Taiwan 50 Index.

SENTIMENT



Graph 1 Sentiment during period 2017-2020

Based on the graph above, it can be seen that during the research period, the electronic sector shows the highest sentiment. It means that outside of the assessment of the various factors that may affect it, the electronic sector remains the main choice for investing in different economic conditions when viewed from an industrial resilience perspective, then followed by various other sectors.

On the other hand, to construct the investor trading behavior index, the researcher uses the buy and sell trading imbalance (BSI) of the individual company, which indicates the net investor demands on individual stocks. According to (Chiang et al., 2011), The BSI indicates investor needs and predicts the dynamics of future trading needs and prices. Thus, when a certain group of investors has a significant buy-sell imbalance, it can affect future returns based on trading needs, and different investors can speculate information from other investors and mimic their actions. To determine the trading behavior of investor, this research uses two groups of the investor as a comparison, there are foreign institutional investor and domestic institutional investor, which can be used to determine buy-sell imbalance of each sectors. Then to obtain BSI data, researchers used raw data in the form of buy volume and sell volume, which was then used to determine the BSI of each group of investors.

Research questions

Based on the above background, the study questions could be composed as follows:

- Does investor sentiment ($S_{i,t}$) affect stocks return, analyzing from Taiwan index series that trade on the main market?
- Does buy-sell imbalance for the foreign institutional investor ($BSI_{For_{i,t}}$) affect stocks return, analyzing from Taiwan index series that trade on the main market?
- Does buy-sell imbalance for domestic institutional investor ($BSI_{Insti_{i,t}}$) affect stocks return, analyzing from Taiwan index series that trade on the main market?
- Does volatility ($Vol_{i,t}$) affect stocks return, analyzing from Taiwan index series that trade on the main market?
- Does firm size ($Size_{i,t}$) affect stocks return, analyzing from Taiwan index series that trade on the main market?

- f. Does book to market ($BM_{i,t}$) affect stocks return, analyzing from Taiwan index series that trade on the main market?
- g. Does debt to equity ratio ($DER_{i,t}$) affect stocks return, analyzing from Taiwan index series that trade on the main market?
- h. Does return on asset ($ROA_{i,t}$) affect stocks return, analyzing from Taiwan index series that trade on the main market?
- i. Does cash flow ($CF_{i,t}$) affect stocks return, analyzing from Taiwan index series that trade on the main market?

The coherency between variables

Sentiment and stocks return

The causality effect makes sentiment inseparable from stocks return because the greater investor sentiment, the greater movement of stocks return. Moreover, when it is in a very competitive market, it also will create market equilibrium and increase market aggressiveness. Consistent with the research from (Brown & Cliff, 2005), that argue sentiment is most likely a very persistent effect so that demand shocks of uninformed noise traders may be correlated over time to give rise to strong and persistent mispricings. In other side Investor sentiment assumes that traders are subject to periods of optimism and pessimism and that their optimism (pessimism) will influence the way information is perceived even though there is no fundamental difference in the information content. Investor sentiment expands traditional asset pricing theory with two new assumptions. The first assumption is that investors are subject to sentiment. This assumption is based on the research done on noise traders. The second assumption is that betting against sentimental investors is a costly and risky affair. This assumption is based on the limits of arbitrage theory (Baker & Wurgler, 2006). Based on several previous literature, according to (Schmeling, 2009), the research result stated that there is a significant effect of sentiment on returns for small but not for large stocks and also consumer confidence remains a statistically and economically significant predictor of returns. This is directly proportional to the research of (Anusakumar, Ali, & Wooi, 2017) who stated that Sentiment appears to be positively related to stock returns. While (Ryu, Kim, & Yang, 2017) stated that sentiment coefficients are significantly positive irrespective of the models used. Then from several previous literature above we can construct the hypothesis as follows.

H1: Investor sentiment ($S_{i,t}$) affect significantly to the stocks return

This constructed hypothesis was developed to find out whether the results of this application will be in line with previous studies which also showed significant results when applied to this study which observed market sentiment based on the Taiwan 50 index, so that later it can be used as reference material in further research.

Buy-sell imbalance and stocks return

The buy-sell imbalance can be reflected as a trading behavior where the behavior can be seen from many types of investors, which can be ascertained that it has a significant effect on the stocks return. In this research, the buy-sell imbalance is divided into two types of investors. There are buy-sell imbalance for the foreign institutional investor ($BSI_{For_{i,t}}$), and buy-sell imbalance for domestic institutional investor ($BSI_{Insti_{i,t}}$). As stated by (Chiang et al., 2011), The BSI indicates investor needs and predicts the dynamics of future trading needs and prices. Thus, when a certain group of investors has a significant buy-sell imbalance, it can affect future returns based on correlation of trading needs, and different investors can speculate information from other investors and mimic their actions. According to (Ryu, Kim, & Yang, 2017) the

research result stated that the BSI coefficients of domestic institutions (BSI_Insti) and foreign institutions (BSI_For) are significantly positive for both daily and monthly estimations. In contrast, the BSI coefficients of domestic individuals (BSI_Indi) are always negative. Then from the previous literature above we can construct several hypothesis as follows.

H2: Buy-sell imbalance for foreign institutional investor ($BSI_For_{i,t}$) affect significantly to the stocks return.

H3: Buy-sell imbalance for domestic institutional investor ($BSI_Insti_{i,t}$) affect significantly to the stocks return.

Control variables and stocks return

Control variables refer to variables or contributing factors that are fixed or eliminated in order to clearly identify the relationship between an independent variable and a dependent variable, where in this study the control variables are volatility ($Vol_{i,t}$), firm size ($Size_{i,t}$), book to market ($BM_{i,t}$), debt to equity ratio ($DER_{i,t}$), return on asset ($ROA_{i,t}$), and cash flow ($CF_{i,t}$). Firstly, volatility is a statistical measure of the dispersion of returns for a given security or market index. In most cases, the higher the volatility, the riskier the security. Second, if we learn about size, this measure the total market value of the securities in a fund. It can also be referred to as assets under management. Third, is about the book to market ratio, that we can said that it used to compare a company's net asset value or book value to its current or market value. If the market value of a company is trading higher than its book value per share, it is considered to be overvalued. If the book value is higher than the market value, analysts consider the company to be undervalued. The fourth is the debt to equity ratio, which is used to evaluate a company's financial leverage. It is a measure of the degree to which a company is financing its operations through debt versus wholly-owned funds. Fifth, Return on Assets (ROA) measure as an indicator of how well a company utilizes its assets, by determining how profitable a company is relative to its total assets. The last one of the control variable that we use is cash flow, where cash flows refer to the operational turnover of a business and its ability to generate revenues. Thats the brief explanation of the control variable that used in this research. As well as the control variable mentioned in this study, according to (Palm, 2019) for the sorted portfolios there are significant positive estimates for Size_5, Vol_1, Vol_5, Profit_1 after a high-sentiment day. This might be indicative of the herding effects seen in previous regression results, since all statistically significant estimates are positive. Then from the previous literature above we can construct several hypothesis as follows.

H4: Volatility ($Vol_{i,t}$) affect significantly to the stocks return.

H5: Firm size ($Size_{i,t}$) affect significantly to the stocks return.

H6: Book to market ($BM_{i,t}$) affect significantly to the stocks return.

H7: Debt to equity ratio ($DER_{i,t}$), affect significantly to the stocks return.

H8: Return on asset ($ROA_{i,t}$), affect significantly to the stocks return.

H9: Cash flow ($CF_{i,t}$) affect significantly to the stocks return.

Research methods

This research uses the daily stock price of the company that includes in Taiwan index series that trade on the main market and trading volumes classified by the three investor groups from 2017 to 2020. From 50 companies listed during the sample period, the researcher excludes those suffering from the suspension of trading or administrative issues, which leaves us with 43

companies, then divided into 3 groups sector, to see the effect of each sector on the sentiment and trading behavior based on the sample of selected companies that have superior market capitalization.

Research variable operations

In this study, the response (dependent) variable is the stocks return, the explanatory (independent) variables in this study are sentiment ($S_{i,t}$), buy-sell imbalance for the foreign institutional investor ($BSI_For_{i,t}$), and buy-sell imbalance for domestic institutional investor ($BSI_Insti_{i,t}$), and the control variables are volatility ($Vol_{i,t}$), firm size ($Size_{i,t}$), book to market ($BM_{i,t}$), debt to equity ratio ($DER_{i,t}$), return on asset ($ROA_{i,t}$), and cash flow ($CF_{i,t}$).

Constructing the investor sentiment index

According to (Ryu, Kim, & Yang, 2017) to construct the comprehensive sentiment index for each individual company, they use the following four daily proxies capturing market sentiment and expectation. In this research we are also use two principal component analysis (PCA) that are the first and the second principal component analysis (PCA) for isolate the common component for each stock in the sample.

Relative strenght index (RSI)

The relative strength index (RSI), developed by J. Welles Wilder, is a momentum oscillator that measures the speed and change of price movements. The RSI oscillates between zero and 100. Traditionally the RSI is considered overbought when above 70 and oversold when below 30. Signals can be generated by looking for divergences and failure swings. RSI can also be used to identify the general trend. According to (Ryu, Kim, & Yang, 2017) RSI gauges the overbought (80 and above) or oversold (20 or below) market condition. The calculation for the RSI is presented in equation (1).

$$RSI_{i,t} = \left[\frac{RS_{i,t}}{1+RS_{i,t}} \right] \times 100, \text{ where } RS_{i,t} = \frac{\sum_{k=0}^{13} \max(0, P_{i,t-k} - P_{i,t-1-k})}{\sum_{k=0}^{13} \max(0, P_{i,t-1-k} - P_{i,t-k})} \quad (1)$$

Psychological line index (PLI)

The psychological line index is the indicator of the number of rising periods over the total number of periods. Being a technical oscillator, the psychological line fluctuates between the range 0 and 100. If the indicator is above 50, buyers dominate the market and also the overall sentiment is believed to be bullish. And, if the reading is below 50, sellers are in control of the market and the overall sentiment and it is bearish. According to (Ryu, Kim, & Yang, 2017) PSY captures the psychological stability of investors, and also measures the overbought (75 and above) or oversold (25 or below) market condition. Both RSI and PSY move on a scale from 0 to 100. The calculation for the PLI is presented in equation (2).

$$PLI_{i,t} = 100 \times \sum_{k=0}^{11} \left\{ \frac{\max(0, P_{i,t-k} - P_{i,t-1-k})}{P_{i,t-k} - P_{i,t-1-k}} \right\} / 12 \quad (2)$$

The logarithm of trading volume (LTV)

The LTV is defined as the logarithm of the trading volume, with a large trading volume indicates positive sentiment and a small trading volume indicates negative sentiment. This is based on the assumption that optimistic, irrational investors are more likely to invest, and thus add liquidity, when sentiment is high, but not sell, when sentiment is low (Baker & Stein, 2004).

According to (Ryu, Kim, & Yang, 2017) LTV reflects investors' various opinions on each individual stock. The calculation for the LTV is presented in equation (3).

$$LTV_{i,t} = \ln(V_{i,t}) \quad (3)$$

Adjusted turnover rate (ATR)

The ATR measure of liquidity that based on the turnover rate, as employed by (Baker & Wurgler, 2006). The ATR is able to distinguish between optimistic and pessimistic sentiment (optimistic sentiment when positive, pessimistic sentiment when negative). According to (Ryu, Kim, & Yang, 2017) ATR is used to determine whether investors are optimistic or pessimistic. The positive (negative) ATR value under positive (negative) stock returns indicates a bullish (bearish) market state. The calculation for the ATR is presented in equation (4).

$$ATR_{i,t} = \left[\frac{V_{i,t}}{\#of\ shares\ outstanding_{i,t}} \right] \times \left[\frac{R_{i,t}}{|R_{i,t}|} \right], \text{ where } R_{i,t} = \ln \left(\frac{P_{i,t}}{P_{i,t-1}} \right) \quad (4)$$

Principal component analysis (PCA)

A PCA is done to reduce the dimensionality of a data set that consists of many interrelated variables, while retaining as much of the variation as possible in the data set. This is done by an orthogonal transformation to a new set of uncorrelated variables, the principal components, which are ordered so that the first couple retain as much of the variation as possible present in the original variables (Jolliffe, 2002). In this thesis, principal component analysis is done with the first and the second principal component analysis (PCA) to isolate the common component of the chosen sentiment indicators for each stock in the sample.

F = Composite Investor Sentiment Index based on the first and the second principal component analysis (PCA) of each company.

This is done by extracting the first and the second component from the principal component analysis, which has been computed in the following equation (5).

The investor sentiment indicator ($S_{i,t}$) :

$$S_{i,t} = ((F_{i,1} \times RSI_{i,t}) + (F_{i,2} \times RSI_{i,t})) + ((F_{i,1} \times PLI_{i,t}) + (F_{i,2} \times PLI_{i,t})) + ((F_{i,1} \times LTV_{i,t}) + (F_{i,2} \times LTV_{i,t})) + ((F_{i,1} \times ATR_{i,t}) + (F_{i,2} \times ATR_{i,t})) \quad (5)$$

According to (Anusakumar, Ali, & Wooi, 2017) sentiment appears to be positively related to stock returns. Specifically, there is significant and positive relationship between stock specific sentiment and returns for all eight countries and for overall sample.

Constructing the buy-sell imbalance

Considering the trading motive, sentiment level, information processing abilities, and other characteristics exhibit unique patterns across investor groups, the buy-sell imbalance or in this research used for identify the investor trading behavior, divides into two investor types: foreign institutional investor, and domestic institutional investor. According to (Ryu, Kim, & Yang, 2017) to construct the investor trading behavior index, they use the buy and sell trading imbalance (BSI) of the company, which indicates the net investor demands on individual stocks, which has been computed in the following equation (6).

$$BSI_{i,t} = (BV_{i,t} - SV_{i,t}) / (BV_{i,t} + SV_{i,t}) \quad (6)$$

According to Ryu, Kim, and Yang (2017), the BSI coefficients of domestic institutions (BSI_Insti) and foreign institutions (BSI_For) are significantly positive for both daily and monthly estimations. In contrast, the BSI coefficients of domestic individuals (BSI_Indi) are always negative.

Here, $BV_{i,t}(SV_{i,t})$ denotes the volume of total buy(sell) trades for stock i on day t :

- a) if $BV_{i,t} > 0$ indicates that stock i is overbought.
- b) if $BV_{i,t} < 0$ indicates that stock i is oversold.

Then to combined effects of sentiment, buy-sell imbalance, volatility, firm size, book to market, debt to equity ratio, return on asset and cash flow on the investor sentiment, trading behavior and stock return should be as the following regression (7).

$$R_{i,t} - R_{ft} = \beta_0 + \beta_1 \times Sentiment_{i,t} + \beta_2 \times BSI_For_{i,t} + \beta_3 \times BSI_Fund_{i,t} + \beta_4 \times BSI_Dealer_{i,t} + \beta_5 \times Vol_{i,t} + \beta_6 \times Size_{i,t} + \beta_7 \times BM_{i,t} + \beta_8 \times DER_{i,t} + \beta_9 \times ROA_{i,t} + \beta_{10} \times CF_{i,t} + e_{i,t} \quad (7)$$

In this research, $R_{i,t}$ and R_{ft} are returns on individual stock i and risk-free rate at time t , where the risk free rate was represented by bank of Taiwan's (BOT) time deposit 1 year that retrieved from the interest rate (daily) section of TEJ. BSI_For and BSI_Insti denote the BSI indicators for a foreign institutional investor, and domestic institutional investor. Vol , $Size$, BM , DER , ROA , and CF denote the stock return volatility, firm size, book to market ratio, debt to equity ratio, return on assets, and cash flow. Specifically, volatility is measured as the variance of the return, size is the natural logarithm of the total asset, BM is the ratio of book to market values of common equity, DER is the ratio of debt to equity, ROA is the ratio of return on asset, and CF is stands for the ratio of cash flow.

Data analysis method

The method of this quantitative causality research is multiple linear regression (MLR). Multiple linear regression described as an economic model with more than one explanatory variable into its corresponding econometric model (Griffiths, Hill, & Lim, 2012). this research model originated from simple regression model, there are slight changes in the interpretation of the β parameters, the degrees of freedom for the t -distribution will change, and need to modify the assumption concerning the characteristics of the explanatory (x) variables. In a general multiple regression model, a dependent variable y is related to a number of explanatory variables $x_2, x_3, \dots, x_k$ through a linear equation that can be written as equation (8).

$$y = \beta_1 + \beta_2 x_2 + \beta_3 x_3 + \dots + \beta_k x_k + e \quad (8)$$

Regression analysis is a tool for describing and evaluating the relationship between a given variable, the dependent variable, and one or more other variables. The goal of regression analysis is to produce coefficients for the independent variables. These coefficients serve as estimates that bring the values predicted from the regression equation as close as possible to the values obtained by measurement. In this research, the analysis process was divided into two models, namely the model without and with control variables. This is intended to see the role and function of control variables in the model. In the data analysis process, this research uses 3 testing models, namely the pooled model or in this chapter described as common effect model (CEM), the fixed effect model (FEM) and the random effect model (REM). These three models

provide different analysis results due to different assumptions made in the test. Therefore, in order to determine the best model to be used, it is necessary to do a model comparison test using the likelihood or chow test, hausman test and lagrange multiplier (LM) test.

Results and analysis

Electronic sector

Based on the regression comparison that applied to the electronic sector and tested with daily and monthly data, the sentiment in the electronic sector shows a positive influence, which means that the electronic sector is one of the choices in investing, considering that this sentiment variable is measured by two types of oscillators, trading volume and turnover rate, sentiment variables are solid constructions in reflecting the psychology of investors in choosing stocks in certain companies. While trading behavior which is proxied by buy-sell imbalance on the foreign institutional investor and domestic institutional investor, both of them shows a positive effect on the return on the daily and monthly data. This is contrary to the result of the control variables, because of the inconsistency of the result, it can be concluded that the control variables reflect a weak influence on returns. Then in research conducted in the electronics sector, testing using sentiment indicators and trading behavior more accurately shows consistent result than the control variable, so it can be said that the control variable does not have a big influence on return. In other testing results, the magnitude of the influence in the explanatory variable can be seen in the result of adjusted R square that shows the number that close to 1. Due to its a positive effect result on the sentiment dan trading behavior indicator, this electronic sector is assumed to have the potential factor to promote better economic stability. As we know that Taiwan is a country that is in the field of electronics very rapidly developing and is one of the largest contributors of GDP in Taiwan. The result can be seen in the table 1.

Finance sector

After carrying out the testing phase on a sample of the financial sector which is included in the Taiwan Index 50, it can be seen that the sentiment indicator on daily data testing shows a positive effect, but when testing with monthly data shows that sentiment has a negative effect. It can be assumed that daily data has a high accuracy is better than monthly data, because the sentiment measurement is based on changes in the every day stock prices. So, it can be said that in the financial sector, positive sentiment is shown in daily data, while monthly data on the financial sector shows negative sentiment, this case could happen when it is assumed that investors have the tendency to trade short term rather than long term so that outcome is very likely. Meanwhile, on the buy-sell imbalance for foreign institutional investor indicator, the financial sector whether tested using daily or monthly data, still shows a negative effect on returns, this shows that the tendency of foreign institutional investors in the financial sector is less aggressive than the electronic sector. This is also reflected in other test results such as the buy-sell imbalance for domestic institutional investor on daily data, book to market value on daily and monthly data, return on assets and cash flow which show a negative effect, and instead have a positive impact on debt to equity ratio, that the debt to equity ratio should be better if it is negative, because this can show the company's internal strength in controlling its debt, and also from the result of the adjusted R square which is far from 1 and close to 0, this is also reflects the small effect of the explanatory variables on the returns when testing in the financial sector. Some of these assumptions from the results of this test indicate that, even though volatility and firm size have a positive effect on returns, on the other hand, the financial sector generally is a sector that is quite high risk because this sector is a sector that is volatile or can be said that it is to be quite sensitive to economic issues or in other words when there is a change in the economic conditions of the financial sector it will show instability. So it is true, if investor

sentiment and trading behavior do not show a positive effect, because in general investors do not place the financial sector as the main choice for investing. The result can be seen in the table 2.

Traditional sectors

This sector grouping separates companies based on the types of companies that are not classified as electronic and financial. It can grouped as traditional sector because this sector has a fairly high level of stability, in terms of this is the good sector choices in investing both short-term and long-term investments, because this sector can be said to be a fairly safe sector because it is classified in defensive stocks. Defensive stocks are stocks that are not too affected by a weak economic or business situation. This type of stock includes shares in public utilities, industrial and consumer goods companies that produce or market raw materials such as food, beverages or medicines. Defensive stocks are usually used by more aggressive investors. Investors who choose this type of stock generally to wait for a period when the economy is still weak, until the investment situation improves. This can be reflected in the results of testing the effect of sentiment and trading behavior on returns on monthly and daily data studies that show a positive effect. As previously said, the positive sentiment shown in this sector shows the stable existence of this type of defensive stock. Even though the control variable shows inconsistency of the significant value, the adjusted R square value which is close to 1 shows that the explanatory variable has a big influence on the return. The result can be seen in the table 3.

Table 1. Result of electronic sector

	Intercept	Sentiment	BSI_For	BSI_Insti	Vol	Size	BM	DER	ROA	CF	adj R ²
Daily	-9.733181 (0.0000)	0.000200 (0.0000)	0.015418 (0.0000)	0.004604 (0.0000)	2.415381 (0.0034)	0.455676 (0.0000)	-1.275799 (0.0000)	-0.000200 (0.0013)	-0.002040 (0.0000)	-0.000226 (0.0001)	0.210722
Monthly	-9.416042 (0.0000)	0.001108 (0.0000)	0.067137 (0.0001)	0.010956 (0.0136)	1.636899 (0.0000)	0.433828 (0.0000)	-2.359854 (0.0000)	0.000407 (0.2723)	-0.003743 (0.0134)	-0.000365 (0.2780)	0.264278

**The shown significant value and adjusted R² above are tested using fixed effect model*

(Source: data processing results)

Table 2. Result of finance sector

	Intercept	Sentiment	BSI_For	BSI_Insti	Vol	Size	BM	DER	ROA	CF	adj R ²
Daily	-1.034571 (0.0000)	0.000734 (0.0000)	-0.026232 (0.0000)	-0.009198 (0.0000)	9.793402 (0.0000)	0.507750 (0.0000)	-1.734812 (0.0000)	0.001323 (0.0000)	-0.173043 (0.0000)	-0.010309 (0.0000)	0.037591
Monthly	-1.490625 (0.0000)	-0.000396 (0.0073)	-0.000805 (0.0000)	0.008557 (0.0189)	0.002145 (0.0000)	0.026407 (0.0011)	-0.272491 (0.0000)	0.037172 (0.0000)	-0.054898 (0.0000)	-0.001607 (0.0000)	0.090201

**The shown significant value and adjusted R² above are tested using random effect model*

(Source: data processing results)

Table 3. Result of traditional sector

	Intercept	Sentiment	BSI_For	BSI_Insti	Vol	Size	BM	DER	ROA	CF	adj R ²
Daily	-3.017993 (0.0000)	0.000899 (0.0000)	0.016244 (0.0000)	0.003125 (0.0002)	-1.469396 (0.0011)	0.084272 (0.0000)	-0.893364 (0.0000)	0.007821 (0.0000)	-0.033157 (0.0000)	0.052495 (0.0000)	0.617233
Monthly	-1.145308 (0.0000)	0.001953 (0.0000)	0.043864 (0.0048)	0.015359 (0.0011)	-2.736466 (0.0000)	0.336477 (0.0000)	-2.271276 (0.0001)	0.006323 (0.0000)	-0.036102 (0.0000)	0.048494 (0.0000)	0.658319

**The shown significant value and adjusted R² above are tested using random effect model*

(Source: data processing results)

Hypothesis testing

In this study, the estimation test was applied into three groups of corporate sectors, including the electronic, financial, and traditional sectors. Where these three sectors are treated equally, namely the hypothesis testing, which in this hypothesis testing is carried out to determine the significance of the effect of each variable. That variables are the stocks return as dependent variable, sentiment ($S_{i,t}$), buy-sell imbalance for the foreign institutional investor ($BSI_For_{i,t}$), and buy-sell imbalance for domestic institutional investor ($BSI_Insti_{i,t}$) as the independent variable and ($Vol_{i,t}$), firm size ($Size_{i,t}$), book to market ($BM_{i,t}$), debt to equity ratio ($DER_{i,t}$), return on asset ($ROA_{i,t}$), and cash flow ($CF_{i,t}$) as the control variables. This equal treatment is applied to determine the difference in the of various variables used in each sector represented by a sample of companies that have superior market capitalization. Whether these three sectors are treated with the equal test will also show the equal result on the significance of the influence between variables or even vice versa which may not be in accordance with the expectations.

Electronic sector t test

To determine the significant decision, it can be seen in the probability value < 0.05 . From the data of electronic sector the result can be seen on the table 2 and table 3 as follows.

Table 2. Electronic sector t test daily result

Hypothesis	Sig. value	Probability	Conclusion
$Sentiment_{i,t}$ has a positive significant effect on $R_{i,t} - R_{ft}$	0.0000	0.05	H1 Accepted
$BSI_For_{i,t}$ has a positive significant effect on $R_{i,t} - R_{ft}$	0.0000	0.05	H2 Accepted
$BSI_Insti_{i,t}$ has a positive significant effect on $R_{i,t} - R_{ft}$	0.0000	0.05	H3 Accepted
$Vol_{i,t}$ has a positive significant effect on $R_{i,t} - R_{ft}$	0.0034	0.05	H4 Accepted
$Size_{i,t}$ has a positive significant effect on $R_{i,t} - R_{ft}$	0.0000	0.05	H5 Accepted
$BM_{i,t}$ has a negative significant effect on $R_{i,t} - R_{ft}$	0.0000	0.05	H6 Accepted
$DER_{i,t}$ has a negative significant effect on $R_{i,t} - R_{ft}$	0.0013	0.05	H7 Accepted
$ROA_{i,t}$ has a negative significant effect on $R_{i,t} - R_{ft}$	0.0000	0.05	H8 Accepted
$CF_{i,t}$ has a negative significant effect on $R_{i,t} - R_{ft}$	0.0001	0.05	H9 Accepted

(Source: data processing results)

Table 3. Electronic sector t test monthly result

Hypothesis	Sig. value	Probability	Conclusion
$Sentiment_{i,t}$ has a positive significant effect on $R_{i,t} - R_{ft}$	0.0000	0.05	H1 Accepted
$BSI_For_{i,t}$ has a positive significant effect on $R_{i,t} - R_{ft}$	0.0000	0.05	H2 Accepted
$BSI_Insti_{i,t}$ has a positive significant effect on $R_{i,t} - R_{ft}$	0.0136	0.05	H3 Accepted
$Vol_{i,t}$ has a positive significant effect on $R_{i,t} - R_{ft}$	0.0000	0.05	H4 Accepted
$Size_{i,t}$ has a positive significant effect on $R_{i,t} - R_{ft}$	0.0000	0.05	H5 Accepted
$BM_{i,t}$ has a negative significant effect on $R_{i,t} - R_{ft}$	0.0000	0.05	H6 Accepted
$DER_{i,t}$ has no effect on $R_{i,t} - R_{ft}$	0.2723	0.05	H7 Rejected
$ROA_{i,t}$ has a negative significant effect on $R_{i,t} - R_{ft}$	0.0134	0.05	H8 Accepted
$CF_{i,t}$ has no effect on $R_{i,t} - R_{ft}$	0.2780	0.05	H9 Rejected

(Source: data processing results)

Finance sector t test

To determine the significant decision, it can be seen in the probability value < 0.05 . From the data of finance sector the result can be seen on the table 4 and table 5 as follows.

Table 4. Finance sector t test daily result

Hypothesis	Sig. value	Probability	Conclusion
<i>Sentiment</i>_{<i>i,t</i>} has a positive significant effect on $R_{i,t} - R_{ft}$	0.0000	0.05	H1 Accepted
<i>BSI_For</i>_{<i>i,t</i>} has a negative significant effect on $R_{i,t} - R_{ft}$	0.0000	0.05	H2 Accepted
<i>BSI_Insti</i>_{<i>i,t</i>} has a negative significant effect on $R_{i,t} - R_{ft}$	0.0000	0.05	H3 Accepted
<i>Vol</i>_{<i>i,t</i>} has a positive significant effect on $R_{i,t} - R_{ft}$	0.0000	0.05	H4 Accepted
<i>Size</i>_{<i>i,t</i>} has a positive significant effect on $R_{i,t} - R_{ft}$	0.0000	0.05	H5 Accepted
<i>BM</i>_{<i>i,t</i>} has a negative significant effect on $R_{i,t} - R_{ft}$	0.0000	0.05	H6 Accepted
<i>DER</i>_{<i>i,t</i>} has a positive significant effect on $R_{i,t} - R_{ft}$	0.0000	0.05	H7 Accepted
<i>ROA</i>_{<i>i,t</i>} has a negative significant effect on $R_{i,t} - R_{ft}$	0.0000	0.05	H8 Accepted
<i>CF</i>_{<i>i,t</i>} has a negative significant effect on $R_{i,t} - R_{ft}$	0.0000	0.05	H9 Accepted

(Source: data processing results)

Table 5. Finance sector t test monthly result

Hypothesis	Sig. value	Probability	Conclusion
<i>Sentiment</i>_{<i>i,t</i>} has a negative significant effect on $R_{i,t} - R_{ft}$	0.0073	0.05	H1 Accepted
<i>BSI_For</i>_{<i>i,t</i>} has a negative significant effect on $R_{i,t} - R_{ft}$	0.0000	0.05	H2 Accepted
<i>BSI_Insti</i>_{<i>i,t</i>} has a positive significant effect on $R_{i,t} - R_{ft}$	0.0189	0.05	H3 Accepted
<i>Vol</i>_{<i>i,t</i>} has a positive significant effect on $R_{i,t} - R_{ft}$	0.0000	0.05	H4 Accepted
<i>Size</i>_{<i>i,t</i>} has a positive significant effect on $R_{i,t} - R_{ft}$	0.0011	0.05	H5 Accepted
<i>BM</i>_{<i>i,t</i>} has a negative significant effect on $R_{i,t} - R_{ft}$	0.0000	0.05	H6 Accepted
<i>DER</i>_{<i>i,t</i>} has a positive significant effect on $R_{i,t} - R_{ft}$	0.0000	0.05	H7 Accepted
<i>ROA</i>_{<i>i,t</i>} has a negative significant effect on $R_{i,t} - R_{ft}$	0.0000	0.05	H8 Accepted
<i>CF</i>_{<i>i,t</i>} has a negative significant effect on $R_{i,t} - R_{ft}$	0.0000	0.05	H9 Accepted

(Source: data processing results)

Traditional sector t test

To determine the significant decision, it can be seen in the probability value < 0.05 . From the data of traditional sector the result can be seen on the table 6 and table 7 as follows.

Table 6. Traditional sector t test daily result

Hypothesis	Sig. value	Probability	Conclusion
<i>Sentiment</i>_{i,t} has a positive significant effect on $R_{i,t} - R_{ft}$	0.0000	0.05	H1 Accepted
<i>BSI_For</i>_{i,t} has a positive significant effect on $R_{i,t} - R_{ft}$	0.0000	0.05	H2 Accepted
<i>BSI_Insti</i>_{i,t} has a positive significant effect on $R_{i,t} - R_{ft}$	0.0002	0.05	H3 Accepted
<i>Vol</i>_{i,t} has a negative significant effect on $R_{i,t} - R_{ft}$	0.0011	0.05	H4 Accepted
<i>Size</i>_{i,t} has a positive significant effect on $R_{i,t} - R_{ft}$	0.0000	0.05	H5 Accepted
<i>BM</i>_{i,t} has a negative significant effect on $R_{i,t} - R_{ft}$	0.0000	0.05	H6 Accepted
<i>DER</i>_{i,t} has a positive significant effect on $R_{i,t} - R_{ft}$	0.0000	0.05	H7 Accepted
<i>ROA</i>_{i,t} has a negative significant effect on $R_{i,t} - R_{ft}$	0.0000	0.05	H8 Accepted
<i>CF</i>_{i,t} has a positive significant effect on $R_{i,t} - R_{ft}$	0.0000	0.05	H9 Accepted

(Source: data processing results)

Table 7. Traditional sector t test monthly result

Hypothesis	Sig. value	Probability	Conclusion
<i>Sentiment</i>_{i,t} has a positive significant effect on $R_{i,t} - R_{ft}$	0.0000	0.05	H1 Accepted
<i>BSI_For</i>_{i,t} has a positive significant effect on $R_{i,t} - R_{ft}$	0.0048	0.05	H2 Accepted
<i>BSI_Insti</i>_{i,t} has a positive significant effect on $R_{i,t} - R_{ft}$	0.0011	0.05	H3 Accepted
<i>Vol</i>_{i,t} has a negative significant effect on $R_{i,t} - R_{ft}$	0.0000	0.05	H4 Accepted
<i>Size</i>_{i,t} has a positive significant effect on $R_{i,t} - R_{ft}$	0.0000	0.05	H5 Accepted
<i>BM</i>_{i,t} has a negative significant effect on $R_{i,t} - R_{ft}$	0.0001	0.05	H6 Accepted
<i>DER</i>_{i,t} has a positive significant effect on $R_{i,t} - R_{ft}$	0.0000	0.05	H7 Accepted
<i>ROA</i>_{i,t} has a negative significant effect on $R_{i,t} - R_{ft}$	0.0000	0.05	H8 Accepted
<i>CF</i>_{i,t} has a positive significant effect on $R_{i,t} - R_{ft}$	0.0000	0.05	H9 Accepted

(Source: data processing results)

SUMMARY AND CONCLUSIONS

Based on the results of the research hypothesis, it shows that *Sentiment*_{i,t} on the daily data of all sectors, and monthly data of electronic and traditional sector has a positive influence on excess return, this is directly proportional to the research of (Anusakumar, Ali, & Wooi, 2017) who stated that Sentiment appears to be positively related to stock returns. Specifically, there is significant and positive relationship between stock specific sentiment and returns for all eight countries and for overall sample. But it has contrary effect on the monthly data of finance sector that is negative significant. Then after doing several trial and error for getting the best result of trading behavior that proxied with buy-sell imbalance for each type of groups, surprisingly *BSI_For*_{i,t} for finance sector both daily and monthly data and *BSI_Insti*_{i,t} for daily data of finance sector it has a negative effect, but not for *BSI_For*_{i,t}, and *BSI_Insti*_{i,t} on the sector electronic and traditional both daily and monthly data that keep consistent showing positive effect on the excess return, and *BSI_Insti*_{i,t} for monthly data of finance sector that also has a positive effect, as well as the research of (Ryu, Kim, & Yang, 2017) the buy-sell imbalance of foreign investors and institutional investors show a positive effect on excess return. According to (Palm, 2019) for the sorted portfolios there are significant positive estimates for Size_5, Vol_1, Vol_5, Profit_1 after a high-sentiment day. In line with this research as a control variables *Size*_{i,t} for both daily and mothly data of electronic, finance, and traditional shows a

positive effect against the excess return, and $Vol_{i,t}$ for both daily and monthly data that shows a positive effect only appears in the electronic and finance sector, but its contrary with $Vol_{i,t}$ both daily and monthly data of traditional sector that shows a negative effect to the excess return.

So based on the Taiwan 50 Index with research sample in the study period 2017-2020, it can be concluded that in the Taiwan market, excess return is strongly influenced by investor sentiment and trading behavior, on the other hand excess return is also strongly influenced by other factors such as volatility, firm size, book to market value, DER (debt to equity ratio), ROA (return on assets), and CF (cash flow) which act as control variables, and after pay more attention on both indicators it can be conclude that investor sentiment indicator are more accurate in showing the stocks market return than the trading behavior indicators.

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