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The V-Shaped Disposition Effect in the Stock Exchange of Thailand*

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Abstract

The objective of this study is to investigate how investors in the Stock Exchange of Thailand practically trade in response to a magnitude of profits and losses, given a discussion of the widely well-known behavioral explanation, so called as the disposition effect. We provide empirical evidence of an existence of the V-shaped disposition effect, which has been recently found in several advanced equity markets. By adopting the methodology suggested by An's (2016) and Fama and Macbeth (1973), we document that stock return patterns in relation to aggregate unrealized gains and losses of investors are consistent with the V-shaped selling schedule, given an increase in unrealized gains and losses over the period of January 1996 to December 2015. The effect of unrealized gains is stronger than that of unrealized losses and this asymmetry underlies the existence of the V-shaped disposition effect in the Thai equity market. Interestingly, the effect of the V-shaped selling schedule is strongest over the short-term holding time horizon. Last but not the least, stocks for which investors have large unrealized gains and losses outperform in the following month and the long-short trading strategy, based on this premise, generates the average 1.7% monthly (equivalent to 20.0% per year) abnormal return.

Keywords: Disposition Effect, Behavioral Finance, V-Shaped, Thailand

JEL Classification Code: G14, G40, G41

1. Introduction

Many empirical studies confirm an existence of disposition effect in equity markets, which describes irrational behavior of a certain group of investors.¹ The traders tend to sell securities that have increased in

prices rather than those that have decreased in prices. The Prospect theory, proposed by Kahneman and Tversky (1979), has been widely used to explain this phenomenon, in which investors value gains and losses differently. They tend to be risk-averse when they are exposed to gains but comparatively tend to be risk-seeking when they face losses. The empirical studies² on the disposition effect typically assumes that the selling propensity of investors is a monotonically increasing function in response to profits. The interpretation of this assumption is that investors would have more tendency to hold on to losing securities when the magnitude of losses increase. This result is based on the Prospect theory, which tells about the willingness to take more risk in order to avoid a certain loss from selling decisions.

Ben-David and Hirshleifer (2012) and An (2016) suggest that investors do not really hold on to losing securities because their losses becomes larger in magnitude. In fact, their willingness to sell losing securities increases with an increase in magnitude of losses. Moreover, they observe that investors' propensity to sell securities in response to profits is actually a V-shaped function with a kink around the zero profit. However, the alphabet 'V' is not symmetric due to a steeper slope on the domain of gain compared to that on the domain of loss. They suggest that the asymmetry of the V-shaped selling schedule underlies the disposition effect

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because the average selling propensity on the gain side is larger, implying that investors tend to sell more on winners than on losers.

The motivation of this study comes from an interest in how investors in the Stock Exchange of Thailand practically trade in response to a magnitude of profits.³ With faith in the traditional finance theory, investors are assumed to always be rational when making decisions; however, a growing literature in behavioral finance indicates the opposite. The disposition effect exists when investors tend to sell their winners too early but hold onto their losers too long. As is the case with the U.S. and other countries, numbers of studies provide largely the same empirical evidence confirming the existence of the disposition effect in stock markets, but existing studies focus on the difference in selling probability conditioned to the sign of profit (gain or loss) rather than on its magnitude. In this study, we shed a new light in this strand of research by providing a functional form of how investors in the Stock Exchange of Thailand trade in the light of unrealized profits.

The present study offers two sets of findings. First, it provides empirical evidence of the existence of the V-shaped disposition effect in the Thai stock market. By adopting An's (2016) methodology, we document the return patterns in relation to unrealized gains and losses of investors to be consistent with the V-shaped selling schedule. Second, it demonstrates that a portfolio of stocks with a large magnitude of unrealized profits outperforms that of stocks with a small magnitude of unrealized profits in the following month. We construct a variable, *V-shaped selling propensity (VSP)*, to capture selling pressure from investors' unrealized gains and losses and show that a long-short trading strategy, buying a portfolio of stocks with high value of *VSP* and selling a portfolio of stocks with low value of *VSP*, generates positive monthly abnormal returns (alphas) in the following month.

The remainder of this study is organized as follows. Section 2 provides a detailed definition of the V-shaped disposition effect. Section 3 reviews existing pertinent studies. Section 4 describes data and key variables and Section 5 introduces the methodology. Section 6 presents the empirical results. Finally, the last section presents conclusion and suggests some further possible studies.

2. The V-Shaped Selling Schedule and V-Shaped Disposition Effect

The V-shaped selling schedule, first documented by Ben-David and Hirshleifer (2012), refers to an increase in investors' selling propensity when unrealized losses and gains become larger. The finding indicates that the slope in the realm of gains is steeper than that in the realm of losses and that the lowest selling propensity is located around zero profits. The asymmetry between the gain side and the loss

side leads to a higher average selling propensity for gains than for the losses. Thus, its implication is still in line with many empirical studies on the disposition effect that investors tend to sell winners than losers. Ben-David and Hirshleifer (2012) suggest that the asymmetry on selling schedule underlies the disposition effect. This is later called as the V-shaped disposition effect (An, 2016).

Moreover, Ben-David and Hirshleifer (2012) suggest that the disposition effect cannot be necessarily explained as a result of individual preference. Under the Prospect theory (Kahneman & Tversky, 1979), investors tend to be risk-seeking in the realm of loss so they would be willing to maintain a risky position after a loss in order to avoid the negative utility from realizing that loss (i.e. loss aversion). However, this is not found in the study of Ben-David and Hirshleifer (2012), documenting that investors tend to sell more stocks that have gone down in value. They propose that a speculative trading motive (i.e. trading upon beliefs) of investors is more appropriate in explaining the disposition effect by showing that the strength of the V-shaped selling propensity depends on a speculative characteristic of investors.

The mechanism of speculation as the source of the V-shaped disposition effect is that speculative investors place purchase transactions on a stock, believing that they possess superior information than an overall market and expect to make positive returns from their own information. When little news spreads throughout the market and consequently causes a minor change in stock prices, these speculative investors have less incentive to update their beliefs and subsequent trades. This can explain that the selling propensity around zero profits is very small. If news, on the other hand, leads to a large change in stock prices, the investors are more inclined to update their beliefs on the investment position and trade accordingly, since it is reasonable to expect the trading activities from belief-updating to be correlated with a magnitude of gain or loss on the investment position. As the price rises, the investors would think that their information has been already incorporated into the price, and on the other hand when the price falls, they would reevaluate the genuineness of their information on which their trading is based on. However, the information that induces the investors to trade has no correlation with the intrinsic value of the stock so the downward pressure on the prices from their trading activities is just temporary leading to return predictability.

3. Review of Literature

Behavioral finance is the study that combines traditional finance with psychological theories in order to seek for an explanation as to why people do not behave or make decisions reasonably from time to time. Kahneman and

Tversky (1979) suggest that the investors' utility function is different in the realm of losses and that of gains; that is, they are risk averse when they are exposed to gains but they become risk lover when they are in losses.

The Prospect theory has been commonly used to give an explanation to the phenomenon that investors tend to sell winners too early and ride losers too long. This is known as the disposition effect proposed by Shefrin and Statman (1985). However, many studies cast doubt upon whether the Prospect theory holds true. Barberis and Xiong (2009) point out that the Prospect theory often fails to predict the disposition effect, which is confirmed by Hens and Vlcek (2011). Kaustia (2010) finds that it can predict holding onto losers but it also predicts holding onto winners. The disposition effect is widely studied and confirmed to exist across different types of investors, securities, and countries. For example, Odean (1998) suggests that the U.S. retail investors behave in accordance with this effect. Locke and Mann (2005) show that even professional investors realize their winning trades faster than the losing ones. Heath, Huddart, and Lang (1999) find this effect in stock options. Shapira and Venezia (2001) analyze the Israeli investment patterns and show that this effect is found in both professional and individual investors. Chen, Kim, Nofsinger, and Rui (2007) find several behavioral biases including the disposition effect in the Chinese stock market. Grinblatt and Keloharju (2001) find this effect among Finnish investors. Last but not least, Calvet, Campbell, and Sodini (2009) find this effect in Swedish retail investors.

Many studies of the disposition effect assume that the selling propensity is monotonically increasing in response to profits. Odean (1998) proposes a methodology to measure a spread between the proportion of realized gains and that of realized losses and suggests that a preference for realizing gains rather than realizing losses among investors exists. Grinblatt and Han (2005), motivated by the Prospect theory and mental accounting (Thaler, 1980), introduce the capital gains overhang variable, which is volume weighting of past returns with reference to the capital gains or losses of investors in each stock, to exhibit that the disposition effect plays an important role in asset pricing and to show that the momentum effect loses its prediction power after adding the new variable. Frazzini (2006) invents another capital gains variable based on net purchase of mutual funds and suggests that the disposition effect induces under-reaction to news. Stocks with paper gains lead to a positive post-earning announcement drift while those with paper losses lead to a negative one. Goetzmann and Massa (2008) construct disposition effect proxy variables and indicate that the disposition effect can explain stock returns, volume, and volatility. Moreover, the empirical findings in the studies of Grinblatt and Han (2005), Frazzini (2006) and Goetzmann and Massa (2008) indicate a link between the disposition effect and equilibrium prices.

A monotonic relationship between sell propensity and profits has been challenged by subsequent studies. Ben-David and Hirshleifer (2012) provide empirical evidence showing that the selling propensity is not monotonically increasing in response to profits, instead the relationship is actually a V-shaped function. They also find the alphabet 'V' is not symmetric with a steeper slope on the gain side compared to that on the loss side. An average selling propensity on the loss side is less than that on the gain side; that there is a tendency to sell winners more than losers is still present in their study.

An (2016) extends the study of Ben-David and Hirshleifer (2012) by constructing stock-level variables to investigate the pricing implications and cross-sectional return predictability of the V-shaped disposition effect. The capital gain overhang variable is created by employing the approach of Grinblatt and Han (2005). However, the variable is separated into two proxies in order to capture the effects of unrealized gains and losses. When the selling propensity of investors is aggregated, it lowers current prices and leads to return predictability when the prices go back to fundamental values. The variable in Grinblatt and Han (2005) model loses its power in predicting asset returns, while the ability to forecast the variable in the An's (2016) study is powerful. Moreover, the long-short trading strategy provides 0.5-1.0% monthly alpha return in the following month. Sorted portfolios based on level of stocks' speculative characteristics show that the more speculative stocks are the stronger ones and they exhibit the V-shaped disposition effect. This provides supporting evidence to the study of Ben-David and Hirshleifer (2012) that the effect is driven by the speculative trading behavior.

An and Argyle (2015) continue to further examine the V-shaped disposition effect. They find that even sophisticated investors like mutual fund managers also exhibit the V-shaped disposition effect. The evidence is stronger in mutual funds with higher speculative characteristics, including higher trading turnover and shorter average holding period.

The V-shaped selling propensity also appears in several studies but is not their main focus. The empirical results documented by Barber and Odean (2008) exhibit buy-sell imbalances in portfolios' return, showing the V-shaped selling propensity. Seru, Shumway, and Stoffman (2010) suggest that their plot of relationship between the propensity to sell a stock and the stock's holding period return is actually a V-shaped function with a kink around zero. Unfortunately, since the V-shaped disposition effect is not their main focus, the effect is not formally established. Weisbrod (2018) finds the V-shaped relationship between the likelihood of selling and stock return. Additionally, Hartzmark (2015) introduces the Rank effect, which describes investors tending to sell extreme winning and extreme losing securities in their portfolios, being consistent with the V-shaped disposition effect.

As in the U.S. and other countries, the disposition effect has also been investigated on Thai investors and confirmed to exist by several studies. Based on the survey, DeWeaver and Shannon (2010) suggest that the disposition effect is derived from cognitive dissonance following losses, which subsequently leads to paying less attention to information and delaying response to sell losers than winners. Leemakdej (2011), investigating the portfolio adjustment of Thai investors, finds that the investors tend to be more cautious and to lower their bullish sentiment after two consecutive gains by reducing systematic risk in their portfolio. The findings support the disposition effect arising from the loss aversion. Maneenil (2012), adopting the methodology from Bremer and Kato (1996) to examine trading volume for winners and losers, finds that trading volume for winners is higher than that for losers which exhibits the disposition effect in the Thai stock market. Suppaodom (2014) follows the Odean's (1998) methodology to examine the disposition effect. The results suggest that investors' sophistication, measured by the trading frequency and return deviation of their portfolio from the market portfolio, appears to be correlated with the strength of the disposition effect.

4. Data and Key Variables

4.1. Stock Samples and Filters

We use daily and monthly stock data of all listed companies in the Stock Exchange of Thailand from January 1996 to December 2015. We exclude stocks with price less than one baht in order to avoid an impact of penny stocks. We also exclude certain stocks that are traded less than ten days in the previous month in order to avoid an impact of illiquid stocks. Since we construct *Capital Overhang Gain* (*Gain*) and *Capital Overhang Loss* (*Loss*) by using five-year historical data, we require stocks to have at least five years of available data at the end of each month. One-month T-bill rate of return as a representative of the risk-free rate is obtained from the Bank of Thailand,⁴ which is used to construct idiosyncratic volatility (*IVOL*). The sample results in 42,000 stock-month observations, which is approximately 250 stocks for each month over the period of study.

4.2. Gain, Loss, and the V-Shaped Selling Propensity Variables

Suggested by An (2016), the aggregate unrealized gains and losses are measured separately by using volume-weighted of the percentage deviation of purchase price from current price. *Capital Overhang Gain* (*Gain*) is constructed to capture the effect of unrealized gains. *Capital Overhang Loss* (*Loss*) is constructed to capture the effect of unrealized losses. For each stock, these two variables are calculated using daily closing data for the past five years or 1,250 trading days. The *Gain* is computed as follows.

$$Gain_t = \sum_{n=1}^{1250} \omega_{t-n} gain_{t-n} \quad (1)$$

$$gain_{t-n} = \begin{cases} 0, & P_t < P_{t-n} \\ \frac{P_t - P_{t-n}}{P_t}, & P_t \geq P_{t-n} \end{cases} \quad (2)$$

$$\omega_{t-n} = \frac{1}{k} \theta_{t-n} \prod_{i=1}^{n-1} [1 - \theta_{t-n+i}] \quad (3)$$

where P_t and P_{t-n} are stock prices at time t and $t-n$, respectively. θ_{t-n} is the daily turnover ratio, which is the ratio of the total number of shares traded over the number of shares outstanding, at time $t-n$. The weight (ω_{t-n}) is the fraction of stocks that are bought at time $t-n$ and has not been sold since then. The constant k is used to normalize all the ω_{t-n} so that the summation of ω_t over the five-year period is equal to one as follows.

$$k = \sum_n \theta_{t-n} \prod_{i=1}^{n-1} [1 - \theta_{t-n+i}] \quad (4)$$

The underlying assumption is that the probability for a stock to be traded depends solely on the turnover ratio. Hence, the probability for a stock to be purchased at $t-n$ is the turnover ratio at that time. On the other hand, the probability for that stock not to be traded since purchase is equal to the multiplication of one minus such the turnover ratio along the holding period, which is in this case from $t-n+1$ to $t-1$. Since the *Gain* captures the gain effect only, $gain_{t-n}$ is equal to zero when the current price is less than the purchase price. The five-year window is chosen because it allows different trading horizons among different groups of investors. Even though Ben-David and Hirshleifer (2012) find that the V-shaped selling propensity becomes flatter for more than one-year investment horizon among retail investors, the disposition effect is still existent.

Similar to the *Gain*, the *Loss* is computed as follows.

$$Loss_t = \sum_{n=1}^{1250} \omega_{t-n} loss_{t-n} \quad (5)$$

$$loss_{t-n} = \begin{cases} \frac{P_t - P_{t-n}}{P_t}, & P_t < P_{t-n} \\ 0, & P_t \geq P_{t-n} \end{cases} \quad (6)$$

$$\omega_{t-n} = \frac{1}{k} \theta_{t-n} \prod_{i=1}^{n-1} [1 - \theta_{t-n+i}] \quad (7)$$

By this construction, if the current price is higher than all of the five-year historical prices, the *Loss* is zero and vice versa for the *Gain*.

To reflect the asymmetry found in the disposition effect, the V-shaped selling propensity (*VSP*) is constructed as follows.

$$VSP_t = Gain_t - \rho Loss_t \quad (8)$$

The coefficient ρ indicates the strength of selling pressure on the loss side compared to that on the gain side. In other words, it indicates how much steeper the slope on the loss side is compared to that on the gain side. Since the slope on the gain side is steeper than that on the loss side, the coefficient ρ is smaller than one.

4.3. Other Control Variables

Firstly, we define a monthly return for each stock in the sample as *Ret*. The monthly return is simply calculated as a change in monthly prices divided by the stock price at the end of the previous month. Since *Gain* and *Loss* are constructed using prices over the past five years, they tend to correlate with the past returns. Taking this into consideration, variables that represent past returns have to be included in order to tease out the potential effects of the two variables on future returns. The past twelve- to two-month cumulative return ($Ret_{-12;-2}$) is assigned to control the medium-term horizon momentum effect documented in Jegadeesh and Titman (1993). The variable is separated into positive and negative past returns ($+Ret_{-12;-2}$ and $-Ret_{-12;-2}$) in order to address the concern documented in Hong, Lim, and Stein (2000) that the momentum effect is greater for past losers than past winners. The short-term and long-term momentum effects are controlled by the past month return (Ret_{-1}) and the past three- to one-year cumulative return ($Ret_{-36;-13}$), respectively.

The average daily turnover ratio in the past year (*TOver*) is also included in order to address the concerns documented in Lee and Swaminathan (2000) and Gervais, Kaniel, and Mingelgrin (2001) that turnover ratio and trading volume affects future returns. To address the concern that high idiosyncratic volatility would lead to low future returns documented in Ang, Hodrick, Xing, and Zhang (2006), the idiosyncratic volatility (*IVOL*) calculated from the daily volatility of return residuals in the past year is also included. Logarithm of firm's market capitalization (*LogMCap*) is added for the size premium effect. Last, logarithm of book-to-market ratio (*LogBTM*) is included for considering value premium effect.

5. Methodology

We apply the Fama and Macbeth (1973) regressions to examine how *Loss* and *Gain* affect future returns. We then examine a monthly alpha generated by the long-short strategy based on the *VSP*.

5.1. The Effects of Gains and Losses on Asset Prices

We begin our analysis by validating the hypothesis that, on an aggregate level, unrealized gains and losses generate return patterns that are consistent with the V-shaped selling schedule.

H1: *Stocks face higher selling pressure from the V-shaped-disposition-prone investors when unrealized gains or losses become larger. The higher selling pressure causes stock prices to be temporarily lower and lead to a higher subsequent return when stock prices go back to their fundamental value.*

To better control factors known to affect future returns, the Fama and Macbeth (1973) regressions with weights equal to the previous month gross return are employed to examine implications of *Gain* and *Loss* on asset pricing below.

$$Ret_t^i = \alpha_1 + \beta_1 Gain_{t-1}^i + \beta_2 Loss_{t-1}^i + \beta_3 Ret_{t-1}^i + \beta_4 + Ret_{t-12;t-2}^i + \beta_5 - Ret_{t-12;t-2}^i + \beta_6 Ret_{t-36;t-13}^i + \beta_7 LogBTM_{t-1}^i + \beta_8 LogMCap_{t-1}^i + \beta_9 TOVer_{t-1}^i + \beta_{10} IVOL_{t-1}^i + \varepsilon_t^i \quad (9)$$

To validate the hypothesis, the estimated coefficients for both variables are statistically significant. Moreover, the estimated coefficient of the *Gain* ($\widehat{\beta}_1$) is expected to be positive and that of the *Loss* ($\widehat{\beta}_2$) is expected to be negative because an increase in the value of the *Loss* indicates a decrease in magnitude of losses and hence lower future returns.

The absolute value of the estimated coefficient of the *Gain* is higher than that of the *Loss* ($|\widehat{\beta}_1| > |\widehat{\beta}_2|$) to reflect the asymmetry of the V-shaped selling propensity; that is the effect of unrealized gains is relatively larger than that of unrealized losses.

Another main purpose of this subsection beside to validate the hypothesis is to obtain the coefficient ρ , which indicates how much steeper the slope on the loss side is compared to that on the gain side. The coefficient ρ is computed by the absolute value of the estimated coefficient of the *Loss* divided by that of the *Gain* (i.e. $|\widehat{\beta}_2|/|\widehat{\beta}_1|$).

5.2. The Effect of the V-Shaped Selling Propensity on Asset Prices

In previous section, both unrealized gains and losses are potential return predictors, but how much benefit one can

make. From knowing this could also be interesting to find out. Hence, we setup the hypothesis as follows.

H2: A long-short trading strategy based on the V-Shaped disposition effect generates a positive monthly alpha return in the next one month.

Again, we employ the same procedure as shown in prior sections to investigate the implications of the V-shaped selling propensity on asset pricing. The regression model is exactly the same as in equation (9) except the *Gain* and *Loss* being replaced with the *VSP* as shown below.

$$\begin{aligned}
 Ret_t^i = & \alpha_2 + \beta_{11}VSP_{t-1}^i + \beta_{12}Ret_{t-1}^i + \beta_{13}^+ Ret_{t-12:t-2}^i \\
 & + \beta_{14}^- Ret_{t-12:t-2}^i + \beta_{15}Ret_{t-36:t-13}^i \\
 & + \beta_{16}LogBTM_{t-1}^i + \beta_{17}LogMCap_{t-1}^i \\
 & + \beta_{18}TOVer_{t-1}^i + \beta_{19}IVOL_{t-1}^i + \varepsilon_t^i \quad (10)
 \end{aligned}$$

where $VSP_{i,t-1}$ is computed using this equation as $VSP_{i,t-1} = Gain_{i,t-1} - \rho Loss_{i,t-1}$ where the coefficient ρ is obtained by the methodology described in the previous section. By this construction, the *VSP* captures the asymmetry of the V-shaped selling propensity.

Difference in average values of the *VSP* variable between the 10th and the 90th percentiles is calculated for each month. Investors would long stocks with a high value of *VSP* and short those with a low value of *VSP*. To validate the hypothesis, the monthly alpha obtained is positive.

6. Empirical Results

6.1. Summary Statistics

Descriptive statistics of *Gain*, *Loss*, *VSP* and control variables are shown in Table 1. All of independent variables are winsorized at 1% in both tails. Table 2 presents correlations among these independent variables. Both of the summary statistics and the correlations are calculated at the monthly level.

It is not surprising that *VSP* and *Gain* are highly correlated ($\rho = 0.78$). This is because *VSP* is constructed from *Gain* and *Loss* and about 80% of the value of *VSP* comes from *Gain* as we discuss in detail later. Moreover, the high correlation coefficients between *Gain* and *Loss* and past return at the medium-term horizon ($Ret_{-12:-2}$) confirm an importance of controlling the past returns at different horizons in order to ensure that the effects of *Gain* and *Loss* would not contaminate with the effects of the past returns.

6.2. The Effects of Gains and Losses on Asset Prices

After performing the Fama and Macbeth (1973) procedure with weights equal to the prior-month gross return, we obtain regression results from equation (9) as reported in Table 3. The estimated coefficient of *Gain* is positive and that of *Loss* is negative as suggested by the V-shaped disposition effect. The effect of *Gain* is statistically significant; however, it is not true for the effect of *Loss*. This indicates weak evidence on the loss side of the V-shaped selling propensity. This partially confirms *Hypothesis 1* that stocks with a large magnitude of unrealized gain predicts higher positive subsequent returns and those with a large magnitude of unrealized loss do not predict higher positive subsequent returns.

Table 1: Summary statistics of *Gain*, *Loss*, *VSP*, and control variables

	<i>Gain</i>	<i>Loss</i>	<i>VSP</i>				
<i>Mean</i>	0.1338	-0.1785	0.1887				
<i>p50</i>	0.0829	-0.0662	0.1527				
<i>sd</i>	0.1394	0.2855	0.1251				
<i>Skewness</i>	1.0839	-3.3876	1.1687				
<i>p10</i>	0.0024	-0.4973	0.0611				
<i>p90</i>	0.3590	-0.0009	0.3802				
	<i>Ret</i> ₋₁	<i>Ret</i> _{-12:-2}	<i>Ret</i> _{-36:-13}	<i>LogBTM</i>	<i>LogMCap</i>	<i>TOVer</i>	<i>IVOL</i>
<i>Mean</i>	0.0113	0.1985	0.4684	-0.2247	22.0762	0.0248	0.0228
<i>p50</i>	0.0035	0.0806	0.2121	-0.1838	21.8964	0.0017	0.0206
<i>sd</i>	0.1011	0.5124	0.9818	0.7099	1.5768	0.0948	0.0095
<i>Skewness</i>	0.5185	2.0401	2.8687	-0.2841	0.3556	4.3551	0.9597
<i>p10</i>	-0.1000	-0.2833	-0.3889	-1.1908	20.1071	0.0001	0.0124
<i>p90</i>	0.1333	0.8025	1.6214	0.6276	24.4223	0.0137	0.0373

Table 2: Correlation matrix

	<i>Gain</i>	<i>Loss</i>	<i>VSP</i>	Ret_{-1}	$Ret_{-12;-2}$	$Ret_{-12;-2}^+$	$Ret_{-12;-2}^-$	$Ret_{-36;-13}$	<i>LogBTM</i>	<i>LogMCap</i>	<i>TOver</i>	<i>IVOL</i>
<i>Gain</i>	1.0000											
<i>Loss</i>	0.4693	1.0000										
<i>VSP</i>	0.7853	-0.1781	1.0000									
Ret_{-1}	0.2612	0.2428	0.1208	1.0000								
$Ret_{-12;-2}$	0.3870	0.3626	0.1771	0.0123	1.0000							
$Ret_{-12;-2}^+$	0.3331	0.2272	0.2119	0.0120	0.9681	1.0000						
$Ret_{-12;-2}^-$	0.3584	0.6130	-0.0304	0.0066	0.5752	0.3520	1.0000					
$Ret_{-36;-13}$	0.1874	0.1143	0.1286	-0.0116	-0.1093	-0.0834	-0.1361	1.0000				
<i>LogBTM</i>	-0.0967	-0.0595	-0.0660	0.0678	0.1885	0.1721	0.1424	-0.3594	1.0000			
<i>LogMCap</i>	0.2217	0.2208	0.0922	0.0325	0.0740	0.0555	0.0953	0.1292	-0.4782	1.0000		
<i>TOver</i>	-0.1660	0.0164	-0.1965	0.0000	0.1710	0.1972	-0.0053	0.0322	0.0473	-0.1225	1.0000	
<i>IVOL</i>	-0.0903	-0.1875	0.0309	0.0360	0.2973	0.3604	-0.0658	-0.0305	0.2166	-0.3678	0.3300	1.0000

Table 3: Fama and Macbeth (1973) regression on *Gain*, *Loss*, *VSP*, and control variables

	<i>Gain</i>	<i>Loss</i>	Ret_{-1}	$Ret_{-12;-2}^+$	$Ret_{-12;-2}^-$	$Ret_{-36;-13}$	<i>LogBTM</i>	<i>LogMCap</i>	<i>TOver</i>	<i>IVOL</i>	<i>Constant</i>
β	0.041**	-0.013	0.053***	0.070	0.077***	-0.006	-0.006	-0.005***	0.005	-0.212	0.112***
<i>t</i> - <i>stat</i>	2.29	-0.82	2.66	1.31	2.57	-1.73	-1.45	-3.12	0.23	-0.78	3.36

** indicates statistical significance at 5% level.

*** indicates statistical significance at 1% level.

Nonetheless, the regression results still indicate that the effect of *Gain* is stronger than that of *Loss*. The gain side effect is approximately $\frac{0.041}{0.013} = 3.15$ times as strong as the loss side effect, meaning the slope of the gain side of the V-shaped relationship is approximately 3.15 times steeper than that of the loss side. Thus, an asymmetry between the gain and loss sides is confirmed. Based on equation (8), ρ is equal to $\left| \frac{0.013}{0.041} \right| = 0.31$, which is closed to the results shown in the study of An (2016) ($\rho = 0.23$). However, it is important to note that even though the coefficient of the *VSP* is significant, it could not be fully confirmed *Hypothesis II* because the coefficient for *Loss*, which is used to calculate ρ is not statistically significant. The effect of past month returns (Ret_{-1}) is statistically significant, suggesting that the short-term momentum effect is present in the market.

Estimated coefficients of the other control variables seem to be consistent with other studies. The coefficients of the past twelve-to-two-month return variables indicate that the positive past returns possess a weaker effect than the negative past return but only the negative ones are statistically significant. The size of the coefficients is consistent with Hong, Lim, and Stein (2000), who find

that the big bulk of the momentum effect comes from the losers rather than winners. Moreover, there appears to be a significant negative relationship between the idiosyncratic volatility and subsequent returns. This essentially means that the stocks with low idiosyncratic volatility outperform those with high idiosyncratic volatility, *ceteris paribus*. This is in line with the findings of Ang et al. (2006). Unsurprisingly, the size premium effect is well captured by the model with the 99% confidence level. However, the value premium effect does not seem to significantly contribute in predicting subsequent returns.

In the main specification, *Gain* and *Loss* are constructed using historical five-year data. Hence, we vary the window of historical data for *Gain* and *Loss* in order to capture the effect of unrealized gains and losses among investors with different average holding periods, in particular six- to two-year holding periods. The control variables remain the same as shown in equation (9). The regression results of the Fama and Macbeth (1973) procedure are reported in Table 4.

Table 4 presents the results of the Fama and Macbeth (1973) regressions on the *Gain* and *Loss* using different windows of historical data. Signs of coefficients for the *Gain* and *Loss* are still consistent with the V-shaped disposition effect for all holding periods, indicating that the results are robust. Additionally, a magnitude of the coefficient of the

Gain and that of the *Loss* in the absolute term seem to be negatively correlated with investment holding periods. This suggests that the strength of the V-shaped selling schedule is stronger among investors with shorter holding period; that is, the slopes on both sides of the V-shaped are steeper as the holding period becomes sooner. The results seem to be in line with the finding of Ben-David and Hirshleifer (2012), who demonstrate that the effect of the V-shaped selling schedule is strongest for short-term holding periods.

6.3. The Effect of the V-Shaped Selling Propensity on Asset Prices

Using the ρ obtained in the previous section, we calculate *VSP* for each stock at the end of each month and then perform the Fama and Macbeth (1973) procedure with weights equal to the prior month gross return to obtain the coefficient of *VSP* as shown in equation (10). The regression results are presented in Table 5.

Table 4: Alternative specifications of the Fama and Macbeth (1973) regressions

	6-year horizon	5-year horizon	4-year horizon	3-year horizon	2-year horizon
<i>Gain</i>	0.031*	0.041**	0.052***	0.070***	0.096***
	(1.87)	(2.29)	(2.72)	(3.36)	(3.50)
<i>Loss</i>	-0.002	-0.013	-0.011	-0.018	-0.018
	(-0.14)	(-0.82)	(-0.82)	(-1.35)	(-1.38)
Ret_{-1}	0.035**	0.053***	0.043**	0.036*	0.030
	(2.02)	(2.66)	(2.13)	(1.76)	(1.41)
$Ret_{-12;-2}^+$	0.063	0.070	-0.012	-0.012	-0.002
	(1.03)	(1.31)	(-0.27)	(-0.32)	(-0.07)
$Ret_{-12;-2}^-$	0.065**	0.077***	0.051**	0.045**	0.047**
	(2.32)	(2.57)	(2.24)	(2.11)	(2.19)
$Ret_{-36;-13}$	-0.006	-0.006*	-0.006*	-0.005	-0.005
	(-1.62)	(-1.73)	(-1.74)	(-1.61)	(-1.53)
<i>LogBTM</i>	-0.006	-0.006	-0.004	-0.003	-0.004
	(-1.56)	(-1.45)	(-1.20)	(-0.96)	(-1.08)
<i>LogMCap</i>	-0.005***	-0.005***	-0.005***	-0.004***	-0.004***
	(-3.06)	(-3.12)	(-3.03)	(-2.73)	(-3.05)
<i>TOver</i>	-0.005	0.005	0.014	0.019	0.033
	(-0.24)	(0.23)	(0.60)	(0.73)	(1.07)
<i>IVOL</i>	-0.235	-0.212	-0.106	-0.124	-0.126
	(-0.94)	(-0.78)	(-0.38)	(-0.44)	(-0.45)
<i>Constant</i>	0.108***	0.112***	0.108***	0.092***	0.097***
	(3.28)	(3.36)	(3.22)	(2.89)	(3.22)

* indicates statistical significance at 10% level.

** indicates statistical significance at 5% level.

*** indicates statistical significance at 1% level.

Table 5: Fama-Macbeth regression on β and the control variables

	VSP	Ret_{-1}	$Ret_{-12;-2}^+$	$Ret_{-12;-2}^-$	$Ret_{-36;-13}$	<i>LogBTM</i>	<i>LogMCap</i>	<i>TOver</i>	<i>IVOL</i>	<i>Constant</i>
β	0.043***	0.047**	0.066	0.068***	-0.007**	-0.006	-0.005***	0.004	-0.213	0.121***
<i>t - stat</i>	2.75	2.45	1.28	2.65	-2.08	-1.48	-3.01	0.22	-0.76	3.28

** indicates statistical significance at 5% level.

*** indicates statistical significance at 1% level.

The *t*-statistic for the *VSP* is positive and statistically significant, indicating a stronger predictive power of the *Gain*. The estimated coefficient is positive, indicating that the V-shaped selling propensity is positively associated with future one-month returns. Nonetheless, as mentioned in the previous section, the estimated coefficient for *Loss* is not statistically significant so the results obtained from using insignificant coefficient may be classified as weak evidence even if we obtain very strong significance for the estimated coefficient for the *VSP*.

Taken all together, the results partially confirm *Hypothesis II* that a long-short trading strategy based on the V-shaped disposition effect generates a positive monthly alpha return in the next one month.

To calculate the monthly abnormal return (alpha) of the trading strategy for each month, we calculate difference between 10th and 90th percentile portfolios and find the time-series average of those difference. The average monthly difference is 0.387; hence, the monthly alpha generated is equal to 0.0166, which equals to return of 0.20 per annum.

7. Conclusion

This study provides evidence of the newly documented refinement of the disposition effect so called as the V-shaped disposition effect that describes a tendency of investors to sell more when unrealized gains and losses of their portfolios are larger. Our setting sample is the Stock Exchange of Thailand with the assumption that aggregate investor selling tendencies affect stocks by temporarily putting down stock prices and lead to return predictability when the prices go back to fundamental values. By constructing variables that measure unrealized gains and losses of stocks, we show evidence in support of the assumption that stocks with larger unrealized gains and losses can lead to higher subsequent returns. The result of the Fama and Macbeth (1973) regression suggests that the evidence on the gain side of the V-shaped selling schedule is strong and significant, indicating that selling propensity of investors increases when a magnitude of unrealized gains increases. However, the evidence on the loss side of the V-shaped selling schedule is statistically weak but still consistent with previous studies. The result also shows that the effect on the gain side is stronger than the loss side so the asymmetry of the V-shaped selling documented in previous studies also appears in this study. This asymmetry underlies the traditional disposition effect that investors tend to sell more gains than losses. Furthermore, we find that a long-short trading strategy based on this effect could generate the 1.66% monthly alpha or 20% per annum on average over the period of study.

Our further analysis on the strength of the effects of unrealized gains and losses suggests that the effects of both sides depend on the investors' holding periods. We find that

investors with a shorter holding period tend to sell more compared to those with a longer holding period, given the same level of unrealized gains and losses. This finding reconfirms the evidence in previous studies that a strength of the V-shaped disposition effect is associated with the investors' holding period and the effect is stronger among investors with a relatively short holding periods.

A recommendation for future studies on this area is to analyze this behavior at an individual level. An individual-level premise is necessary in order to further confirm an existence of the V-shaped disposition effect in equity markets. Future studies on this area can also further investigate into the source of this effect whether or not it is investors' speculation that underlies this effect as suggested by previous studies. Using investor level data would help to better define speculative characteristics of investors and provide a confirmation of the conjecture.

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Endnotes

¹Using questionnaires, Udin and Yuniawan (2020) demonstrate that psychological capital roles and personality traits affect task performance in Indonesia, showing an importance of psychology in other business activities.

²See Odean (1998), Grinblatt and Han (2005), Frazzini (2006), and Goetzmann and Massa (2008).

³Recently, Khanthavit (2020) find the herd behavior among foreign investors in the Stock Exchange of Thailand during the COVID-19 pandemic. Herd behavior in stock markets heavily relies on irrational behavior of traders, which confirms that a behavioral approach is useful to explain phenomena in the Thai equity market. Moreover, herd behavior is also found in Vietnam and Taiwan during the COVID-19 (Luu & Luong, 2020).

⁴The official URL is <https://www.bot.or.th>.