

Investor Sentiment, Corporate Transparency and Market Returns: Evidence from Taiwan Intraday Data

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Abstract

Investment sentiment has been suggested as one of the factors significantly affecting market returns. However, studies investigating the role which corporate transparency plays between investment sentiment and market returns are still lacking. This study uses the autoregressive model to measure the relationship among investor sentiment, corporate transparency and market returns in different sample spans. By analyzing the intraday data in Taiwan stock market from 2011 to 2013, the findings show that the market returns are more influenced by investor sentiment when firms are with low corporate transparency in contrast to those with high corporate transparency, particularly in the bear market.

JEL classification numbers: G00, G1, G3

Keywords: Investor sentiment, Corporate transparency, Market returns

1 Introduction

According to the Efficient Market Hypothesis (Fama, 1980), stock prices are correspondent with their fundamental value, indicating that it is less likely for investors to obtain excess returns in an efficient market. However, when information is inaccessible, investors' reliance on their sentiments in making investment decisions may cause market prices to deviate seriously from their

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fundamental values. While a body of literature have documented the effects of investor sentiment on asset pricing (Brown and Cliff, 2004; Chung, Hung and Yeh, 2012; Da, Engelberg and Gao, 2015), excess returns, momentum and reversals in stock prices (Barberis, Shleifer and Vishny, 1998), and access to finance (McLean and Zhao, 2014), whether investor sentiment is associated with market returns linking to the level of corporate transparency remains under-explored.

Corporate transparency is the foundation by which the market prompts companies to value the interests of shareholders and creditors because it reduces the influence of sentimental fluctuations on the investment environment (Johnson, Boone, Breach and Friedman, 2000). Moreover, companies with higher information transparency are less susceptible to sentiments. Therefore, corporate transparency affects investors' decision making and thus their sentimental fluctuations. The aforementioned information transparency indicates circumstances when a company releases good news to induce noise traders to purchase its shares, and this manipulation for increasing corporate value causes the original asset prices to deviate from fundamentals and possibly exerts various effects on irrational investors. Particularly in developing stock markets, corporate transparency is of significant importance because the sensitivity of stock prices is highly likely to influence investor sentiment (Firth, Wang and Wong, 2015). If the corporate information is opaque to the public, such as firms with high percentage of state-owned ownership, unclear third-party transactions among subsidiaries, and frequent earnings smoothing, it is difficult for investors to make accurate judgments and even arouse fears to create sentiment. Accordingly, we argue that the effect of investor sentiment on market returns should vary across different level of corporate transparency.

Using high-frequency data from stocks traded on the Taiwan Stock Exchange (hereafter TAIEX) as the testing venue, this study tries to explore how investor sentiment which may occur in a very short period of time reacts to transparent information in the form of comprised indices, namely, Taiwan 50 Index (hereafter TW50) and Mid-Cap 100 Index (hereafter TWMC) that relate to market returns. The sample is divided into three spans as bear market, market correction and bull market, which lasts for six months respectively. By doing so allows this study to distinguish the variations in a consequential observation from 2011 to 2013. Besides, this study retrieves the information disclosure and transparency ranking data from Taiwan Economic Journal (hereafter TEJ), and the data shows that the percentage of the constituents in TW50 (TWMC) with ranking A or above in bear market, market correction and bull market is 74% (45%), 74% (38%), and 74% (31%) respectively. What found above indicates that the level of transparency is higher in TW50 than that in TWMC. As a result, we will proxy TW50 as a higher cooperate transparent indicator and TWMC as a less cooperate transparent indicator. Extended from previous studies, this study adopts volatility index (hereafter $volx_t$) in TAIEX Options, the ratio of limit up bid buy and limit down

bid sell (ud_t), and the quotient of number of advancing and declining issues ($advdec_t$) respectively to proxy for investor sentiment (Brown and Cliff, 2004; Simon and Wiggins, 2001). The findings show that the market returns are more influenced by investor sentiment when firms are with low corporate transparency in contrast to those with high corporate transparency, particularly in the bear market.

This study makes contributions in two aspects. First, few studies have explored the relationship between investor sentiment, corporate transparency, and market returns simultaneously by using high-frequency data (e.g., daily and intraday data). This study divides the sample span into those of bull market, bear market, and market correction, and each lasting for 6 months. Subsequently, we compile the data of each minute in 9:00–13:25 from each day in each sample span. The volume of the data is relatively enormous; the number of daily data is 266, and the total number of data from all sample spans is 99,750. Subsequently, the levels of influence of investor sentiment on market returns under different degrees of transparency within the same sample span are explored. Higher degrees of transparency result in higher levels of information disclosure and thus more accurate assessments of corporate value from investors. Accordingly, the influence of investor sentiment on market returns is weaker under high transparency than under low transparency.

Second, this study refers to the Information Disclosure and Transparency Ranking System established by the Securities and Future Institute (SFI), and categorized constituent stocks in the TW50 and TWMC according to the stocks' ratios of high and low transparencies in the ranking system as proxy variables for high and low transparencies. This method has been rarely applied to examine transparency, and therefore this study provides an alternative method for future scholars to explore corporate transparency in different forms of indices.

The practical implications of this study reside in providing references for investors to assess companies. If companies can timely and appropriately disclose information regarding corporate governance, business strategies, and financial performance to the public, they will improve corporate transparency and thus reduce investor–company information asymmetry. Companies with a higher level of transparency are less susceptible to investor sentiment. Companies, investors, and the overall market can benefit from one another if investors are fully informed of corporate information to invest in the stock market rationally, and if informational uncertainty is reduced to prevent investors from being affected by sentiment and making irrational investment decisions.

2 Literature Review

2.1 Investor sentiment on market returns

The efficient market hypothesis presumes that investors are rational, and stock prices can fully reflect available information and hence no one in the market can obtain excess returns. Numerous anomalies are caused and attract scholars to explore investor sentiment is a critical one.

Brown and Cliff (2004) maintain that sentiment is not restricted to individual investors; by contrast, the empirical results indicate that institutional investors are strongly related to large-cap stocks. These results support the hypothesis of the effect of conformity, revealing that returns can predict sentiment, whereas sentiment cannot predict returns.

Different levels of investor sentiment lead to different effects of corporate attributes on stock returns. The sentiment index of the current term significantly and positively affects the stock returns of the current term, whereas the sentiment index of the previous term significantly and negatively affects the stock returns of the current term. Fisher and Statman (2000) employ the sentiment framework, a univariate generalized autoregressive conditional heteroscedasticity model, and a vector autoregressive model to categorize different types of sentiment indices into different periods to examine the influence of investor sentiment on stock return volatility and the level of mutual influence between them. This result indicates that market returns does not significantly vary with bull and bear markets, and only fluctuations in daily market trading volume affect stock market returns. Hu, Huang, Chang and Lin (2015) also document that stock market trading volume does facilitate the rise and fall of stock prices. It is concluded that stock price fluctuations significantly affect fluctuations in daily amount financed, indicating that volatility in individual investors' amount financed is related to volatility in stock price returns.

In particular, investor sentiment is crucial to explaining positive feedback trading during market rises. Baker, Wurgler and Yuan (2012) adopt market turnover rate, ratio of initial public offering, and ratio of balance of margin and stock loans as sentiment indices. They find that without factoring in transaction costs, investors can only profit by buying stocks with a high turnover rate or buying stocks with a turnover rate while selling those with a low turnover rate. Moreover, portfolios highly sensitive to sentiment have almost always outperformed those lowly sensitive to sentiment during the holding period, indicating that sentiment strategies are profitable. Chung et al. (2012) test the effects of investor sentiment in predicting the cross section of stock returns in different economic conditions. They employ a Markov-switching model to depict economic expansion and contraction. The results determine that economic expansion results in rising sentiment, whereas economic contraction leads to falling sentiment.

According to the aforementioned studies, investor sentiment is susceptible to

various factors such as weather and TAIEX fluctuations, and investors tend to neglect crucial information due to excessive optimism or pessimism. All these factors would be reflected on stock prices or returns, thus causing asset prices to deviate from economic fundamentals.

2.2 Investor sentiment on market returns under different level of corporate transparency

Corporate transparency and full disclosure are at the core of corporate governance; moreover, they are essential factors for the quality of corporate governance. Leuz and Oberholzler-Gee (2006) indicate that corporate transparency and information disclosure are crucial to corporate governance. They find that all corporate performance is positively related to the quality of corporate information disclosure. In addition, they argue that strong corporate governance should include satisfactory transparency and practice of information disclosure to improve its performance. Particularly in a capital market, investors must depend on reliable and instant information to make judgements and decisions. If information is more transparent, investors' decision-making ability will improve, and resource allocation will become increasingly efficient (Francis, Huang, Khurana and Pereira, 2009).

To enhance information transparency, the Securities Exchange Committee in Taiwan has commissioned the SFI to establish the Information Disclosure and Transparency Ranking System. These organizations actively planned and designed a performance indicator that satisfies the demand of the domestic market to enhance corporate transparency and information disclosure. Evaluation results can serve as references for investment decisions making and provide sounder protection for the rights and interests of investors. The Corporate Governance Best Practice Principles for TWSE/GTSM Listed Companies have also been formulated and presented on the Law Source Retrieving System of Stock Exchange and Future Trading. The purpose of formulating best practice principles is to assist listed companies to establish satisfactory corporate governance systems, as well as facilitate the sound development of the security market. Satisfactory corporate governance is critical to a company's investors and stakeholders because information disclosure improves the company's financial information transparency and thus relieves the agency problem implied in information asymmetry. Accordingly, when making investment decisions, investors will include corporate transparency into the criteria for assessing investment targets to reduce risks.

Low corporate transparency hinders investors from obtaining accurate corporate information and consequently prompts them to make irrational investment decisions due the influence of sentiment. This situation is also profitable to arbitrageurs, who capitalize on public sentiment fluctuations to earn excess returns by buying stocks during price busts that occur at low sentiment and selling stocks during price booms at high sentiment. Accordingly, the level of corporate

transparency affects investor sentiment and thus market returns.

Bergman and Roychowdhury (2008) adopt the Michigan Consumer Confidence Index as a proxy variable for sentiment to explore how businesses strategically employ corporate information disclosure to respond to market bias induced by investor sentiment. They find that during low sentiment, financial analysts and investors are pessimistic about company prospects and consequently underestimate the company. In this case, managers increase the voluntary disclosure of predictive information about the company's future profits to change pessimism among market participants. By contrast, when market sentiment is high, managers tend to decrease the disclosure of future predictions to maintain investors' optimistic assessment of the companies. In short, long-term voluntary disclosure indicates that managers intend to maintain investors' optimism for company profits. Firth et al. (2015) examine how corporate transparency explains the sensitivity of stock prices to general investor sentiment. Previous studies have focused on developed countries, whereas the study particularly concentrates on exploring the market of China. By using the five proxy variables for sentiment (e.g., close-end fund discount and turnover rate) employed by Baker and Wulger (2006), they consider that local investors in the developing financial market of China will transfer available funds in their bank accounts and the stock market. Therefore, growth of investment account and growth of savings deposits are incorporated as additional indices for the domestic investment market of China, and the resultant seven proxy variables form a composite sentiment index through principal component analysis. Corporate transparency is measured using five indices, namely earnings management, auditor quality, audit opinions, related-party transactions, and state ownership of firms. The empirical results of the study show that investors fail to make accurate judgements due to difficulties in obtaining corporate information from businesses with low corporate transparency, thus frequently causing abnormal returns.

3 Methodology

3.1 Data and sample

The present study mainly investigates the influence of investor sentiment on market returns and corporate transparency. The study period is divided into three sample spans, namely the bull market, bear market, and other periods, each lasting for 6 months. The data used in this study are high-frequency data collected daily by minute from 9:00 to 13:25. The number of samples collected each day is 266. The data such as TW50, TWMC, number of advancing issues, number of declining issues, numbers of buying and selling orders in the auction trading of common stocks, number of buying orders at limit up, number of selling orders at limit down, and information disclosure ranking are retrieved from the database of TEJ. The data of volatility index in TAIEX Options are collected from the Taiwan

Future Exchange, and levels of corporate transparency are selected from the SFI.

Taiwanese people are known for their passion for elections, and election results not only affect people's livelihood but also impact the investment market. This study accordingly selects samples from the year before the 2012 presidential election in Taiwan since stock market speculation usually has begun before each presidential election. In 2011, stock markets worldwide, including TAIEX, experienced a considerable downturn in 2011 due to the European debt crisis. Studies have found that TAIEX was substantially affected 1 year before and after the presidential election. According to historical records, the stock market would start to rise several months before the election, reach the peak, and immediately fall after the election. Therefore, this study divides sample spans into bull markets, bear markets, and correction period according to market trends (Fabozzi and Francis, 1977, 1979). The market is defined as a bull market if the market index is on increase; contrarily, the market is defined as a bear market if the index is on a decline.

3.2 Variables

3.2.1 Investor sentiment

Following Brown and Cliff (2004) and Simon and Wiggins (2001), the volatility index (vix_t), the ratio of limit up bid buy and limit down bid sell (ud_t), and the advance/decline ratio ($advdec_t$) are used as proxy variables for sentiment.

A. Volatility index in TAIEX options (vix_t)

The vix_t data in this study is purchased from the Taiwan Future Exchange, and the index is calculated by using the vix_t formula developed by the Chicago Board Options Exchange.³ It reflects the order-imbalance noises with liquidity-related trading underlain. TAIEX is inversely related to vix_t . When vix_t increases (decreases), market participants expect greater (smaller) aftermarket price volatility that reflects investor anxiety. Therefore, vix_t is also referred to as the investor fear gauge. Generally, when vix_t is high, investors are with high sentiment and the market might fluctuate a lot; when vix_t is low, investors are rather rational and the market will be relatively stable.

B. Ratio of limit up bid buy and limit down bid sell (ud_t)

³ Formula for TAIEX VIX could be seen here: <http://www.taifex.com.tw/chinese/7/VixQA.asp>

$$U/D_t = \text{limit up } BIDBuy_t / \text{limit down } BIDSell_t$$

Where *limit up* $BIDBuy_t$ denotes the number of buying orders at limit up in the t^{th} minute, and *limit down* $BIDSell_t$ refers to the number of selling orders at limit down in the t^{th} minute. Irrational investors that are susceptible to sentiment tend to follow the public blindly to enter and withdraw from the stock market. When TAIEX is at the peak, the number of traders also remains at the highest point, indicating that prospective stock markets induce investors to become optimistic about the market, rush to invest in the market, and thus buy stocks at the highest price. By contrast, when the stock market exhibits a downturn, investors sell their shares at the lowest price to stop loss and preserve capital. Buying stocks because of bullish markets and selling them to stop loss is referred to as buy high and sell low in a financial market. Therefore, this study refers to the statistics of buying and selling orders in the auction trading of common stocks, and divides the number of buying orders at limit up by the number of selling order at limit down to obtain ud_t .

C. Advance/decline ratio ($advdec_t$)

$$advdec_t = \text{Number of advancing issues} / \text{Number of declining issues}$$

Based on the market performance, $advdec_t$ is a commonly used sentiment measure (Brow and Cliff, 2004). A high $advdec_t$ indicates an overbought market and a low $advdec_t$ indicates an oversold market, and both of which reflect the high investor sentiment in the market. Hu *et. Al* use $advdec_t$ to capture the instant intraday sentiment level to examine the relationship between market sentiment and trading frequency. The valuable securities in the number of issues concerned in this study include not only common stocks (i.e., listed companies) but also preferred stocks, corporate bonds, exchange traded funds, and warrants, capturing the real-time sentiment.

3.2.2 Corporate transparency

The level of corporate transparency is selected according to the information disclosure and transparenance ranking provided by the SFI. The ranking involves six ranks, namely A++, A+, A, A-, B, and C. The categorized data in Table 1 shows that the percentage of the constituents in TW50 (TWMC) with ranking A or above in bear market, market correction and bull market is 74% (45%), 74% (38%), and 74% (31%) respectively. What found above indicates that the level of transparency is higher in TW50 than that in TWMC. Subsequently, TW50 and TWMC are individually designated as a proxy variable for high or low corporate transparency.

Table 1: The percentage of the constituents with ranking A or higher transparency

	2011 bear market period	2012 market correction period	2013 bull market period
TW50	74%	74%	74%
TWMC	45%	38%	31%

3.2.3 Market returns

The volatility of the current term (t) is obtained by deducting the index of the previous term ($t - 1$) from that of the current term, and the formulas show as $dtw50_t = tw50_t - tw50_{t-1}$ and $dtwmc_t = twmc_t - twmc_{t-1}$, where $tw50_t$ denotes the TW50 of the t^{th} minute, $tw50_{t-1}$ refers to the TW50 of the $(t - 1)^{\text{th}}$ minute, $twmc_t$ represents the TWMC of the t^{th} minute, and $twmc_{t-1}$ represents the TWMC of the $(t - 1)^{\text{th}}$ minute.

3.3 Empirical models

3.3.1 Empirical model of sentiment variables and volatility of corporate transparency

This study focuses on TW50 and TWMC and establishes an autoregression model that includes exogenous variables to investigate the influence of investor sentiment on market returns and corporate transparency. When transparency is high, the model can be expressed as follows:

Let $dtw50_t = y_t$

$$y_t = \beta_0 + \beta_1 \Delta vix_t + \beta_2 ud_t + \beta_3 advdec_t + \alpha_i \sum_{i=1}^p y_{t-i} + u_t \quad (1)$$

where vix_t denotes the VIX in TXO in the t^{th} minute, ud_t refers to the UD in the t^{th} minute, and $advdec_t$ represents the ADVDEC in the t^{th} minute. If unit roots exist in the VIX in TXO, Δvix_t that has undergone 1st-order difference is used to perform empirical analysis, where i represents the number of lags, and p denotes the total number of lags. Because y_{t-i} is a lag auto-term (i.e., endogenous variable) of y_t , (1) can be rewritten as

$$y_t^* = \beta_0 + \beta_1 \Delta vix_t + \beta_2 ud_t + \beta_3 advdec_t + \alpha^* y_t^* + u_t \quad (2)$$

which is then transposed as

$$(1 - \alpha^*) y_t^* = \beta_0 + \beta_1 \Delta vix_t + \beta_2 ud_t + \beta_3 advdec_t + u_t \quad (3)$$

Finally, $dtw50_t$ is resubstituted into the formula as follows:

$$dtw50_t = \frac{\beta_0}{(1-\alpha^*)} + \frac{\beta_1}{(1-\alpha^*)} \Delta vix_t + \frac{\beta_2}{(1-\alpha^*)} ud_t + \frac{\beta_3}{(1-\alpha^*)} advdec_t + u_t \quad (4)$$

When transparency is low, the formula is rewritten as

$$dtwmc_t = \frac{\beta_0}{(1-\alpha^*)} + \frac{\beta_1}{(1-\alpha^*)} \Delta vix_t + \frac{\beta_2}{(1-\alpha^*)} ud_t + \frac{\beta_3}{(1-\alpha^*)} advdec_t + u_t \quad (5)$$

After the formula is rewritten into (4) and (5), the Wald test is performed to test if the auto-term affects the dependent variable. If yes, the method of least squares can be used to estimate the coefficient of the variable. Finally after transposition, the influences of sentiment on market returns and corporate transparency can be compared.

3.3.2 Empirical model of the average elasticity of sentiment variables to the volatility of corporate transparency

To obtain the average elasticity of sentiment variables to the volatility of corporate transparency, sentiment variables in (5) first undergo partial differentiation to derive the coefficients of individual sentiment variables such as $\frac{\beta_1}{(1-\alpha^*)}$ and

$$\frac{\beta_2}{(1-\alpha^*)}.$$

$$dtw50_t = \frac{\beta_0}{(1-\alpha^*)} + \frac{\beta_1}{(1-\alpha^*)} \Delta vix_t + \frac{\beta_2}{(1-\alpha^*)} ud_t + \frac{\beta_3}{(1-\alpha^*)} advdec_t + u_t \quad (6)$$

Subsequently, the elasticity formula is employed to adjust (6) into (7):

$$\varepsilon_{vix_t} = \frac{\frac{\partial dtw50_t}{\partial \Delta vix_t}}{\frac{\Delta vix_t}{dtw50_t}} \quad (7)$$

$$\varepsilon_{vix_t} = \frac{\partial dtw50_t}{\partial \Delta vix_t} \times \frac{\Delta vix_t}{dtw50_t} \quad (8)$$

where $\frac{\beta_1}{(1-\alpha^*)} = \frac{\partial dtw50_t}{\partial \Delta vix_t}$, and therefore (8) can be rewritten to obtain a per-minute elasticity formula as (9):

$$\varepsilon_{vix_t} = \frac{\beta_1}{(1-\alpha^*)} \times \frac{\Delta vix_t}{dtw50_t} \quad (9)$$

Finally, the elasticity values in every minute of the samples are averaged as in (10).

$$\overline{\varepsilon_{vix_t}} = Exp\left(\frac{\beta_1}{(1-\alpha^*)} \times \frac{\Delta vix_t}{dTW50}\right) \quad (10)$$

Elasticity refers to the ratio of percentages of two variables. A higher elasticity indicates a higher level of sensitivity between the two related variables, suggesting that a small change in one of the variables would result in a great response from the other variable. Therefore, we adopt average elasticity to determine how many units of change would be caused to the volatility of transparency by the variation in investor sentiment variables within every minute. The elasticity of sentiment variables can reveal the sensitivity of market returns to investor sentiment when investor sentiment changes. When investigating changes in sentiment variables, the variation in the volatility of transparency is determined by comparing the absolute values of average elasticity. Moreover, average elasticity can be used to compare the influences of investor sentiment on market returns under different

4 Empirical Results

4.1 Descriptive statistics

Table 2 present the descriptive statistics of data from the three sample spans. The mean value of $dTW50_t$ is better than that of $dTWMC_t$ by 2% market returns in bear market, indicating that because investors are inclined to be pessimistic, and when the corporate transparency is low, investors are intended to avoid risks that results in worse returns. On the contrary, the mean value of $dTWMC_t$ is better off 1% than that of $dTW50_t$ in bull market. It is speculated that investors' tendency to the stock market is to go short in bull periods, and the market returns are thus better off particularly when the corporate transparency is low because of high risks.

Regarding investor sentiment, the vix_t inversely related to the stock market suggests that investors are unsure and pessimistic about the market during bear markets (the mean value is 27.89), and becomes overly optimistic about the market during bull markets (the mean value is 13.58). The standard deviations in different sample spans show that investor sentiment exhibits the greatest volatility during bear markets (6.44), followed by bull markets (1.36) and then by correction periods (1.15). Overall, all the correlation coefficients between the independent variables are lower than 0.9, inferring that collinearity does not exist among the independent variables.

Table 2: Descriptive statistics and correlation metrics in different spans

	Mean	S.D.	Min.	Max.	Median	$dTW50_t$	$dTWMC_t$	Δvix_t	ud_t
Bear Market (N=34,313)									
$dTW50_t$	-0.03	5.02	-308.55	188.36	-0.06				
$dTWMC_t$	-0.05	6.88	-480.30	263.13	-0.06	0.887			
vix_t	27.89	6.44	14.91	49.26	28.55	-0.097	-0.071		
ud_t	1.25	0.48	0.03	21.93	1.23	0.106	0.125	-0.08	
$advdec_t$	0.85	1.16	0.00	31.0	0.48	0.162	0.178	-0.123	0.419
Bull Market (N=31,122)									
$dTW50_t$	0.00	4.25	-114.29	100.92	-0.01				
$dTWMC_t$	0.01	3.03	-191.76	111.8	-0.01	0.476			
vix_t	13.58	1.36	11.25	18.6	13.13	-0.041	-0.048		
ud_t	1.46	1.10	0.32	75.55	1.38	0.016	0.052	0.013	
$advdec_t$	0.78	0.82	0.00	15.00	0.54	0.105	0.200	-0.061	0.159
Correction (N=34,314)									
$dTW50_t$	0.01	2.60	-90.62	92.31	0.00				
$dTWMC_t$	0.01	2.76	-91.00	98.58	-0.04	0.708			
vix_t	16.74	1.15	14.42	20.40	16.84	-0.007	-0.009		
ud_t	1.33	0.40	0.22	22.03	1.31	0.122	0.162	-0.081	
$advdec_t$	0.78	0.86	0.00	25.40	0.53	0.186	0.234	-0.311	0.445

4.2 Influence of investor sentiment on market returns at different levels of corporate transparency

Table 3 shows that the Δvix_t exerts a stronger influence on the market returns when lower transparency in bear market (-2.990) and bull market (-3.100), whereas the other two sentiment variables exhibit weaker effects (ud_t is 0.460 in bear market and 0.010 in bull market, $advdec_t$ is 0.581 in bear market and 0.473 in bull market). Overall, the influence of investor sentiment is weaker on market returns under high corporate transparency and stronger on market returns under low corporate transparency. These results correspond with our expectations. It is noticed that ud_t in bull markets is not significant (the coefficient is 0.010) in the

high-transparency model, indicating that ud_t does not significantly affect the market returns when firms are with high transparency. By contrast, the other variables are significant at the significance level of 1%, and sentiment variables vary in directions as expected.

Table 3: The influence of investor sentiment on market returns with high/low corporate transparency in different sample spans

	<i>Bear Market</i>		<i>Bull Market</i>		<i>Correction</i>	
	$dTW50_t$	$dTWMC_t$	$dTW50_t$	$dTWMC_t$	$dTW50_t$	$dTWMC_t$
Interce	-1.092	-1.905	-0.381	-0.639	-2.810	-3.842
pt	(0.104)***	(0.076)***	(0.042)***	(0.031)***	(0.217)***	(0.228)***
Δvix_t	-2.990	-2.707	-3.100	-3.164	0.119	0.158
	(0.286)***	(0.209)***	(0.644)***	(0.477)***	(0.013)***	(0.013)***
ud_t	0.460	0.882	0.010	0.060	0.302	0.479
	(0.085)***	(0.062)***	(0.021)	(0.016)***	(0.040)***	(0.042)***
$advdec_t$	0.581	0.886	0.473	0.718	0.547	0.724
	(0.035)***	(0.025)***	(0.028)***	(0.021)***	(0.019)***	(0.020)***

*** $p < 0.01$, ** $p < 0.05$; Standard deviation is in parentheses.

Overall, investor sentiment has a weaker influence on the market returns of high transparency (i.e., $dTW50_t$) and a stronger influence on the market returns of low transparency (i.e., $dTWMC_t$) in the three sample spans, indicating that investors sentiment fluctuates with market and firm transparency obviously.

4.3 Comparing the average elasticity of sentiment variables to market returns in relation to corporate transparency

Table 4 demonstrates the average elasticity of sentiment variables to the market returns of transparency to support the results of regression coefficients by giving further explanation in terms of sensitivity. In the sample span of bear markets, the average elasticities of εvix_t with high transparency (0.014) and low transparency (0.012) are only in a difference of 0.2%. By contrast, the average elasticity of εud_t and $\varepsilon advdec_t$ with high-low transparency is 3.1% and 6.4% respectively. In the sample span of bull markets, the average elasticity of three investor sentiment proxy with high-low transparency is much smaller than that in bear markets. Overall, investor sentiment is clearly demonstrated in bear markets, and the sensitivity of sentiment on market returns is higher in bear markets in contrast bull markets. Besides, the sensitivity is fairly manifest when the corporate transparency is low.

Table 4: The average elasticity of investor sentiment on market returns with high/low corporate transparency in different sample spans

	<i>Bear Market</i>		<i>Bull Market</i>		<i>Correction</i>	
	$dTW50_t$	$dTWMC_t$	$dTW50_t$	$dTWMC_t$	$dTW50_t$	$dTWMC_t$
Δvix_t	0.014	0.012	0.000	0.000	0.188	0.250
ud_t	0.047	0.078	0.000	0.003	0.043	0.058

5 Conclusion

This study uses high-frequency data to investigate the difference in the effects of investor sentiment on high or low corporate transparencies and on market returns in different sample spans. The findings indicate that in all sample spans, the overall influence of investor sentiment is weaker on the market returns of high corporate transparency, and stronger on that of low corporate transparency. Because investors are able to more fully grasp corporate and market information when a company has higher information transparency, they can make investment decisions more rationally and precisely without depending on their own sentiment or following the public blindly to make irrational investments. This study further employs the average elasticity of investor sentiment to high and low transparencies to verify the amount of influence that sentiment has on transparency. The findings also reveal that during the sample spans of bear and bull markets, the elasticity of investor sentiment has a slightly larger amount of influence on high transparency than on low transparency. In short, when the trends of going short or long appear in the market, market returns is more susceptible to investor sentiment. Moreover, the influence of investor sentiment is stronger in the sample span of bear markets, where market returns is higher, than in the sample span of bull markets.

Our findings contribute to the debate on whether investor sentiment influences market returns and to what level it does. Extended on previous arguments, this study subtly explores the argument by using intraday data and found that corporate transparency is a critical factor to influence investor sentiment on market returns. On the other hand, the individual ticker in by-minute intraday data bank is highly likely missing and results in unmatched within-minute observations. Therefore, a feasible and effective alternative is to use composite indices, which comforts the unmatched problem and simultaneously acts as a proxy for corporate transparency. The findings tally with our expectations, indicating that our novel ideas in this research design is attainable and reasonable. While we provide comprehensive evidence on how the investor sentiment on market returns is affected by corporate transparency, the decomposition of indices is worth pursuing in future research. Although this study has found several interesting results, the research process

faces multiple restrictions that could be further explored by future studies. First, the duration of each sample span is set at 6 months, and intraday data are high-frequency data in large amounts. Therefore, the sample span can be shortened to explore if investor sentiment reacts more strongly or instantly to Taiwan's stock market within a shorter period. Moreover, this study adopts TW50 and TWMC as proxy variables for high and low transparencies. To determine the influence of sentiment on the overall market returns, we suggest that future studies use and analyze the data of individual stocks to difference between companies with high and low transparencies and to examine different industries or types of stocks in detail. Finally, due to the limited sources of intraday data, we collect samples of 2011–2013 and derive three sample spans (i.e., bear markets, bull markets, and correction periods). The decline range of TAIEX in bear markets is more substantial than the rise range of TAIEX in bull markets. The results also indicate that the influence of investor sentiment over market returns is stronger in bear markets than in bull markets. However, investor sentiment is susceptible to market trends. Therefore, to compare the influences of investor sentiment over the market in different sample spans, we suggest that future studies select two sample spans involving similar ranges of rise and decline in TAIEX to further examine the variation in investor responses to Taiwan's stock market in different periods.

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