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The Evidence of the Residual Momentum Strategy in the Thai Stock Market

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Abstract

Employing the residual momentum in the Stock Exchange of Thailand (SET) using data during January 2001 to December 2011 shows the improvement of the strategy in terms of reducing time-varying risk exposures of the momentum return. The results found that the residual momentum has higher raw return together with lower variability; as a result, has higher Sharpe ratio. The key prominence of the residual momentum is its better performance during economic crisis. The residual momentum portfolio do not face as much losses as the total return momentum portfolio when there is a market reversal after a severe recession because the residual momentum is considerably neutralized in the time-varying risk exposures. While the total return momentum tends to invest in high exposure stocks, the residual momentum tends to put less weight in these stocks, which result in lower volatility in the residual momentum returns. The study supports the hypothesis that the momentum is not risk factor; on the contrast, its effect is caused by the behavior biases of investors. The study supports the gradual-formation-diffusion hypothesis that the market underreacts to the firm-specific events more than to common events; and the residual momentum generates longer positive profits than the total return momentum does. That is the Thai stock market is inefficient under the weak-form hypothesis. To employ the strategy in practice, however, need to consider the transaction costs in such the way that the obtaining return may significantly decrease when taking the transaction costs into account.

JEL Classification: G11, G12, G14

Keywords: Momentum, Time-varying risk, Residual returns, Thailand

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Contents

Table

Figure

Chapter 1 Introduction

Investors would like to earn excess returns from investing in the stock market. They seek to employ the trading strategies in which they can capture positive returns consistently. One of the strategies widely used is the momentum strategy. The momentum strategy is originally advocated by (Jegadeesh and Titman 1993), who indicate the positive serial correlation in stock prices. They documented that over a short horizon, three to twelve months, the stock prices that rise will continue to rise in the subsequent month, and the stock prices that fall will continue to fall in the subsequent month. To exploit this short-term effect, they develop the momentum strategy, also known as the relative strength strategy, by which buying past winner stocks and selling past loser stocks to generate abnormal profits.

(Fama and French 1996), who purposed the Fama and French three-factor model to capture stock returns in 1992 and 1993, used their model to examine several anomalies, including the momentum effect and the contrarian effect. The contrarian effect, worked by (De Bondt and Thaler 1985), is the effect of long-run reversal, in which stocks with low returns in past three to five years will have higher return than stocks with high returns in past three to five years. Using the three-factor model to explain stock returns, the results showed no evidence of abnormal returns based on the long-run contrarian strategy, whereas the short-run momentum strategy still generates positively excess profits.

Since the work of (Jegadeesh and Titman 1993), the momentum strategy is interested both among academics and among practitioners. It is popular because of its uncomplicated and expedient to implement. There are many evidences investigating the momentum effect in the stock market around the world. Some researches further developed the momentum strategies that are claimed to be better than the conventional one. For example,

(Moskowitz and Grinblatt 1999) suggested the industrial return momentum strategy, buying stocks from past winning industries and selling stocks from past losing industries will generate higher profit; and (George and Hwang 2004) suggested the 52-week high price momentum strategy, buying stocks that have price closest to the 52-week high price and selling stocks that have price farthest from the 52-week high price will generate higher profit.

While the momentum strategy worked by (Jegadeesh and Titman 1993) is broadly applied, some researchers argue on the source of returns of the strategy. As documented by(Asem 2009), there are several studies examined the relation between risk factors or transaction costs and the momentum returns. It is suggested by these works that the momentum, itself, does not generate profits, but the profits are obtained by risk or transaction costs the strategy consumes. For example, (Conrad and Kaul 1993) reported that the momentum returns are actually compensated for bearing the systematic risk, which is the sensitivity of the security risk relative to the market risk, β; (Daniel and Titman 1999) reported that the returns are compensated for the book-to-market factor; (Lesmond, Schill et al. 2004) reported that the returns are compensated for the size factor; (Sagi and Seasholes 2007) reported that the returns are compensated for the growth options; (Moskowitz and Grinblatt 1999) reported that the returns are compensated for the industrial effects; (Lesmond, Schill et al. 2004) and (Korajczyk and Sadka 2004) reported that the returns are compensated for the transaction costs; and (Chordia and Shivakumar 2002), (Antoniou, Lam et al. 2007) and (Li, Miffre et al. 2008) reported that the returns are compensated for the time variation in risk. (Asem 2009) documented the momentum returns are higher for non-dividend-paying firms than payers. Nevertheless, the works of (Fama and French 1996) and (Grundy and Martin 2001) found no evidence that these risk factors can entirely explain the momentum profits.

(Grundy and Martin 2001) argued that the traditional momentum strategies of (Jegadeesh and Titman 1993), which use total stock returns to rank the past performance, are subjected to time-varying risk exposures to the Fama and French factors, which are market factor, size factor and value factor. These common-factors returns are dynamic; that is, they are

not stable and vary across time. They argued that the profitability of the total returns momentum rely heavily on these dynamic-factor returns. Consequently, following the total return momentum strategy could generate the positive returns only if the factor returns in the holding period still hold the same direction as in the formation period, and it hurts the profits if it turns out to be otherwise. That is, when the common factors have positive returns in the formation period, the momentum will tend to place a positive factor loading bet on common factors by purchasing stocks with high level of factor loading and selling stocks with low level of factor loading. By performing these transactions, the net factor loading sign will be positive. If the common-factor returns in the holding period still be positive, the momentum will generate positive profit. On the other hand, if the common-factor returns in the holding period turn to be negative, the momentum will face loss. Conversely, the momentum will tend to load negatively on common factors when common factors have negative returns in the formation period by purchasing stocks with low level of factor loading and selling stocks with high level of factor loading. By performing these transactions, the net factor loading sign will be negative.

As explained by (Grundy and Martin 2001), the momentum strategy will go long stocks with high beta and short stocks with low beta if the market return is higher than Treasury bills during the formation period, while go long stocks with low beta and short stocks with high beta if the market return is lower than Treasury bills during the formation period. In case of size factor, the momentum strategy will go long small capitalization stocks and short large capitalization stocks if small capitalization stocks return are higher than large-capitalized stocks return during the formation period, while go long large capitalization stocks and short small capitalization stocks if small capitalization stocks return are lower than large capitalization stocks return during the formation period. In case of value factor, the momentum strategy will go long value stocks and short growth stocks if high book-to-market stocks (value stocks) have higher return than low book-to-market stocks (growth stocks) during the formation period, while go long growth stocks and short value stocks if high book-to-market stocks have lower return than low book-to-market stocks during the formation period.

According to the empirical evidence of (Blitz, Huij et al. 2011), the total return momentum portfolios end up with large losses during the year 1932 and 2009 because of the severe economic recession followed by the strong market reversal. After the market return of -49% in 1931, which is during the great depression, the total return momentum was tend to invest in the low-beta stocks at the end of 1931. When the market recovered in 1932 with returns of 34% and 37% in July and August 1932, respectively, the negative market beta of -1.1 over 1932 of the total return momentum caused large losses. The similar pattern can be observed in 2009, after the market return of -39% in 2008, which is during the credit crisis, the total return momentum was tend to invest in the low-beta stocks at early 2009. When the market recovered in 2009 with returns of 9%, 11% and 7% in March, April and May 2009, respectively, the negative market beta of –0.9 over 2009 of the total return momentum caused large losses.

Since there is nothing to guarantee that these dynamic common-factor returns; the market factor, the size factor and the value factor, in the formation period and in the holding period will always move in the same direction. As a result, the abnormal profits generated by the total return momentum tend to be contingent. (Grundy and Martin 2001) concluded that hedging the portfolios against these time-varying risk factors can obtain higher profit than the conventional momentum can obtain. Nevertheless, they cannot find the optimal hedging portfolio that can generate considerably profits and can be implemented in real situation.

(Blitz, Huij et al. 2011) further investigated the work of (Grundy and Martin 2001). They claim the development of their residual momentum strategy over the work of (Grundy and Martin 2001) in terms of the availability of information used to form the residual momentum portfolios. They argued that the strategy to use zero-cost hedge portfolios of (Grundy and Martin 2001) cannot be employed in realistic because the estimators are estimated in the formation period which is the *ex post* factor loadings estimation that unknown at portfolios formation time. Instead of using zero-cost hedge portfolios based on *ex post* factor loadings estimation, (Blitz, Huij et al. 2011) suggested to use residual returns, which are obtained *ex*

ante to form the momentum portfolios by regressing against the Fama and French model in the estimation period using 36-month rolling windows approach. While the hedging strategy of (Grundy and Martin 2001) shows only little improvement from the total return momentum strategy when use the *ex ante* information, the residual momentum still generate significant abnormal profits. The residual momentum, which use the residual return of the Fama and French factors regression, is suggested to improve over the total return momentum in terms of i) decreasing variability of profits, ii) having higher long-run average Sharpe ratios, which is risk-adjusted returns, iii) better consistency of performance over time, iv) less prone to small-capitalized stocks, which related to transaction costs and v) reducing the January effect.

The rational of using the residual return, or the error term is that because the residual return of each regression represents the asset return that is already adjusted to the factor exposures; thus, using this residual term considerably hedges against these time-varying risk factors, and better predicts future return. The empirical evidence of the total return momentum shows inconsistency in its performance because it is likely to rely its profit on the direction of the time-varying factor returns in the formation period and in the holding period. The total return momentum could earn positive profit only if the common factor returns in the formation period and in the holding period move in the same direction. The residual return momentum; however, does not depend on these factor returns because it already hedges against these time-varying risk exposures which resulting in more consistent in higher profit. Furthermore, the residual return momentum could reduce risks that the momentum strategy consumes regarding to the factor exposures. With higher profit together with lower risk, the residual momentum has higher Sharpe ratio. Unlike the total return momentum, which tends to invest in small stocks, the residual momentum has less weight in small capitalization stocks since the residual return is already adjusted for the size factor. Therefore, the residual momentum is slightly subjected to the financial distress, the transaction costs and the January effect issues. For these explanations, the residual return momentum could guarantee better and more consistent results over time compare to performance of the total return momentum. Note

that the rational of using the residual return of the Fama and French three-factor model is that the Fama and French model is one of the most acceptable models which commonly used to explain the assets return at present.

While (Blitz, Huij et al. 2011) used the U.S. data, which represents the results in developed markets, applying their residual returns strategy with the data from emerging market as the Thai stock market may not hold the same results. The characteristics of these two types of stock market are different in many aspects including the volatility of stock returns. There is evidence reporting the higher volatility of stock returns in the emerging stock markets such as the document of (Gerald, Ninon et al. 2004) and (Fayyad 2010). Both evidence which are the document of (Gerald, Ninon et al. 2004), which studies the risk and return characteristics of the emerging stock markets, including Thailand, and the developed stock markets, including U.S, and the document of (Fayyad 2010), which compares the return volatility of Kuwait and Arab Emirates, representing the emerging markets, with U.S. and U.K, representing the developed markets, found that the return volatility of the emerging markets is, in general, higher than that of the developed markets. Since the evidence of the residual momentum suggests that it is an efficient approach to reduce the volatility of the return, employing the residual momentum in the emerging markets as the Thai stock market could be an alternative strategy to reduce risk exposures faced by investors from investing in these markets. From this reason, it is interesting to investigate the results in the Thai stock market, whether that the residual momentum strategy still improves the volatility of the return, the risk-adjusted profit and dominates the total return momentum in the Thai stock market or not.

The momentum strategies are also interested in Thailand for a decade. There are evidences of the existence of the momentum effect in the Thai stock market. The empirical evidence of (Kamjornpreecha 2008) found that momentum strategies based on reward-risk criteria, using the Sharpe ratio and expected shortfall, acquire higher profits and better risk-adjusted returns than the traditional one. (Lamwilai 2008) suggested that time-varying unsystematic risk cannot explain the abnormal returns resulting from the momentum strategies.

(Rungrojvanich 2009) found short-run momentum profits in the up market and the opposite in the down market. (Chantanapongwanij 2009) examined the profitability of enhanced momentum strategies based on one of the firm characteristics and found that stocks with high revenue growth volatility or high market-to-book ratio generate significantly high momentum returns. (Laowattanabhongse 2009) found a relationship between momentum strategies and firm characteristics which are the size and the value. Even though there are several research studied on the momentum strategy in the Thai stock market, no research directly studies on the residual momentum. The main objective of this study aims to examine the residual momentum strategy based on residual returns regressing against the Fama and French three-factor model and its application in the Stock Exchange of Thailand (SET). This study replicate the work of (Blitz, Huij et al. 2011) by comparing the performance of the total return momentum strategy of (Jegadeesh and Titman 1993) and the residual momentum strategy of (Blitz, Huij et al. 2011). This study also investigates the residual momentum performance in other aspects such as their consistency of profits over time, the business cycle effect, the small-cap exposures, distress risk and transaction costs, and the calendar effect.

The study results purpose to contribute both in academics and in practical investments in the Thai stock market. It extends the residual momentum effect in the emerging stock market from the developed one. The study supports the argument that the momentum effect is one of the anomalies, not price risk factor. That is, it challenges the weak form of the efficient market hypothesis, in which whether investor can use past stock returns to predict future returns or not. Furthermore, residual momentum is a longer-lived phenomenon than total return momentum, in which it still generate positive profits when invests in a horizon beyond one year. Researchers may further apply the residual returns in other trading strategies. Sophisticated investors can implement the residual momentum strategies to improve their trading technique more efficiently. If the results hold in the Thai stock market, residual momentum investors will consume lower variability in profits and earn higher risk-adjusted profits with more consistency over time than the total return momentum investors will. The

benefit of holding the residual momentum portfolio is explicit during the period of a strong expansion market after an economic crisis. That is, investor will be better off if holding the residual momentum portfolio than holding the total return portfolio. This is because the residual term nearly neutral to the Fama and French time-varying risk exposures, since it is considerably hedged against these dynamic-risk factors and put comparable weights between high-beta stocks and low-beta stocks. The factor loadings of the residual momentum are less vary and substantially smaller. Consequently, the residual momentum can better predict future returns and reduce portfolio risk; thus, consume lower profits volatility. The total return momentum has more variation in profits because it tends to bet its profit on the direction of the dynamic-factor returns in the formation period and in the holding period. The returns of the momentum strategies continue to increase for a period because the market seem to underreact to the firm-specific events as suggested by the gradual-formation-diffusion hypothesis of (Hong and Stein 1999).

The implementation of the residual return momentum strategy is not hard to employ since information of each factors, which are the market factor, the size factor and the value factor, is publicly available. The residual returns are prior obtained to form the momentum portfolios; thus, the residual strategy can be implemented in realistic. The method to obtain the residual returns is only the simple regression on the well-known Fama and French three-factor model.

Research Objective

To examine the residual momentum strategy in the Thai stock market whether that it improves the volatility of the return, the risk-adjusted profit and dominates the total return momentum in the Thai stock market.

Expected outcomes

If the results hold in the Thai stock market, residual momentum investors will consume lower variability in profits and earn higher risk-adjusted profits with more consistency over time than the total return momentum investors will. The benefit of holding the residual momentum portfolio is explicit during the period of a strong expansion market after an economic crisis. That is, investor will be better off if holding the residual momentum portfolio than holding the total return portfolio. This is because the residual term nearly neutral to the Fama and French time-varying risk exposures, since it is considerably hedged against these dynamic-risk factors and put comparable weights between high-beta stocks and low-beta stocks. Consequently, the residual momentum can better predict future returns and reduce portfolio risk.

Definition

SET	Stock Exchange of Thailand
NYSE	New York Stock Exchange
AMEX	American Stock Exchange
NASDAQ	NASDAQ Stock Market

Chapter 2 Literature Review

The efficient market hypothesis (EMH) suggests that all available information at the time is correctly and fully reflected in the stock prices, so stock prices follow the random walk. That is, stock prices change randomly, and people cannot use past prices to predict future returns. The momentum strategies, on the other hand, are based on the notion that the stock market is inefficient, and investor can employ past performance to generate profits.

The momentum strategies suggest to earn profits by forming a zero-cost portfolio that long the stocks with high past returns and short the stocks with low past returns. The intuition follows the momentum effect, originally advocated by (Jegadeesh and Titman 1993), that stocks which perform well will continue their performance for three to twelve months, whereas stocks which perform worse will continue to be worse for three to twelve months as well.

(Jegadeesh and Titman 1993) investigated the momentum strategies by ranking stocks based on their return over three, six, nine and twelve months, and then hold them for three, six, nine and twelve months. By using this J-month lagged formation period and K-month holding period, called (J,K) strategy, they form portfolios based 16 strategies and also the other 16 strategies with one-week skipping period between the formation period and the holding period. The reason why skip one week is to mitigate the bid-ask spread, price pressure and lagged reaction effects as documented by (Jegadeesh 1990) and (Lehmann 1990). Ranked stocks from the highest returns to the lowest returns are grouped into ten equally-weighted deciles portfolios. The portfolio that long the winners, the top deciles portfolio, and short the losers, the bottom one, are then held for a specified horizon. They use the overlapping portfolio approach, where the consecutive series of portfolios are overlapped for K-1 months. Their

empirical results show that the most profit strategy is the strategy based on twelve- month formation period with three-month holding period. Returns of the six-month formation portfolios are about 1%. From the (6,6) portfolio, they found the negative beta of the zero-cost portfolio, which results from the beta of the losers that are higher than that of the winners. The loser portfolios also contain smaller stocks. Therefore, they suggest that the profitability of the momentum strategy does not come from selecting the high-risk stocks; and the beta and size cannot explain all of the profits of the momentum strategies. They conclude that the profitability of the strategies do not come from the systematic risk but from delayed stock price reaction to firm-specific information. They also found the evidence of the January effect, in which the negative return in January is about 7%, on average. The intuition they had explained is that the market tend to underreact to the short-term expectation of firms information, but overreact to the long-term expectation information; as a result, long-term stock prices are temporarily deviated according to the momentum trading and then cause price to overreact.

(Grundy and Martin 2001) examine risks and sources of returns of the traditional momentum strategies of (Jegadeesh and Titman 1993), which use the total stock returns to rank the past performance. They agree that the returns of the total return momentum are subjected to the time-varying exposures of the Fama and French factors. Since its profitability relies heavily on these dynamic-factor returns, one cannot say whether the returns come from the factors or the strategy itself. For example, the momentum strategy will go long high-beta stocks and short low-beta stocks if the market outperforms Treasury bills during the formation period, while go long low-beta stocks and short high-beta stocks if the market underperforms Treasury bills during the formation period. Following the strategy, one could obtain positive returns only if the market returns in the holding period still outperform Treasury bills as in the formation period, and obtain negative return if it turns out to have the opposite direction. As a consequence, they constructed the zero-cost hedging portfolios based on *ex post* factor loadings estimated by the size and market factors, and by the Fama and French three factors and suggested that these portfolios can earn higher returns with lower variability, especially in

January. Even though (Grundy and Martin 2001) seem to agree with the work of (Conrad and Kaul 1993), (Daniel and Titman 1999), (Lesmond, Schill et al. 2004) and (Chordia and Shivakumar 2002) that the returns of the total return momentum are subjected to the risk factors, they found that after adjusted for these dynamic exposures, their stock-specific return momentum still obtain positive returns. That is, these time-varying risks cannot totally explain the momentum profits, but magnify the performance. The hedging portfolio of (Grundy and Martin 2001), however, is hard to implement in reality since one need to know the exposed factors in advance. The empirical result of the performance of the zero-cost portfolio based on *ex ante* information shows only little improvement from the total return momentum strategy. They left the scope of finding the optimal hedging portfolio to be further identified.

(Blitz, Huij et al. 2011) advocate the performance of the residual momentum, ranking past performance of stocks based on their residual returns. They claim that by using the residual terms, which are acquired by regressing the past returns on the dynamic variables, can construct the feasible hedging portfolio using *ex ante* available information. By studying on stocks listed on the New York (NYSE), American (AMEX), and NASDAQ from January 1926 to December 2009, their empirical results of using the residual terms of the Fama and French factors regression show the improvement of the profitability of their strategy over that of the total return momentum. Their strategy gives higher risk-adjusted return with significant lower in returns volatility, resulting in almost double average Sharpe ratios. In terms of behavior explanation, their results support the behavioral biases explanation of (Barberis, Shleifer et al. 1998), (Daniel, Hirshleifer et al. 1998) and (Hong and Stein 1999), especially the gradual-formation-diffusion hypothesis of (Hong and Stein 1999), which supposes that firm-specific information diffuses slowly across the market; hence, the market underreacts to the firm-specific events more than to common events. According to (Gutierrez and Prinsky 2007), the residual momentum generates longer positive profits than the total return momentum does, and its performance does not revert after one year investment horizon. Furthermore, its performance is more consistent over time, as can be shown by positive returns during contraction period. This

is because the residual momentum put comparable weights between high-beta stocks and low-beta stocks. The persistence of the positive performance, even during recession, is inconsistent with the argument that the momentum is one of the price risk factors suggested by (Chordia and Shivakumar 2002).

The other concerns of the total return momentum such as the financial distress, the transaction costs and the January effect are caused by tilting toward small capitalization stocks. According to the finding of (Jegadeesh and Titman 1993) that the total return momentum tend to invest in high-beta and small-cap stocks, (Agarwal and Taffler 2008) and (Avramov, Chordia et al. 2007) report that these high credit-risk stocks are likely to subject to the financial distress. (Korajczyk and Sadka 2004), (Lesmond, Schill et al. 2004), (De Groot, Huij et al. 2012) and (Keim and Madhavan 1997) also report the negative relation between the equity capitalization and trading costs, that is, the small capitalization stocks tend to have higher transaction costs. Lastly, according to the works of (D'Mello, Ferris et al. 2003), (Griffiths and White 1993) and (Roll 1983), one of the most accepted explanations of the January effect is the tax-loss-selling effect, in which investors tend to sell small capitalization stock during December to recognize loss for tax-reduction purpose, this causes dropping in stock prices, and then positive returns. In early January, they repurchase stocks, so stock prices rebound back and cause negative returns. Since the residual momentum has less weight in small capitalization stocks, it is slightly subjected to the financial distress, the transaction costs and the January effect issues.

The subsequent evidence of the momentum strategy suggests that future returns are predictable, which contradicts to what supposed by the efficient market hypothesis (EMH). Some who believe in the EMH suggest that the market is efficient but the available asset pricing model cannot capture all of the possible risk factors. This leads to the suspicion that whether the model used to explain asset returns is valid or not. The most important basis of the asset pricing equation lies in the capital asset pricing model. The capital asset pricing model (CAPM) is a model for predicting future return, based on the relation of the risk of an asset and its expected return. The CAPM was developed by (Sharpe 1964), (Lintner 1965) and (Mossin

1966). The model is a single-factor model, according to which the expected asset return is explained by risk-free rate and the market factor. The market factor is the market risk premium multiplied by the relative risk of that asset, β. The CAPM, however, has a flaw in explaining accurately future returns. It cannot explain the effects had been found in the following period such as the size effect, the value effect and even the momentum effect.

The size effect is documented by (Banz 1981) and (Reinganum 1981). It is the effect that portfolios of small firms have higher returns than portfolios of large firms. (Keim 1983), (Reinganum 1983) and (Blume and Stambaugh 1983) found the relationship between the market capitalization and the turn-of-the-year effect, in which small firms effect mostly occur during the early of January after adjusted by using CAPM. There are some studies try to find the explanation of this effect, and one of the most accepted is the tax-loss-selling effect purposed by (Roll 1983). Even though there are evidences of the size anomaly, the argument supporting the EMH noted that the size effect is not actually anomaly, but it represents the risk that cannot be captured by the CAPM beta. Some said the market capitalization might represent the liquidity risk.

For the value effect, there are many multiples represents the value effect such as the earning-to-price ratios, the dividend-to-price ratios and the book-to-market ratios. (Fama and French 1992) advocated the book-to-market effect, in which portfolios of firms with high book-to-market (value firms) have higher returns than portfolios of low book-to-market (glamour firms). As suggest by (Fama and French 1993) and the other arguments supporting the EMH, the market is efficient but this factor represents the risk that cannot be captured by the CAPM beta. Some believe that the BTM factor might represents the financial distress risk.

There are several evidences shows that the CAPM cannot accurately explain such a market anomaly. As the evidence suggested by (Fama and French 1993) and the other arguments supporting the EMH, the market is efficient but the market sensitivity, beta, cannot capture all of feasible risk exposure, so the validity of the CAPM in predicting future returns is questioned. It is also questioned about the underlying assumptions of the CAPM that are too

extreme. Consequently, subsequent researchers have modified the original CAPM and also added some feasible factors to the model. (Fama and French 1993) suggested the addition of the size factor and the book-to-market factor to the original CAPM, and suggested that it can better explain the asset returns. Their three-factor asset pricing model is the most accepted one at present.

Chapter 3 Data

This study investigates the first 100 highest market cap stocks listed on the Stock Exchange of Thailand (SET) extracted from the DATASTREAM database during the period of January 2001 to December 2011 (covering 132 months). In order to fulfill the study objectives, the included stocks must have information about the total return index (*TRI*) of each stock, the market capitalization and the market-to-book value of common stocks. The information required running the Fama and French regression is the market return, denoted by the return of SET index; and the risk free rate, denoted by the one-month Government Treasury Bills (T-bills). The monthly return is computed by using the total return index of stock (*TRI*).

Chapter 4 Methodology

The methodology of this research is mainly applied from the empirical work of (Blitz, Huij et al. 2011), which constructs the zero-cost holding portfolios based on their past performance, which use different measurement according to the type of the specified momentum strategies, followed by examining the performance of each strategy. That is, the pattern to form the zero-cost portfolios is the same as buying the top performance portfolios and selling the worst one. The difference lays in the method each momentum strategy use to measure the past performance. The total return momentum strategy is looking at the total returns and the residual momentum strategy is looking at the residual returns. The zero-cost portfolios are then held for a certain period of time, one, three, six, twelve months. The performance of each portfolio is computed by running the conditional Fama and French

regression.

The total returns momentum strategy

The formation of portfolios mainly follows the (Jegadeesh and Titman 1993) approach, which ranks stocks based on their past return over twelve months, and then hold them for one, three, six and twelve months. The basis notion of using the past twelve-month formation period is because of its popularity.

At the end of each month t, the stocks are ranked from the highest returns to lowest returns based on their average monthly return over past twelve months, which is month t-12 to month t-1. These ranked stocks are then sorted into equally-weighted quintile portfolios. The zero-cost portfolios are formed by buying the top 20% (the highest return or the winner) portfolios and selling the bottom 20% (the lowest return or the loser) portfolios at the closing price of month t. These portfolios are held for K months (one, three, six and twelve months). By constructing portfolios for every consecutive month, the portfolios are overlapped for K-1 months, where K is the holding period. At the end of each holding period, the zero-cost portfolios are closed their positions by selling the winners and buying the losers at the closing price.

The returns on each stock are calculated by using the logarithmic return obtained as follows;

$$R_{i,t} = \ln\left(\frac{TRI_{i,t}}{TRI_{i,t-1}}\right)$$

where $TRI_{i,t}$ denotes the total return index on stock i in month t; and

$TRI_{i,t-1}$ denotes the total return index on stock i in month t-1.

The momentum returns are computed during January 2005 to November 2011.

The residual return momentum strategy

The residual return momentum strategy mainly follows the empirical work of (Blitz, Huij et al. 2011), which ranks stocks based on their residual returns over past twelve-month periods, and then hold them for one, three, six and twelve months. The reason why using the past twelve-month formation period is because of its popularity.

Residual returns used to rank are the residual terms, error terms, obtaining from running the Fama and French three-factor regression as follows:

$$r_{i,t} = \alpha_i + \beta_{1,i} RMRF_t + \beta_{2,i} SMB_t + \beta_{3,i} HML_t + \varepsilon_{i,t}$$

where $r_{i,t}$ denotes the excess return of stock i over the risk-free rate in month t;

$RMRF_t$ denotes the excess return of a market portfolio over the risk-free rate in month t;

SMB_t denotes the excess return of a small-stocks portfolio over a large-stocks portfolio in month t;

HML_t denotes the excess return of a high book-to-market portfolio over a low book-to-market portfolio in month t;

α_i, $\beta_{1,i}$, $\beta_{2,i}$ and $\beta_{3,i}$ denote the coefficients to be determined; and

$\varepsilon_{i,t}$ denotes the residual term of stock i in month t.

The returns on each stock are calculated by using the logarithmic return obtained as follows;

$$R_{i,t} = \ln\left(\frac{TRI_{i,t}}{TRI_{i,t-1}}\right)$$

where $TRI_{i,t}$ denotes the total return index on stock i in month t; and

$TRI_{i,t-1}$ denotes the total return index on stock i in month t-1.

The market return is calculated by using SET index return ($R_{m,t}$) as follows;

$$R_{m,t} = \ln\left(\frac{SETIndex_t}{SETIndex_{t-1}}\right)$$

where $SETIndex_t$ denotes the SET index return in month t; and

$SETIndex_{t-1}$ denotes the SET index return in month t-1.

According to (Blitz, Huij et al. 2011), the residual returns are estimated by employing the past 36-month rolling window approach. The raw return observed over month t-48 to month t-13 is used to run regression against the Fama and French factors to get the residual returns on month t-12. The estimation window is then rolled to be the regression of month t-47 to t-12 to get the residuals returns on month t-11. The estimation windows are rolled over by one month to get the residual returns until those of month t-1. The residual momentum portfolios are formed at month t using the residual returns over the period of month t-12 to t-1, and then are held for a specified holding period, which is one, three, six or twelve months. That is, the total returns during January 2001 to December 2003 are used to estimate the residual returns in the January 2004 and the residual returns during January 2004 to December 2004 are used to form the residual momentum portfolio. The 36-month rolling window is used in order to have sufficient number of observations to estimate the most accurate estimators. Therefore, the analysis is included only stocks that have a complete return history over the 36-month rolling windows.

Note that the analysis does not use the raw residuals but use the standardizing one. According to the work of (Gutierrez and Prinsky 2007), which reported that while the raw residual return might be a noisy estimator, the standardizing one can better reflect firm-specific information; hence, yield an improved measurement. As a result, the residuals deriving from the regression is standardized by their standard deviation over the formation period.

At the end of each month t, the stocks are ranked from the highest residual returns to the lowest residual returns based on their average monthly residual return over past twelve months, which is month t-12 to month t-1. These ranked stocks are then sorted into equally-

weighted quintile portfolios. The zero-cost portfolios are formed by buying the top 20% (the highest residual return or the winner) portfolios and selling the bottom 20% (the lowest residual return or the loser) portfolios at the closing price of month t. These portfolios are held for K months (one, three, six and twelve months). By constructing portfolios for every consecutive month, the portfolios are overlapped for K-1 months, where K is the holding period. At the end of each holding period, the zero-cost portfolios are closed their positions by selling the winners and buying the losers at the closing price.

The performance measurement

Regardless of the method deriving the zero-cost portfolios, all portfolios are held for one, three, six and twelve months depend on what they are allocated. The performance of each strategy is measured by comparing the raw returns, the volatilities (Standard deviation, SD), the Sharpe ratios and the alphas that derived from the conditional Fama and French factors regression as follows:

$$r_{i,t} = \alpha_i + \beta_{1,i} RMRF_t + \beta_{2,i} SMB_t + \beta_{3,i} HML_t + \beta_{4,i} RMRF\_UP_t + \beta_{5,i} SMB\_UP_t + \beta_{6,i} HML\_UP_t + \varepsilon_{i,t}$$

where $RMRF\_UP_t$ denotes the dummy that is equal to the excess return of a market portfolio over the risk-free rate in month t when there is a consecutively positive return on the factor over month t—12 to t—1 and zero otherwise;

SMB_UP_t denotes the dummy that is equal to the excess return of a small-stocks portfolio over a large-stocks portfolio in month t when there is a consecutively positive return on the factor over month t—12 to t—1 and zero otherwise.

HML_UP_t denotes the dummy that is equal to the excess return of a high book-to-market portfolio over a low book-to-market portfolio in month t there is a consecutively positive return on the factor over month t—12 to t—1 and zero otherwise.

According to the work of (Grundy and Martin 2001), the rational of employing the conditional Fama and French model is to account for the dynamic factor exposures of momentum strategies. The conditional regression allows betas to change through time. These betas represent risk exposure. It is well-known that unconditional beta (constant risk exposure) fails to explain anomalies. The reason why using only the UP dummy and do not include the DOWN dummy because there is a perfect multi-collinearity between UP factor and DOWN factor. This is because $UP = 1 - DOWN$.

To test the performance of each strategy, this research aims to test the main performance of the strategy and the consistency of the performance overtime.

Chapter 5 Empirical Results

The empirical results are examined in five parts, the main performance comparing between the total return momentum strategy and the residual momentum strategy and the consistency of the performance overtime.

To be fairly considered the results, this study start investigating the results from January 2005 for the total return momentum portfolio and the residual momentum portfolio have the same set of analysis stock since the residual return need to be estimated using prior data set from January 2001 to December 2003.

Main Results

The main objective of this study is to examine the comparing performance of the residual momentum portfolios and the total return momentum in terms of the raw returns, the volatilities (Standard deviation, SD), the Sharpe ratios and the alphas that derived from the conditional Fama and French factors regression. The main empirical results comparing the performance of the total return momentum and the performance of the residual return momentum from January 2005 to November 2011 are shown in table 1.

Table 1: The performances of the total return momentum and the residual momentum

	Return	Volatility	Sharpe	P(return>0)(%)	Alpha	RMRF	SMB	HML	RMRF_UP	SMB_UP	HML_UP	RSQ
Panel A. Total return momentum												
1M	10.55%	24.15%	0.4368	59.30%	1.16%	-0.4694	0.0089	-0.0178	0.0000	0.0000	0.0000	0.2321
					(1.6971)	(-4.6704)	(0.0473)	(-0.1134)	(0.0000)	(0.0000)	(0.0000)	
3M	4.71%	13.76%	-0.0328	60.47%	0.90%	-0.5681	-0.0476	-0.1469	1.0020	0.0000	3.5491	0.1582
					(1.1824)	(-3.4032)	(-0.1168)	(-0.5778)	(1.8215)	(0.0000)	(1.1920)	
6M	-0.35%	3.06%	-0.5828	55.81%	1.45%	-0.6569	-0.0851	-0.7012	0.7225	8.1678	0.0000	0.0967
					(1.6356)	(-2.6939)	(-0.1532)	(-1.7159)	(1.1121)	(0.5021)	(0.0000)	
12M	-3.52%	6.04%	-0.5828	48.84%	0.22%	0.4800	-0.6434	2.1130	0.3007	-5.5375	-3.4496	0.1585
					(0.1780)	(0.9914)	(-0.7387)	(2.1516)	(0.3592)	(-0.1712)	(-3.4380)	
Panel B. Residual return momentum												
1M	20.35%	12.82%	1.5870	63.95%	1.58%	-0.0337	-0.0345	-0.0115	0.0000	0.0000	0.0000	0.0070
	(1.1152)	(0.2773)			(3.8521)	(-0.5544)	(-0.3036)	(-0.1211)	(0.0000)	(0.0000)	(0.0000)	
3M	15.66%	8.61%	1.7468	74.42%	1.50%	0.0926	0.0543	-0.0140	0.0408	0.0000	2.9149	0.0500
	(1.9262)	(0.3843)			(3.5118)	(0.9826)	(0.2359)	(-0.0975)	(0.1313)	(0.0000)	(1.7350)	
6M	11.32%	1.87%	1.3022	73.26%	1.30%	0.2642	0.2456	0.0774	-0.0069	-9.7940	0.0000	0.0818
	(3.0365)	(0.3703)			(2.7453)	(2.0232)	(0.8253)	(0.3536)	(-0.0198)	(-1.1243)	(0.0000)	
12M	5.15%	3.95%	1.3022	69.77%	1.35%	0.6043	0.0239	-0.0644	-0.6114	-3.1423	0.3288	0.1209
	(4.4698)	(0.4233)			(2.0190)	(2.2989)	(0.0504)	(-0.1207)	(-1.3454)	(-0.1789)	(0.6036)	

Source: This table presents the performance of the total return momentum strategies and the performance of the residual momentum strategies by reporting the average monthly returns, the volatilities, the Sharpe ratios, the alphas, the betas of the Fama and French factors, and the R-squared values. Data used to analyze is all stocks listed on the Stock Exchange of Thailand (SET) extracted from the DATASTREAM database during the period of January 2001 to December 2011 (covering 132 months). The total return momentum portfolios are zero-cost portfolio constructed based on their past ranking returns over twelve months, in which long the top quintile (winners) and short the bottom quintile (losers), and then hold the zero-cost portfolios for one, three, six and twelve months. The residual momentum portfolios are zero-cost portfolio constructed based on their past ranking standardized residual returns over twelve months, in which long the top quintile (winners) and short the bottom quintile (losers), and then hold the zero-cost portfolios for one, three, six and twelve months. The residual returns are estimated using the past 36-month rolling window approach regressing on the Fama and French three factor equation and then standardized by the standard deviation over the formation period. By constructing portfolios for every consecutive month, the portfolios are overlapped for K-1 months, where K is the holding period. At the end of each holding period, the zero-cost portfolios are closed their positions by selling the winners and buying the losers at the closing price. The

performance of the total return momentum strategies and the performance of the residual momentum strategies cover the period of January 2005 to November 2011. Alphas and betas are estimated using the conditional Fama and French factors regression. All values reported in table 1 are monthly values. T-statistics are in parentheses. Panel A shows the performance of the total return momentum, and Panel B shows the performance of the residual return momentum

The results in table 1 show that the raw returns, the volatilities, the Sharpe ratios and the percentage getting positive returns are align with the empirical results of (Blitz, Huij et al. 2011). Raw returns of the residual momentum portfolio are higher than those of the total return momentum portfolio for all holding period. For example, raw return of the one-month holding residual momentum portfolio is 20.35% per year whereas raw returns of one-month holding the total return momentum portfolio is 10.55% per year. Raw returns of the three-month, six-month and twelve-month holding residual momentum portfolios are 15.66%, 11.32% and 5.15%, respectively, while those of the total return momentum portfolios are 4.71%, -0.35% and -3.52%, respectively. The higher raw returns of the residual momentum are affected by the less loss of the residual momentum faced during the economic recession. As expected, the volatilities of the residual momentum portfolio (12.82%, 8.61%, 1.87% and 3.95% for one-month, three-month, six-month and twelve-month holding period respectively) are lower than, even insignificantly examining by F-test, those of the total return momentum portfolio (24.15%, 13.76%, 3.06% and 6.04% for one-month, three-month, six-month and twelve-month holding period respectively). This is because the residual momentum portfolios are assumed to be hedged against the time-varying Fama and French risk factors. As a result of the higher returns and the lower volatilities of the residual momentum, the Sharpe ratios of the residual momentum portfolio are higher than those of the total return momentum portfolio for all holding periods. For example, the Sharpe ratio of the residual momentum portfolio of 1.5870 is higher than the Sharpe ratio of the total return momentum portfolio of 0.4368 for one-month holding period. The residual momentum portfolios are, on average, generate positive return more than the total return momentum portfolios do. This is represented by the higher percentage getting

positive return. The result reflects the better persistency of the residual momentum in generating positive profit than the total return momentum.

The conditional Fama and French regression results are consistent to the empirical results of (Blitz, Huij et al. 2011) in terms of the significantly lower beta coefficient values and the lower R-squared values of the residual momentum compare to those of the total return momentum. The study, however, found the opposite result in terms of the abnormal returns, alpha values. The empirical results of (Blitz, Huij et al. 2011) suggests to observe the significantly higher alpha values of the residual momentum portfolio. This is because the residual momentum portfolio is nearly neutralized to the time-varying factors; thus, it should generate higher abnormal returns after adjusting raw returns to these factors. This study, on the contrast, found that the alpha values of the residual momentum are lower than the alpha values of the total return momentum.

The R-squared values of the total return momentum ranges from 9.67% to 23.21%, which mean that the variances of the total return momentum can be explained by the time-varying Fama and French factors around 9.67% to 23.21%. The R-squared values of the residual momentum range from 0.70% to 12.09%, which mean that the variances of the residual momentum can be explained by the time-varying Fama and French factors around 0.70% to 12.09%. According to the empirical results of (Blitz, Huij et al. 2011), the R-squared values of the residual momentum portfolio are lower than those of the total return momentum portfolio. This evidence support the notion that the residual return can reduce the time-varying exposures of the total return momentum since the time-varying Fama and French factors can less explain the variances of the residual momentum.

The beta coefficient values of the total return momentum have higher magnitude, both negatively and positively, than those of the residual momentum portfolio. These result patterns are also observed in size factor and value factor as predicted by the hypothesis. This indicates that the returns of the total return momentum exposes to these risk factors more than the residual momentum; as a result, the higher volatility of its return should be observed.

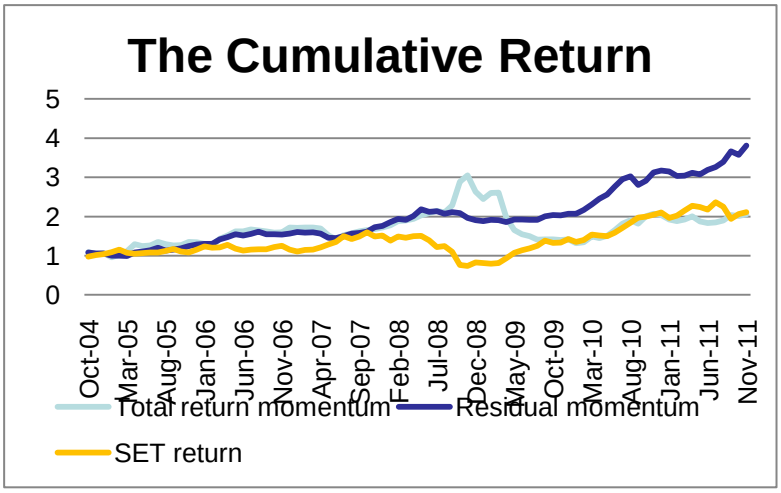
According to the empirical results of (Blitz, Huij et al. 2011), the alpha values, which are returns after adjusted to the Fama and French factors, of the residual momentum are significantly higher than the alpha values of the total return momentum for all holding period. The higher Sharpe ratios of the residual momentum support the evidence of momentum anomaly in the Thai stock market that the markets are weak-form inefficient. This evidence is more obvious than using the total return momentum to explain since the magnitude of the Sharpe ratios of the residual momentum is higher. The results support the gradual-formation-diffusion hypothesis of (Hong and Stein 1999), that firm-specific information diffuses slowly across the market. Therefore, the market underreacts to the firm-specific events more than to common events.

Performance Differences over Time

As documented by (Blitz, Huij et al. 2011), one of the key success of the residual momentum portfolios over the total return portfolios is the persistency of returns over time. To compare the performance of these two strategies, this study examines the cumulative performances and drawdowns of the total return momentum and the residual momentum.

The cumulative return of the total return momentum portfolio and the residual momentum portfolio over time are reported in the figure 2. Portfolios are constructed using monthly return of one-month holding period.

Figure 1: The Cumulative Return



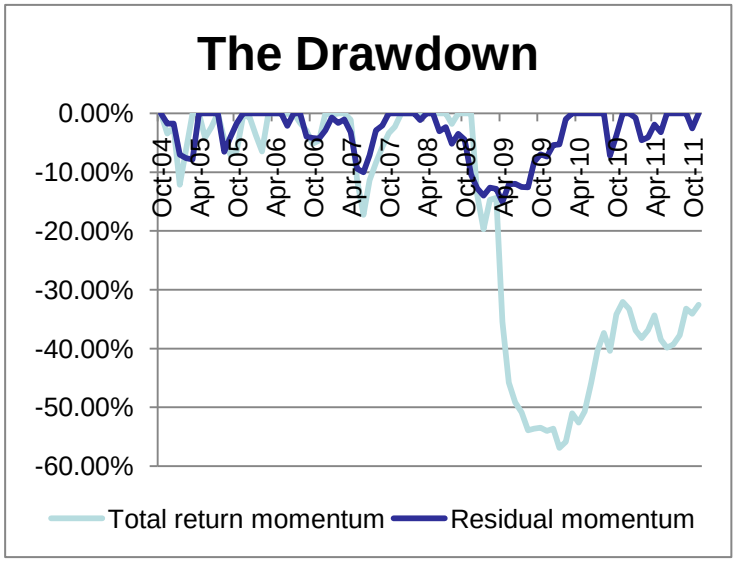
Source: This figure presents the cumulative monthly return of the one-month holding total return momentum portfolio and the one-month holding residual momentum portfolio over time. Data used to analyze is all stocks listed on the Stock Exchange of Thailand (SET) extracted from the DATASTREAM database during the period of January 2001 to December 2011 (covering 132 months). The total return momentum portfolios are zero-cost portfolio constructed based on their past ranking returns over twelve months, in which long the top quintile (winners) and short the bottom quintile (losers), and then hold the zero-cost portfolios for one, three, six and twelve months. The residual momentum portfolios are zero-cost portfolio constructed based on their past ranking standardized residual returns over twelve months, in which long the top quintile (winners) and short the bottom quintile (losers), and then hold the zero-cost portfolios for one, three, six and twelve months. The residual returns are estimated using the past 36-month rolling window approach regressing on the Fama and French three factor equation and then standardized by the standard deviation over the formation period. By constructing portfolios for every consecutive month, the portfolios are overlapped for K-1 months, where K is the holding period. At the end of each holding period, the zero-cost portfolios are closed their positions by selling the winners and buying the losers at the closing price. The cumulative monthly return of the one-month holding total return momentum portfolio and the one-month holding residual momentum portfolio over time cover the period of January 2005 to November 2011.

The graph in figure 1 shows the opposite result as suggested by (Blitz, Huij et al. 2011) in the year 2008. According to the work of (Blitz, Huij et al. 2011), the residual momentum should generate higher cumulative return than the total return momentum for the whole period. That is the cumulative residual return momentum should lie above the cumulative total return momentum. The cumulative return results of this study, however, show the opposite during the period of 2008 that the total return momentum generate higher cumulative return. The results align with the work of (Blitz, Huij et al. 2011) in other periods in which the two line move together, but the residual momentum cumulative return is considerably higher than the total return momentum cumulative return.

This study uses the drawdown to compare the volatilities of the returns of the two momentum portfolios. According to the work of (Blitz, Huij et al. 2011), the drawdown is computed by comparing the cumulative return at that point in time to the all-time high cumulative return which is achieved up to that point in time. The drawdown at time t is calculated as the ratio between the cumulative return of the strategy at time t to the all-time high cumulative return of the strategy up to time t, minus 1. Therefore, at best, the drawdown is 0%, in case the strategy is at an all-time high, and negative otherwise.

The drawdown of the total return momentum portfolio and the residual momentum portfolio over time are reports in the figure 2. Portfolios are constructed using monthly return of one-month holding period.

Figure 2: The Drawdown



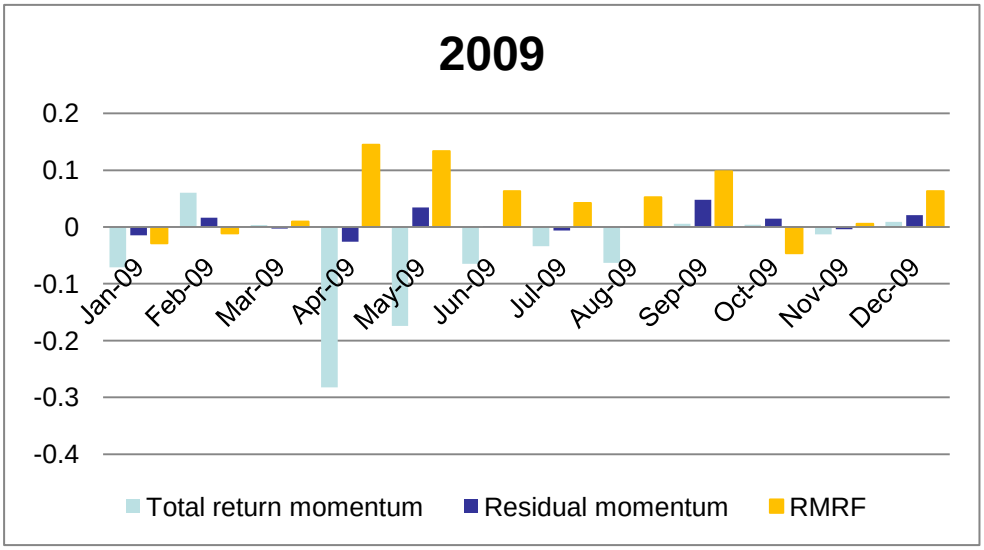
Source: This figure presents the monthly drawdown of the one-month holding total return momentum portfolio and the one-month holding residual momentum portfolio over time. Data used to analyze is all stocks listed on the Stock Exchange of Thailand (SET) extracted from the DATASTREAM database during the period of January 2001 to December 2011 (covering 132 months). The total return momentum portfolios are zero-cost portfolio constructed based on their past ranking returns over twelve months, in which long the top quintile (winners) and short the bottom quintile (losers), and then hold the zero-cost portfolios for one, three, six and twelve months. The residual momentum portfolios are zero-cost portfolio constructed based on their past ranking standardized residual returns over twelve months, in which long the top quintile (winners) and short the bottom quintile (losers), and then hold the zero-cost portfolios for one, three, six and twelve months. The residual returns are estimated using the past 36-month rolling window approach regressing on the Fama and French three factor equation and then standardized by the standard deviation over the formation period. By constructing portfolios for every consecutive month, the portfolios are overlapped for K-1 months, where K is the holding period. At the end of each holding period, the zero-cost portfolios are closed their positions by selling the winners and buying the losers at the closing price. The monthly drawdown of the one-month holding total return momentum portfolio and the one-month holding residual momentum portfolio over time cover the period of January 2005 to November 2011. The drawdown is done by comparing the cumulative return at that point in time to the all-time high cumulative return which is achieved up to that point in time. The drawdown at time t is calculated as the ratio between the cumulative return of the strategy at

time t to the all-time high cumulative return of the strategy up to time t, minus 1. Therefore, at best, the drawdown is 0%, in case the strategy is at an all-time high, and negative otherwise.

According to the empirical results of (Blitz, Huij et al. 2011), the drawdown result of figure 2 shows that the returns of the residual momentum portfolio are more consistent than that of those of the total return momentum portfolio as the graph of the residual momentum is less deviate from 0% than the other one. Figure 2 shows the large drawdown of both momentum portfolios in period of year 2009, however; the magnitude of the residual momentum drawdown is still lower than the total return momentum drawdown. The result of the drawdown supports the hypothesis of (Blitz, Huij et al. 2011) that the residual momentum portfolio consumes less risk than the total return momentum portfolio because the residual momentum considerably less exposes to the time-varying risk factors.

When taking a detail look in the period of the severe economic crisis in Thailand, which is in year 2009 (as defined using the coincident index, Consumer price index (CPI) and Producer price index (PPI)), raw returns of the total return momentum, the residual momentum and the market factor return are represented for each month in a year in figure 3.

Figure 3: The monthly return of the year 2009



Source: This figure represents the monthly return of the one-month holding total return momentum, the one-month holding residual return momentum and the market return in year 1998 and 2009. Data used to analyze is all stocks listed on the Stock Exchange of Thailand (SET) extracted from the DATASTREAM database during the period of January 2001 to December 2011 (covering 132 months). The total return momentum portfolios are zero-cost portfolio constructed based on their past ranking returns over twelve months, in which long the top quintile (winners) and short the bottom quintile (losers), and then hold the zero-cost portfolios for one, three, six and twelve months. The residual momentum portfolios are zero-cost portfolio constructed based on their past ranking standardized residual returns over twelve months, in which long the top quintile (winners) and short the bottom quintile (losers), and then hold the zero-cost portfolios for one, three, six and twelve months. The residual returns are estimated using the past 36-month rolling window approach regressing on the Fama and French risk factors and then standardized by the standard deviation over the formation period. By constructing portfolios for every consecutive month, the portfolios are overlapped for K-1 months, where K is the holding period. At the end of each holding period, the zero-cost portfolios are closed their positions by selling the winners and buying the losers at the closing price.

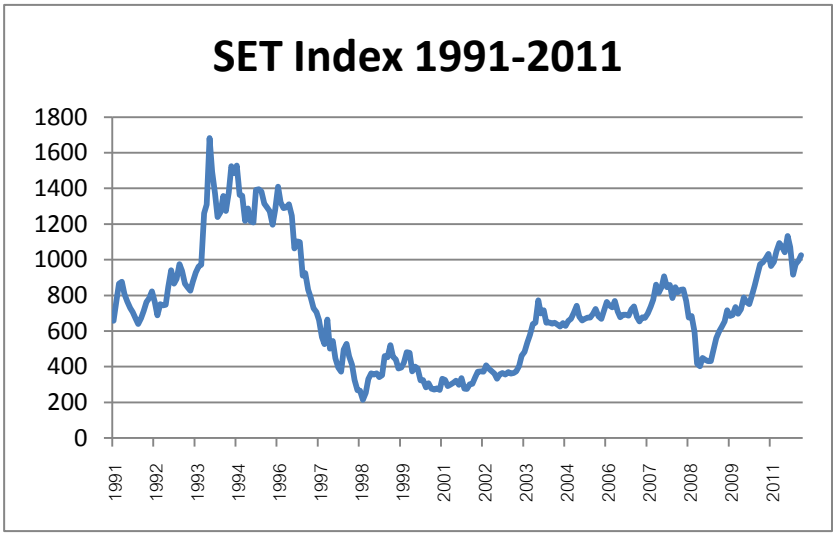
The graph in figure 3 also shows that when there is a market reversal after an economic recession, the losses consumed by the total return momentum are larger than the losses consumed by the residual momentum for some period. For example, after the market reversal in April 2009, the total return momentum generates larger magnitude of negative returns than the residual momentum in April,

May and June 2009, which are -28.47%, -19.16% and -8.38%, respectively for the total return momentum and -2.5%, 3.75% and -0.32%, respectively for the residual momentum. This result supports the hypothesis that the outperformance of the residual momentum over the total return momentum is prominent when there is the strong market reversal after a severe economic crisis. This is because while the total return momentum consumes more exposure to the time-varying Fama and French risk factors, the residual momentum is considerably neutralized in these time-varying risk exposures; as a result, it hurts from the losses less than the total return momentum.

Theoretically, the performance of the residual momentum portfolio should be prominent during the recession period followed by the market reversal, which is the period that the factor returns in the formation period and in the holding period move in the opposite direction. While the returns of the total return momentum portfolio are fluctuate and contingent in these period, the returns of the residual momentum portfolio are more stable as shown in the empirical results of (Blitz, Huij et al. 2011). The rational is simply explained that the residual momentum portfolio is nearly neutral to the dynamic Fama and French exposures since it is considerably hedged against these factors. Consequently, the residual momentum should be less subjected to the business cycle effects. This evidence opposes to the argument of (Chordia and Shivakumar 2002), who suggest that the momentum is one of the price risk factor. The notion of the residual momentum, however, suggest otherwise since the poor performance of the total return momentum during the economic recession occurs because of the reversion of the Fama and French factor returns.

To investigate the crisis, the study defines the period of Thailand's business cycle according to the report of the Thailand business cycle index documented by (Dermtoranin 2010) using the coincident index, Consumer price index (CPI) and Producer price index (PPI), which is developed from the NBER business cycles program. According to this document, economic recessions in Thailand occur during the year 1997 to 1999, Tom Yam Kung Crisis, and 2008 to 2009, which are consistent with the monthly SET index value for a period of January 1991 to December 2011 as shown in figure 5. From the figure 5, it shows large drop in SET index during year 1997 to 1999 and year 2008 to 2009.

Figure 4: The monthly SET index value



Source: The monthly SET index value for a period of January 1991 to December 2011

Chapter 6 Conclusion

According to the work of (Grundy and Martin 2001), the total return momentum strategies of (Jegadeesh and Titman 1993), which ranks past performance using total stock returns, are subjected to time-varying risk exposures to the Fama and French factors, which are the market factor, the size factor and the value factor. They argued that the profitability of the total returns momentum rely heavily on these dynamic-factor returns. Consequently, following the total return momentum strategy could generate the positive returns only if the factor returns in the holding period still hold the same direction as in the formation period, and it hurts the profits if it turns out to be otherwise. To alleviate the sensitivity of the return of the total return momentum to these time-varying factor exposures, (Blitz, Huij et al. 2011) suggested to form zero-cost momentum portfolio using residual returns, which are obtained from the Fama and French regression in the estimation period using 36-month rolling windows approach, to rank past performance instead. The residual momentum is suggested to improve over the total return momentum in terms of decreasing variability of profits, having higher long-run average Sharpe ratios, having better consistency of performance over time. This is because the residual return of each regression represents the stock return that already adjusted to the factor exposures; thus, using this residual term considerably hedges these time-varying risk factors, and better predicts future returns.

Employing the residual momentum in the Stock Exchange of Thailand (SET) using data during January 2001 to December 2011 shows the improvement of the strategy in terms of reducing time-varying risk exposures of the momentum return. The results found that the residual momentum has higher raw return together with lower variability; as a result, has higher Sharpe ratio. The key prominence of the residual momentum is its better performance during economic crisis. The residual momentum portfolio do not face as much losses as the total return momentum portfolio when there is a market reversal after a severe recession because the residual momentum is considerably

neutralized in the time-varying risk exposures. While the total return momentum tends to invest in high exposure stocks, the residual momentum tends to put less weight in high exposure stocks, which result in lower volatility in the residual momentum returns.

The study supports the argument of (Blitz, Huij et al. 2011) that the momentum is not risk factor as suggested by (Chordia and Shivakumar 2002). That is the Thai stock market is inefficient under the weak-form hypothesis which is supported by the evidence of the higher reward-to-risk ratios of the residual momentum; and the momentum effect is caused by the behavior biases of investors. The study supports the gradual-formation-diffusion hypothesis of (Hong and Stein 1999) that the market underreacts to the firm-specific events more than to common events.

To employ the strategy in practice need to consider the transaction costs in such the way that the obtaining return may significantly decrease when taking the transaction costs into account.

Consequently, following the residual momentum strategy in the Thai stock market considerably consumes less risk and earns higher reward-to-risk ratios.

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