Print ISSN: 1738-3110 / Online ISSN 2093-7717
JDS website: http://www.jds.or.kr/
http://dx.doi.org/10.15722/jds.21.05.202305.101

A Study on the Prediction of Stock Return in Korea's Distribution Industry Using the VKOSPI Index*

Jeong-Hwan LEE[1], Gun-Hee LEE[2], Sam-Ho SON[3]

Received: January 15, 2022. Revised: November 29, 2022. Accepted: December 05, 2022.

Abstract

Purpose: The purpose of this paper is to examine the effect of the VKOSPI index on short-term stock returns after a large-scale stock price shock of individual stocks of firms in the distribution industry in Korea. **Research design, data, and methodology:** This study investigates the effect of the change of the VKOSPI index or investor mood on abnormal returns after the event date from January 2004 to July 2022. The significance of the abnormal return, which is obtained by subtracting the rate of return estimated by the market model from the rate of actual return on each trading day after the event date, is determined based on T-test and multifactor regression analysis. **Results:** In Korea's distribution industry, the simultaneous occurrence of a bad investor mood and a large stock price decline, leads to stock price reversals. Conversely, the simultaneous occurrence of a good investor mood and a large-scale stock price rise leads to stock price drifts. We found that the VKOSPI index has strong explanatory power for these reversals and drifts even after considering both company-specific and event-specific factors. **Conclusions:** In Korea's distribution industry-related stock market, investors show an asymmetrical behavioral characteristic of overreacting to negative moods and underreacting to positive moods.

Keywords: VKOSPI, Mood, Reversals, Drifts, Large-Price Change.

JEL Classification Code: G11, G12, G40, C30.

1. Introduction

This paper conducts an event study of the large-scale stock price changes of individual stocks of firms in the distribution industry in Korea. By examining how the change in the VKOSPI index on the event date affects the short-term stock return after the event date, the effect of investor mood on stock returns can be characterized. Korea's VKOSPI index is equivalent to the US VIX. Just as the VIX is based on the S&P500 option price, the VKOSPI index is based on the KOSPI200 option price to measure the future volatility in the stock market expected by option investors. The VKOSPI index shows an inverse correlation with the KOSPI200 index and is generally used as an investor's fear measure. In general, the VKOSPI index increases when market turmoil occurs due to falling stock prices, threats of war, unexpected changes in interest rates, or other news. These changes reflect a growing sense of fear

---

* This research was supported by the Soonchunhyang University Research Fund.

1 First Author. Associate Professor, Department of Economics and Finance, Hanyang University, Republic of Korea.
Email: Jeonglee@hanyang.ac.kr

2 Second Author. M.A. Student, Department of Economics and Finance, Hanyang University, Republic of Korea.
Email: egh962@naver.com

3 Corresponding Author. Associate Professor, Department of Economics and Finance, Soonchunhyang University, Republic of Korea, Email: sch35@sch.ac.kr

in the market.

Most established theories on decision-making under risk and uncertainty take a cognitive and consequentialist position. This position assumes that people know the probable outcomes and probabilities of alternative options, and that people can integrate this information into expectations in the decision-making process. However, a series of recent psychological studies has focused on the fact that people's subjective assessments of future risk are substantially influenced by their current feelings and emotions. Examples of such studies include Constans and Mathew (1993) and Loewenstein et al. (2001). They have noted the negative correlation between feelings or moods and subjective risk and have emphasized the roles played by these feelings and moods in decision-making. These psychological studies related to decision-making under uncertainty emphasize that a good mood makes people think that future outcomes are likely to be positive, while a bad mood makes people think that future outcomes are likely to be negative. In this context, Kliger and Kudryavtsev (2013) empirically demonstrated that the effect of an analyst rating upgrade on stock returns is amplified when investor mood increases (VIX decreases) using the negative correlation between changes in the VIX index and investor mood. In addition, Kudryavtsev (2017) reports that when the stock price increases (decreases) on the day the VIX falls (rises), the increases (decreases) in the stock price are amplified by the good (bad) mood of the investor. As a result, he reports that price reversals occur after the event date.

Referring to the research methods used in the existing literature, this paper focuses on whether reversals appear when the stock price moves in the same direction as the investor's mood. An event study of large-scale stock price changes targeting individual stocks of firms belonging to the distribution industry in Korea showed that both stock price reversals and stock price drifts appear. Specifically, when the stock price increases on a large scale, the stock price drift appears, and when the stock price drops on a large scale, the stock price reversal appears. This tendency is further strengthened when considering the fluctuations in the VKOSPI index. When the VKOSPI rises and the stock price drops sharply, the stock price reversal is stronger. Further, when the stock price rises sharply as the VKOSPI falls, the stock price drift appears stronger. It can also be confirmed that the significance is further amplified in the case of stocks of firms with small company sizes and high stock price volatility.

Through multi-factor regression analysis, this paper tested whether the VKOSPI index maintains explanatory power for the cumulative stock return after the event date, even after controlling for company-specific factors and event-specific factors. As a result, it was found that the VKOSPI index has additional significant explanatory power for the stock price reversals, even after considering these factors when the stock price declines. Moreover, in the case of a large stock price increase, the VKOSPI index was found to have additional significant explanatory power for the stock price drifts. Investors' reactions to changes in the VKOSPI index in Korea's distribution industry-related stock market can be differentiated from those in the US market. In the case of the US market, investors overreact when the VIX index goes up or down. In the case of Korea's distribution industry-related stock market, when the VKOSPI index rises and fears expand, investors overreact, as is the case in the US market. However, when the VKOSPI index declines and investor sentiment stabilizes, an underreaction rather than an overreaction occurs, which is the exact opposite of the case in the US market.

The rest of this paper proceeds as follows. In section 2, we look at existing research literature related to topics such as stock return characteristics after large-scale price changes, investor mood, and the VIX index. Section 3 defines the research hypothesis of this study. Section 4 presents the data and research methodology. Section 5 presents the results of the empirical analysis. Section 6 concluded by summarizing the results and conducting a brief discussion.

2. Literature Review

This paper conducts an event study of large-scale daily stock price changes of individual stocks of companies involved Korea's distribution industry. Specifically, this paper focuses on the effect of the VKOSPI index which represents the psychological mood of investors on stock returns after the event date. Existing studies related to the predictability of short-term stock returns following large-scale stock price changes can mostly be classified into three categories based on which type of hypothesis they propose: the overreaction hypothesis, the underreaction hypothesis, and the market efficiency hypothesis.

First, studies supporting the overreaction hypothesis include Zarowin (1989), Sturm (2003), Avramov et al. (2006) and Gencyurek (2023). The authors of these studies believe that there are some factors that cause an excessive response to the initial price change. Kudryavtsev (2017), which is consistent with their research, reports that the stock price change is further amplified when the stock price change on the event date is supported by a change in investor mood, i.e., a change in the VIX index. Due to the excessive reaction of the stock price on the event date, reversals occur in which the stock price returns to its intrinsic value after the event date. Therefore, the overreaction hypothesis is commonly linked to stock price reversals.

On the other hand, studies supporting the underreaction hypothesis mainly focus on the relationship between large-scale price change and public information. This category includes studies such as Ikenberry and Ramnath (2002), Vega (2006), Savor (2012), and Rasheed et al. (2021). They report that investors underreact to large-scale price changes accompanying public information. This underreaction causes drifts in the stock price after the event date, in which the stock price continues to approach the intrinsic value in the same direction as the event date. On the other hand, Cox and Peterson (1994) support the efficient market hypothesis, stating that the abnormal return caused by overreaction disappears when the elasticity of bid-ask bounce is considered. As such, the existing research literature does not present consistent results regarding the predictability of stock returns after the event date.

However, large-scale stock price changes of a particular stock tend to amplify the risks and uncertainties felt by investors. Studies emphasizing the importance of mood in relation to decision-making under uncertainty are increasing. For example, Johnson and Tversky (1983) and Forgas (1992) found that people in a positive mood tend to make optimistic judgments, while people in a negative mood tend to make pessimistic judgments. In the same context, Loewenstein et al. (2001) emphasized that the decision-making process related to risk and uncertainty is influenced by the decision-maker’s feelings.

Recently, the field of behavioral finance has also begun to pay attention to the factors that affect investors’ moods or emotional biases (Talhartit et al., 2022). Hirshleifer and Shumway (2003) and Goetzmann and Zhu (2005) studied whether weather affects mood and how it affects stock prices. Meanwhile, Cao and Wei (2005) studied the effect of high temperatures on stock prices. Further, Levy and Yagil (2011) reported that air pollution causes mood changes and negatively affects stock returns.

In this paper, we paid attention to the VKOSPI index as a factor that is directly related to the investor’s mood. According to Whaley (2000, 2009) and Zhenxiong et al. (2023), changes in the VIX index show the direction in which investors’ expectations of market volatility change, and it has been widely used as a measure of fear and relief felt by investors. Kliger and Kudryavtsev (2013) and Kudryavtsev (2017) are examples of studies related to stock return prediction that directly link mood and VIX. The authors of these studies believe that when the VIX falls, investors are in a positive mood, which amplifies the rise in the stock price, and consequently, a reversal occurs in the stock price after the event date. By contrast, when the VIX rises, investors have a negative mood, which amplifies the fall in the stock price, and similarly, a stock price reversal occurs after the event date. In the empirical analysis below, we will examine in detail how the VKOSPI index, which serves as a kind of proxy variable for investor mood, affects stock price after the event date.

3. Research Hypothesis

This paper examines the cases in which investors’ moods tend to overreact to the information they possess and thereby expand large-scale stock price fluctuations. Moreover, in the aftermath, we want to check whether the stock price has a reversal effect after the event date. In the previous section, we emphasized the importance of mood in decision-making in cases of uncertainty. In this context, this paper considers the intraday change of VKOSPI as a simultaneous proxy variable of investor mood.

In general, it is evaluated that when the VIX value in the US exceeds 30, uncertainty and risk increase, and investors feel fear. Further, when the VIX value is less than 20, investor sentiment is generally evaluated as stable and low-stress. However, during most of the sample period, the VIX index maintains a stable value of less than 20, and only in some exceptionally short periods such as economic crises did the VIX index soar above 30. Extremely high VIX indicators are exceptional cases when the market deteriorates, thus creating a situation where investors are prone to overactivity. However, a situation where investor sentiment is stable with the VIX index remaining below 20 as usual, is a relatively difficult environment for investors to become overactive in, even if the VIX index declines.

Meanwhile, in the case of individual stocks related to Korea’s distribution industry, the stock returns after large-scale stock price fluctuations appear differently in the case of stock price increases and stock price declines. If the stock price rises significantly, there will be drifts in the stock return after the event date. If the stock price has fallen significantly, there will be reversals in the stock return after the event date. The basic situation is quite different from the case of Kudryavtsev (2017), which only shows reversal effects after the event date.

If the VKOSPI index is set as a proxy variable for investors’ moods, then the characteristics of stock returns in the Korean distribution industry can be further highlighted. If the VKOSPI index falls on the day of the event when the stock price rose sharply, the value of the VKOSPI index typically maintains a stable value below 20, so investor overactivity is relatively unlikely to occur. As a result, if investors underreact to information on the date of the event, there is a possibility that a drift effect will occur in the stock price after the event date. Conversely, if the VKOSPI index rises on the day of the event when the stock price has fallen significantly, such as cases where the VKOSPI index breaks through the 30 lines and rises extremely, then it is highly likely that investors will overreact and have a reversal effect on stock prices after the event. Considering these circumstances, the main hypothesis of this paper is set as follows.

H1: If the VKOSPI index falls on the event day when a large-scale price increase occurred, there is a stock price drift effect in which the stock price continues to rise after the event date.

H2: If the VKOSPI index rises on the event day when a large-scale price decline occurred, a reversal will appear in the stock return after the event date.

4. Data and Estimation Methodology

The sources of the data are as follows: First, market index data and individual stock price data related to Korea's distribution industry were obtained from DataGuide.

Table 1: Descriptive Statistics for Stock Returns on the Event Date

Proxy/Threshold	Obseravations	Mean	St.Dev.	Proxy/Threshold	Obseravations	Mean	St.Dev.
$\mid SR0_i \mid > 10\%$	7,376	14.75	4.46	△VKOSPI > 0	2,992	15.03	4.63
				△VKOSPI < 0	4,384	14.56	4.32
$\mid AR0_i \mid > 10\%$	4,062	15.29	4.67	△VKOSPI > 0	1,827	15.3	4.8
				△VKOSPI < 0	2,235	15.28	4.55
$\mid SR0_i \mid < 10\%$	3,413	-13.32	3.0.	△VKOSPI > 0	2,414	-13.29	3.04
				△VKOSPI < 0	999	-13.4	2.91
$\mid AR0_i \mid < 10\%$	2,148	-13.09	3.29	△VKOSPI > 0	1,201	-14.52	3.51
				△VKOSPI < 0	947	-13.55	2.91

Second, VKOSPI data were obtained from the Korean Statistical Information Service (KOSIS). The data sampling period was from January 2004 to July 2022. We defined daily simple returns and daily abnormal returns as proxy variables for large-scale daily stock price changes. The concrete definitions of these proxy variables are as follows.

SR_i: $|SR_\mathrm{i}| > 10\%$. We define SR_i as the daily rate of actual return on the event date (day 0) of the i-th event, the absolute value of which is greater than 10%. The 10% threshold is considered to reflect significant changes, such as substantial changes in fundamentals or investor sentiment. We set the threshold of 10% to ensure that we have obtained a sufficient number of samples.

AR_i: $|AR_\mathrm{i}| > 10\%$. We define AR_i as the daily rate of abnormal return on the event date (day 0) of the i-th event, the absolute value of which is greater than 10%. $\mathrm{AR_i}$ is the market model adjusted return (MMAR) on the event day of the i-th event. We constructed the beta using individual stock price data and market stock data for a period extending back to 250 days prior to the event date.

For inference, it is necessary to use the following regression equation to estimate the rate of return of market model for each trading day after the event date.

$$SR = \alpha_\mathrm{i} + \beta_\mathrm{i} MR + \epsilon_\mathrm{i} \tag{1}$$

This equation regresses the stock return for the 250 days preceding the event date to the market return for the same period. The regression coefficients estimated in this regression equation are $\widehat{\alpha}$ and $\widehat{\beta}$. By using this regression coefficient as well as the stock return and market return on the day after the event date of the i-th event, the abnormal return, AR_i can be calculated. This is expressed as shown in Equation (2) below.

$$AR_\mathrm{i} = SR_\mathrm{i} - [\widehat{\alpha} + \widehat{\beta} MR_\mathrm{i}] \tag{2}$$

The analysis in this paper focuses on the effect that the investor mood on the event date has on the cumulative rate of return after the event date. Equation (2) plays a key role in calculating this cumulative rate of return, or CAR_i. CAR_i is defined in windows of 1, 5, and 20 trading days after the event date. CAR_i is calculated by accumulating the abnormal rate of return obtained in the same way as in Equation (2) during the corresponding window period. The significance of CAR_i is determined based on T-test and multifactor regression analysis.

Meanwhile, the principle of extracting a large-scale daily stock price change sample is as follows: First, there must be at least 250 trading days prior to the event date, and there must be at least 20 trading days after the event date. Second, certain market capitalization information should be available, as it can help ascertain the effect of investor mood on stock returns by size group. Using samples extracted according to these principles, Table 1 lists the number of samples and basic statistics of stock return for the cases of both rising and falling stock prices as well as rising and falling VKOSPI.

A distinctive feature that can be seen in Table 1 is that the average AR_i (15.28) was higher than the average SR_i (14.56) when the stock price rose and VKOSPI fell. Moreover, when the stock price fell and the VKOSPI rose, the absolute value of the average AR_i (-14.52) was higher than the average SR_i (-13.29). This can be interpreted to mean that the AR_i measure better reflects the influence of investor mood than the SR_i measure of large-scale stock price changes.

5. Results and Discussion

5.1. Ex Post Stock Returns: Total Sample

Table 2 shows the cumulative rate of return after the event date of the entire sample of events in which large-scale price changes of individual stocks of companies involved in the distribution industry in Korea. In this table, under the window of up to 20 days after the event date, the statistical significance of the cumulative return of SR and AR defined above can be confirmed. First, in Panel A, where a large stock price rise occurred, significant drifts appeared in the cumulative return after the event date of the SR and AR samples for each window of the 1st and 5th days after the event date. This is in contrast to Kudryavtsev (2017). According to his analysis, in the case of individual stocks belonging to the S&P500 index, stock price reversals appear after a large stock price increase.

On the other hand, in Panel B, stock price drifts appear in all samples on the 1st day after the event date, but only in the case of the SR sample, a significant stock price reversal appears in the 20th-day window. In the case of stock price decline, it also shows a difference from the result of Kudryavtsev (2017), but the significance of the reversal effect can be evaluated as low overall. As such, the stock market related to the distribution industry in Korea exhibits a stock return phenomenon that is different from the US market after a large-scale stock price fluctuation event. However, it is necessary to further confirm the nature of the way the VKOSPI index influences the mood of investors and how it affects the rate of return on and after the event date.

Table 2: Abnormal Stock Returns Following Large Stock Price Increases and Decreases: Distribution Industry Total Sample

Panel A: Large stock price increases		
Days relative to event	**Average AR following initial price changes**	
	|*SR0*i|>10% (7,317 events)	**|*AR0*i|>10% (7,173 events)**
1	0.01*** (0.0)	0.0117*** (0.0)
2	0.0011 (16.6)	0.0012 (31.4)
1 to 5	0.0112*** (0.0)	0.0125*** (0.0)
1 to 20	0.0039 (24.4)	0.0079 (12.5)

Panel B: Large stock price decreases		
Days relative to event	**Average AR following initial price changes**	
	|*SR0*i|>10% (3,375 events)	**|*AR0*i|>10% (3,282 events)**
1	-0.0068*** (0.0)	-0.008*** (0.0)
2	0.0012 (26.7)	0.0007 (62.6)
1 to 5	0.0041* (8.3)	-0.0013 (69.4)
1 to 20	0.0227*** (0.0)	0.0079*** (17.6)

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

5.2. Effect of VKOSPI Fluctuation

In this section, in order to examine the effect of VKOSPI fluctuations on the cumulative return after the event date, the samples in which large-scale price changes occurred are divided into cases where the VKOSPI index rose and fell on the event date. Panel A in Table 3 below shows the pattern of cumulative returns after the event date for the case where VKOSPI index rose and fell on the event date, respectively, for the simple return measure and the abnormal return measure in the case of a large-scale stock price increase. Contrary to what was expected, when the VKOSPI index fell and the investment mood was positive, the cumulative return showed a positive value rather than a negative value due to the reversals in both the simple return measure and the abnormal return measure. Compared to the entire sample, in the case of the simple return measure, the significance was strengthened and the magnitude of the cumulative return increased in the 5-day and 20-day windows. Compared to the entire sample, in the case of the abnormal return measure, there was no change in significance, but the scale of the cumulative return was slightly increased. On the other hand, in the case where VKOSPI rose and the investment mood appeared negative, significance decreased in all windows after the event date and the scale of cumulative return was small.

As a result of this review, the first research hypothesis of this paper, that is, the hypothesis that the drifts of the stock prices after the event date would appear when the VKOSPI index fell and the investment mood was positive on the event day when a large-scale price increase occurred, was accepted. The cumulative returns do not show a negative value due to the reversal effect but show a significant positive value due to a kind of drift effect. In other words, in the case of Korea's distribution industry-related stocks, when the VKOSPI index declines, investors show a kind of underreaction rather than an overreaction, and it can be seen that there is a stock price drift effect rather than a stock price reversal effect after the event date.

In addition, Panel B in Table 3 below shows the cumulative returns when the VKOSPI index rose and fell in both the simple return measure and the abnormal return measure on the event day of a large stock price decline. First of all, looking at the case where the VKOSPI index rose and the investment mood was negative on the event day, it can be confirmed that the price reversals after the event date appear in both the simple return measure and the abnormal return measure. Compared to the case of the full sample in Table 2, it can be seen that the significance and magnitude of the cumulative return for the 5-day and 20-day windows have increased. In the case of the simple rate of return measure, the cumulative returns for the 5-day and 20-day windows in the full sample were 0.41% and 2.27%, respectively. It increased significantly to 1.27% and 3.5%, respectively. In addition, the cumulative rate of return for the 5-day and 20-day windows in the full sample was -0.13% and 0.79%, respectively, in the case of the abnormal return measure. However, when the VKOSPI index rose and the investment mood was negative, the corresponding cumulative returns were 1.15% and 2.33%, respectively, showing significantly high positive values. On the other hand, when the VKOSPI index fell on the event day when the stock price fell on a large scale and the investment mood was positive, the cumulative returns after the event date both showed negative values in the simple return measure and the abnormal return measure, and the significance decreased significantly.

In the case of Korea's distribution industry-related stocks, if the VKOSPI index rises on the day of the event when the stock price fell significantly, resulting in a negative investor mood, investors overreact to the decline in stock prices, as in the case of the US stock market. And as a result, it can be confirmed that the reversal effect appears clearly in the cumulative return after the event date. In Panel B of Table 3, which analyzes the case where the stock price fell significantly, compare the size and significance of the cumulative returns in each case where the VKOSPI index rises and falls. Such a comparison makes it clearer the effect of the rising VKOSPI index and deteriorating investor mood on the reversal of cumulative returns after the event. As a result of this review, the second research hypothesis of this paper, that is, the hypothesis that the reversals of the stock prices after the event date would appear when the VKOSPI index rose and the investment mood was negative on the event day when a large-scale price decrease occurred, was adopted.

Table 3: Abnormal Stock Returns Following Large Stock Price Increases and Decreases, by the Sign of △VKOSPI : Proxy A and B for Defining Large Price Moves

Panel A: Large stock price increases				
Days relative to event	**Average AR following initial price changes**			
	|*SR0*i|>10%		**|*AR0*i|>10%**	
	△VKOSPI >0	**△VKOSPI <0**	**△VKOSPI >0**	**△VKOSPI <0**
1	0.0074*** (0.0)	0.0118*** (0.0)	0.0076*** (0.0)	0.0129*** (0.0)
2	-0.0006 (65.8)	0.0023** (2.5)	-0.0006 (63.5)	0.0018 (13.8)
1 to 5	0.0011 (74.2)	0.018*** (0.0)	0.0009 (80.1)	0.017*** (0.0)
1 to 20	-0.0095* (6.1)	0.0131*** (0.3)	-0.0096* (6.9)	0.0075 (16.3)
Panel B: Large stock price decreases				
Days relative to event	**Average AR following initial price changes**			
	|*SR0*i|>10%		**|*AR0*i|>10%**	
	△VKOSPI >0	**△VKOSPI <0**	**△VKOSPI >0**	**△VKOSPI <0**
1	-0.0058*** (0.0)	-0.0094*** (0.0)	-0.0072*** (0.1)	-0.009*** (0.0)
2	0.0027** (2.5)	-0.0026 (19.1)	0.0038** (3.7)	-0.0034 (10.6)
1 to 5	0.0129*** (0.0)	-0.017*** (0.0)	0.0115** (1.1)	-0.0175*** (0.0)
1 to 20	0.035*** (0.0)	0.0071 (44.7)	0.0233*** (0.1)	-0.0116 (23.5)

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

5.3. Effect of VKOSPI Fluctuations - Classification by Company Size

In this section, we divide the size of the stocks traded in the KOSPI market among stocks of companies involved in Korea's distribution industry into the top 30% and the bottom 30%, and we then examine the pattern of cumulative returns after large-scale price changes caused by fluctuations in the VKOSPI index. Baker and Wurgler (2006) pointed out that relatively small companies are more sensitive to investor mood. Accepting their analysis, this paper also examines the effect of VKOSPI index fluctuations by company size. Looking at Panel A of Table 4 below, focusing on the cumulative return and its significance after the event date for both the simple return measure and the abnormal return measure, respectively, it can be seen that the VKOSPI index fell simultaneously on the event day when the stock price rose significantly. The left side of each cell represents the cumulative return of large stocks whereas, the right side represents the cumulative return of small stocks.

In this way, distribution-related companies were divided by size and an interesting fact was discovered when examining the response to changes in the VKOSPI index. When the stock price rises, the drift effect of the stock price of the small stock group mainly leads the drift effect of the full sample. As can be seen in panel A below, when the VKOSPI index fell, the cumulative returns of small stocks in the 5-day and 20-day windows under the simple return measure were 2.44% and 2.85%, respectively, thus showing significant values. Moreover, even in the case of abnormal return measure, the cumulative returns of small stocks showed significant values of 2.29% and 2.26%, respectively. On the other hand, in the case of the large-cap group, the cumulative rate of return shows insignificant values in this case. It can be seen that the cumulative return of small stocks is leading the drifts effect of stock prices in the full sample.

The reason why large-cap and small-cap stocks react to changes in the VKOSPI is so mixed is attributed to the effect of disclosure information. Vega (2006) and Savor (2012) pointed out that large-scale price changes that accompany public information cause stock price residual effects after the event date. However, in the case of large-cap stocks, information on shocks is disclosed in a relatively accurate manner, and investors' reactions to them are immediately reflected, so it is difficult to show a specific trend in stock prices after the event date. However, in the case of small stocks, it is relatively rare for information on shocks to be publicly disclosed, thus creating situations in which small stock investors are forced to be passive in responding to shocks. As a result, it is judged that an underreaction to the shock on the event day occurs; as a result, a strong drift effect occurs after the event day. Overall, the empirical analysis results can be evaluated to allow the adoption of the first hypothesis of this paper.

On the other hand, looking at the case where the VKOSPI index rose at the same time that the stock price rose, the cumulative return of small stocks under the simple return measure was 0.62% and 0.63%, respectively, for the 5-day and 20-day windows, thus showing insignificant values. Even in the case of abnormal return measures, the cumulative returns of small stocks are 0.65% and 0.67%, respectively, thus showing insignificant values. In addition, when the stock price and the VKOSPI index both rise simultaneously, the cumulative returns of large-cap stocks are very small and insignificant.

Meanwhile, an interesting fact can be seen in Panel B of Table 4 below. When stock prices fall and the VKOSPI index rises at the same time, there is a strong reversal effect in both large and small stocks. In the case of the simple return measure, for the 5-day and 20-day windows, the cumulative returns of small stocks are 1.71% and 5.5%, respectively, and the cumulative returns of large stocks are 2.22% and 3.56%, respectively. In the case of the abnormal return measure, the cumulative returns of small stocks for the 5-day and 20-day windows are 2.07% and 5.83%, respectively, while for large stocks, they are 0.057% and 0.022%, which are significant values. In contrast to the case of price rise, the reversal effect is evenly manifested in both small and large stocks.

To properly understand this result, it is necessary to consider the basic situation of the hypotheses set in this paper analyzed. In situations where the VKOSPI index rose on the event day when the stock price fell significantly, as mentioned above, a case where the VKOSPI index rose in an extreme manner was included. In this case, the fear of investors is extremely increased, creating a situation leading to an overreaction. As a result, the reversal effect on stock prices after the event is highly likely to be common to all stocks, whether they are large or small. Therefore, the second research hypothesis of this paper namely, that if a price decline occurs and the VKOSPI index rises on the event date, a reversal effect will appear on the stock price after the event date is supported.

On the other hand, when the stock price and the VKOSPI index fall simultaneously, the cumulative return shows insignificant values in both the simple return and abnormal return measures. Overall, when the stock price declines in a large-scale manner and coincides with the direction of change in the investment mood, a strong reversal effect with high significance is strong for both large and small stocks. On the other hand, the cumulative return is insignificant when the large-scale decline in stock prices is inconsistent with the direction of change in the investment mood.

Table 4: Abnormal Stock Returns Following Large Stock Price Increases and Decreases, by the Sign of △VKOSPI : for High and Low Market Capitalization Firms

Panel A: Large stock price increases				
Days relative to event	Average AR following initial price changes for high/low market capitalization firm			
	|SR0i|>10%		|AR0i|>10%	
	△VKOSPI >0 (283/1350 events)	△VKOSPI <0 (672/1746 events)	△VKOSPI >0 (248/1319 events)	△VKOSPI <0 (389/1510 events)
1	0.0015/ 0.008***	0.0023/ 0.0015***	0.0015/ 0.0082***	-0.000006/ 0.0164***
2	-0.0006/ -0.0022	-0.0012/ 0.0035**	-0.0009/ -0.0021	-0.0016/ 0.0026
1 to 5	-0.0038/ 0.0062	0.006/ 0.0244***	-0.0051/ 0.0065	0.0003/ 0.0229***
1 to 20	-0.0085/ 0.0063	0.0016/ 0.0285***	-0.0108/ 0.0067	-0.0064/ 0.0226***

Panel B: Large stock price decreases				
Days relative to event	Average AR following initial price changes for high/low market capitalization firm			
	|SR0i|>10%		|AR0i|>10%	
	△VKOSPI >0 (413/1006 events)	△VKOSPI <0 (112/453 events)	△VKOSPI >0 (149/535 events)	△VKOSPI <0 (100/429 events)
1	-0.0043/ -0.0056**	-0.0118**/ -0.0043	-0.0019/ -0.0072**	-0.0107*/ -0.0045
2	0.0026/ 0.0051***	0.0019/ -0.0031	-0.0004/ 0.0089***	0.0011/ -0.0041
1 to 5	0.02225***/ 0.0171***	-0.0028/ -0.0114	0.0057***/ 0.0207***	-0.0034/ -0.012*
1 to 20	0.0356***/ 0.055***	0.0222/ 0.0237	-0.0022*/ 0.0583***	0.014/ 0.0213

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

5.4. Multifactor Analysis

Above, we examined the effect of changes in the VKOSPI index or changes in investor mood on the cumulative rate of return after the event date by company size. In this section, we examine whether changes in the VKOSPI index still affect the cumulative return after the event date even after considering both company-specific factors and event-specific factors. In addition to company-specific factors and event-specific factors, the following multiple regression analysis was conducted in this paper to examine the effect of changes in the VIX index on the cumulative return after the event date.

$$CAR = \gamma_0 + \gamma_1 VIX\_dum_i + \gamma_2 MCap_i + \gamma_3 Mbeta_i + \gamma_4 SRVolat_i + \gamma_5 |SR0|_i + \gamma_6 ABVOL0_i + \epsilon_i \quad (3)$$

In this regression analysis, the explanatory variable CAR represents the cumulative return of the windows of 1, 5, and 20 days after the event date corresponding to the simple measure and the abnormal return measure, respectively. In this equation, VIX_dum_i is a dummy variable that gives a value of 1 if the VKOSPI index moves in the direction that coincides with the direction of the stock price change on the event date, and gives a value of 0 if it does not coincide. And $MCap_i$ is the natural logarithm of the market capitalization of the company corresponding to the i-th event, standardized across the cross-section. And $Mbeta_i$ is the standardized value across the cross-section of the market beta obtained from the stock return for the 250 days prior to the event date of the i-th event. And $SRVolat_i$ represents the cross -sectional standardization of the standard deviation of the stock return for the 250 days prior to the event date of the i-th event. $|SR0|_i$ represents the absolute value of the stock return on day-0 of the i-th event. Finally, $ABVOLO_i$ is the abnormal trading volume on the event day of the i-th event, which is standardized by subtracting the average trading volume for the 250 days prior to the event day form the actual trading volume on the event day and dividing it by the standard deviation of the trading volume for the same period. Among the independent variables of this multiple regression analysis, $|SR0|_i$ represents event-specific factor, and ($MCap_i$, $Mbeta_i$, $SRVolat_i$, $ABVOLO_i$) represent company-specific factors.

Table 5 below presents the coefficient estimates of the regression equation for the cumulative returns of windows 1, 5, and 20 days after the event date under the simple return measure and the abnormal return measure. As a result of the analysis, when the stock price rose, the coefficient estimate of VIX_dum_i for both the simple return measure and the abnormal return measure showed a significant positive value in the 5 and 20-day windows. As discussed above, when the stock price rises, it can be confirmed that the residual effect appears in this case as well. Looking at the case where the stock price fell, both the simple return measure and the abnormal return measure showed a significant positive value in the coefficient estimate of VIX_dum_i for the 20-day cumulative return, confirming that the stock price reversal effect appeared.

Overall, the coefficient estimate of VIX_dum_i was found to be significant. Even after considering both company-specific factors and event-specific factors, it can be judged that investors' mood exerts a significant influence on the cumulative rate of return after the event date. However, as mentioned above, when the stock price declines, the fluctuations in VKOSPI cause an overreaction on the event date and cause a stock price reversal effect after the event date. However, it is different from the US market in that the change in VKOSPI causes an underreaction on the event date when the stock price rises and causes a drift effect in the stock price after the event date.

Next, the coefficient estimate of $|SR0|_i$, an event-specific factor, shows insignificant values in the 5-day and 20-day windows when the stock price rises. However, when the stock price fell, it showed a significant positive value in the 20-day window. It can be seen that the cumulative return for the 20 days after the event date is significantly affected by the size of the price shock on the event date when the stock price declines. In addition, the estimated coefficient of $MCap_i$, which represents the market capitalization, showed very significant negative values for the 5-day and 20-day windows in the case of stock price rise. In the case of stock price decline, a significant negative value was shown only for the 20-day window. In the case of price increases, it has been confirmed that large-cap stocks did not show significant stock price drifts, while small-cap stocks showed very large stock price drifts. In addition, when the stock price fell, the coefficient estimate of $MCap_i$ showed a significant negative value for the 20-day window, but the significance and absolute value of the coefficient estimate were somewhat lower than in the case of a price increase. This is interpreted as the effect of a stock price reversal effect in both large and small stocks when stock prices fall.

Next, the estimated coefficient of $SRVolat_i$, which represents the volatility of the stock return, shows a positive value when the stock price has risen and a negative value when the stock price has fallen. It can be confirmed that stocks with high volatility contribute to the residual effect of cumulative returns after the event date. In addition, the coefficient estimate of $Mbeta_i$, which represents the market risk of an individual stock, showed a significant negative value both when the stock price rose or fell. It can be seen that when the stock price rises, the reversal effect is induced, and when the stock price decreases, the drift effect is induced. Finally, the coefficient estimate of $ABVOLO_i$, which represents the abnormal trading volume on the event day, shows a significant negative value in both cases where the stock price rose or fell. It can be seen that stocks with a large trading volume induce a reversal effect after the event date in the case of a price increase, and a drift effect after he event date in the case of a price decrease.

Table 5: Multifactor Regression Analysis of ARs Following Large Stock Price Increases and Decreases

Panel A:Large stock price increases						
Explanatory variables	Coefficient estimates					
	|*SR0*i|>10% (7,376events)			|*AR0*i|>10% (4,062events)		
	Day 1	Day 1 - 5	Day 1 - 20	Day 1	Day 1 - 5	Day 1 - 20
Intercept	-0.0027	0.02*	0.0841***	-0.0049	0.0256	0.1288***
|SR0|	0.0013***	0.0005	-0.0004	0.0019***	0.0015*	-0.0004
VIX_dummy	0.0056***	0.0187***	0.0234***	0.0049*	0.0193***	0.0249**
Mcap	-0,0089	-0.032***	-0.1064***	-0.0163**	-0.0327*	-0.1775***
beta	-0.0148***	-0.0212*	0.011	-0.0018***	-0.0504***	-0,0191
SRvolat	-0.0085*	0.0032	-0.0777***	0.0042	-0.0057	-0.0915***
ABVOLO	-0.0113***	-0.0232***	-0.0449***	-0.0087*	-0.0259**	-0.0364**

Panel B:Large stock price decreases						
Explanatory variables	Coefficient estimates					
	|*SR0*i|>10% (3,413events)			|*AR0*i|>10% (2,148events)		
	Day 1	Day 1 - 5	Day 1 - 20	Day 1	Day 1 - 5	Day 1 - 20
Intercept	0.0173**	-0.0067	0.0298	0.0247**	0.0041	0.0481
|SR0|	-0.0019***	0.001	0.0055***	-0.0016**	0.0013	0.006***
VIX_dummy	0.0027	0.0197***	0.0197*	0.0027	0.022***	0.0195
Mcap	-0.0108	-0.0173	-0.1046***	-0.014	-0.0356*	-0.1618***
beta	0.0082	0.0426***	0.0914***	0.0046	0.0433***	0.066**
SRvolat	-0.0023	-0.0364***	-0.1495***	-0.0134*	-0.0498***	-0.1529***
ABVOLO	0.0005	-0.0362***	-0.08***	-0.0053	-0.0447***	-0.0751***

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

5. Conclusions

In this study, we analyzed the effect of the investor's prediction of future volatility behind the VKOSPI index on the cumulative return after large-scale daily stock price fluctuations. When the VKOSPI index rises, the investor mood is negative, while when the VKOSPI index falls, the investor mood is positive. If VKOSPI rose on the event day when the stock price fell sharply, thus indicating a negative investor mood, investors would rate the subjective probability of negative returns higher. This will conversely result in a further widening of the stock price decline. The overreaction of such investors will cause the stock price to fall more than the intrinsic value level, which will have a reversal effect on stock prices after the event date.

Conversely, suppose that the investor mood represented by VKOSPI is positive on the day of the event when the stock price rose sharply. In this case, investors will increase the subjective probability of a positive return, which magnifies the stock price rise. The overreaction of these investors is expected to cause the stock price to rise above the level of the intrinsic value. This creates a reversal effect for stock prices after the event date. In this paper, an empirical analysis was conducted based on the basic research hypothesis that an overreaction would occur if stock price fluctuations proceeded in the same direction as the investor's mood, and as a result, a reversal effect would appear on stock prices after the event date.

The empirical analysis showed that, in the case of Korea's distribution industry stocks, the overreaction to the change in investor mood and the consequent reversal effect was not consistent. If the VKOSPI index rose on the event day when the stock price fell sharply, thus resulting in a negative investor mood, there was a significant stock price reversal effect after the event date due to the investor's overreaction. However, when the VKOSPI index fell on the event day when the stock price rose significantly and the investor mood was positive, the stock price reversal effect did not appear after the event date, but a significant drifts effect was found instead.

As for the result of the drift effect when the stock price rises, if the empirical analysis is conducted by classifying companies by size, it can be confirmed that the significance of the residual effect in stock prices in small companies is very large and strengthened. In the case of large-cap stocks, it appears as an insignificant reversal effect. It can therefore, be confirmed that the stock price residual effect in the Korean distribution industry-related stock market is mainly driven by small companies. On the other hand, there was no difference in the stock price reversal effect that occurs when the stock price falls. In the case of stock price declines, the stock price reversal effect was similar to that of large or small stocks.

The reason why large and small stocks respond differently to the decline in the VKOSPI index is attributable to the difference in the effect of information disclosure on large and small stocks. In the case of large-cap stocks, the quantity of disclosure information is relatively abundant and its accuracy is also high. Therefore, in the case of large-cap stocks, information on stock price shocks is reflected in the price in a relatively accurate manner, and accordingly, there is little additional stock price adjustment after a stock price shock. However, in the case of small stocks, information disclosures are rarely made, and their reliability is low. Considering these points, small-cap investors maintain low confidence in the information on the stock price shock of small-cap stocks, and they therefore reflect the information passively in the price. As a result, in the case of small-cap stocks, additional stock price adjustments after stock price shocks appear in the form of stock price residual effects. It is therefore understandable that a positive investor mood has a differential effect on large- and small-cap stocks.

However, when investor mood rapidly deteriorates and stock prices fall sharply, both large and small stocks tend to fall excessively due to overreaction. As a result, a stock price reversal effect is common after the event date. In this case, the effect of investors' overreaction due to the rapid deterioration of investor mood appears stronger than the effect of discriminating disclosure information according to the size of the company. It can therefore be understood that a common stock price reversal effect appears after the event date.

In summary, this study found that the mood of investors in the Korean distribution industry-related stock market has a differential effect on the stock return after the event date. A positive investor mood underreacts when stock price rise, thus causing stock price drifts, particularly in the case of small stocks. In addition, a negative investor mood causes stock price reversals by overreacting when the stock price declines, which was a tendency shown for both small and large stocks. As such, the fact that the influence of investor mood on stock price shocks was differentiated in the case of rise and fall can be seen as a distinctive feature of Korea's distribution industry stock market.

Equity investors related to the distribution industry in Korea underreact to the shock when the investor's mood is positive, which is when greed affects behavior. When the investor's mood is negative, that is, when fear is active, the behavioral characteristics of overreacting to shock are shown. Investors' specific responses to these changes in investment mood represents a unique phenomenon in stocks related to Korea's distribution industry. It is judged that this will provide a rich topic for discussion in academic circles related to the efficient market hypothesis. In practice, it has the implication that it is possible to build an investment strategy that can obtain a stable, large-scale abnormal return by using the psychological behavior of these investors.

References

Avramov, D., Chordia, T., & Goyal, A. (2006). Liquidity and Autocorrelations in Individual Stock Returns. *Journal of Finance, 61*(5), 2465-2494.

Baker, M., & Wurgler, J. (2006). Investor Sentiment and the Cross-Section of Stock Returns. *Journal of Finance, 61*(4), 1645-1680.

Cao, M., & Wei, J. (2005). Stock Market Returns: A Note on Temperature Anomaly. *Journal of Banking and Finance, 29*(6), 1559-1573.

Constans, J. I., & Mathew, A. M. (1993). Mood and Subjective Risk of Future events. *Cognition and Emotion, 7*(6), 545-560.

Cox, D. R., & Peterson, C. R. (1994). Stock Returns following Large One-Day Declines: Evidence on Short-Term Reversals and Longer-Term Performance. *Journal of Finance, 49*(1), 255-267.

Forgas, J. P. (1992). On Mood and Peculiar People: Affect and Person Typicality in Impression Formation. *Journal of*

Personality and Social Psychology, 62(5), 863-875.

Goetzmann, W. N., & Zhu, N. (2005). Rain or Shine: Where is the Weather Effect? *European Financial Management, 11*(5), 559-578.

Gencyurek, A. G. (2023). Investors' Overreaction to Political News: The case of Turkey, *PressAcademia Procedia, 16*, 7-9.

Hirshleifer, D., & Shumway, T. (2003). Good Day Sunshine: Stock Returns and the Weather. *Journal of Finance, 58*(3), 1009-1032.

Ikenberry, D. L., & Ramnath, S. (2002). Underreaction to Self-Selected News Events: The Case of Stock Splits. *Review of Financial Studies, 15*(2), 489-526.

Johnson, E. J., & Tversky, A. (1983). Affect, Generalization, and the Perception of Risk. *Journal of Personality and Social Psychology, 45*(1), 20-31.

Kliger, D. & Kudryavtsev, A. (2013). Volatility Expectations and the Reaction to Analyst Recommendations. *Journal of Economic Psychology, 37*, 1-6.

Kudryavtsev, A. (2017). VIX Index and Stock Returns Following Large Price Moves. *Journal of Risk and Control, 4*(1), 71-101.

Levy, T. & Yagil, J. (2001). Air Pollution and Stock Returns in the US. *Journal of Econmic Psychology, 32*(3), 374-383.

Loewenstein, G. F., Hsee, C. K., Weber, E. U., & Welch, N. (2001). Risk as Feelings. *Psychological Bulletin, 127*(2), 267-286.

Rasheed, M. S., Sheikh, M. F., Sultan, J. S., Ali, Q., & Buhtta, A. I. (2021). Stock Market Behavior after Large Price Changes and Winner-Loser Effect: Empirical Evidence from Pakistan, *The Journal of Asian Finance, Economics and Business, 8*(10), 219-228.

Savor, P. (2012). Stock Returns after Major Price Shocks: The Impact of Information. *Journal of Financial Economics, 106*(2), 635-659.

Sturm, R. (2003). Investor Confidence and Return Following Large One-Day Price Changes. *Journal of Behavioral Finance, 4*(4), 201-216.

Talhartit, I., Jillali, S. A., & Kabbouri, M. E. (2022). Behavioral Finance: How are Traders' Financial Decisions and Performance Impacted by Behavioral Biases under Uncertainty? *International Journal of Science Academic Research, 3*(10), 4588-4597.

Vega, C. (2006). Stock Price Reaction to Public and Private Information. *Journal of Financial Economics, 82*(1), 103-133.

Whaley, R. E. (2000). The Investor Fear Gauge. *The Journal of Portfolio Management, 26*(3), 12-17.

Whaley, R. E. (2009). Understanding the VIX. *The Journal of Portfolio Management, 35*(3), 98-105.

Zarowin, P. (1989). Short-Run Market Overreaction: Size and Seasonality Effects, *Journal of Portfolio Management, 15*(3), 26-29.

Zhenxiong, L, Xingzhi, Y., & Marwan, I. (2023). On the Right Jump Tail Inferred from the VIX Market, *International Review of Financial Analysis, 86*, 102507.