UNIVERSITAS INDONESIA

COMPARISON IN MEASURING EFFECTIVENESS OF MOMENTUM AND CONTRARIAN TRADING STRATEGY IN INDONESIAN STOCK EXCHANGE

THESIS

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FACULTY OF ECONOMICS
MAGISTER MANAJEMEN PROGRAM
JAKARTA
JUNI 2010

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Submitted to fulfill one of the requirements to obtain degree of Magister Management

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STATEMENT OF ORIGINALITY

This final paper represents my own effort,
Any idea or excerpt from other writers in this final paper, either in form of publication or in other form of publication, if any, have been acknowledged in this paper in accordance to academic standard or reference procedures

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PREFACE

Alhamdulillah, finally I can finish my thesis writing to fulfill one of requirement to complete my Magister Manajemen degree. Thanks to all people who have helped me in entering this Magister Manajemen, following the learning process, writing final paper and finally ending this program well. I am really thankful to the following people:

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Final words, I hope this thesis benefit people who read it and contribute to the development of our knowledge.

Jakarta, 1 July 2010

Rizky Luxianto

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ABSTRACT

Name :Rizky Luxianto
Study Program :Magister of Management–Master of Business International
Title : **COMPARISON IN MEASURING EFFECTIVENESS OF MOMENTUM AND CONTRARIAN TRADING STRATEGY IN INDONESIAN STOCK EXCHANGE**

This thesis wants to explore the effectiveness of momentum or contrarian strategy in Indonesian Stock Exchange using different methods in measuring the performance. The point of momentum or contrarian strategy is selecting winner (stocks with highest gain) or loser stock (stocks with highest loss) and then buy or sell it depend on the research result. This research using three methods in measuring performance used to select winner and loser stock. The first method is using cross section relative return, the second method is using cross section relative return plus risk component (return divided by standard deviation), and the third method is using historical relative return instead of cross section. The result is that, all of those three methods prove that momentum strategy is effectively applicable for winner stock, so in the next period winner stock will continue to make profit, while for loser stock, it is more effective to use contrarian strategy because in the next period, loser stock will rebound and make profit after suffering from high loss.

Key Words:
momentum strategy, contrarian strategy, behavioral finance, stocks market.

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CHAPTER 1
INTRODUCTION

1.1 Background of the Problem

In perfectly efficient stock market, investor will get what they have expected. But the researchers have found that stock market is not perfectly efficient, that's why investor could get more than expected profit or suffer from unexpected loss. Investor will try to get more than expected profit by studying the market in order to predict the future, so they can grab the positive return and avoid loss.

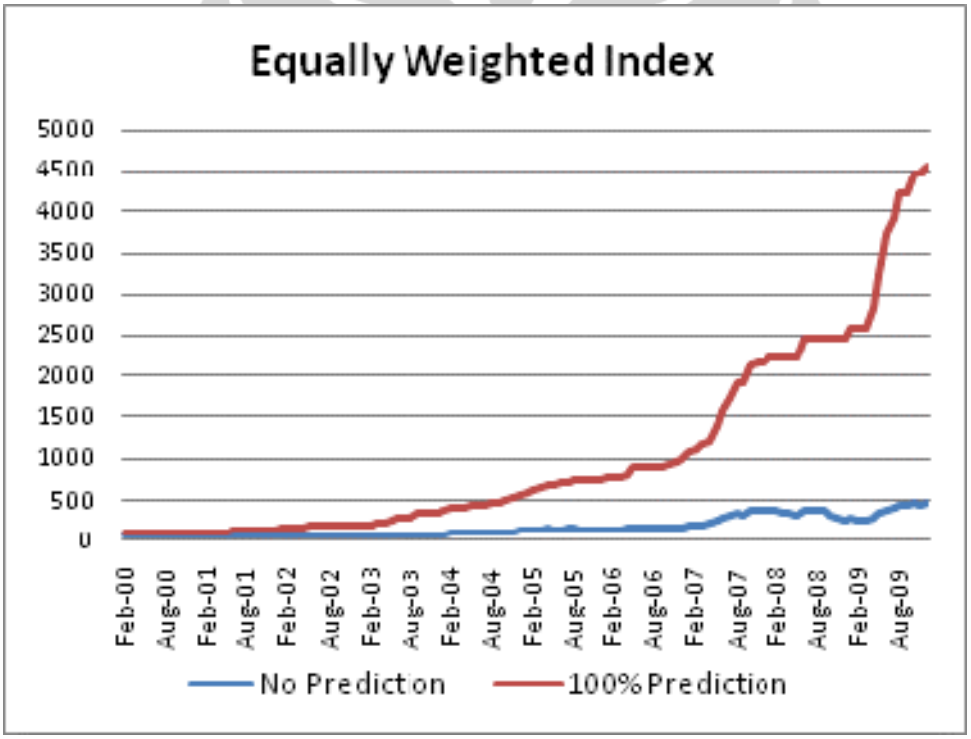

Figure 1.1 Equally Weighted Index without Prediction and 100% Prediction

Source: Data processing

These are the graphs to figure out the power of prediction on leveraging investor return. The first graph is comparing between holding equally weighted market portfolio all time (no prediction, just buy in the first period and hold it to the end) and using prediction with 100% accuracy (avoid all loss in that period). The result is that, from beginning of 2000 to the end of 2009, no prediction index grew from

100 to 479 or 16.96% per year growth, while 100% prediction index grew from 100 to 4,571 or 46.55% per year growth. So in ten years the 100% prediction index will be almost ten times the no prediction index.

But in the real market, no one will be able to make 100% prediction. So The second graph contains the comparison of no prediction index with another index which has 10% accuracy in avoiding loss. The result is that, from beginning of 2000 to the end of 2009, 10% prediction index grew from 100 to 725 or 21.92% per year growth. So in ten years using a prediction with only 10% accuracy will make investor almost twice wealthier than using no prediction at all.

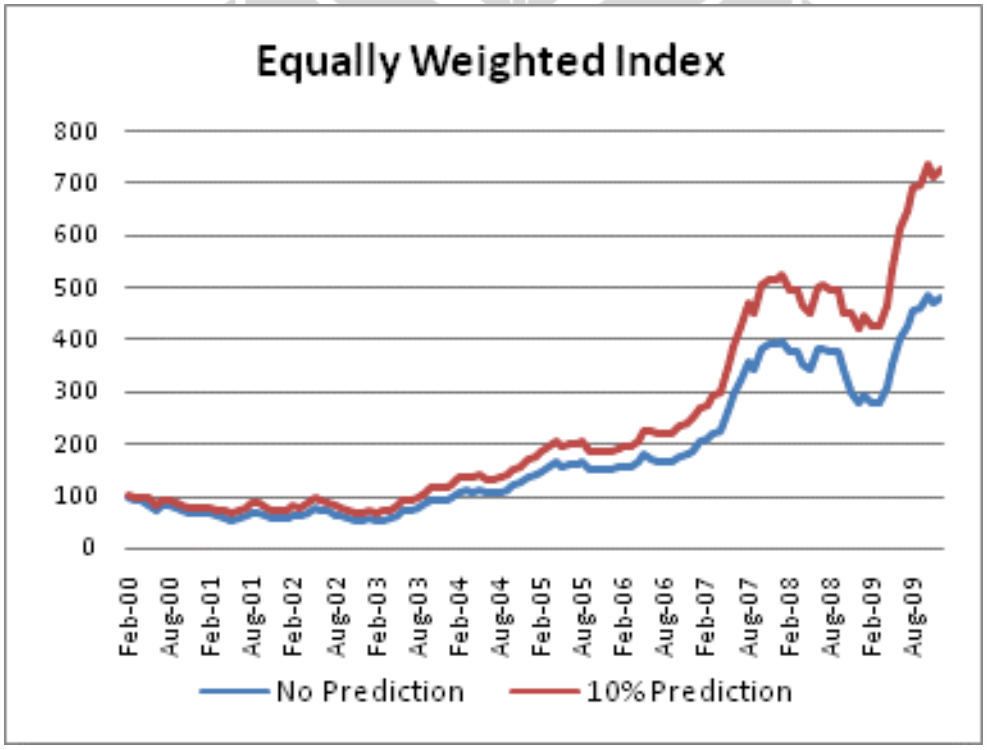

Figure 1.2 Equally Weighted Index without Prediction and 10% Prediction

Source: Data processing

One of the strategies trying to predict the future is momentum strategy or contrarian strategy. Momentum strategy says that winner stock (stock which has high positive return) and loser stock (stock which suffer from high loss) will continue its trend. So in the next period winner stock will continue to make profit, while loser stock will continue to suffer from loses (Jegadeesh and Titman, 1993;

p. 89). In the other hand contrarian strategy says that the trend will be reversed in the next period. So the winner stock will suffer from loses because it has made high gain, while the loser stock will go up in the next period.

The research in the momentum strategy and contrarian strategy will be the same, because its try to see what happen to the winner and loser stock in the next period. If it is proved that the trend is continuing, the conclusion will say that momentum strategy can be used. But, if it is proved that the trend is reversed in the next period, the contrarian strategy will be visible to execute.

Jegadeesh and Titman (1993 p. 89) concluded that strategies that buy past winner and sell past loser realize significant abnormal return. It means stock which is top winner (gain high profit) in one period (3, 6, 9, and 12 month) would continue to make profit, so investors should buy it. While the top loser stock (suffer from high loss) would continue to get loss, so investors should sell it. This kind of strategy—buying top winner and selling top loser, is called momentum strategy.

Lakonishok et al. (1996; p. 1709) and Grundy and Martin (2001; p. 29) continued the research on the US stock market and confirmed that the momentum strategy still could be applied. Other researchers try to apply it out of US stock market. Rouwenhorst (1997 p. 16, 1999 p 1462) concluded that in European stock market, momentum can largely be found. Hart et al. (2003; p. 108) did the research in the 32 emerging countries and confirmed that momentum effect still could be found. Chui, Titman, and Wei (2000 p. 26) confirmed it in asia. There are at least five stock markets is Asia where this phenomenon appeared. Chan et al. (2000; p. 154) did an interesting different approach. Instead of comparing individual stock, they tried to compare market index between national stock market to do country selection. The result was consistent that the momentum effect still could be found. The recent study did by Rastogi et al. (2009; p. 83) and Herberger et al. (2009; p. 3) in Indian and Swiss equity market respectively, and still found momentum profitability.

Contrarian strategy was researched first by De Bondt and Thaler (1985) in US stock market. They concluded that sell winner stock and buy loser stock was profitable. The tendencies of people to overreact to unexpected and dramatics news events was the background of this research De Bondt and Thaler (1985; p. 793). Lakonishok et al. (1994; p. 1575) confirmed this finding in US stock market. Bauman et al.(1999; p. 110) found that overreaction appeared in international market as well. He did the study on Europe, Australasia, Far East, plus Canadian market (Bauman et al., 1999; p. 103). Balvers et al. (2000; p. 745) extended the research on contrarian strategy to 18 countries and found the strong evidence of price reversion. Rastogi et al. (2009; p. 83) confirmed this phenomenon in Indian equity markets. He found the strong overreaction on mid cap stocks, but low overreaction in low and high cap stocks.

In this paper, momentum or contrarian strategy are tried to be applied in Indonesian stock exchange, using three different approaches and then compare the results. The difference in each approach is in determining whether a stock is categorized as top winner or top loser. In the original approach, the way to determine the top winner and top loser is by ranking the return of each stock in one period and take the 10% highest as top winner and 10% lowest as top loser. So actually it is based on relative return compared to others.

That approach has at least two weaknesses that can be identified. First weakness is that it doesn't include risk embedded in each stock. For example stock A has average return 10% and deviation 2.5%. When in one period it makes 15% return, it is top performance because statistically probability of happening is only 5%. While stock B has average return 15% and standard deviation 5%. When in one period it makes 20% return statistically it should be not in the winner condition compared to stock A, because probability of happening is 15%. But if original approach is used, stock B will be winner compared to stock A, because the way it rank is based on return only without considering risk (standard deviation). So this research proposes approach which includes standard deviation.

The second weakness comes from the relativity model. In determining whether it is top performance or top loser it uses relative return. So imagine that the market is down and the highest return is only 5% it will become top winner because it is the highest. So this research suggests another approach which is compare whether it is top performance or top loser with historical performance not with other stocks.

So this paper will measure momentum strategy effectiveness in Indonesian stock exchange using three approaches. First is using original approach which is comparing the return only among all of stock. Second is using original approach plus risk that is embedded in each stock. Third is comparing stock current performance with historical performance not with other stock current performance.

1.2 Problem Statement and Research Question

Indonesian stock exchange is one of emerging stock market in the world. Based on the previous research by Rouwenhorst (1999 p 1462) and Chui, Titman, and Wei (2000 p. 26), momentum strategy could appear in this kind of market. So this paper tries to answer whether those strategies could be applied in this market.

Jegadeesh and Titman (1993 p. 68), Rouwenhorst (1997 p. 3, 1999 p 1449) and Chui, Titman, and Wei (2000 p. 9) used return only as criteria to determine the winner and loser stock. So they rank the stock based on the past return then select the 10% highest rank as winner stock and 10% lowest rank as loser stock. Theoretically, in the stock market, risk return trade-off is always happening. Return will always be associated with risk embedded in the stock. So this paper proposes another method in determining the winner and loser stock for this kind of research by adding risk calculation. This paper tries to prove whether the addition of the risk component will result a different output.

By conducting this research, the following question will be answered:

1. Whether momentum or contrarian trading strategy using cross section relative return as performance measurement can realize significant positive return and outperform market?
2. Whether momentum or contrarian trading strategy using cross section relative return plus risk adjustment (using standard deviation) as performance measurement can realize significant positive return and outperform market?
3. Whether momentum or contrarian trading strategy using historical relative return as performance measurement can realize significant positive return and outperform market?
4. Whether different measurements are resulting different returns?

1.3 Objective of Research

Objectives of this research are:

1. Testing the effectiveness of Momentum or Contrarian Trading Strategy using cross section relative return as performance measurement and compare it with market index.
2. Testing the effectiveness of Momentum or Contrarian Trading Strategy using cross section relative return plus risk adjustment (using standard deviation) as performance measurement and compare it with market index.
3. Testing the effectiveness of Momentum or Contrarian Trading Strategy using historical relative return as performance measurement and compare it with market index.
4. Testing whether different measurements result different returns.

1.4 Limitation of Research

Limitations in this research are:

a. This research only uses one single period from 2000 to 2009, so it will result one conclusion. In the next research, others can split the period became two or more, so they can categorize it into crisis and non-crisis period, or bullish and bearish period, etc.

b. Risk measurement used is only standard deviation. In the next research, other measurement could be included, for example beta systematic risk.
c. This research only measures the effectiveness of momentum and contrarian strategy. In the next research, others can test what variables causing or affecting this strategy.

1.5 Benefit of Research

This research will benefit both, investor and academician. For investor, they will be able to predict the behavior of stock movement better. And those strategies (momentum and contrarian strategy) could give more alternative for investor in selecting stock that they will buy or sell.

For academician, this research can give more reference on momentum and contrarian strategies, especially in Indonesian stock market. It can suggest another method in doing research on those strategies as well by adding risk component.

1.6 Research Methods

This paper uses four tests to achieve the objective of this research:

a. This paper uses individual sample mean t-test to prove the effectiveness of those strategies.
b. This paper uses paired sample t-test to prove whether those strategies can outperform market return.
c. This paper uses one way ANOVA to prove whether those three different methods have different result.
d. This paper uses Pair wise comparison to see from those three different methods which methods have the same result and which methods have different result.

1.7 Systematic of Research Writing

Chapter 1 is about the introduction of the research. It constitutes back ground of the problem, problem statement and research question, objective of research,

limitation of research, benefit of research, research methods, testing hypothesis, and systematic of research writing.

Chapter 2 is about review of literature. It constitutes preface, theory of momentum and contrarian strategies, review of previous research, and some theories in behavioral finance.

Chapter 3 is about research methodology and data. It constitutes preface, data descriptive, research methodology, flowchart of steps in research.

Chapter 4 is about analysis and discussion. It constitutes preface, analysis of problem, and discussion of research finding.

The last chapter (chapter 5) constitutes conclusion of the research and suggestion for the next research.

CHAPTER 2
REVIEW OF LITERATURE

2.1 Preface

This chapter is going to explain some basic theories related to this study. Capital market definition, efficient market hypothesis, investment strategy, and behavioral finance will be briefly explained later on.

After that, some study and theory related to this research are provided. In this section, some study on momentum strategy in US market, European, and Asian stock market will be briefly explained. The result was consistent one another, those three market exhibit momentum effect, except in Japan market.

2.2 Theories will be used

In this section some theories that can help in understanding the study on this topic will be covered. Those theories will include capital market definition, efficient market hypothesis, investment strategies, and behavioral finance in the next part of this section.

2.2.1 Capital Market

a. Capital Market Definition

Based on money and capital market dictionary, capital market is a tangible or intangible market that meets parties who offering and searching long term funding which is longer than one year. The mean of intangible in capital market is the transaction done through over the counter (OTC) mechanism. According to David L. Scoot , capital market is a market for long term funding where common stocks, preferred stocks, and bonds are traded.

b. The Objective of Capital Market

Capital market has important role for the country, because it run two function in the same time, economic function and financial function. Capital market has economic function due to its ability to provide facility that meets two interests, the parties which have excess fund, and the parties which need fund (issuer). The existence of capital market enables parties which has excess fund to invest into the issuers in order to get return. While the issuers, can use those fund to invest on their business without waiting internal funding from its own operation.

Capital market has financial function due to its ability to provide return to investor based on their characteristic. The existence of capital market hopefully can increase economic activity, because it provides firms with various funding alternatives that enable them to operate in a larger scale. When the firms become larger the income of the firms it self and the society will increase as well.

c. Capital Market Instrument

Instruments of capital market are all commercial papers that commonly traded in capital market. They are including notes, commercial papers, bonds, stocks, rights, warrants, or any others instrument that categorized by Bapepam (Indonesia capital market regulator) as tradable. Characteristic of instrument that is traded in capital market is usually long term assets. The most common instrument in this market is stocks and bonds.

2.2.2 Efficient Market Hypothesis

A capital market is efficient if the price of security papers can adjust quickly on any new information. So current security price has reflected all related information about that security (Reilly 2003).

a. Assumption of Efficient Capital Market

There are some assumptions in efficient capital market, which are:

- There are so many traders in the market that want to maximize their profit, analyze, and value security price. Each of them is independent one another.

- New information related to security appear randomly in the market, and the timing of announcement is independent one another.
- Investors who maximize their profit adjust the price quickly to reflect the effect of new information.

b. Importance of Efficient Capital Market

Efficient capital market will erase all practices that ruin capital market mechanism such as fake data and financial information and insider trading, because analyst doing comprehensive analysis will be able to make correction and adjust the effect of the wrong information. In the efficient capital market, investors can not get information that enables them to make return above the market return consistently. Transaction and information cost will be low and the price has shown all the information needed. The manager will work hard and well to build the trust from investors. In the efficient capital market no investor is able to affect the price movement in the market. And efficient capital market will protect small investor from unfair practices.

c. Requirements of Efficient Capital Market

There are four requirements in efficient capital market:

- There is no transaction cost.
- There is no information cost, and any information is accessible by investors.
- There is no barrier to entry neither for firm nor investor.
- There is perfect competition between investor, where the number of investor is so large that no one is able to control the price movement.

d. Some Important Things Related to Efficient Capital Market.

Some important things that need to notice related to efficient capital market are:

- Efficient capital market doesn't require that market price reflect the intrinsic value all time. The deviation is allowable as long as it appear randomly.

- From that random deviation, investor will never be able to consistently find under-valued stocks to make abnormal return.
- The efficient market condition is also determined by the kind of available information in the market (public of private) and its relation to stock price.

2.2.3 Investment Strategy

Investment strategy show how investors behave in managing their investment. There are two strategies that can be used by investor, passive and active strategy.

a. Passive Strategy

This strategy is resulted from the belief of the investor that the market is efficient. So they accept that price of the stock is the best estimator of the value of the stocks. They will also accept the expected return and the risk from calculation of price movement. They will only rely on those two variables (return and risk) without finding a way to get a return above market expectation.

There are two common strategies to implement passive strategy, buy and hold strategy and index fund investment strategy. In buy and hold strategy investors will choose some stocks based on their return and risk profile to buy and hold them for certain periods. The objective of this strategy is to minimize transaction cost. Investors with index fund strategy will invest on index instead of individual or portfolio of stocks. The reason of this strategy is that index is more efficient because it is collection of stocks in the market.

b. Active Strategy

On the other hand, investors with active strategy thing that price doesn't reflect the true value of the stocks. So they actively search under-valued stocks to get abnormal return that exceed market expectation. The reason is that, in the real word the information that reach investor differ each other. So some investor could lose important information related to the stocks.

2.2.4 Behavioral Finance

Behavioral finance is study of investment behavior that based on the belief that investor can not act rationally. The irrational act is including overreact, overconfident, regretting decision, etc. The familiar strategies that exploit this irrational behavior are momentum and contrarian strategy.

Momentum strategy assumes that the investor will be affected by the movement of price. When the price move up they tend to overconfident that they will keep buying the stocks in the future, while when the price move down, they will believe that the price will continue to move down, so they keep selling the stocks.

On the other hand, contrarian strategy assumes that investors have overreacted with the price movement. When the price goes down, they will keep selling the stocks until the price is under-valued. So this kind of stocks should be bought because their real value is more than the price.

2.3 Previous Research

This section will explain three previous researches that have been conducted in momentum strategy topic. There will be research of Jegadeesh and Titman (1993) that become the pioneer in this kind of research. They studied momentum strategy in US stock market. The next research provided was conducted by Rouwenhorst (1997) that do the same research in 12 European Country. The last research in this section was conducted by Chui, Titman, and Wei (2000) that doing research in Asian countries.

2.3.1 Jegadeesh and Titman (1993)

Jegadeesh and Titman want to see whether momentum strategy can be applied effectively in US stock market. They called this strategy as “buying winner and selling loser” strategy. To accomplish their research objective, they evaluated the performance of each stock in US market monthly. There were four period that they used in evaluating stock return, 3 month performance, 6, 9, and 12 month. And then they ranked all stock based on their 3, 6, 9, and 12 month stock return.

From all stock that they had been ranked, they picked up 10% with highest rank as winner stock and formed winner portfolio. They also picked up 10% with lowest rank as loser stock and formed loser portfolio. So there were 8 portfolios that ready to hold, four winner portfolic 8 l on 3, 6, 9, and 12 month performance and four loser portfolio based on the same period performance.

And then they hold those 8 portfolios for 3, 6, 9, and 12 month as well. So in total there were 32 combination of portfolio based on evaluation period, holding period, and winner or loser categories. They did this mechanism monthly, since 1965 to 1989.

After forming those portfolios, they calculated the return of each portfolio monthly. They used individual sample mean t-test to test whether the strategy realize significant return. They also used CAPM to test whether the strategy made abnormal return after systematic risk adjustment.

The result was that, using "buying winner and selling loser" strategy, they can realize significant profit. And those significant profits were not due to systematic risk of the portfolio. The conclusion was that in US stock market, momentum strategy can be applied effectively. So winner stock will continue to make profit and loser stock will continue to suffer from loses.

2.3.2 Rouwenhorst (1997)

Using the same methodology, Rouwenhorst tried to apply Jegadeesh and Titman research out of US stock market. He applied the strategy on 12 European countries. He pooled all of stock in those 12 countries into one big International stock market. Those countries were Austria (60 firms), Belgium (127), Denmark (60), France (427), Germany (228), Italy (223), The Netherlands (101), Norway (71), Spain (111), Sweden (134), Switzerland (154) and the United Kingdom (494). He converted the currency to Deutschmarks (DM) to make them comparable to be processed.

The result was that, the momentum strategy can be applied in the European stock market as well. When he applied it locally on each country stock market the momentum strategy was still exist. It means that the local condition didn't affect the existence of momentum strategy.

The finding related to systematic risk role was similar to Jegadeesh and Titman finding. The systematic risk gave no effect on the existence of momentum strategy. So this was contradiction with the market efficiency theory and asset pricing model that require return to be correlated with its systematic risk.

Rouwenhorst also tried to find out the relation of momentum strategy and the size of the firms. He found that they were negatively related. So momentum effect is higher in the small firms compared to the large firms.

2.3.3 Chui, Titman, and Wei (2000)

In 2000, Chui, Titman, and Wei did momentum strategy research in Asian stock market. Using the same methodology, they studied this momentum phenomenon in eight different Asian countries: Hong Kong, Indonesia, Japan, Korea, Malaysia, Singapore, Taiwan and Thailand. As what Rouwenhorst had done, they also did the research using pooled data that combined all countries into one international stock market and local data that compare the stock between other stocks in the same country.

The result is that in pooled data, momentum effect was not significant. They found that this was because the momentum effect was dominated by Japan. In Japan it self momentum effect was not appear. So they excluded Japan from pooled data. The result was that momentum effect was significant in Asian stock market. But magnitude was lower than the effect in US and European stock market.

When conducting study on local market, they found that momentum effect appeared to be significant in most of countries except Korean and Indonesia. Instead of making profit, momentum strategy made loses in those two countries. While in Japan, the effect is positive but it's not significant.

Related to the size of the firm, they also found the same relation. Small stocks exhibited more momentum than large stocks. They also found that growth stocks exhibited more momentum than value stocks, and high turnover stocks exhibited more momentum than low turnover stocks.

CHAPTER 3
RESEARCH METHODOLOGY AND DATA

3.1 Preface

In this chapter the methodology used to process the data and testing hypothesis in this research will be explained. Four kind of test will be used, which are individual sample mean t-test, paired sample t-test, one way ANOVA, and Pair wise comparison.

Second section of this chapter will describe about the data used in this research. The third section contains testing hypothesis that will be proved. The fourth section will cover the detail of step by step in processing the data. The first part of fourth section is the flowchart of the research and the rest is the detail of the step in this research.

3.2 Data Descriptive

In this research the data used is monthly adjusted closing price data of listed company in Indonesian stock exchange. The selection of adjusted closing price is in order to avoid bias due to stock split or reverse stock and dividend sharing.

The duration is ten years data from January 2000 to December 2009. In January 2000 there are 293 companies in the list, while in December 2000 there are 379 companies. This research doesn't require that companies must be listed from the beginning to the ending period. So all the company data available is used without excluding any companies who were listed after January 2000.

3.3 Testing Hypothesis

Below are the hypotheses that will be tested in this research:

a. Momentum or Contrarian Trading Strategy Using Cross Section Relative Return as Performance Measurement Could be Implemented Effectively. (h0 is rejected and h1 is accepted)

   h0 : R1 = 0

h1 : R1 ≠ 0

b. Momentum or Contrarian Trading Strategy Using Cross Section Relative Return as Performance Measurement Results Higher Return Than Market Index. (h0 is rejected and h1 is accepted)

   h0 : R1 – Rm = 0

   h1 : R1 – Rm ≠ 0

c. Momentum or Contrarian Trading Strategy Using Cross Section Relative Return Plus Risk Adjustment (Using Standard Deviation) as Performance Measurement Could be Implemented Effectively. (h0 is rejected and h1 is accepted)

   h0 : R2 = 0

   h1 : R2 ≠ 0

d. Momentum or Contrarian Trading Strategy Using Cross Section Relative Return Plus Risk Adjustment (Using Standard Deviation) as Performance Measurement Results Higher Return Than Market Index. (h0 is rejected and h1 is accepted)

   h0 : R2 – Rm = 0

   h1 : R2 – Rm ≠ 0

e. Momentum or Contrarian Trading Strategy Using Historical Relative Return as Performance Measurement Could be Implemented Effectively. (h0 is rejected and h1 is accepted)

   h0 : R3 = 0

   h1 : R3 ≠ 0

f. Momentum or Contrarian Trading Strategy Using Historical Relative Return as Performance Measurement Results Higher Return Than Market Index. (h0 is rejected and h1 is accepted)

   h0 : R3 – Rm = 0

   h1 : R3 – Rm ≠ 0

g. Different Measurements are Resulting Different Returns. (h0 is rejected and h1 is accepted)

   h0 : R1 = R2 = R3

   h1 : R1 ≠ R2 ≠ R3

3.4 Research Methodology

In this section, steps in conducting this research and some tests that will be used to confirm the hypothesis above will be explained.

3.4.1 Flowchart of the Research

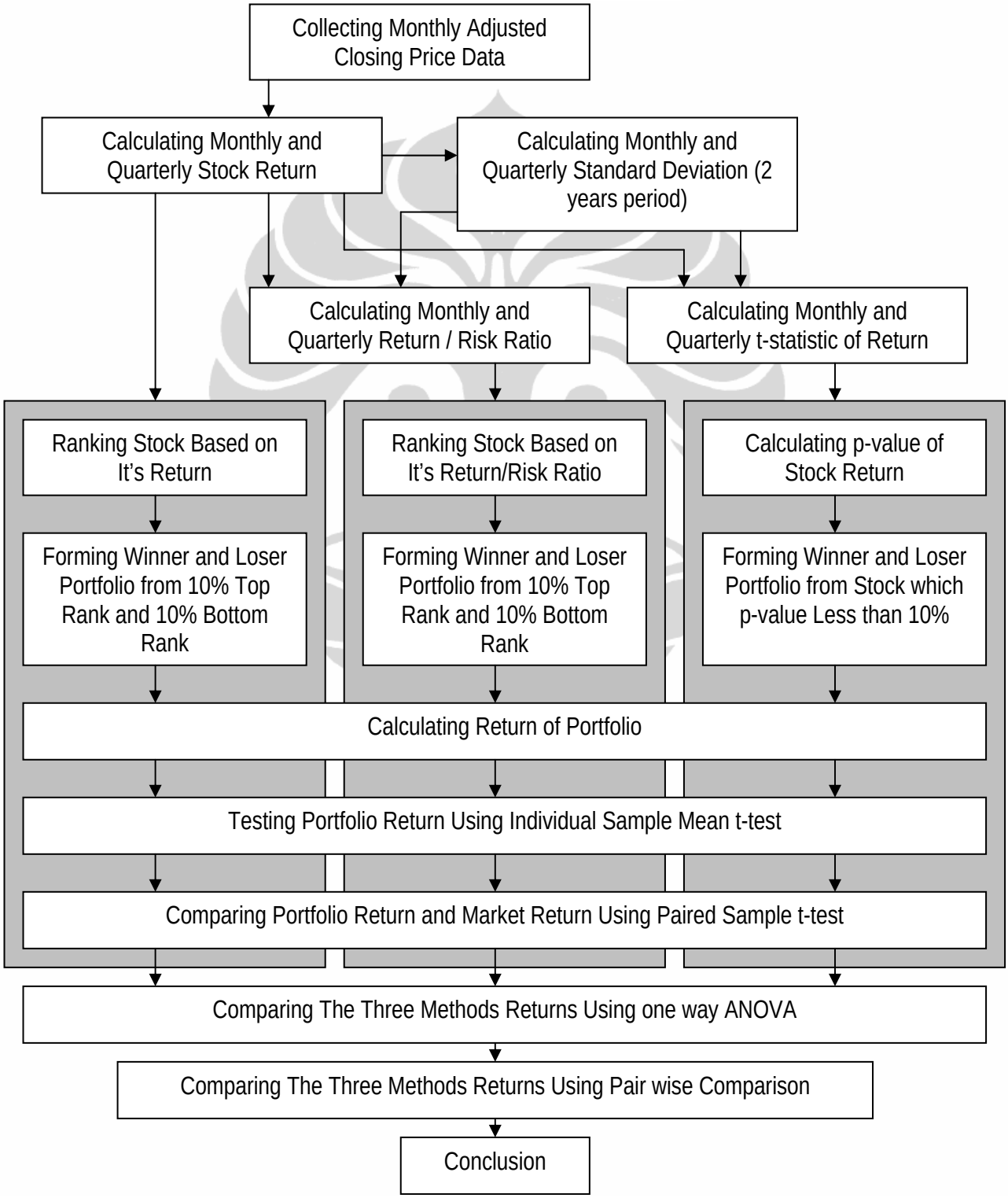

Figure 3.1 Flowchart of the Research

3.4.2 Calculating Monthly and Quarterly Stock Return

For evaluation period, one month and three month are used. The calculation of monthly and quarterly return is needed. To calculate them the following formula is used (Ross, 2001; p. 356):

$$R_{it} = \frac{P_{it}}{P_{it-1}} - 1 \qquad (3.1)$$

Where

R_{it} = Return of Stock *i* at time t.

P_{it} = Price of Stock *i* at time t.

$P_{it\text{-}1}$ = Price of Stock *i* at time t - 1.

3.4.3 Calculating Monthly and Quarterly Standard Deviation

To calculate monthly and quarterly standard deviation the following formula is used (Berenson, et al., 2006; p. 84):

$$S_{it} = \sqrt{\frac{\sum_{n=0}^{23}\left(R_{it-n} - \overline{R_{it}}\right)^2}{24-1}} \qquad (3.2)$$

Where

S_{it} = Standard Deviation of Stock *i* Return at time t (for 2 Years Period).

$R_{it\text{-}n}$ = Return of Stock *i* at time t - n.

$\overline{R_{it}}$ = Mean Return of Stock *i* at time t (for 2 Years Period).

3.4.4 Calculating Monthly and Quarterly Return/Risk Ratio

To calculate monthly and quarterly return/risk ratio the following formula is used:

$$RR_{it} = \frac{R_{it}}{S_{it}} \qquad (3.3)$$

Where

RR_{it} = Return / Risk Ratio of Stock *i* at time t.

R_{it} = Return of Stock *i* at time t.

S_{it} = Standard Deviation of Stock *i* Return at time t (for 2 Years Period).

3.4.5 Calculating Monthly and Quarterly t-statistic of Return

To calculate monthly and quarterly t-statistic of return the following formula is used (Berenson, et al., 2006; p. 266):

$$t_{it} = \frac{R_{it} - \overline{R}_{it}}{S_{it} / \sqrt{24}} \tag{3.4}$$

Where

t_{it} = t-statistic of Stock *i* at time t.

R_{it} = Return of Stock *i* at time t.

$\overline{R}_{it}$ = Mean Return of Stock *i* at time t (for 2 Years Period).

S_{it} = Standard Deviation of Stock *i* Return at time t (for 2 Years Period).

3.4.6 Forming Portfolio Using Method I.

In the first method, cross section relative return as performance measurement is used. So the rank of monthly and quarterly return of the stock are needed monthly. Every month, each stock has its own rank according to its own monthly and quarterly return.

From these rank of return, winner and loser portfolio are formed. Every month, the top 10% rank and 10% lowest rank are taken as winner portfolio and as loser portfolio respectively. Then they are hold for a month or three month. So there will be 8 combinations of portfolio, 4 portfolio of winner stock and 4 portfolio of loser stock.

Four combinations of each winner and loser stock come from the combination of evaluation period and holding period. As noted earlier in 3.4.1 section, 1 month and 3 month evaluation period are used and the same period for holding the portfolio are used as well. So there will be 1_1 portfolio (portfolio that come from 1 month evaluation and will be hold for 1 month), 1_3 portfolio (portfolio that come from 1 month evaluation and will be hold for 3 month), 3_1 portfolio (portfolio that come from 3 month evaluation period and will be hold for 1 month),

and 3_3 portfolio (portfolio that come from 3 month evaluation and will be hold for 3 month as well).

3.4.7 Forming Portfolio Using Method II.

In the second method, cross section relative return plus risk component as performance measurement is used. So instead of sorting the return of monthly and quarterly stock return, the return/risk ratio of stock is shorted monthly. Every month there will be rank of each stock based on its return/risk ratio.

Top 10% rank of monthly return/risk ratio is taken, then it is hold for a month to form 1_1 winner portfolio, and hold for three month to get 1_3 winner portfolio. Top 10% rank of quarterly return/risk ratio is also taken, then is hold for a month to get 3_1 winner portfolio, and hold for three month to get 3_3 winner portfolio.

The same steps are used for loser portfolio. The 10% lowest rank of monthly or quarterly stock return/risk ratio is taken, and then is hold for a month and three month. So for loser stocks there will be 4 portfolios as well, 1_1, 1_3, 3_1, and 3_3 portfolio.

3.4.8 Forming Portfolio Using Method III.

In the last method, a quite different way is used to determine winner and loser stock. In the two previous methods, performance of each stock is compared with other stock in the market, but in the last method it is compared with its own historical performance.

The method of comparison is different as well. In the previous method rank of each stock is used, but for historical comparison it's difficult to use the same way (ranking). Ranking method needs a lot of data that easily available in two previous method. In cross section comparison there are hundreds stock data to be compared but in historical comparison there are only 24 data (2 years or 24 months) to be compared. So instead of ranking method, t-statistic of return is used in historical comparison.

From t-statistic value that has been calculated before, its p-value, the tail probability of its t-student distribution, can be found. Every month stocks that have positive return with p-value less then 10% are taken as winner stocks and hold for one and three month. While, stocks that have negative return with p-value less then 10% will be the loser stocks. So, same with the two previous methods there will be 8 portfolio, 1_1, 1_3, 3_1, and 3_3 winner portfolio, and 1_1, 1_3, 3_1, and 3_3 loser portfolio.

3.4.9 Calculating Return of Portfolio.

Return of portfolio is calculated in monthly basis. Equally weighted return is used to find return of portfolio. It means that each stock in portfolio has the same proportion or contribution on the return of portfolio. The following formula is used to calculate return of portfolio (Ross, 2001; p. 386):

$$Rp_t = \sum_{i=1}^{n} R_{it} w_{it} \tag{3.5}$$

Where

Rp_t = Return of Portfolio at time t.

R_{it} = Return of Stock *i* at time t.

w_{it} = Weight of Stock *i* at time t.

But as noted earlier, equally weighted return is used to calculate portfolio return. So the formula above could be replaced by the simpler formula below:

$$Rp_t = \frac{\sum_{i=1}^{n} R_{it}}{n} \tag{3.6}$$

Where

Rp_t = Return of Portfolio at time t.

R_{it} = Return of Stock *i* at time t.

n = Number of Stock in Portfolio.

3.4.10 Testing Portfolio Return Using Individual Sample Mean t-test.

After calculating return of all portfolios, the hypothesis that strategies used to form those portfolios are effective needs to be tested. In other words the test of whether the returns of those portfolios are significant (either positive or negative) is needed. Individual sample mean t-test is used to prove the hypothesis. There are few steps to conduct the individual sample mean t-test:

a. Formulate hypothesis of the test.

   Test of whether the return of portfolio is significant (either positive or negative) is needed. So the testing hypothesis will be:

$$Ho : Rp_0 = 0$$
$$Hi : Rp_0 \neq 0 \qquad (3.7)$$

   Where

   Rp_0= Mean Return of Portfolio.

   If *Ho* is accepted then the mean return of portfolio is equal to 0. It means that the return is not significant, and the hypothesis that momentum or contrarian strategy is effective is not proven. If *Ho* is rejected, or in the other words *Hi* is accepted, then the return is statistically significant and the hypothesis that the strategy is effective is proven.

b. Determine the acceptance and rejection area.

   From the hypothesis above, it can be inferred that it is two tail t-test. So the acceptance area can be figured out as the graph below:

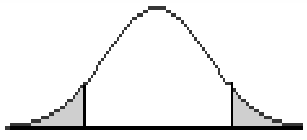

Figure 3.2 Two Tails t-test

Source: Berenson, et al., 2006; p. 310

The acceptance area (*Ho*) is the white area in the graph. On the other hand, the rejection area (*Hi*) is the grey area in the left and right of the graph.

This research use maximum 10% error level. Given two tail t-test, the error level need to be divided by two. So, in each side there is 5% rejection area. If the *p-value* resulted from the test is more then 5% then *Ho* is accepted, but if it is less then 5% then *Ho* is rejected.

c. Calculating t-statistic

To calculate t-statistic, mean return of portfolio and its standard deviation need to be calculated first. The following formula is used to calculate return of portfolio:

$$Rp = \frac{\sum_{t=1}^{n} Rp_t}{n} \tag{3.8}$$

Where

Rp = Mean Return of Portfolio.

Rp_t = Return of Portfolio at time t.

n = Number of periods in observation.

Standard deviation of portfolio return can be calculated using following formula (Berenson, et al., 2006; p. 84):

$$Sp = \sqrt{\frac{\sum_{t=1}^{n} \left(Rp_t - Rp\right)^2}{n-1}} \tag{3.9}$$

Where

Sp = Standard Deviation of Return of Portfolio.

Rp = Mean Return of Portfolio.

Rp_t = Return of Portfolio at time t.

n = Number of periods in observation.

After calculating return and standard deviation of portfolio return then, t-statistic of mean return can be calculated using the following formula (Berenson, et al., 2006; p. 266):

$$t = \frac{Rp - Rp_0}{Sp/\sqrt{n}} \quad (3.10)$$

Where

t = t-statistic of Portfolio Return.

Rp = Mean Return of Portfolio.

Rp_0= Testing Hypothesis of Mean Return of Portfolio.

Sp = Standard Deviation of Return of Portfolio.

n = Number of periods in observation.

The last thing that needs to do is finding *p-value* of the test. *p-value* can be found from t-student distribution table. t-statistic from the calculation above is needed and degree of freedom (*df*) as well (Berenson, et al., 2006; 266).

$$df = n - 1 \quad (3.11)$$

Where

df = Degree of Freedom.

n = Number of periods in observation.

d. Determine whether the hypothesis is accepted or rejected

After finding *p-value,* it can be compared with error level that has been determined in the second step. In this test, the error level that has been determined is 10% with two tail t-test. So if *p-value* is more than 5% then the *Ho* is accepted, but if *p-value* is less than 5% then the *Ho* is rejected.

In total there are 24 portfolios that need to be tested using this individual sample mean t-test. There are three methods in this research, and in each method there are two categories of portfolio (winner and loser), and in each category there are four

combination of portfolio (1_1, 1_3, 3_1, and 3_3). So there are 3 x 2 x 4 equal to 24 portfolios.

3.4.11 Compare Portfolio Return and Market Return Using Paired Sample t-test.

After testing hypothesis that the strategy can be effectively implemented, other hypothesis need to be proven. It is hypothesis that the strategy can outperform market. The first thing needs to be calculated is market return. Equally weighted market return is used instead of value weighted market return (as used to calculate Jakarta Composite Index), in order to make it comparable to portfolios in this research which calculated using equally weighted. The following formula is used to calculate market return.

$$Rm_t = \frac{\sum_{i=1}^{n} R_{it}}{n} \tag{3.12}$$

Where

Rm_t = Market Return at time t.

R_{it} = Return of Stock *i* at time t.

n = Number of Stocks in the Market.

After calculating market return, paired sample t-test can be conducted using the following steps:

a. Formulate hypothesis of the test.

   Whether the difference between return of portfolio and market return is significant (either positive or negative) is need to be tested. So the testing hypothesis will be:

$$Ho : d_0 \leq 0$$
$$Hi : d_0 > 0 \tag{3.13}$$

   Where

   d_0 = Mean Difference between Return of Portfolio and Market Return.

   If *Ho* is accepted then the mean difference between return of portfolio and market return is equal to 0. It means that the return of portfolio is

the same with market return. It means, the hypothesis that momentum or contrarian strategy can outperform market is not proven. If *Ho* is rejected, or in the other words *Hi* is accepted, then the difference in return is positive and statistically significant, so the hypothesis that the strategy can outperform market is proven.

b. Determine the acceptance and rejection area.

From the hypothesis above, it can be inferred that it is one tail t-test. So the acceptance area can be figured out as the graph below:

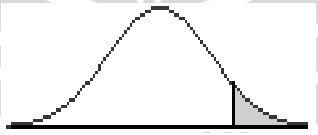

Figure 3.3 One Tail t-test

Source: Berenson, et al., 2006; p. 316

The white area in the graph is the acceptance area (*Ho*). On the other hand, the grey area in the right of the graph is the rejection area (*Hi*).

This research use maximum 10% error level. Given one tail t-test, the error level doesn't need to be divided by two. If the *p-value* resulted from the test is more then 10% then *Ho* is accepted, but if it is less then 10% then *Ho* is rejected.

c. Calculating t-statistic

To calculate t-statistic, the mean difference between return of portfolio and market return and its standard deviation need to be calculated. The following formula is used to calculate mean difference of return:

$$d = \frac{\sum_{t=1}^{n} Rp_t - Rm_t}{n} \qquad (3.14)$$

Where

d = Mean Difference between Return of Portfolio and Market Return.

Rp_t = Return of Portfolio at time t.

Rm_t = Market Return at time t.

n = Number of periods in observation.

Standard deviation of portfolio difference return can be calculated using following formula (Berenson, et al., 2006; p. 362):

$$Sd = \sqrt{\frac{\sum_{t=1}^{n}\left(Rp_t - Rm_t - d\right)^2}{n-1}} \quad (3.15)$$

Where

Sd = Standard Deviation of Difference Return.

d = Mean Difference between Return of Portfolio and Market Return.

Rp_t = Return of Portfolio at time t.

Rm_t = Market Return at time t.

n = Number of periods in observation.

After calculating return and standard deviation of difference return, t-statistic of mean return wan be calculated using the following formula (Berenson, et al., 2006; p. 362):

$$t = \frac{d - d_0}{Sd/\sqrt{n}} \quad (3.16)$$

Where

t = t-statistic of Difference Return.

d = Mean Difference between Return of Portfolio and Market Return

d_0 = Testing Hypothesis of Mean Difference Return.

Sd = Standard Deviation of Difference Return.

n = Number of periods in observation.

The last thing, *p-value* of the test needs to be calculated. *P-value* can be found from t-student distribution table. T-statistic from the calculation above is needed and degree of freedom (*df*) as well (Berenson, et al., 2006; p. 360).

$$df = n - 1 \tag{3.17}$$

Where

df = Degree of Freedom.

n = Number of periods in observation.

d. Determine whether the hypothesis is accepted or rejected

After finding *p-value,* it must be compared with error level from the second step. In this test, 10% error level with one tail t-test is determined. So if *p-value* is more than 10% then the *Ho* is accepted, but if *p-value* is less than 10% then the *Ho* is rejected.

3.4.12 Comparing The Three Methods Return Using One Way ANOVA

In this section, the method to test the last hypothesis will be explained. One way ANOVA is used to test whether the hypothesis that the three methods will realize different return is proven. One way ANOVA is selected due to the comparison is between more than two variables in one time.

Hypothesis that used in one way ANOVA test is:

$$Ho : Rp_1 = Rp_2 = Rp_3$$
$$Hi : Rp_1 \neq Rp_2 \neq Rp_3 \tag{3.18}$$

Where

Rp_1 = Mean Return of Portfolio Using First Method.

Rp_2 = Mean Return of Portfolio Using Second Method.

Rp_3 = Mean Return of Portfolio Using Third Method.

If *p-value* of F-statistic is more than 10% then *Ho* is accepted and the hypothesis that those three methods realize different return is unproven. But if *p-value* of F-statistic is less than 10% then *Ho* is rejected and the conclusion is that those three methods statistically realize significant different return.

3.4.13 Comparing The Three Methods Return Using Pair wise Comparison

Using one way ANOVA, the answer of whether those three methods realize different return can be answered. But it can't answer which of them are the same, and which of them are different, or it could be that all of those three methods are different. So pair wise comparison is needed in testing difference between those three methods. By using pair wise comparison each pair of methods can be compared, so which of them are the same and which of them are different can be evaluated.

In comparing each pair of the methods, paired sample t-test in section 3.4.11 is used. The testing hypotheses for this test are:

a. Comparing First Method and Second Method

$$Ho : Rp_1 - Rp_2 = 0$$
$$Hi : Rp_1 - Rp_2 \neq 0 \quad (3.19)$$

Where

Rp_1 = Mean Return of Portfolio Using First Method.

Rp_2 = Mean Return of Portfolio Using Second Method.

b. Comparing First Method and Third Method

$$Ho : Rp_1 - Rp_3 = 0$$
$$Hi : Rp_1 - Rp_3 \neq 0 \quad (3.20)$$

Where

Rp_1 = Mean Return of Portfolio Using First Method.

Rp_3 = Mean Return of Portfolio Using Third Method.

c. Comparing Second Method and Third Method

$$Ho : Rp_2 - Rp_3 = 0$$
$$Hi : Rp_2 - Rp_3 \neq 0 \quad (3.21)$$

Where

Rp_2 = Mean Return of Portfolio Using Second Method.

Rp_3 = Mean Return of Portfolio Using Third Method.

CHAPTER 4
ANALYSIS AND DISCUSSION

4.1 Preface

The result of the test concludes that in Indonesia both strategy can be applied. Momentum strategy can be applied to the winner portfolio, but for loser portfolio contrarian strategy should be used. Because based on the result, winner portfolio will continue its trend to make profit, while loser portfolio will rebound and make profit in the next period.

Different methods applied on this research result only slightly different output. Because the profit of the winner portfolio and the loss of the loser portfolio is too high, that make risk component added only give a little effect.

Second section of this chapter (4.2) will provide the test result of effectiveness of momentum or contrarian trading strategy using cross section return as performance measurement, while the third section (4.3) will try to compare it with the market. The fourth (4.4) and five (4.5) section provide the same analysis but for different methods. In those sections, the result of using cross section relative return plus risk adjustment (using standard deviation) as performance measurement is explained. While in sixth (4.6) and seventh (4.7) section the result of the third method, using historical relative return as performance measurement compared to market is provided. In the eighth section (4.8), comparison of the result of those three methods using one way ANNOVA and Pair wise comparison is shown. The last section (4.9) will contain discussion of the research findings.

4.2 Analysis of Effectiveness of Momentum or Contrarian Trading Strategy Using Cross Section Relative Return as Performance Measurement.

In this section is aimed prove the hypothesis that momentum or contrarian trading strategy using cross section relative return as performance measurement can be applied effectively. So test of the return of portfolio using individual sample mean

t-test is conducted. If the return is significantly positive (or negative) then the momentum or contrarian strategy is proven as effective trading strategy.

For winner stock if the result is positive then the effective strategy will be momentum strategy, but if the result is negative then the effective strategy will be contrarian strategy. In the other hand, for loser stock if the result is positive then the effective strategy will be contrarian strategy, but if the result is negative then the effective strategy will be momentum strategy.

Test in the winner stock portfolio (table 4.1) shows, that momentum trading strategy can be applied effectively. The output shows that in the next period, winner portfolio will make profit. The t-statistic shows that those positive returns are significant at 1% and 5% level.

Table 4.1 Return of Winner Portfolio Using Cross Section Relative Return as Performance Measurement

Return of Winner Portfolio			Holding Period	
			1 Month	3 Month
Evaluation Period	1 Month	return	0.0234**	0.0310***
		t-stat	2.5394	3.7110
		p-value	0.0127	0.0003
	3 Month	return	0.0327***	0.0275***
		t-stat	3.3794	3.2004
		p-value	0.0011	0.0019

*** Significant at α=1%

** Significant at α=5%

* Significant at α=10%

Source: Data processing

Table 4.1 said that when 1 month winner portfolio is hold for 1 month, it will realize 2.34% return per month significantly but if it is hold for 3 month it will realize higher return which is 3.10% per month significantly as well. On the other hand, if 3 month winner portfolio is hold for 3 month it will result lower then if it is hold only 1 month which are 3.27% and 2.75% respectively. It means that the winner stock in shorter period (1 month) will make higher profit if it is hold in

longer period (3 month). But winner stock in longer period must be hold shorter. It means that the cycle of high gain is about 3 month. If the evaluation and holding period shorter (1 month evaluation and 1 month holding period), the gain will still increase but it can increase more if the holding period is longer. But if it is hold and evaluate longer (3 month evaluation and 3 month holding period), the gain has decreased.

For loser portfolio, strategy that can be applied effectively is contrarian trading strategy. The output (table 4.2) said that in the next period, loser portfolio will make profit. The t-statistic shows that all of those positive returns are significant at 1%.

Table 4.2 Return of Loser Portfolio Using Cross Section Relative Return as Performance Measurement

Return of Loser Portfolio			Holding Period	
			1 Month	3 Month
Evaluation Period	1 Month	return	0.0570***	0.0417***
		t-stat	6.2153	5.2225
		p-value	0.0000	0.0000
	3 Month	return	0.0476***	0.0401***
		t-stat	5.1059	4.4276
		p-value	0.0000	0.0000

*** Significant at α=1%

** Significant at α=5%

* Significant at α=10%

Source: Data processing

Table 4.2 shows the result of loser portfolio. Returns of 1 month loser portfolio hold for 1 month and 3 month are 5.70% and 4.17% per month respectively. They are significant at α=1%. The result of the longer evaluation period shows the same condition. When 3 month winner portfolio is hold for 3 month it will also realize lower then when it is hold only 1 month which are 4.01% and 4.76% respectively. It means that the loser stock whether in shorter or longer period will rebound quickly (in 1 month). If it is hold longer the rebound effect will decrease and the average return will be lower as well.

4.3 Analysis of Comparison between Momentum or Contrarian Trading Strategy Using Cross Section Relative Return as Performance Measurement and Market Index.

In this section, the result from previous section will be compared with market return. The test is intended to see whether the hypothesis that momentum or contrarian trading strategy using cross section relative return as performance measurement can outperform market return is proven. Paired sample t-test is used to do the comparison. If the result of difference in return is positive and significant then it is concluded that the momentum or contrarian strategy can outperform market return.

After comparing the return of winner portfolio with market return, it is concluded that overall, winner portfolio can not outperform market significantly. Only 1_3 (1 month evaluation and 3 month holding period) portfolio can outperforms market significantly at 10% level. On the contrary, 1_1 portfolio gives less return than market. (see table 4.3)

Table 4.3 Return of Winner Portfolio Compared to Market Using Cross Section Relative Return as Performance Measurement

Return of Winner Portfolio minus Return Market			Holding Period	
			1 Month	3 Month
Evaluation Period	1 Month	return	-0.0007	0.0069*
		t-stat	-0.1366	1.9675
		p-value	0.8916	0.0521
	3 Month	return	0.0086	0.0034
		t-stat	1.4849	0.7631
		p-value	0.1409	0.4473

*** Significant at α=1%

** Significant at α=5%

* Significant at α=10%

Source: Data processing

Return of 1_1 portfolio is 0.07% below market return, while 1_3, 3_1, and 3_3 portfolio are 0.69%, 0.86% and 0.34% higher then market. Statistically it is said

that winner portfolio returns are the same with market return. But in practice, when portfolio is formed using those strategies, the result is quite interesting. Investment simulation is started with 100 point in beginning of 2002 for all portfolio and market portfolio as well. At the end of 2009 value of market portfolio become 693.13 while 1_3 portfolio 1,201.96 and 3_1 portfolio 1,213.75. So, 0.69% and 0.86% differences can make almost twice result at the end.

Table 4.4 Beginning and Ending Value of Investment Simulation of Winner Portfolio Using Cross Section Relative Return as Performance Measurement

Portfolio Value	Market	1_1	1_3	3_1	3_3
Beginning 2002	100.00	100.00	100.00	100.00	100.00
Ending 2009	693.13	584.14	1,201.96	1,213.75	833.35

Source: Data processing

Even though 1_1 portfolio result lower than market return but in practice it also gives benefit to investor. The reason is that to form the real market portfolio, investor need to set aside huge funds because he has to buy 379 stocks. While, if he used momentum strategy and buy 1_1 portfolio, he will need about one tenth of the funds, because he only need to buy 37 stocks instead of 379 stocks. It will be preferable for investor because given quite the same return and risk he need significantly less money.

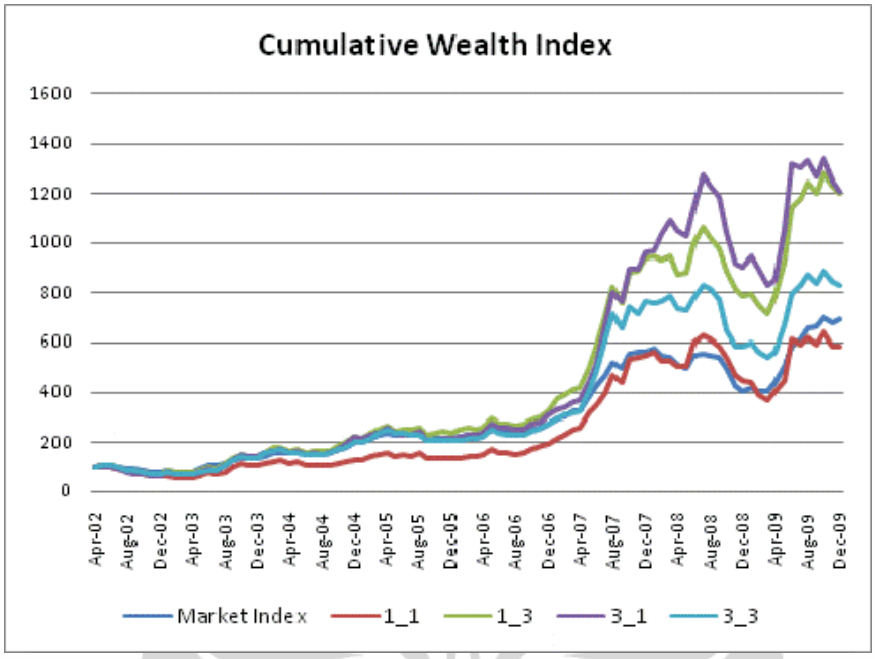

Figure 4.1 Graph of Investment Simulation Value of Winner Portfolio Using Cross Section Relative Return as Performance Measurement

Source: Data processing

For loser portfolio, it is found that the difference in return with market portfolio is positive. From the output (table 4.5), it is concluded that all loser portfolios can always outperform market significantly. It is shown from p-value that all of them are significant at 1% level.

Table 4.5 Return of Loser Portfolio Compared to Market Using Cross Section Relative Return as Performance Measurement

Return of Loser Portfolio minus Return Market			Holding Period	
			1 Month	3 Month
Evaluation Period	1 Month	return	0.0330***	0.0177***
		t-stat	6.1321	5.5245
		p-value	0.0000	0.0000
	3 Month	return	0.0235***	0.0160***
		t-stat	4.5644	3.6447
		p-value	0.0000	0.0004

*** Significant at α=1%

** Significant at α=5%

* Significant at α=10%

Source: Data processing

Return of 1_1 portfolio is 3.3% below market return, while 3_1, 1_3, and 3_3 portfolio are 2.35%, 1.77% and 1.60% higher then market. Statistically it is said that winner portfolio returns are higher than market return. When portfolio is formed using those strategy, the result is amazing. The investment simulation is started with 100 point in beginning of 2002 for all portfolio and market portfolio as well. At the end of 2009 value of market portfolio become 693.13 while 1_1 portfolio 11,049.00, 3_1 portfolio 4,384.28, 1_3 portfolio 3,150.98, and 3_3 portfolio 2,419.87. So in 8 years, investment value will grow 110 times the beginning value.

Table 4.6 Beginning and Ending Value of Investment Simulation of Loser Portfolio Using Cross Section Relative Return as Performance Measurement

Portfolio Value	Market	1_1	1_3	3_1	3_3
Beginning 2002	100.00	100.00	100.00	100.00	100.00
Ending 2009	693.13	11,049.00	3,150.98	4,384.28	2,419.87

Source: Data processing

From the pattern of the simulation investment value in the graph below, it is shown that the high return is resulted from the associated high risk. When the market value is increase the loser portfolio value is increase higher. But when market is decrease, loser portfolio will result worse decrease as shown in August 2008 to April 2009 period.

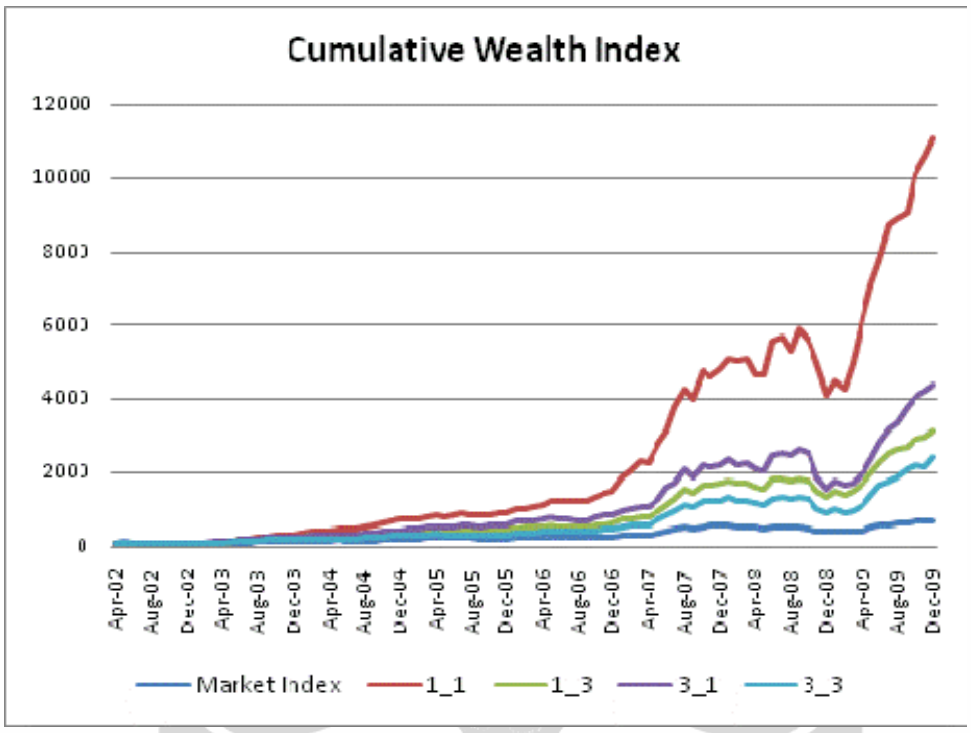

Figure 4.2 Graph of Investment Simulation Value of Loser Portfolio Using Cross Section Relative Return as Performance Measurement

Source: Data processing

4.4 Analysis of Effectiveness of Momentum or Contrarian Trading Strategy Using Cross Section Relative Return Plus Risk Adjustment (Using Standard Deviation) as Performance Measurement.

In this section, instead of using cross section relative return as performance measurement, cross section relative return plus risk adjustment (using standard deviation) is used. The hypothesis said that this method will realize positive significant return as well. So, individual sample mean t-test is applied to check whether the hypothesis is proven.

For winner portfolio, it is found that momentum trading strategy can be applied effectively. From the output, it is concluded that in the next period, winner portfolio will make profit. The t-statistic shows that all of those combinations of evaluation and holding period result positive significant returns at 1% level.

Table 4.7 Return of Winner Portfolio Using Cross Section Relative Return Plus Risk Adjustment (Using Standard Deviation) as Performance Measurement

Return of Winner Portfolio			Holding Period	
			1 Month	3 Month
Evaluation Period	1 Month	return	0.0231***	0.0296***
		t-stat	2.6980	3.8117
		p-value	0.0083	0.0002
	3 Month	return	0.0302***	0.0301***
		t-stat	3.3600	3.7026
		p-value	0.0011	0.0004

*** Significant at α=1%

** Significant at α=5%

* Significant at α=10%

Source: Data processing

From the table above it is shown that when 1 month winner portfolio is hold for 1 month it will realize 2.31% return per month significantly but if it is hold for 3 month it will realize higher return which is 2.96% per month significantly as well. Different with previous method (using return only), when the evaluation period is 3 month there is no different whether it is hold for a month or 3 month, it result quite the same 3.02% and 3.01% respectively. It means that in the longer period using second method will result more stable return. The explanation is that, when risk component is included in evaluating winner portfolio it will realize the winner stock which has lower risk compared to the previous method. So it is possible to get higher profit in the longer period for its stability or low risk.

For loser portfolio, instead of applying momentum strategy it is found that applying contrarian trading strategy is more effective. It is shown from the table that in the next period, loser portfolio will make profit. The t-statistic shows that all of those positive returns are significant at 1%.

Table 4.8 Return of Loser Portfolio Using Cross Section Relative Return Plus Risk Adjustment (Using Standard Deviation) as Performance Measurement

Return of Loser Portfolio			Holding Period	
			1 Month	3 Month
Evaluation Period	1 Month	return	0.0564***	0.0400***
		t-stat	6.7937	5.8997
		p-value	0.0000	0.0000
	3 Month	return	0.0522***	0.0404***
		t-stat	6.5969	5.5317
		p-value	0.0000	0.0000

*** Significant at α=1%

** Significant at α=5%

* Significant at α=10%

Source: Data processing

From the table above it is shown that when 1 month loser portfolio is hold for 1 month it will realize 5.64% return per month significantly but if it is hold for 3 month it will realize lower return which is 4.00% per month significantly as well. On the longer evaluation period the result show the same. If 3 month winner portfolio is hold for 3 month it will also realize lower then if it is hold only 1 month which are 4.04% and 5.22% respectively. It means that the loser stock whether in shorter or longer period will rebound quickly (in 1 month). If it is hold longer the rebound effect will decrease and the average return will be lower as well.

4.5 Analysis of Comparison between Momentum or Contrarian Trading Strategy Using Cross Section Relative Return Plus Risk Adjustment (Using Standard Deviation) as Performance Measurement and Market Index.

In this section, the hypothesis that this strategy can outperform market will be tested. Paired sample t-test is used to prove whether the difference between return of this strategy and market return is positive and significant.

From the output in table 4.9, It is shown that on overall the difference return is not positively significant. Only 1_3 (1 month evaluation and 3 month holding period)

portfolio can realize higher significant profit than the market at 10% level. Unfortunately, 1_1 portfolio gives less return than market instead.

Table 4.9 Return of Winner Portfolio Compared to Market Using Cross Section Relative Return Plus Risk Adjustment (Using Standard Deviation) as Performance Measurement

Return of Winner Portfolio minus Return Market			Holding Period	
			1 Month	3 Month
Evaluation Period	1 Month	return	-0.0009	0.0056*
		t-stat	-0.1935	1.7358
		p-value	0.8470	0.0859
	3 Month	return	0.0065	0.0063
		t-stat	1.1991	1.4982
		p-value	0.2336	0.1375

*** Significant at α=1%

** Significant at α=5%

* Significant at α=10%

Source: Data processing

The difference between 1_1 portfolio return and market return is -0.09%. It means that it is below market return. While 1_3, 3_1, and 3_3 portfolio realize 0.56%, 0.65% and 0.63% more return then market. So statistically it can't be concluded that the strategy can outperform market. Same with previous approach, simulation is conducted by forming portfolio using those strategies. The result is at the end of 2009 value of market portfolio become 693.13 while 1_3 portfolio 1,107.51, 3_1 portfolio 1,051.24 and 3_3 portfolio 1,103.71. So the second approach makes the result more stable.

Table 4.10 Beginning and Ending Value of Investment Simulation of Winner Portfolio Using Cross Section Relative Return Plus Risk Adjustment (Using Standard Deviation) as Performance Measurement

Portfolio Value	Market	1_1	1_3	3_1	3_3
Beginning 2002	100.00	100.00	100.00	100.00	100.00
Ending 2009	693.13	550.94	1,107.51	1,051.24	1,103.71

Source: Data processing

From the graph below, it can be seen that almost all portfolio result better return than market, except 1_1 portfolio. They move in the same direction with market but the value is higher. When market makes return they make higher return but when market suffer from loss they also hit by higher loss.

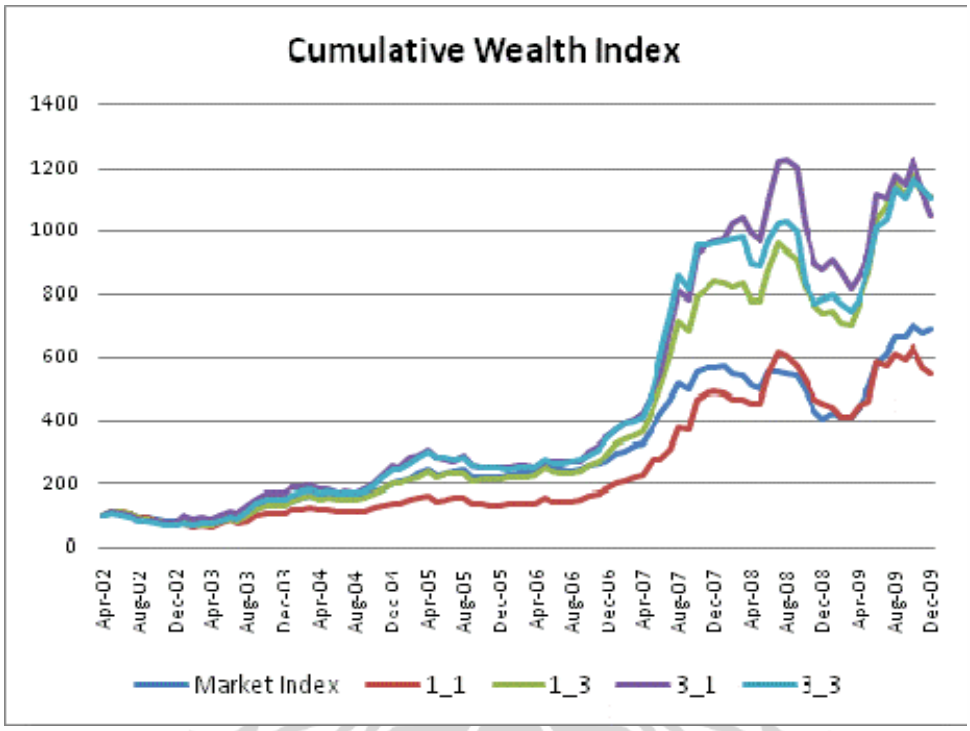

Figure 4.3 Graph of Investment Simulation Value of Winner Portfolio Using Cross Section Relative Return Plus Risk Adjustment (Using Standard Deviation) as Performance Measurement

Source: Data processing

After comparing the return of loser portfolio with return of market, it is concluded from table 4.11 that all loser portfolios can always outperform market significantly. The difference between portfolio return and market return is always positive and significant at 1% level.

Table 4.11 Return of Loser Portfolio Compared to Market Using Cross Section Relative Return Plus Risk Adjustment (Using Standard Deviation) as Performance Measurement

Return of Loser Portfolio minus Return Market			Holding Period	
			1 Month	3 Month
Evaluation Period	1 Month	return	0.0324***	0.0160***
		t-stat	6.5200	6.1908
		p-value	0.0000	0.0000
	3 Month	return	0.0285***	0.0167***
		t-stat	5.8598	4.7951
		p-value	0.0000	0.0000

*** Significant at α=1%

** Significant at α=5%

* Significant at α=10%

Source: Data processing

Return of 1_1 portfolio is 3.24% below market return, while 3_1, 1_3, and 3_3 portfolio are 2.85%, 1.60% and 1.67% higher then market. The differences of return are so high that when portfolio is formed using those strategy, the result is terrific. In the investment simulation, it is found that from 100 point in beginning of 2002 to the end of 2009 value of market portfolio grew become 693.13, while 1_1 portfolio 11,585.2, 3_1 portfolio 7,936.11, 1_3 portfolio 2,919.82, and 3_3 portfolio 2,878.66. So in 8 years, investment value will grow 115 times the beginning value. The interesting result is 3_1 portfolio which value is 7,936.11 at the end of the period. Compared to the previous approach which result 4,384.28 it is almost double. The analysis is that, when risk component is added, it will realize stock which less standard deviation, so when those stock deviate from their average return (suffer from loss) it will rebound more quickly.

Table 4.12 Beginning and Ending Value of Investment Simulation of Loser Portfolio Using Cross Section Relative Return Plus Risk Adjustment (Using Standard Deviation) as Performance Measurement

Portfolio Value	Market	1_1	1_3	3_1	3_3
Beginning 2002	100.00	100.00	100.00	100.00	100.00
Ending 2009	693.13	11,585.24	2,919.82	7,936.11	2,878.66

Source: Data processing

From the pattern of the simulation investment value in the graph below, it can be shown that holding period have important effect. The portfolio with 3 month holding period result almost the same. While the portfolio with 1 month holding period make higher ending. It can be concluded from the graph that stocks that suffer from the lost in one month will recover more quickly then the stock that suffer from the lost in three month. But in the longer period (three month) their recovery rates quite the same.

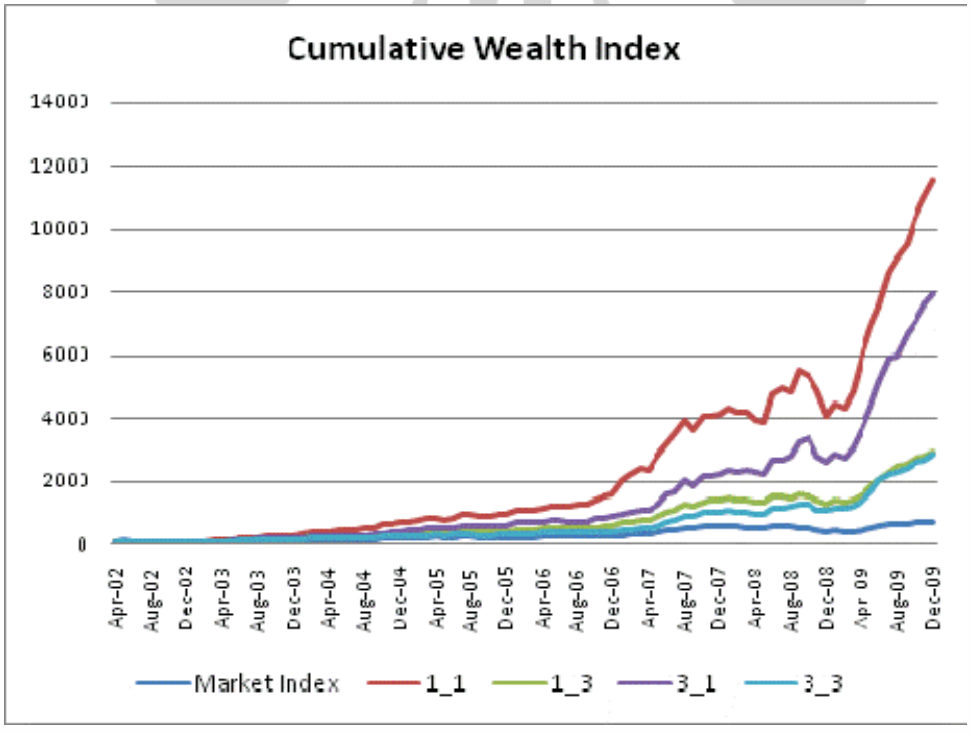

Figure 4.4 Graph of Investment Simulation Value of Loser Portfolio Using Cross Section Relative Return Plus Risk Adjustment (Using Standard Deviation) as Performance Measurement

Source: Data processing

4.6 Analysis of Effectiveness of Momentum or Contrarian Trading Strategy Using Historical Relative Return as Performance Measurement.

In this section the hypothesis on the last method is going to be tested. Instead of using cross section relative return, historical relative return as performance measurement is used in determining winner and loser stock. The test will be conducted to see whether using this performance measurement, momentum or contrarian strategy still can be applied effectively. Same with previous methods, individual sample mean t-test is applied to prove the hypothesis.

For winner portfolio, it is concluded that in the next period, winner portfolio will still make profit. So momentum trading strategy can be applied effectively. From the output (table 4.13) he t-statistic shows that all of those combinations of evaluation and holding period result positive significant returns at 1% level.

The return of 1_1 portfolio is 2.39% per month, while 3_1, 1_3, and 3_3 portfolio are 2.57%, 2.91%, and 2.55%. Overall, it is lower than the result of the first approach. But the interesting think is that the risk of those portfolios is lower. It is shown that even the return is lower but the significant level is higher. So, the treatment in the third approach by using historical relative return instead of cross section will decrease the risk but unfortunately the return as well (risk return trade off).

Table 4.13 Return of Winner Portfolio Using Historical Relative Return as Performance Measurement

Return of Winner Portfolio			Holding Period	
			1 Month	3 Month
Evaluation Period	1 Month	return	0.0239***	0.0291***
		t-stat	3.0760	4.0568
		p-value	0.0027	0.0001
	3 Month	return	0.0257***	0.0255***
		t-stat	3.4843	3.6224
		p-value	0.0008	0.0005

*** Significant at α=1%

** Significant at α=5%

* Significant at α=10%

Source: Data processing

For loser portfolio, same with two previous methods, it is found that contrarian trading strategy can be applied effectively instead of momentum strategy. It is shown from the output that in the next period, loser portfolio will make profit and statistically they are significant at 1%.

Table 4.14 Return of Loser Portfolio Using Historical Relative Return as Performance Measurement

Return of Loser Portfolio			Holding Period	
			1 Month	3 Month
Evaluation Period	1 Month	return	0.0396***	0.0331***
		t-stat	4.9889	4.4393
		p-value	0.0000	0.0000
	3 Month	return	0.0397***	0.0333***
		t-stat	4.9975	4.4794
		p-value	0.0000	0.0000

*** Significant at α=1%

** Significant at α=5%

* Significant at α=10%

Source: Data processing

The loser portfolio returns from this approach are 3.96%, 3.97%, 3.31% and 3.33% for 1_1, 3_1, 1_3, and 3_3 portfolio respectively. The interesting thing is

that when it is hold for the same period the result will be the same whether the evaluation period is one or three month. So evaluation period doesn't matter while holding period does matter.

4.7 Analysis of Comparison between Momentum or Contrarian Trading Strategy Using Historical Relative Return as Performance Measurement and Market Index.

In this section, the return of portfolio using historical relative return with the market return will be compared as well. The hypothesis is that the portfolio return will be able to outperform market return. To get the conclusion, paired sample t-test is run.

The test result (table 4.15) said that winner portfolio can not outperform market significantly. Only 1_3 (1 month evaluation and 3 month holding period) portfolio can outperforms market significantly at 1% level. This is interesting because the previous two methods can outperform market only at 10% level.

Table 4.15 Return of Winner Portfolio Compared to Market Using Historical Relative Return as Performance Measurement

Return of Winner Portfolio minus Return Market			Holding Period	
			1 Month	3 Month
Evaluation Period	1 Month	return	-0.0001	0.0051***
		t-stat	-0.0481	2.7196
		p-value	0.9617	0.0078
	3 Month	return	0.0019	0.0018
		t-stat	0.7684	0.8118
		p-value	0.4442	0.4190

*** Significant at α=1%

** Significant at α=5%

* Significant at α=10%

Source: Data processing

1_1 portfolio return is 0.001% below market return, while 1_3, 3_1, and 3_3 portfolio are 0.51%, 0.19% and 0.18% higher then market. Statistically it is said

that winner portfolio returns are the same with market return. But differ from the first approach, this approach is quite impractical, because the number of stock that included in the portfolio is changing over time. So it possible that in one period the number of stock in one portfolio is 5 but in other period is 100, while in the previous the number of stock in each portfolio is always 37.

Table 4.16 Beginning and Ending Value of Investment Simulation of Winner Portfolio Using Historical Relative Return as Performance Measurement

Portfolio Value	Market	1_1	1_3	3_1	3_3
Beginning 2002	100.00	100.00	100.00	100.00	100.00
Ending 2009	693.13	632.21	1,047.33	782.91	788.38

Source: Data processing

The ending result of investment simulation using this approach is, they are quite the same with market result except for 1_3 portfolio. But the main advantage to investor is its low risk compared to others. The graph confirms this low risk by showing almost the same move all over period.

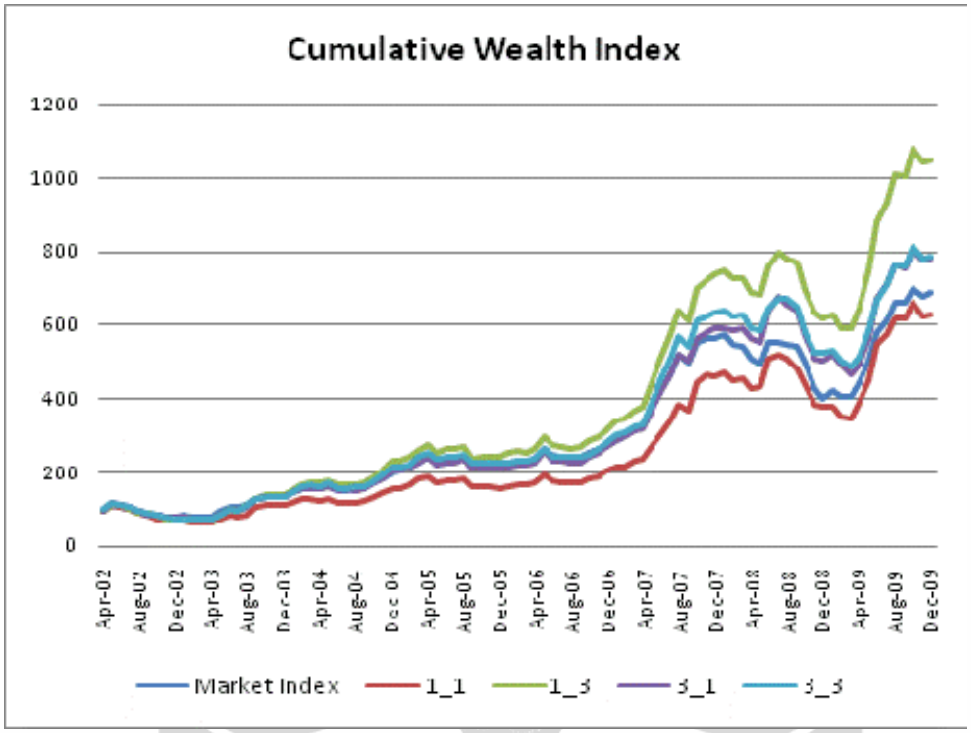

Figure 4.5 Graph of Investment Simulation Value of Winner Portfolio Using Historical Relative Return as Performance Measurement

Source: Data processing

After comparing of the loser portfolio with return of market, it is concluded that all loser portfolios can always outperform market significantly. All of them are significant at 1% level.

Table 4.17 Return of Loser Portfolio Using Historical Relative Return as Performance Measurement Compared To Market

Return of Loser Portfolio minus Return Market			Holding Period	
			1 Month	3 Month
Evaluation Period	1 Month	return	0.0155***	0.0091***
		t-stat	4.6078	4.5574
		p-value	0.0000	0.0000
	3 Month	return	0.0160***	0.0096***
		t-stat	4.3507	3.9221
		p-value	0.0000	0.0002

*** Significant at α=1%

** Significant at α=5%

* Significant at α=10%

Source: Data processing

Given the lower risk the result of loser portfolio is not as amazing as the two previous approaches. 1_1 portfolio results 2,521.20 at the end of period while 1_3, 3_1, and 3_3 result 1,419.84, 2,710.56 and 1,566.34 respectively. It is interesting to see that 3_1 portfolio ending value is higher than 1_1 portfolio which is not happening in the two previous approaches. The explanation is that 1_1 portfolio is highly risky portfolio. Using the third approach the high risk is effectively reduce that is why the return is reduced as well.

Table 4.18 Beginning and Ending Value of Investment Simulation of Loser Portfolio Using Historical Relative Return as Performance Measurement

Portfolio Value	Market	1_1	1_3	3_1	3_3
Beginning 2002	100.00	100.00	100.00	100.00	100.00
Ending 2009	693.13	2,521.20	1,419.84	2,710.56	1,566.34

Source: Data processing

From the graph It is shown that the risk is neutralized. The movement of portfolio seems the same. The one month holding period portfolios are in one line whether it is evaluated in one or three months. So evaluation period isn't matter in this third approach whether the investor holds it in one month or three month.

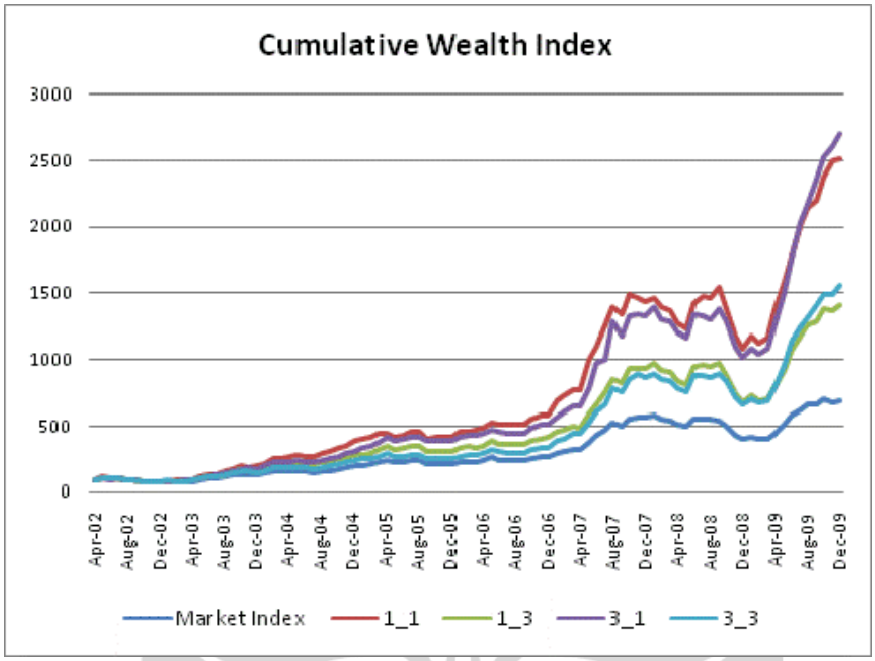

Figure 4.6 Graph of Investment Simulation Value of Loser Portfolio Using Historical Relative Return as Performance Measurement

Source: Data processing

4.8 Analysis of Comparison between the Three Methods.

In this section, the result of those three methods will be compared. The hypothesis is that those three methods will realize different return. To prove this hypothesis two kind of test one way ANOVA and Pair wise comparison are used. One way ANOVA is used to compare those three methods in the same time. While, Pair wise comparison is used to see which methods result the same return and which methods result different return.

Using one way ANOVA to compare return of those three methods, it is found that statistically there is no significant difference of each method. P-values of the test are more than 85%. It means that for winner portfolio those three methods give almost the same result. Comparing 1_1, 1_3, 3_1, and 3_3 portfolio, it is found that 3_1 portfolio is resulting higher difference than others. So, pair wise comparison is conducted for 3_1 portfolio, to know whether there is difference between two methods.

Table 4.19 Result of One Way ANOVA Test on Winner Portfolio

Winner Portfolio			Holding Period	
			1 Month	3 Month
Evaluation Period	1 Month	F stat	0.003	0.021
		p-value	0.997	0.979
	3 Month	F stat	0.163	0.080
		p-value	0.850	0.923

*** Significant at α=1%

** Significant at α=5%

* Significant at α=10%

Source: Data processing

From pair wise comparison, it is found that approach 1 and approach 3 differ more than other. It shows 16.7% level of significance. On average approach 1 give 0.7% higher return than approach 3. It could be caused by the lower risk of approach 3 (see the explanation of approach 3 above). So approach 1 generates highest return than others, but it is not significant.

Table 4.20 Result of Pair Wise Comparison Test on Winner 3_1 Portfolio

Return Diff. on 3_1		Approach 2	Approach 3
Approach 1	d return	0.0025	0.0070
	t-stat	0.7718	1.3928
	p-value	0.4422	0.1670
Approach 2	d return		0.0045
	t-stat		0.9934
	p-value		0.3231

*** Significant at α=1%

** Significant at α=5%

* Significant at α=10%

Source: Data processing

For loser portfolio, the result of one way ANOVA shows that there is no significant difference as well. But from p-value data shown in the table, it is concluded that in loser portfolio the three approaches are resulting slightly

difference return. Because on overall p-value of loser is lower than winner portfolio. Although there is no different return in comparing those three methods using one way ANOVA, it seems that in pair wise comparison, it will realize two different returns.

Table 4.21 Result of One Way ANOVA Test on Loser Portfolio

Loser Portfolio			Holding Period	
			1 Month	3 Month
Evaluation Period	1 Month	F stat	1.415	0.437
		p-value	0.245	0.646
	3 Month	F stat	0.547	0.225
		p-value	0.579	0.798

*** Significant at α=1%

** Significant at α=5%

* Significant at α=10%

Source: Data processing

From the table 4.22 below, it is found that approach 1 and 2 are the same while approach 3 is significantly difference than others. Approach 1 and 2 statistically realize higher return than approach 3. But approach it can't be stated which of approach 1 and 2 realize higher return. So, using historical return as relative comparison instead of cross section return gives significant different return. While, adding risk component gives only little difference.

Table 4.22 Result of Pair Wise Comparison Test on Loser 1_1 Portfolio

Return Diff. on 1_1		Approach 2	Approach 3
Approach 1	d return	0.0004	0.0179***
	t-stat	0.1300	4.6513
	p-value	0.8969	0.0000
Approach 2	d return		0.0175***
	t-stat		5.2955
	p-value		0.0000

*** Significant at α=1%

** Significant at α=5%

* Significant at α=10%

Source: Data processing

4.9 Discussion of Research Finding

It is found that for winner portfolio, momentum strategy can be applied effectively. It is concluded that winner stock will continue to make profit. After comparing this return with market return it is found that the return of winner portfolio can not outperform market return. But still, for investor, this portfolio gives them benefit. Instead of forming market portfolio consist of 379 stocks, it will be easier to form winner portfolio with only consist of 37 stock while resulting the same return.

Even though all period data show that momentum strategy is effective for winner portfolio, from the pattern of investment from the beginning to the end of period, it is found that in some period the strategy is not effective. After carefully studying the pattern, it is shown that when market index goes down the momentum strategy become ineffective. So it is concluded that momentum strategy for winner stock is effective when market in bullish condition, but when market condition is bearish contrarian strategy will be more effective.

The loser portfolios show the opposite result. When the market is bullish it is better to apply contrarian strategy while in bearish condition, it is better to apply momentum strategy. So for loser portfolio, when market goes up loser will rebound and goes up as well. But when market goes down the loser portfolio will continue to make a loss.

The addition of risk component to the original methods, gives only slightly different return. It will give more stable return and lower risk. But the difference is not significant. While changing the relative benchmark from cross section relative return to historical relative return, give significant difference return. It makes smaller return but lower risk significantly.

CHAPTER 5
CONCLUSION AND SUGGESTION

5.1 Conclusion

From the analysis in chapter 4 above, it is concluded that:

1. Using any method presented, momentum strategy can be applied effectively for winner stock portfolio. While for loser portfolio, the effective strategy is contrarian strategy. So winner stocks in the past period will continue to make profit in the next period while loser stocks in the past period will rebound and make profit in the next period.
2. The return of winner stocks using momentum strategy can not outperform market. Statistically it result the same return with market portfolio, except 1_3 winner portfolio. Using first and second methods (cross section relative return and plus risk component) the significant level is 10% in outperforming market return, but using third method (historical relative return) the significant level increase to 1%.
3. The return of loser stock using contrarian strategy can always significantly outperform market return.
4. Using one way ANOVA test, return of those three methods is relatively the same. But after seeing more detail using pair wise comparison it is concluded that the first and the second methods result the same return, but both methods are different with the third method that use historical relative return instead of cross section relative return. So changing cross section with historical relative return give more significant impact than adding risk component.

5.2 Suggestion

Based on the research result, those strategies can generate return above market return. It means that Indonesian Stock Exchange is not efficient. When there is a strategy that generates return higher than market return, then there is condition where investor gets lower than market return. So, investor needs to be careful in

making buy or sell decision to avoid loss. Given that condition, government need to actively control the market through regulation that can minimize the inefficiency. It is important, because the more efficient the market, the more trust given by investor and the more fund that can be generated from the market.

For the next research, other can try to use beta systematic risk as risk component, instead of standard deviation. The evaluation period and holding period can be extended as well to see the result on different time duration.

This research is run fully on the whole period data. Others can split the data into several time frames, by differentiating between bearish and bullish period.

In comparing the return of strategy and market return Paired sample t-test is used, other can add another performance criteria such as Sharpe ratio, Treynor ratio, or using alfa Jensen abnormal return using CAPM model.

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ATTACHMENT A

(List of Stock Listed in Indonesian Stock Exchange in 2009)

List of Stock Listed in Indonesian Stock Exchange in 2009

No.	Kode	Company Name
1	ABBA	Abdi Bangsa Tbk PT
2	ACES	Ace Hardware Indonesia Tbk PT
3	ADES	Ades Waters Indonesia Tbk PT
4	ADHI	Adhi Karya Tbk PT
5	ADMF	Adira Dinamika Multi Finance PT
6	TMPI	Agis Tbk PT
7	AIMS	Akbar Indo Makmur Stimec Tbk PT
8	AKRA	AKR Corporindo Tbk PT
9	ALKA	Alakasa Industrindo Tbk PT
10	ASRI	Alam Sutera Realty Tbk PT
11	ALFA	Alfa Retailindo Tbk PT
12	ALMI	Alumindo Light Metal Industry Tbk PT
13	AKKU	Aneka Kemasindo Utama Tbk PT
14	ANTM	Aneka Tambang Tbk PT
15	ANTA	Anta Express Tour & Travel Service Tbk P
16	MYTX	Apac Citra Centertex Tbk PT
17	APEX	Apexindo Pratama Duta PT
18	AQUA	Aqua Golden Mississippi Tbk PT
19	AKPI	Argha Karya Prima Industry Tbk PT
20	ARGO	Argo Pantes Tbk PT
21	APOL	Arpeni Pratama Ocean Line Tbk PT
22	ARTA	Arthavest Tbk PT
23	ARNA	Arwana Citramulia Tbk PT
24	AMFG	Asahimas Flat Glass Tbk PT
25	ASIA	Asia Grain International Tbk PT
26	AKSI	Asia Kapitalindo Securities Tbk PT
27	APLI	Asiaplast Industries Tbk PT
28	AALI	Astra Agro Lestari Tbk PT
29	AUTO	Astra Otoparts Tbk PT
30	ABDA	Asuransi Bina Dana Arta Tbk PT
31	ASBI	Asuransi Bintang Tbk PT
32	ASDM	Asuransi Dayin Mitra Tbk PT
33	AHAP	Asuransi Harta Aman Pratama Tbk PT
34	ASJT	Asuransi Jasa Tania Tbk PT
35	AMAG	Asuransi Multi Artha Guna Tbk PT
36	ASRM	Asuransi Ramayana Tbk PT
37	ATPK	ATPK Resources Tbk PT
38	BASS	Bahtera Adimina Samudra Tbk PT
39	BNBR	Bakrie and Brothers Tbk PT
40	UNSP	Bakrie Sumatera Plantations Tbk PT
41	BTEL	Bakrie Telecom PT
42	ELTY	Bakrieland Development Tbk PT
43	INPC	Bank Artha Graha Internasional Tbk PT
44	BBKP	Bank Bukopin Tbk PT
45	BNBA	Bank Bumi Arta Tbk PT
46	BABP	Bank Bumiputera Indonesia Tbk PT

No.	Kode	Company Name
47	BACA	Bank Capital Indonesia PT Tbk
48	BBCA	Bank Central Asia Tbk PT
49	BCIC	Bank Century Tbk PT
50	BDMN	Bank Danamon Indonesia Tbk PT
51	BAEK	Bank Ekonomi Raharja Tbk PT
52	BEKS	Bank Eksekutif Internasional Tbk PT
53	SDRA	Bank Himpunan Saudara PT
54	BNII	Bank Internasional Indonesia Tbk PT
55	BKSW	Bank Kesawan Tbk PT
56	LPBN	Bank Lippo Tbk PT
57	BMRI	Bank Mandiri Persero Tbk PT
58	MAYA	Bank Mayapada International Tbk PT
59	MEGA	Bank Mega Tbk PT
60	BBNI	Bank Negara Indonesia Persero Tbk PT
61	BNGA	Bank Niaga Tbk PT
62	NISP	Bank Nisp Tbk PT
63	BBNP	Bank Nusantara Parahyangan Tbk PT
64	PNBN	Bank Pan Indonesia Tbk PT
65	BNLI	Bank Permata Tbk PT
66	BBRI	Bank Rakyat Indonesia
67	BSWD	Bank Swadesi Tbk PT
68	BTPN	Bank Tabungan Pensiunan Nasional Tbk PT
69	BBIA	Bank UOB Buana Tbk PT
70	BVIC	Bank Victoria International Tbk PT
71	MCOR	Bank Windu Kentjana International Tbk PT
72	BRPT	Barito Pacific Tbk PT
73	BATI	BAT Indonesia Tbk PT
74	BAYU	Bayu Buana Tbk PT
75	BAPA	Bekasi Asri Pemula Tbk PT
76	RMBA	Bentoel Internasional Investama Tbk PT
77	BLTA	Berlian Laju Tanker Tbk PT
78	BRNA	Berlina Tbk PT
79	BTON	Betonjaya Manunggal Tbk PT
80	BFIN	BFI Finance Indonesia Tbk PT
81	BCAP	Bhakti Capital Indonesia Tbk PT
82	BHIT	Bhakti Investama Tbk PT
83	BIPP	Bhuwanatala Indah Permai Tbk PT
84	BMSR	Bintang Mitra Semestaraya Tbk PT
85	BISI	Bisi International PT
86	SQBI	Bristol-Myers Squibb Indonesia Tbk PT
87	SQBB	Bristol-Myers Squibb Indonesia Tbk PT
88	BBLD	Buana Finance Tbk PT
89	BUDI	Budi Acid Jaya Tbk PT
90	BKDP	Bukit Darmo Property PT Tbk
91	BUMI	Bumi Resources Tbk PT
92	BSDE	Bumi Serpong Damai PT
93	BTEK	Bumiteknokultura Unggul Tbk PT
94	CEKA	Cahaya Kalbar Tbk PT

No.	Kode	Company Name
95	MTFN	Capitalinc Investment Tbk PT
96	CSAP	Catur Sentosa Adiprana Tbk PT
97	CNKO	Central Korporindo Internasional Tbk PT
98	CPRO	Central Proteinaprima Tbk PT
99	CENT	Centrin Online Tbk PT
100	CMPP	Centris Multipersada Pratama Tbk PT
101	CNTB	Century Textile Industry Tbk PT
102	CNTX	Century Textile Industry Tbk PT
103	CPIN	Charoen Pokphand Indonesia Tbk PT
104	CPDW	Cipendawa Agroindustri Tbk PT
105	CTRA	Ciputra Development Tbk PT
106	CTRP	Ciputra Property TBK PT
107	CTRS	Ciputra Surya Tbk PT
108	CITA	Cita Mineral Investindo Tbk PT
109	CTTH	Citatah Tbk PT
110	CKRA	Citra Kebun Raya Agri Tbk PT
111	CMNP	Citra Marga Nusaphala Persada Tbk PT
112	CTBN	Citra Tubindo Tbk PT
113	CFIN	Clipan Finance Indonesia Tbk PT
114	CLPI	Colorpak Indonesia Tbk PT
115	COWL	Cowell Development Tbk PT
116	DEFI	Danasupra Erapacific Tbk PT
117	DEWA	Darma Henwa PT Tbk
118	DVLA	Darya-Varia Laboratoria Tbk PT
119	DAVO	Davomas Abadi Tbk PT
120	DSUC	Daya Sakti Unggul Corp Tbk PT
121	KARK	Dayaindo Resources International Tbk PT
122	DLTA	Delta Djakarta Tbk PT
123	DOID	Delta Dunia Petroindo Tbk PT
124	PDES	Destinasi Tirta Nusantara Tbk PT
125	DSFI	Dharma Samudera Fishing Industries Tbk P
126	DART	Duta Anggada Realty Tbk PT
127	DGIK	Duta Graha Indah Tbk PT
128	DPNS	Duta Pertiwi Nusantara Tbk PT
129	DUTI	Duta Pertiwi Tbk PT
130	DYNA	Dynaplast Tbk PT
131	DNET	Dyviacom Intrabumi Tbk PT
132	EKAD	Ekadharma International Tbk PT
133	ELSA	Elnusa PT
134	ENRG	Energi Mega Persada Tbk PT
135	EPMT	Enseval Putera Megatrading Tbk PT
136	GSMF	Equity Development Investment Tbk PT
137	ERTX	Eratex Djaja Tbk PT
138	ETWA	Eterindo Wahanatama Tbk PT
139	ESTI	Ever Shine Textile Tbk PT
140	FASW	Fajar Surya Wisesa Tbk PT
141	FAST	Fastfood Indonesia Tbk PT
142	KBLV	First Media Tbk PT

No.	Kode	Company Name
143	FISH	FKS Multi Agro Tbk PT
144	FORU	Fortune Indonesia Tbk PT
145	FMII	Fortune Mate Indonesia Tbk PT
146	GJTL	Gajah Tunggal Tbk PT
147	GEMA	Gema Grahasarana Tbk PT
148	KPIG	Global Land Development Tbk PT
149	BMTR	Global Mediacom Tbk PT
150	GDYR	Goodyear Indonesia Tbk PT
151	GMTD	Gowa Makassar Tourism Development Tbk PT
152	GZCO	Gozco Plantations Tbk PT
153	GMCW	Grahamas Citrawisata Tbk PT
154	KBLI	GT Kabel Indonesia Tbk PT
155	GGRM	Gudang Garam Tbk PT
156	MYRXP	Hanson International Tbk PT
157	MYRX	Hanson International Tbk PT
158	HADE	HD Capital Tbk PT
159	HERO	Hero Supermarket Tbk PT
160	HEXA	Hexindo Adiperkasa Tbk PT
161	SMCB	Holcim Indonesia Tbk PT
162	SHID	Hotel Sahid Jaya International Tbk PT
163	HITS	Humpuss Intermoda Transportasi Tbk PT
164	INKP	Indah Kiat Pulp and Paper Corp Tbk PT
165	INAI	Indal Aluminum Industry Tbk PT
166	INDY	Indika Energy Tbk PT
167	SRSN	Indo Acidatama Tbk PT
168	BRAM	Indo Kordsa Tbk PT
169	ITMG	Indo Tambangraya Megah PT
170	INDR	Indo-Rama Synthetics Tbk PT
171	INTP	Indocement Tunggal Prakarsa Tbk PT
172	INCF	Indocitra Finance Tbk PT
173	INDX	Indoexchange Tbk PT
174	INAF	Indofarma Tbk PT
175	INDF	Indofood Sukses Makmur Tbk PT
176	IMAS	Indomobil Sukses Internasional Tbk PT
177	IATA	Indonesia Air Transport PT
178	OMRE	Indonesia Prima Property Tbk PT
179	ISAT	Indosat Tbk PT
180	IDKM	Indosiar Karya Media Tbk PT
181	INDS	Indospring Tbk PT
182	IATG	Infoasia Teknologi Global Tbk PT
183	INCI	Intanwijaya Internasional Tbk PT
184	INTD	Inter Delta Tbk PT
185	INCO	International Nickel Indonesia Tbk PT
186	IIKP	Inti Agri Resources Tbk PT
187	IKAI	Intikeramik Alamasri Industri Tbk PT
188	DILD	Intiland Development Tbk PT
189	INTA	Intraco Penta Tbk PT

No.	Kode	Company Name
190	ITMA	Itamaraya Gold Industri Tbk PT
191	JAKA	Jaka Inti Realtindo Tbk PT
192	JIHD	Jakarta International Hotel & Developmen
193	JKSW	Jakarta Kyoei Steel Works Ltd Tbk PT
194	JSPT	Jakarta Setiabudi Internasional Tbk PT
195	JPFA	Japfa Comfeed Indonesia Tbk PT
196	JSMR	Jasa Marga PT
197	JTPE	Jasuindo Tiga Perkasa Tbk
198	JKON	Jaya Konstruksi Manggala Pratama Tbk PT
199	JPRS	Jaya Pari Steel Tbk PT
200	JRPT	Jaya Real Property Tbk PT
201	JECC	Jembo Cable Co Tbk PT
202	OCAP	JJ NAB Capital Tbk PT
203	KBLM	Kabelindo Murni Tbk PT
204	IGAR	Kageo Igar Jaya Tbk PT
205	KLBF	Kalbe Farma Tbk PT
206	KARW	Karwell Indonesia Tbk PT
207	KIJA	Kawasan Industri Jababeka Tbk PT
208	KICI	Kedaung Indah Can Tbk PT
209	KDSI	Kedawung Setia Industrial Ltd Tbk PT
210	KAEF	Kimia Farma Tbk PT
211	KOIN	Kokoh Inti Arebama Tbk PT
212	KREN	Kresna Graha Sekurindo Tbk PT
213	LCGP	Laguna Cipta Griya Tbk PT
214	LAMI	Lamicitra Nusantara Tbk PT
215	LMPI	Langgeng Makmur Industri Tbk PT
216	LTLS	Lautan Luas Tbk PT
217	ITTG	Leo Investments Tbk PT
218	LAPD	Leyand International Tbk PT
219	LMAS	Limas Centric Indonesia Tbk PT
220	LION	Lion Metal Works Tbk PT
221	LMSH	Lionmesh Prima Tbk PT
222	LPCK	Lippo Cikarang Tbk PT
223	LPLI	Lippo E-Net Tbk PT
224	LPGI	Lippo General Insurance Tbk PT
225	LPKR	Lippo Karawaci Tbk PT
226	LPPS	Lippo Securities Tbk PT
227	MAIN	Malindo Feedmill Tbk PT
228	MFIN	Mandala Multifinance Tbk PT
229	TCID	Mandom Indonesia Tbk PT
230	MAMI	Mas Murni Indonesia Tbk PT
231	MAMIP	Mas Murni Indonesia Tbk PT
232	MREI	Maskapai Reasuransi Indonesia Tbk PT
233	MPPA	Matahari Putra Prima Tbk PT
234	MYOR	Mayora Indah Tbk PT
235	MEDC	Medco Energi Internasional Tbk PT
236	MNCN	Media Nusantara Citra MNC PT
237	MERK	Merck Tbk PT

No.	Kode	Company Name
238	MTSM	Metro Supermarket Realty Tbk PT
239	MTDL	Metrodata Electronics Tbk PT
240	SDPC	Millennium Pharmacon International Tbk P
241	MAPI	Mitra Adiperkasa Tbk PT
242	MITI	Mitra Investindo Tbk PT
243	MIRA	Mitra Rajasa Tbk PT
244	FREN	Mobile-8 Telecom Tbk
245	MDRN	Modern International Tbk PT
246	MDLN	Modernland Realty Tbk PT
247	MLIA	Mulia Industrindo Tbk PT
248	MLBI	Multi Bintang Indonesia Tbk PT
249	MICE	Multi Indocitra Tbk PT
250	LPIN	Multi Prima Sejahtera Tbk PT
251	MBAI	Multibreeder Adirama Indonesia Tbk PT
252	MLPL	Multipolar Corp Tbk PT
253	MASA	Multistrada Arah Sarana Tbk PT
254	MRAT	Mustika Ratu Tbk PT
255	MYOH	MYOH Technology Tbk PT
256	PTRA	New Century Development Tbk PT
257	NIPS	Nipress Tbk PT
258	META	Nusantara Infrastructure Tbk PT
259	UNIT	Nusantara Inti Corpora Tbk PT
260	TKIM	Pabrik Kertas Tjiwi Kimia Tbk PT
261	LPPF	Pacific Utama Tbk PT
262	PWON	Pakuwon Jati Tbk PT
263	PBRX	Pan Brothers Tbk PT
264	APIC	Pan Pacific International Tbk
265	PAFI	Panasia Filament Inti Tbk PT
266	HDTX	Panasia Indosyntec Tbk PT
267	PEGE	Panca Global Securities Tbk PT
268	PWSI	Panca Wiratama Sakti Tbk PT
269	PNIN	Panin Insurance Tbk PT
270	PNLF	Panin Life Tbk PT
271	PANS	Panin Sekuritas Tbk PT
272	PANR	Panorama Sentrawisata Tbk PT
273	WEHA	Panorama Transportasi PT
274	PICO	Pelangi Indah Canindo Tbk PT
275	TMAS	Pelayaran Tempuran Emas Tbk PT
276	PGLI	Pembangunan Graha Lestari Tbk PT
277	PJAA	Pembangunan Jaya Ancol Tbk PT
278	KONI	Perdana Bangun Pusaka Tbk PT
279	GPRA	Perdana Gapuraprima Tbk PT
280	PKPK	Perdana Karya Perkasa Tbk PT
281	PGAS	Perusahaan Gas Negara PT
282	LSIP	Perusahaan Perkebunan London Sumatra Ind
283	PTRO	Petrosea Tbk PT
284	PTSP	Pioneerindo Gourmet International Tbk PT
285	PLIN	Plaza Indonesia Realty Tbk PT

No.	Kode	Company Name
286	ADMG	Polychem Indonesia Tbk PT
287	POLY	Polysindo Eka Perkasa Tbk PT
288	POOL	Pool Advista Indonesia Tbk PT
289	PSDN	Prasidha Aneka Niaga Tbk PT
290	PRAS	Prima Alloy Steel Universal Tbk PT
291	BIMA	Primarindo Asia Infrastructure Tbk PT
292	ASGR	PT Astra Graphia Tbk
293	ASII	PT Astra International Tbk
294	PNSE	Pudjiadi & Sons Tbk PT
295	PUDP	Pudjiadi Prestige Tbk PT
296	PYFA	Pyridam Farma Tbk PT
297	RUIS	Radiant Utama Interinsco Tbk PT
298	RALS	Ramayana Lestari Sentosa Tbk PT
299	ARTI	Ratu Prabu Energi Tbk PT
300	PLAS	Redland Asia Capital Tbk PT
301	RELI	Reliance Securities Tbk PT
302	KKGI	Resource Alam Indonesia Tbk PT
303	RICY	Ricky Putra Globalindo Tbk PT
304	RIGS	Rig Tenders Indonesia Tbk PT
305	RIMO	Rimo Catur Lestari Tbk PT
306	RBMS	Ristia Bintang Mahkotasejati Tbk PT
307	RDTX	Roda Vivatex Tbk PT
308	RODA	Royal Oak Development Asia Tbk
309	RAJA	Rukun Raharja Tbk PT
310	SGRO	Sampoerna Agro PT
311	SMDR	Samudera Indonesia Tbk PT
312	SQMI	Sanex Qianjiang Motor International Tbk
313	PTSN	Sat Nusapersada Tbk PT
314	SCPI	Schering Plough Indonesia Tbk PT
315	SKLT	Sekar Laut Tbk PT
316	SMSM	Selamat Sempurna Tbk PT
317	SMGR	Semen Gresik Persero Tbk PT
318	BKSL	Sentul City Tbk PT
319	BATA	Sepatu Bata Tbk PT
320	STTP	Siantar Top Tbk PT
321	SIPD	Sierad Produce Tbk PT
322	SMAR	Sinar Mas Agro Resources and Technology
323	SMMA	Sinar Mas Multiartha Tbk PT
324	SIMA	Siwani Makmur Tbk PT
325	SONA	Sona Topas Tourism Industry Tbk PT
326	SOBI	Sorini Corp Tbk PT
327	SAFE	Steady Safe Tbk PT
328	SUGI	Sugi Samapersada Tbk PT
329	SULI	Sumalindo Lestari Jaya Tbk PT
330	IKBI	Sumi Indo Kabel Tbk PT
331	SMRA	Summarecon Agung Tbk PT
332	SSTM	Sunson Textile Manufacturer Tbk PT
333	SPMA	Suparma Tbk PT

No.	Kode	Company Name
334	SCCO	Supreme Cable Manufacturing Corp Tbk PT
335	SAIP	Surabaya Agung Industri Pulp & Kertas Tb
336	SCMA	Surya Citra Media Tbk PT
337	SIMM	Surya Intrindo Makmur Tbk PT
338	SSIA	Surya Semesta Internusa Tbk PT
339	TOTO	Surya Toto Indonesia Tbk PT
340	SIIP	Suryainti Permata Tbk PT
341	SMDM	Suryamas Dutamakmur Tbk PT
342	PTBA	Tambang Batubara Bukit Asam Tbk PT
343	TFCO	Teijin Indonesia Fiber Corp Tbk PT
344	TLKM	Telekomunikasi Indonesia Tbk PT
345	TBMS	Tembaga Mulia Semanan Tbk PT
346	TMPO	Tempo Inti Media Tbk PT
347	TSPC	Tempo Scan Pacific Tbk PT
348	TEJA	Texmaco Jaya Tbk PT
349	AISA	Tiga Pilar Sejahtera Food Tbk
350	TGKA	Tigaraksa Satria Tbk PT
351	TINS	Timah Tbk PT
352	TIRA	Tira Austenite Tbk PT
353	TIRT	Tirta Mahakam Resources Tbk PT
354	FPNI	Titan Kimia Nusantara Tbk PT
355	INRU	Toba Pulp Lestari Tbk PT
356	TKGA	Toko Gunung Agung Tbk PT
357	TOTL	Total Bangun Persada
358	TPIA	Tri Polyta Indonesia Tbk PT
359	TRST	Trias Sentosa Tbk PT
360	TRIM	Trimegah Securities Tbk PT
361	TRIL	Triwira Insanlestari Tbk PT
362	TRUB	Truba Alam Manunggal Engineering PT
363	TRUS	Trust Finance Indonesia Tbk PT
364	TBLA	Tunas Baru Lampung Tbk PT
365	TURI	Tunas Ridean Tbk PT
366	ULTJ	Ultrajaya Milk Industry & Trading Co Tbk
367	UNIC	Unggul Indah Cahaya Tbk PT
368	UNVR	Unilever Indonesia Tbk PT
369	UNTR	United Tractors Tbk PT
370	UNTX	Unitex Tbk PT
371	VRNA	Verena Oto Finance Tbk PT
372	VOKS	Voksel Electric Tbk PT
373	WOMF	Wahana Ottomitra Multiartha PT
374	WAPO	Wahana Phonix Mandiri Tbk PT
375	WICO	Wicaksana Overseas International Tbk PT
376	WIKA	Wijaya Karya PT
377	YPAS	Yanaprima Hastapersada Tbk PT
378	YULE	Yulie Sekurindo Tbk PT
379	ZBRA	Zebra Nusantara Tbk PT