# The Over-Reaction Effect in the Stock Exchange of Thailand: An Empirical Study

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**Abstract**

One of the main cornerstones of traditional financial theory is the Efficient Market Hypothesis (EMH). However, several violations of EMH have been discovered to the contrary of explanation provided by traditional financial theory. One of the key discoveries was the over-reaction effect of investors to recent information over base-rate data by De Bondt and Thaler (1985), which has been further studied in many different markets. Inspired by the work of De Bondt and Thaler (1985), this study investigated the over-reaction effect in the Stock Exchange of Thailand during 2012-2017 and the total return to investors based on the contrarian trading strategy by tracking performance of past losers and winners portfolio. In terms of method of analysis, this study tracked the total return index of stocks listed in the Stock Exchange of Thailand tracked during 2012-2014 to identify top 20% winners and bottom 20% losers. Equal weighted portfolios of winners and loser portfolios were formed with Cumulative Average Returns (CARs) tracked during 2015-2017 for comparison of performance. Mean difference and t-test were performed to test statistical significance. The results show that loser portfolios outperformed winner portfolios by 35.48%, 31.77%, and 55.87% at 1 year, 2 years, and 3 years after ranking, respectively. The differences between the returns generated by loser and winner portfolio were statistically significant from the 27$^{th}$ month onward. This study provides supporting evidence for the over-reaction effect in the Stock Exchange of Thailand during the study period. Results of portfolio tracking suggest that over-reaction of investors in the Stock Exchange of Thailand may present an opportunity for "contrarian trading strategies" over a medium term holding period. In other words, contrarian investors could benefit from tracking performance of underpriced stocks, for which the market has underestimated earning potential and business prospects and avoiding position in overpriced "hot" stocks, for which the market has overreacted to positive news, resulting in overpricing.

**Keywords:** Behavioral Finance, Over-Reaction Effect, Contrarian Trading Strategies, Efficient Market Hypothesis (EMH)

## Introduction

Since the inception of financial markets, investors and speculators have tried to achieve their investment or speculative goals by trying to beat the market and chasing returns through various investment strategies. Most of these strategies try to exploit predictable market anomalies in order to create capital gains for themselves. One of the more commonly known strategies is to go against the grain of conventional thinking and select stocks that other market participants have neglected or ignored at discounted prices compared to its calculated intrinsic value and then take profit when the prices return to or approaches the intrinsic value. This strategy is famously known as value investing and was popularized by Benjamin Graham and Warren Buffett. However, value investing can be considered to a form of a wider genre of investment strategies known as contrarian trading strategies. As the name suggests, contrarian trading strategies implies acting 'contrary' to what the market is doing in order to beat the market (Lin & Swanson, 2010).

By definition, contrarian trading strategy refers to an investment strategy, characterized by purchasing and selling in contrast to the prevailing sentiments of the time. An investor who follows the contrarian strategy believes that certain behaviors among investors can lead to exploitable mispricing in the stock markets. For example, widespread concern about the company could drive the stock price so low that it overstates the

company's risks and understates its prospects for returning to profitability. Identifying and purchasing such distressed stocks, and selling them after the company recovers, could lead to above-average gains. On the other hand, widespread optimism could result in unjustifiably high valuations that will eventually lead to drops, when those high expectations could not be met (Neill, 2007).

From the academic standpoint, the contrarian strategy is associated with the belief in market anomaly that causes mispricing of the securities. There has been empirical evidence, which demonstrates the association between the over-reaction effect which is discovered by De Bondt and Thaler (1985) and the contrarian trading strategy. However, the continued existence and viability of the strategy come in conflict with one of the main tenets of traditional financial theory: the Efficient Market Hypothesis (EMH).

The EMH was proposed as way to explain how the market works by saying that the prices follow a random walk behavior and thus cannot be predicted by using any information, public or private, given in the market (Malkiel & Fama, 1970). Thus, markets are already efficient and investors cannot use the information to gain extraordinary returns in the market. This assertion can also be divided into three forms based on which information is no longer valid: weak form (past information), semi-strong form (all public information), and strong form (public and private information). Since being proposed in 1970, EMH has become one of the cornerstones of traditional financial theory. Despite its popularity, various violations of EMH have been continuously discovered through the discovery of various market anomalies that mostly has not been satisfyingly be explained by traditional financial theory. However, a lot of those anomalies could be explained through the lens of behavioral finance.

Behavioral finance and economics arise from the disagreement some economists have with traditional economic and financial assumptions that humans are rational in all of their decision-making. However, humans are not always so rational in making various decisions and are known to make predictable, biased mistakes. This irrational behavior can make theories and models based around the assumption of human rationality inaccurate. So in order to improve upon traditional economic models and theories, these economists incorporate findings from the psychological and behavioral sciences into their discoveries to make their ideas more grounded in actual human behavior. One of the most famous discoveries is the over-reaction effect by De Bondt and Thaler (1985).

The over-reaction effect demonstrates that the market will over-react to new information over base-rate (mean) data and the subsequent market corrections to base-rate data presents an opportunity for profit. This effect is demonstrated through the creation of winner and loser portfolios and measuring their subsequent performances. This effect does not correspond with even just the weak-form of EMH in that investors can just use past return data alone to predict a stock's future behavior. This clear violation of EMH has sparked numerous studies across various countries to demonstrate whether the effect exists in those regions or not.

As for Thailand, several studies had been conducted to investigate the over-reaction effect, reporting mixed empirical evidence (Lerskullawat & Ungphakorn, 2018). Recent study by Lerskullawat and Ungphakorn (2018) tested the over-reaction effect in the Stock Exchange of Thailand during 1990-2016. Their work rendered support for reversal of Cumulative Annualized Returns for the Losers portfolio after $12^{th}$ months and the Losers-Winners portfolio after $36^{th}$ month. They recommended that further research focused on particular time period for in-depth understanding of over-reaction effect, given certain economics and market conditions.

To contribute to the empirical evidence of over-reaction effect in Thailand, this study investigates the over-reaction effect in the Stock Exchange of Thailand during 2012-2017 and to capture the effect of dividends on return calculations, given that the portfolio monitoring period ranges from 12 months to 36 months.

By focusing on 2012-2017, this study aims to contribute to the empirical evidence of over-reaction effect in the Stock Exchange of Thailand for the recent period. Furthermore, 2012-2017 represented a few political and economic transitions for Thailand. In particular, the country's economy had been subdued with the average annual GDP growth of 3% during 2013-2015. The economic condition picked up momentum from the latter half of 2016 spanning through 2017. Finally, this study proposes to assess the cumulative annualized returns based on the total return index to capture the effect of dividend for winners' and losers' portfolio formation strategy.

## Literature Review

One of the main assumptions of modern economics is that people choose between alternatives in a rational matter (Von Neumann & Morgenstern, 1944) and that people also knows the probability distribution of the world's future states (Arrow & Debreu, 1954). By extension, modern finance assumes that the markets are efficient and that agents know the probability distribution of future market risk (Markowitz, 1952; Merton, 1969). Several researchers believe that standard financial theory is built around four foundational assumptions or ideas: people act rationally, markets are efficient, people will and do design their portfolios around mean-variance portfolio theory, and expected returns are described by standard asset where expected returns are determined by differences in risk (Malkiel & Fama, 1970; Statman, 2014). An extension of the aforementioned assumption is one of the core tenets of modern financial theory: the Efficient Market Hypothesis.

Modern finance has as a building block the Efficient Market Hypothesis or EMH (Ritter, 2003). First empirically studied in 1970, it relies on three assumptions: rationality of participants, market efficiency, and profit maximization (Malkiel & Fama, 1970). Degutis and Novickytė (2014) assert that EMH is built upon two foundations. The first is an efficient market that reflects all available information with the second foundation being in such efficient markets, participants of the market are not allowed to earn excess risk-adjusted return. This is due to the prices moving in a "random walk" and thus future prices are unpredictable (Malkiel & Fama, 1970). According to Malkiel and Fama (1970), market efficiency can be further sub-divided into three forms: weak, semi-strong, and strong. The weak form states that only information related to historical prices are incorporated into current asset prices (Dimson & Mussavian, 1998). This implies that methods that utilize only past prices such as technical analysis would be useless in the weak form. The semi-strong emphasizes that in addition past prices, current prices reflects all the current publicly available information as well (Clarke, Jandik, & Mandelker, 2001). By implication, fundamental analysis as a means to seek extra returns is ruled out as well. The strong form suggests that current prices adjust simultaneously to all possible, public and private, information (Degutis & Novickytė, 2014). Thus, in the strong form, it is impossible to beat the market with any kind of information. The EMH has been tested various times on various markets with different results with most countries showing weak to semi-strong market efficiency (Chan, Gup, & Pan, 1997; Groenewold & Kang, 1993; Kim & Shamsuddin, 2008; Poshakwale, 1996). However, violations of EMH continue to be discovered in a variety of ways.

Over the years, multiple stock market anomalies had been discovered that question the validity of EMH due to these price patterns being inconsistent with EMH (Archana.S, Safeer, & Kevin, 2014). A market anomaly

can be defined as any event or strategy that directly conflicts with the concept of the market's unpredictability. Among the many market anomalies discovered, the two that stand out and receives the most attention are the long-term returns reversal and short-term returns momentum (Barberis, Shleifer, & Vishny, 1998). According to Ali, Nassir, Hassan, and Abidin (2010) both of those anomalies are often characterized as stock market over-reaction and under-reaction. This paper will touch on the over-reaction effect later. Traditional financial theory has failed to adequately explain away these phenomena. However, the new and ground-breaking field of behavioral finance and economics has been proposed as an alternative explanation to this and various financial and economic occurrences.

Researchers agree that while standard financial and economic theories were well constructed to make calculated financial decisions or focus solely on objective conditions, this makes them unable to explain the chaotic and abnormal phenomena or disruptions in actual markets (Huang, Shieh, & Kao, 2016; Kapoor & Prosad, 2017). According to Huang et al. (2016), behavioral finance theorists start their assumptions with the decisions human beings make. The field is defined by Glaser, Nöth, and Weber (2004) as a "sub-discipline of behavioral economics is finance incorporating findings from psychology and sociology into its theories". Behavioral finance is informed by three strands of psychology: cognitive psychology, emotional responses to the intensity or trading, and social psychology (DeBondt, Forbes, Hamalainen, & Muradoglu, 2010). The incorporation of various psychological and behavioral decision theories had allowed scholars to explain many abnormal effects (Huang et al., 2016). One of these effects, the over-reaction hypothesis which was first demonstrated by De Bondt and Thaler in 1985, clashes with another main-stream financial theory: the efficient market hypothesis.

The over-reaction effect was first revealed by De Bondt and Thaler (1985). In their own words, the effect can be described as, "if stock prices systemically overshoot, then their reversal should be predictable from past return data alone with no use of any accounting data such as earnings. They suggest two hypotheses: (a) Extreme movements in stock prices will be followed by subsequent price directions in the opposite direction (b) The more extreme the initial price movement, the greater will be the subsequent adjustment" (De Bondt & Thaler, 1985). This idea directly conflicts with even the weak form of the EMH. In their seminal paper, De Bondt and Thaler (1985) provides empirical evidence for the effect's existence over long (3 or more years) time-periods by forming winner and loser portfolios each consisting 35 stocks from the New York Stock Exchange (NYSE) and compute the cumulative excess average returns. If even the weak-form of EMH holds, the returns of the winner portfolio must be equal to the loser portfolio since the market will reflect the information of each of the stocks symmetrically. What De Bondt and Thaler (1985) found was that, 36 months after portfolio formation, the loser portfolios outperform the market by an average of 19.6%, winner portfolios underperform the market by an average of 5.0%, and the average differences between the two portfolios' performances is 24.6%. In other words, there is an over-reaction effect.

Since the publishing of De Bondt and Thaler (1985)'s paper, multiple scholars has further investigated the over-reaction effect. Generally, market over-reaction demonstrates that stock prices tend to exhibit reversal behavior over the long run and thus suggesting that stock market returns are predictable (Maheshwari & Dhankar, 2014). These reversals of return generally result from the over-reaction effects in which the market participants' irrational behaviors would eventually cause abnormal price movements in the stock market (Ali et al., 2010). By knowing that the market tends to overreact to the extremely good (or bad) news, investors can

utilize the contrarian strategy to assume that the winner (or loser) stock will be pulled much higher (or lower) than its true value (Fung & Lam, 2004; Maheshwari & Dhankar, 2014). Through these assumptions, contrarian investors can make a profit by buying the loser stocks and selling the winner stocks. The consistent positive returns earned by the contrarian strategy have clearly shown that there is a predictably in the stock market such that investors can make future abnormal returns just by using the securities' past information which should be incompatible with EMH (Tripathi & Gupta, 2009).

The over-reaction effect can be easily explained from a behavioral perspective, in which cognitive bias would affect investors' investment decisions (Kaestner, 2006). The variety of cognitive bias include overconfidence (Daniel, Hirshleifer, & Subrahmanyam, 1998), the representativeness heuristic (Barberis et al., 1998), and herding behavior (Yao, Ma, & He, 2014).

In addition to its discovery in the NYSE by De Bondt and Thaler (1985), multiple scholars have demonstrated varying degrees of the over-reaction effect in various markets such as the Japanese stock market (Chiao & Hueng, 2005), Indian stock market (Tripathi & Gupta, 2009), Athens Stock Exchange (Mylonakis, 2012), Bursa Malaysia stock exchange (Ali et al., 2010; Ali, Ahmad, & Anusakumar, 2011), and the Taiwanese stock market (Huang, Chan, Huang, & Chang, 2011). More specifically, there existed statistically significant over-reaction effect and persistent abnormal return based on the loser-winner portfolio strategies in Japan (Chiao & Hueng, 2005), India (Tripathi & Gupta, 2009), Malaysia (Ali et al., 2010; Ali, Ahmad, & Anusakumar, 2011) and Taiwan (Huang, Chan, Huang, & Chang, 2011).

However, the over-reaction effect in Athens Stock Exchange during 2001-2009 was inconclusive. According to Mylonakis (2012), empirical results differed from period to period. In particular, the loser-winner portfolio produced excess return during 2000-2002. There had been no significant reversal and excess return generation between loser-winner portfolio during 30-36 months.

For Thailand, there had been several studies on this area. However, the results remained mixed as researchers found evidence for under-reaction (Panyakosa, 2004), over-reaction (Ruttanajongkol, 2010), or both effects (Saisingthong, 2003). More recently, Lerskullawat and Ungphakorn (2018) studied the over-reaction effect during 1990-2016, which spanned key economic crises and political events in Thailand. Their work supported over-reaction and reversal of return for Losers portfolio over the medium period. The results as well as the studies relevant details are further displayed in table 1.

**Table 1** Previous Studies on Over-Reaction Effect on the SET

| Author(s) and Year of Study | Ranking and Monitoring Period | Sample Selection | Market Adjustment | Results |
|---|---|---|---|---|
| Lerskullawat and Ungphakorn (2018) | 36 Months, 36 Months | SET, Top and Bottom 10% | Utilization of beta | Over-Reaction |
| Ruttanajongkol (2010) | 1-60 Months, 1-60 Months | SET, Top and Bottom n Stocks | Simple Market Adjustment | Over-Reaction |
| Panyakosa (2004) | 12 Months, 12 Months | SET, Top and Bottom n Stocks | Simple Market Adjustment | Under-Reaction |
| Saisingthong (2003) | 36 Months, 36 Months | SET, Top and Bottom 10% | Simple Market Adjustment | Both Effects |

## Methods and Materials

### Hypothesis Formulation

Based on previous literature (De Bondt & Thaler, 1985; Lerskullawat & Ungphakorn, 2018), the over-reaction effect is based on the idea that the markets (in the short-term) over-react to past information and thus are not efficient because price-reversals and corrections occur and can be predicted based on their past return data and so are inefficient. This by extension also means that a proper reaction can be defined as how the market performs and thus if market were efficient, if investors were to create a portfolio of best (Winners) or worst (Losers) performing stocks, their returns compared to the market should be the same. However, if the over-reaction effect exists, the market-adjusted returns of the loser portfolio should significantly exceed that of the winners' portfolio as the market is over-reacting to the good or bad information associated with our winners and losers and thus a reversal for both groups will occur. Thus, our hypothesis can be described as follows:

$H_0$: $R_L - R_W = 0$. There is no significant over-reaction (mean difference) of the loser portfolio over the winner portfolio.

$H_a$: $R_L - R_W > 0$. There is a significant over-reaction (mean difference) of loser portfolio over winner portfolio.

where $R_L$ refers to market adjusted return of the losers' portfolio, which was formed by equal weighted bottom 20% of underperforming stocks in the Stock Exchange of Thailand during the formation period.

$R_W$ refers to market adjusted return of the winners' portfolio, which was formed by equal weighted top 20% of stocks in the Stock Exchange of Thailand during the formation period.

### Data Sources

The monthly closing total return indexes of all stocks ever listed in SET and as well as the closing value of the SET Index from January 2012-December 2017 were obtained via Thomson Reuters Data Steam. Monthly data is selected to avoid several measurement problems arising from the use of daily data such as the "bid-ask" effect and consequences of infrequent trading (De Bondt & Thaler, 1985). The total return indexes are selected over the prices to account for the effect of dividends and other events such as stock splits on the stocks returns as well as the stock's perception among investors. The three-year time period is selected due to it being in the relative "sweet spot" between being long-term and short-term study. The monthly stocks' returns are then ranked for their return in preceding three year time period (ranking period) with winner and loser portfolios being formed. The portfolios' returns are then tracked for the next three years (monitoring period).

### Data Treatment

The steps are closely adapted from De Bondt and Thaler (1985)'s influential paper in demonstrating the over-reaction effect. The steps are as follows:

1. Starting from January 2012 as Month 1 ($t = -35$), the total return indexes of every stock ($RI_j$), j, in the SET are collected as well as the returns for the 36 ensuing time periods ending in December 2014. The stocks will then have their cumulative return ($R_j$) calculated and adjusted. The equation for calculating the cumulative return during the ranking period is shown in Equation 1

$$R_{j,t=0} = \frac{RI_{j,t=0}}{RI_{j,t=-35}} - 1$$

**Equation 1** Calculating Ranking Period $R_j$

Any stocks with missing returns are removed from the list. The remaining stocks' returns are then market adjusted with the returns of the market ($R_m$) which in this case is the return of the SET index over the ranking time period to yield the cumulative excess returns of the stock ($CU_j$). The methods for calculating $R_m$ and $CU_j$ during the ranking time period are shown in Equations 2 and 3.

$$R_{m,t=0} = \frac{SET\ Index_{t=0}}{SET\ Index_{t-35}} - 1$$

**Equation 2** Calculating Ranking Period $R_m$

$$CU_{j,t=0} = R_{j,t=0} - R_{m,t=0}$$

**Equation 3** Calculating Ranking Period $CU_{j,t}$

After computing the $CU_j$ of every stock in the SET, we rank them with the top 20 stocks and bottom 20 stocks forming winner (W) and loser (L) portfolios, respectively. The following figure illustrates how the stocks are ranked and classified.

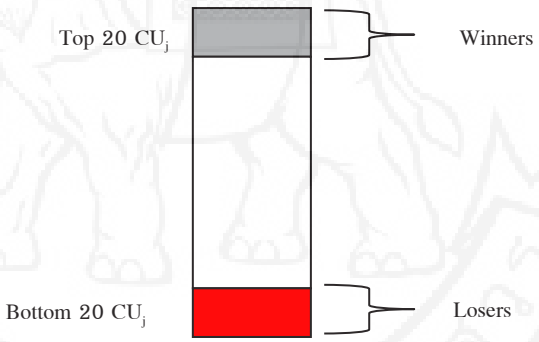


**Figure 1** Illustration of the Formation of Winner and Loser Portfolios

2. For every month, m, after the portfolio formation, the $R_m$, $R_j$, and $CU_j$ for each of ensuing monitoring period months are calculated. If some or all of the returns are missing, the returns are adjusted up until that point. The equations below show how the various returns are calculated for the monitoring periods.

$$R_{j,t=m} = \frac{RI_{j,t=m}}{RI_{j,t=0}} - 1$$

**Equation 4** Calculating Monitoring $R_j$

$$R_{m,t=m} = \frac{SET\ Index_{t=m}}{SET\ Index_{t=0}} - 1$$

**Equation 5** Calculating Monitoring $R_m$

$$CU_{j,t=m} = R_{j,t=m} - R_{m,t=m}$$

**Equation 6** Calculating Monitoring $CU_j$

3. For the winner and loser portfolios, the monthly cumulative average returns (CAR) of each portfolio are calculated for each month by averaging the CUj in each portfolio.

$$CAR_{W\,or\,L,t=m} = \frac{\sum CU_{j,t=m}}{n_{W\,or\,L}}$$

**Equation 7** Calculating $CAR_t$

4. For each month, the differences between winners' and losers' CAR are also calculated.

5. The t-statistic for each month during the monitoring periods is also calculated for the differences in CARs and the corresponding p-values to test whether the differences are statistically significant or not.

$$t - statistic_t = \frac{CAR_{W,t} - CAR_{L,t}}{\sqrt{\frac{s_W^2}{n_W} - \frac{s_L^2}{n_L}}}$$

**Equation 8** Calculating t-Statistic where $s^2$ is the Variance of Each Portfolio

## Results and Discussion

The annualized descriptive statistics for the entirety of SET, winner and loser portfolios for the ranking and monitoring time periods are shown in Table 2 and 3.

**Table 2** Descriptive Statistics for the Ranking Period

| | Ranking Period | |
|---|---|---|
| | **Winners** | **Losers** |
| Mean | 489.32% | -32.92% |
| Minimum | 155.76% | -41.84% |
| Maximum | 3884.79% | -27.68% |
| **Market Average** | **38.07%** | |

**Table 3** Descriptive Statistics for the Monitoring Period

| | Monitoring Period | |
|---|---|---|
| | **Winners** | **Losers** |
| Mean | -3.71% | 14.91% |
| Min | -32.81% | -25.30% |
| Max | 55.51% | 97.37% |
| **Market Average** | **6.09%** | |

During the ranking period, the winners' outperformed the losers by an average over 450% with the average losers' return being nearly 70% below the market's average. However, after the monitoring period, the losers' had higher lowest value, highest values, and average values than the winners' portfolios. The descriptive statistics implied that choosing loser stocks would provide better returns than choosing winner stocks. One

interesting fact to note is that the winners' average after the monitoring period is even lower than the returns of the SET's average returns. Another piece of information that can be gleaned from the descriptive statistics is that the differences between in the average returns of the market compared against itself during the two time periods as well shows that the monitoring period has less bullish market compared to the ranking time period. The monitoring periods also show that the average stocks in the loser portfolio has better performance than the average stock in the market and vice versa for the stocks in the winner portfolio.

The relative performance of the Winners and Losers portfolios based on the Cumulative Adjusted Returns (CARs) as well as the differences in their performances is shown in Table 4 and Figure 2.

**Table 4** The Relative Performance of the Winners and Losers Portfolios Based on Cumulative Average Returns (CARs) for Each n Month after Portfolio Formation, the Mean Differences and the Corresponding t-Statistic

| Months after Ranking | Winners | Losers | Mean Differences | T-Statistic |
|---|---|---|---|---|
| | CARs | CARs | | |
| 1 | -2.67% | -2.43% | 0.24% | 0.1165 |
| 2 | 1.13% | -2.31% | 3.45% | -0.7334 |
| 3 | 4.10% | 2.35% | 1.75% | -0.2491 |
| 4 | -0.27% | 3.52% | -3.79% | 0.4513 |
| 5 | 4.97% | 6.85% | -1.88% | 0.2026 |
| 6 | 0.13% | 7.23% | -7.10% | 0.7492 |
| 7 | 0.84% | 14.68% | -13.84% | 1.0455 |
| 8 | -4.25% | 8.31% | -12.55% | 1.0846 |
| 9 | -1.80% | 13.49% | -15.29% | 1.1403 |
| 10 | -0.68% | 16.73% | -17.41% | 1.1439 |
| 11 | -0.29% | 25.20% | -25.49% | 1.1910 |
| 12 | -4.82% | 30.65% | -35.48% | 1.5687 |
| 13 | -0.31% | 25.84% | -26.15% | 1.2516 |
| 14 | -0.91% | 22.36% | -23.26% | 1.1708 |
| 15 | -3.77% | 20.40% | -24.17% | 1.2335 |
| 16 | -5.15% | 22.06% | -27.21% | 1.3995 |
| 17 | -3.11% | 27.21% | -30.31% | 1.3851 |
| 18 | -5.25% | 24.39% | -29.64% | 1.3269 |
| 19 | -3.31% | 23.92% | -27.24% | 1.2226 |
| 20 | -0.22% | 23.14% | -23.36% | 0.9665 |
| 21 | 1.93% | 22.34% | -20.40% | 0.8504 |
| 22 | 1.53% | 22.22% | -20.69% | 0.8386 |
| 23 | 4.68% | 27.93% | -23.25% | 0.8616 |
| 24 | 4.19% | 35.96% | -31.77% | 1.1359 |
| 25 | 4.20% | 43.55% | -39.34% | 1.3528 |
| 26 | 0.54% | 58.28% | -57.74% | 1.6308 |
| 27 | -4.29% | 50.98% | -55.27% | 1.7786* |
| 28 | -3.29% | 52.09% | -55.38% | 1.7540* |
| 29 | -4.13% | 49.30% | -53.42% | 1.7798* |
| 30 | -3.28% | 54.50% | -57.78% | 1.7840* |
| 31 | -5.42% | 52.50% | -57.92% | 1.8998* |
| 32 | -10.36% | 48.69% | -59.05% | 2.0656** |

**Table 4** (Cont.)

| Months after Ranking | Winners | Losers | Mean Differences | T-Statistic |
|---|---|---|---|---|
| | CARs | CARs | | |
| 33 | -10.72% | 52.18% | -62.89% | 2.1477** |
| 34 | -9.99% | 50.28% | -60.28% | 1.9780* |
| 35 | -11.42% | 50.04% | -61.46% | 2.0088* |
| 36 | -11.13% | 44.74% | -55.87% | 1.8902* |

* Significant at p < 0.10

** Significant at p < 0.05

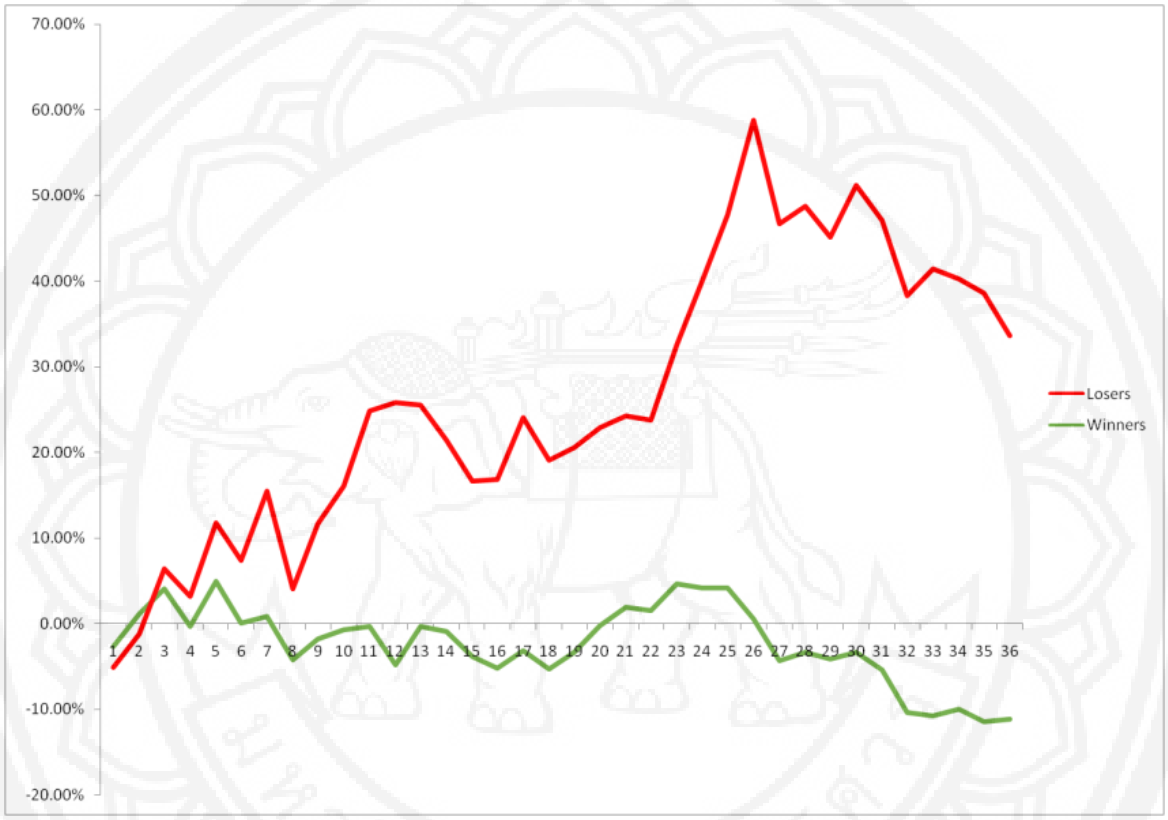


**Figure 2** The Graph Shows the Performances of the Winner and Loser Portfolios

The portfolios' performances show a clear divide between performances in the losers and winners portfolios. The results contrast with traditional financial theory and support the over-reaction hypothesis by showing that the CARs of the loser portfolios generates returns of 30.65%, 35.96%, and 44.74% compared to winners' CARs of -4.82%, 4.19%, and -11.13% with differences of up to 35.48%, 31.77%, and 55.87% by the one year mark (n = 13), two year mark (n = 24), and at the end of the monitoring period (n = 36), respectively.

Based on the result of this study, investor might benefit from applying contrarian strategy to invest in the past losers portfolio during the bearish markets (2014-2015) and held the position over medium to long-term for price reversal (2016-2017). The combined effect of capital gain and dividend from the position resulted in double digit CARs during the tracking period.

In comparison with previous literature, the mean differences between losers and winners portfolio had demonstrated the level of statistical significance, consistent with the pattern explained by De Bondt and Thaler (1985). More specifically, De Bondt and Thaler (1985) observe that past losers outperform past winners in the

long term, particularly over 3 to 5 years. In this respect, the mean difference became statistically significant from the 27th month onwards, which also shared similar characteristics as the equal weighted the Losers-Winners portfolio strategy based on the work of Lerskullawat and Ungphakorn (2018).

These results also by implication suggest that markets are not even weak-form efficient since traders can just pick the worst performing stocks from a pre-set ranking period and can still outperform the best stocks in the market from the ranking period in the following monitoring periods. In addition to that, speculators can also pick the best performing stocks in a pre-set ranking period and short sell them with the expectation that price reversal would occur and thus presenting a trading opportunity for investors to exploit.

Based on the empirical evidence, over-reaction effect tends to be present during significant political or economic events (Ali et al., 2010; Lerskullawat & Ungphakorn, 2018). One possible explanation of over-reaction effect could be related to herding behavioral biases in investment decision making, which suggest that investors tend to make decisions that follow others' trading activities with the belief that others might have superior knowledge and information on investment. Herding behavior had been found to move the market in the same direction, causing mispricing from the intrinsic values (Qiao, Chiang, & Tan, 2014). During market optimism, herding might cause pricing of winner securities to shoot beyond the fundamental value. On the contrary, herding might cause downward pressure on pricing of loser securities beyond the intrinsic value, warranted by prospect of recovery.

In Thailand, herding behaviors had been tested in the work of Qiao, Chiang and Tan (2014) during 1996 to 2009 along with other Asian markets and the works of Kulwanich (2013) and Rattanasri and Vichitthamaros (2018). Based on the analysis of Cross-Sectional Absolute Deviation, results of the study showed evidence of herding behaviors during 1990-2010 (Kulwanich, 2013) and 2010-2015 (Rattanasri & Vichitthamaros, 2018). During the study periods, herding behaviors were persistent in the Stock Exchange of Thailand whether the market was bullish or bearing. It is further noted that the effect of herding behaviors is more pronounced, during volatile market conditions. Hence, the presence of over-reaction effect might be connected to periods of one directional market movement which results from herding behaviors in Thailand.

## Conclusion and Suggestions

The Efficient Market Hypothesis has been tested and demonstrated in its varying forms across different markets. However, despite EMH's wide acceptance, several violations or anomalies of EMH has been discovered. The over-reaction effect, first presented by De Bondt and Thaler (1985), is one of the most well-known of those violations. The effect demonstrates a violation of even the weak-form of EMH through the statistically significant difference in performances of portfolios formed from the best and worst performing stocks, respectively. This clash with modern financial theory can better be explained through the lens of behavioral finance and economics. The effect has been shown to also exist in varying degrees across different markets. In particular, several studies had been conducted in Thailand with a range of conclusions.

These varied conclusions regarding Thailand's market over-reactions led this study to further investigate the over-reaction effect in Thailand but with a key distinction in the portfolios' starting point. Instead of just using the stock's price to create and measure the winner and loser portfolios, the paper utilizes the stock's total return index which incorporates returns from dividends as well to make the returns reflect the actual returns investors will receive in investing in such a strategy. The empirical results show that there is a clear gap in the returns of

the winners and losers that becomes more statistically distinct with each monitoring period. The existence of this gap in returns implies that a successful investment strategy in Thailand can be formulated based on past return data and that opportunity is worth further investigation into its viability as an investment thesis to build around.

It should be further noted that the total return of securities could have been influenced by other factors beyond over-reaction effect. Future research should attempt to attribute the return to potential sources and to separate the impact of over-reaction effect.

**Limitations and Suggestions**

While the results and implications associated with those results are statistically significant, the study does suffer from several limitations. One of the first limitations is the relatively small time period of the study. Since the study is only done once for the time period of 2012-2017, the implications of the study cannot be universally implicated due to the only limited scope. Another limitation might be the study sample's broad scope which makes specifying which industrial sector does the effect holds most sway over in the Thai stock market more difficult. This muddled understanding might make the idea seem more complicated for investors to build investment strategies around the effect. In addition to the aforementioned limitations, another possible criticism of the study can be that the relatively simple method of calculating and market-adjusting the returns which is due to the study's aims to properly imitate normal investors' behavior in as much as accurately possible.

The study's results leave further room for empirical testing. Firstly, since the only test is for one time period, multiple time-periods dating to at least the 2000s can be measured to test whether the effect has persisted in Thailand over a period of time and what the average performances of a winner or loser may look like, given certain market conditions. Secondly, the empirical test should seek to separate the over-reaction effect from other potential influencing factors such as the size effect, the Book to Market ratio (Chiao & Hueng, 2005) and the effect of dividend. Thirdly, future studies can also measure the effect's impact on the various industrial sectors in the SET and add more sophistication to their return calculations based on portfolio formation strategy. Fourthly, De Bondt and Thaler asserts that the effect can be increased (or decreased) by either decreasing (or increasing) the number of stocks in the portfolios or expanding (or contracting) the ranking periods (1985). Further studies can also benefit from customizing their parameters accordingly. Finally, further studies may attempt to conduct cross-country comparison of over-reaction effect or explore the connection with herding behaviors to develop understanding behind the existence of overreaction.

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