APPLYING MONTE CARLO CONCEPT AND LINEAR PROGRAMMING IN MODERN PORTFOLIO THEORY TO OBTAIN BEST STRUCTURED WEIGHTING

THESIS

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UNIVERSITY OF INDONESIA FACULTY OF ECONOMY MAGISTER MANAGEMENT STUDY PROGRAM JAKARTA MARCH 2009



Applying Monte Carlo..., Tumpal M. Sihombing, author, FEB UI, 2009

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THESIS

Completed as one of the requirements to achieve the title Magister Management

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UNIVERSITY OF INDONESIA FACULTY OF ECONOMY MAGISTER MANAGEMENT STUDY PROGRAM JAKARTA MARCH 2009

i

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 the academic standard or reference procedures

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ii

PREFACE

Praise to the Lord Christ Jesus who has given His blessings to all of us so that the writer can complete and finish this thesis as one of some requirements to achieve the formal title of magister management (MM).

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iv

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Jakarta, March 2009

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v

LETTER OF AGREEMENT TO PUBLISH THE THESIS FOR ACADEMIC PURPOSE ONLY (Individual Assignment)

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ABSTRACT

Name:Tumpal M SihombingStudy Program:Magister Management, Majoring in FinanceTitle:Applying Monte Carlo Concept and Linear Programming
in Modern Portfolio Theory to Obtain Best Structured
Weighting

In the capital market, investment is usually utilized as a kind of tool for the investors against the number one enemy, the inflation. By this way, investment is a better alternative than time deposit and cash instrument which offer less return on investment than capital market instrument. Investment can also be a tool for investors in growing their wealth and preserve it. By staying invested, investor can generate earnings and even more from their existing money or fund as long as the market is in expectation and in favour.

Now the world is entering the era of recession when the trend is bearish and market is not so favorable. Many investors are now experiencing great losses and suffer in their investment. The investment has become like an enemy instead of a tool to grow, protect and preserve the wealth of investors. Some investors have stated that the investment did not making them money anymore at this time of recession, some said that better not to invest their money in capital market instead. All of these statements were raised mainly because one thing that investors have usually forgotten, its portfolio risk management. Investment bankings in US were bankrupt and no more. The capital markets in every major country were experiencing great amount of loss and people suffered in their investment. That was because one term that has been abandoned all this time, portfolio risk management.

In bullish trend, that was fine to structure the portfolio of investment in stocks and less in bonds as long as the return and risk of the portfolio were also fine with the investors. But when the market changes, the structure should be different in terms of portfolio contents. The investor should reduce the portion or share of stocks (since these relatively have high volatility) and increase the share of bonds and cash in their portfolio. That is the thing the investor should do.

Capital market of Indonesia has also suffered because of this world recession. The JCI as the main index price of BEI (Indonesia Stock Exchange) has shown a great downturn for the past one year. Now is the bearish year of the JCI. Therefore, it is also wise for the rational investors to also consider restructuring their portfolio to become mainly in bonds and cash instead of stocks. The way the investors doing this should be by applying the best method ever conceived called modern portfolio theory which was founded by Nobel Winner Henry Markowitz.

Risk and Return are just like two sides of one coin. The greater the return, the greater the potential risk may embodied within the investment. The research in this thesis will show investor on how to find out the lowest risk of a portfolio investment by providing them with several structures of portfolio weighting. By this way, investor can compare and make the decision based on risk-return consideration and opportunity cost as well.

Keywords : modern portfolio theory, monte carlo, linear programming

vii

TABLE OF CONTENTS

TITLE PAGE	i
STATEMENT OF ORIGINALITY	ii
LETTER OF APPROVAL	iii
PREFACE	iv
LETTER OF AGREEMENT TO PUBLISH THE THESIS	vi
ABSTRACT	vii
TABLE OF CONTENTS	viii
LIST OF TABLES	х
LIST OF FIGURES	xi
LIST OF EXPRESSIONS	xii

1.	PRF	ELIMI	NARY	1
	1.1.	Backg	ground	1
	1.2.	Main	Issues	5
	1.3.	Resea	rch Objectives	7
	1.4.	Scope	of Research	8
	1.5.	Syster	natic of Writings	9
		-		
2.	STU	DY OI	F LITERATURES	10
	2. 1.	The D	efinition of Investment	10
		2.1.1.	Investment Management Process	- 10
		2.1.2.	Investment Versus Speculation	12
	2. 2.	Asset	Classes	13
		2.2.1.	Stock in Equity Market	15
		2.2.2.	Bond in Fixed Income Market	16
		2.2.3.	Cash in Money Market	18
	2.3.	Portfoli	io Theory	19
		2.3.1.	History & Background	19
		2.3.2.	Return and Risk	20
			2.3.2.1. Expected Return and Mean	21
			2.3.2.2. Coefficient of Correlation and Covariance	22
			2.3.2.3. Variance and Standard Deviation	23
		2.3.3.	Asset Allocation & Diversification	24
		2.3.4.	Portfolio Management	26
			2.3.4.1. Basic Assumptions	26
			2.3.4.2. Portfolio Return & Volatility	27
			2.3.4.3. Efficient Frontier	29
	2.4.	Monte	Carlo Concept and Linear Programming	31
		2.4.1.	History of Monte Carlo Simulation	31
		2.4.2.	The Flaw of Average	32
		2.4.3.	The Advantage of Simulation	33
		2.4.4.	Uniform Random Number	34
		2.4.5.	Monte Carlo in Finance	35
		2.4.6.	Linear Programming With Solver	36

3.	MO	DEL CONSTRUCTION	37
	3.1.	Basic Framework	37
	3.2.	Model Requirement	38
		3.1.1. Historical Data	38
		3.1.2. Data Preparation	39
	3.3.	Model Objective	40
		3.2.1. Lowest Portfolio Risk	40
		3.2.2. Highest Portfolio Expected Return	41
		3.2.3. Objective Selection	42
	3.4.	Model Constraint	42
		3.3.1. Basic Constraint	42
		3.3.2. Conditional	43
		3.3.3. Total Constraints	44
	3.5.	Model Format	44
		3.4.1. Flowchart	45
		3.4.2. Descriptive	46
4.	DAT	A ANALYSIS AND RESULT INTERPRETATION	47
	4.1.	Data Input	47
		4.1.1. Asset Picking	47
		4.1.2. Historical Timeframe	52
		4.1.3. Additional Data Requirement	54
		4.1.4. Data Collection	55
	4.2.	Statistical Data Calculation	56
		4.2.1. Statistical Parameters	56
		4.2.2. Coefficient of Correlation and Covariance	56
		4.2.3. Scenarios of Weighting	57
		4.2.4. Risks Minimization	58
		4.2.5. Random Number Generation	59
		4.2.6. Expected Return of Portfolio	60
		4.2.7. Monte Carlo Basic Simulation	60
	4.3.	Optimal Result Determination	63
	4.4.	Efficient Frontier Plotting	65
5. (CON	CLUSION AND ADVICE	68
	5.1.	Conclusion	68
	5.2.	Advice	69
RE	FER	ENCES	70

ix

LIST OF TABLES

Table 4.1 LQ45 List of Stocks	73
Table 4.3 List of Government Bonds	74
Table 4.6 The Historical Data (2005-2008)	75
Table 4.13 Solver Display of Risk Minimization	76
Table 4.14 Uniform Distribution Random Numbers (partial)	77
Table 4.15 Simulation Result : Weighting Structure 1	78
Table 4.16 Simulation Result : Weighting Structure 2	79
Table 4.17 Simulation Result : Weighting Structure 3	80
Table 4.18 Simulation Result : Weighting Structure 4	81
Table 4.19 Simulation Result : Weighting Structure 5	82
Table 4.20 Simulation Result : Weighting Structure 6	83
Table 4.21 Simulation Result : Weighting Structure 7	84
Table 4.22 Simulation Result : Weighting Structure 8	85
Table 4.23 Simulation Result : Weighting Structure 9	86
Table 4.24 Simulation Result : Weighting Structure 10	87
Table 4.25 Simulation Result : Weighting Structure 11	88
Table 4.26 Simulation Result : Weighting Structure 12	89
Table 4.27 Simulation Result : Weighting Structure 13	90
Table 4.28 Simulation Result : Weighting Structure 14	91
Table 4.29 Simulation Result : Weighting Structure 15	92
Table 4.30 Simulation Result : Weighting Structure 16	93
Table 4.31 Simulation Result : Weighting Structure 17	94

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0

LIST OF FIGURES

Figure 2.1 Investment Management Process	11
Figure 2.2 Asset Class Risk-Return Characteristics	14
Figure 2.3 Relationships between Number of Assets and Standard Deviation	21
Figure 2.4 Single Asset versus Portfolio Investment	25
Figure 2.5 The Efficient (Markowitz) Frontier	30
Figure 2.6 General Flow of Monte Carlo Simulation	35
Figure 3.1 Basic Framework of Model	37
Figure 3.2 Historical Data Filtering	38
Figure 3.3 Tasks in Historical Data Definition	39
Figure 3.4 Deriving Portfolio Risk	41
Figure 3.5 Generating Portfolio Expected Returns	41
Figure 3.6 Finding the Lowest Risk Weighting Structures	44
Figure 3.7 Model in Flowchart	45
Figure 4.1 HM Sampoerna Corporate Bond Rating Statement	51
Figure 4.2 JCI Historical Prices Y2005-Y2008	54
Figure 4.3 Result of Portfolio Returns: Weighting Structure 1	62
Figure 4.4 Efficient Frontier of The Lowest Risk WS	66
Figure 4.5 Histogram of WS-1 Simulation	105
Figure 4.6 Histogram of WS-2 Simulation	105
Figure 4.7 Histogram of WS-3 Simulation	106
Figure 4.8 Histogram of WS-4 Simulation	106
Figure 4.9 Histogram of WS-5 Simulation	107
Figure 4.10 Histogram of WS-6 Simulation	107
Figure 4.11 Histogram of WS-7 Simulation	108
Figure 4.12 Histogram of WS-8 Simulation	108
Figure 4.13 Histogram of WS-9 Simulation	109
Figure 4.14 Histogram of WS-10 Simulation	109
Figure 4.15 Histogram of WS-11 Simulation	110
Figure 4.16 Histogram of WS-12 Simulation	110
Figure 4.17 Histogram of WS-13 Simulation	111
Figure 4.18 Histogram of WS-14 Simulation	111
Figure 4.19 Histogram of WS-15 Simulation	112
Figure 4.20 Histogram of WS-16 Simulation	112
Figure 4.21 Histogram of WS-17 Simulation	113

LIST OF EXPRESSIONS

Expression 2.1 Expected Return of Portfolio of Many Assets	22
Expression 2.2 Coefficient of Correlation, Covariance, Standard Deviations	23
Expression 2.3 Portfolio Standard Deviation and Variance	24
Expression 2.4 Calculating Variance	27
Expression 2.5 Calculating Portfolio Variance	28
Expression 2.6 CAL Slope or Sharpe Ratio	30
Expression 2.7 Standard Error Number of Runs	33
Expression 3.1 Basic Constraints of Weighting Structures	42



xii

CHAPTER 1

PRELIMINARY

1.1. Background

"Change is inevitable. Change is constant." (Quoted by Benjamin Disraeli, 1804-1881). Change does happen, and change is the very fundamental basis of life. Life lies upon an ongoing and dynamically changing world and so does every single thing within it. Anything that does not follow, will be eroded as time goes by before eventually vanished. World is now facing financial crisis and entering the era of recession (Savage, 2009). Change or downturn and bearish trend in the financial market are the major events that attract significant attention of the worldwide economies.

Historically speaking, the crisis was first triggered by the sub-prime mortgage issues in the US financial market. At that time (over and about year 2006-2007), some people and organizations might actually have already been aware regarding the latent problems of sub-prime mortgage prior to the current crisis that the world is now facing. US Investment banking industry has failed and collapsed. In US banking industry, investment banking is no more and no longer exist. The financial crisis has become one of the most radical reshaping of the global banking sector meanwhile governments and the private sector battle to shore up the financial system, following the disappearance of Lehman and Merrill as independent entities and the billions of dollars government rescue of AIG. Some investment banks in US have already been converted into holding banking by regulation of US government (Financial Times, 11/12/2008 8:07 AM).

University of Indonesia

1

Default, restructuring and bankruptcy in major banks are events that happening as the logical consequences of current world financial market crisis. Some banks are bailed out and others just been let gone into the bankruptcy as the case of Lehman Brothers.

The housing market in US is related to the mortgage industry in significant term. And at that time, investment bankings were mainly invest the fund into the mortgage-backed securities, issued by the some institutional which securitize the mortgage into MBS. This is one of the investment vehicle that eventually has made suffer the investors. There are lots of varieties of instruments available in the market. Allocating all the funds into single instrument is significantly vulnerable to risk (Bodie, 2008). Otherwise, putting funds partially into more than one instrument may distribute the risk of investing as well as the return itself. Return is the proceeds gained from the willingness to take the risk(Damodaran, 2002). The higher the risk, the higher the potential gain in return.

It is difficult to define favorable level of return without mentioning the risk involved within the definition and investor's preference. This consideration tends to be subjective and could be differ amongst investors as well as organizations. There are some level of judgment may be included in this concern. Hedge funds define the risk differently from mutual funds. Mutual funds define risk also differently compared to the banking industry.

The way in allocating the funds into some available instruments of investment is the basis of effective diversification in portfolio management. Diversification is a powerful method to manage investment risk. While diversification is good, certain types of diversifications are better. This was the premise of Harry Markowitz's Nobel Prize winning theory. He showed that when the assets in a portfolio do not move in

concert with each other, their individual risks can be effectively diversified away(Gibson, 1996). Diversification among assets that move together is ineffective diversification. Effective diversification reduces portfolio volatility and smoothes out the returns. In general, anything that reduces volatility eventually increases the compound rate of returns.

As for example, let's say an investor has decided to put its funds into several asset classes consist of stocks 60% IDR 120,000,000, Bonds 35% IDR 70,000,000, Cash 5% IDR 10,000,000. Total worth 100% IDR 200,000,000. Let's say it was the initial investment and as time goes by, the market turns. There were some hiking in the return of stock. Let's say that at the certain point of time the portfolio of investment has changed into stocks IDR 160,000,000, bonds IDR 70,000,000, cash IDR 10,000,000 and worth total IDR 240,000,000. This result is good since it has earned favorable return on investment , about 40% above initial capital. But the question remains whether this was a good portfolio investment or not all. The answer will lie upon how much is the portfolio

Effective diversification can be done through an effective asset allocation. Asset allocation is an investment methodology that pools or combines various asset classes such as stocks, bonds, and cash in a single portfolio of investment. It has to wise in terms of risk and return on portfolio investment in order to have an effective diversification. Back to the above example, conducting such allocation may move the investor away from the effective assets allocation and possibly even exposed the investor to more risk if did not well-diversified since the first time. It that is the case, then it is the time the conservative investors should step in and bring the portfolio into the effective diversification. They should change the allocation, in other words

University of Indonesia

3

consider the asset rebalancing. There are some methods on portfolio rebalancing (Fischer and Jordan, 1991), such as:

- Buy-and-hold. It is a do-nothing strategy after buy some assets. It sets the initial allocation weights and then does nothing forever.
- Constant-mix. It is a strategy to dynamically rebalance the current weightings by trading whenever market conditions have changed from the first balance. It implies a constant proportion of the portfolio be invested in shares.
- Constant proportion portfolio insurance. It is a strategy that buys shares as they rise and sells as they fall. When implementing the strategy, investors select a floor below which the portfolio value is not allowed to fall to certain level.
- Active tactical. The goal is to outperform the constant-mix strategy by overweighting asset classes that are expected to be outperformed whereas underweight sectors that are expected to be underperformed. This strategy allows investors to flexibly follow elements of the constant-mix and constant proportion strategies based on market context.

Black-Litterman. In this model, investor inputs any number of views or statements about the expected returns of arbitrary portfolios, and the model combines the views with equilibrium, producing both the set of expected returns of assets as well as the optimal portfolio weights. The investor should invest in portfolio first, and then rebalance from current weighting by adding some weights on portfolios representing investor's views (Vince, 1990).

1.2. Main Issues

There is an old saying, "Do not put all your eggs in one basket". Putting the funds partially in more than one instrument is a very wise and rational act of investing. Rational investors try to achieve certain asset allocation at higher probability of return on investment with the lowest risk possible had. All kinds of strategy in portfolio investment as mentioned above were trying to achieve their objectives with some level of risk-return involved within it.

As time goes by, many strategies or approaches have been improved lately by using advanced knowledge and know-how related to the portfolio risk in terms of investment and finance area (Bodie, 2008). There are some approaches that have been known as tools to better the investor's decision when dealing with the uncertain future events or market volatility, they are:

- Altman Z-Score. This model was created by Edward Altman. It combines some financial ratios to determine the possibility of bankruptcy of a company in certain industry. The lower the score, the higher the probability of bankruptcy.
- Black Scholes. It was developed at 1973 by Fisher Black, Robert Merton and Myron Scholes and is still applied today as one alternative way of determining fair prices of options. This model assumes that market is efficient, European exercise terms apply, and that interest rates should remain constant and known.
- Binomial model. It is an equation or an open-form that generates a tree of possible future price movements. The performance of a portfolio is measured by the result of investor's strategy compared to a certain benchmark selected. Any relationship between investor trading strategies and its expectations concerning asset prices

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5

movement will prove that different portfolios can be interpreted as the result of differing expectations for asset price movements.

To the points, the three things or questions below are the main issues in this research:

- What kinds of asset should be preferred or selected from some asset classes available in the onshore capital market of Indonesia considering recent market situation?
- 2. How should all the funds be allocated amongst the structured weightings into those selected assets in order to have the possible lowest risk in the future without significantly jeopardizing the portfolio rate of return ?
- 3. What portfolio weight structure should be selected in order to satisfy the investor's objectives and constraints or requirements based on the historical and recent market situation?

6

1.3. Research Objectives

The financial crisis has made both individual and institutional investor need to revisit their portfolio balance. That is because the earlier balance has already been such unfavorable in terms of return. The research focuses on resolving issues such as:

- Selection of maximum 12 assets which represent equity, fixed-income and money market. Those 12 assets comprises stocks, bonds and cash. The stocks will be selected from the LQ-45 population. The bond will be selected from government bonds and corporate bonds. Only one is taken from each of the government bond type. As for the cash, this research selects and assumes SBI-1month as the favorable cash instruments in money market.
- 2. Constructing 17 possible portfolio weight structures which need to be minimized respectively in their level of risk. After gaining the lowest risk possibly minimized for each of the 17 weight structures, then simulation will take place in order to provide investor with the statistical outcomes.
- 3. The defined model will provide to the investor about 17 possible weightings with their respective statistical parameters which have already been measured, calculated, simulated and optimized. Those need to be selected according the investor preference.

7

1.4. Scope of Research

There will be some things need to be defined in this research such as:

- The historical data of net returns of all selected assets (stocks, bonds, cash) which are taken from the last three years (2006-2008) respectively is the main input of the model. All the historical data will be provided in monthly basis to simplify the calculation..
- Assumptions are being made in this research, such as the risk-free rate and the target return. Time deposit is considered as the risk-free asset. The rate of time deposit (HSBC counter rate) when this data collection is took place, the rate was 9.25% net per annum (or 0.77% net per month). The reason is the investors will not be burdened by any risk by only keep their money in the time deposit with such rate applies. As for the target return, it is assumed and set about 18% net per annum (or 1.5% net per month). The reason is at time the data collection took places, the highest yield of the investor could gain from the bond market was about 15-17%. So by increasing slightly the figure into 18%, that was considerably enough for the investors as the target return.
- Some possible construction of portfolio which comprises stocks, bonds and cash. This research builds about 17 weighting structures of the portfolio which need to be simulated and optimized by the model.
- Based on the input (maximum twelve assets), the model will randomly generate about 10,000 numbers prior to the Monte Carlo simulation. This is produced by using the excel routine random function which based on the uniform distribution.

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8

1.5. Systematic of Writings

The whole content of writing in this research consists of:

CHAPTER I PRELIMINARY

This chapter contains everything that is related to reasons behind the investor's need for an applied model. Applying basic concept of Monte Carlo and linear programming are considerably powerful.

CHAPTER 2 STUDY OF LITERATURES

This chapter explains the fundamental theory and principles which underlie the research. It originates from many sources and materials.

CHAPTER 3 MODEL CONSTRUCTION

This chapter is about building the model from the very beginning stage into having the final model definition.

CHAPTER 4 DATA ANALYSIS AND RESULT INTERPRETATION This chapter is about data analyzing and executing the defined model by conducting

the calculation, optimization and simulation.

CHAPTER 5 CONCLUSION AND ADVICE

This chapter summarizes the research and provides some conclusions to the investors. This chapter also mentions about the limitation of the research that investors should know about.

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9

CHAPTER 2

STUDY OF LITERATURES

2.1. The Definition of Investment

An investment is the current commitment of money or other resources in the expectation of reaping future benefits (Bodie & Kane & Markus, 2008). In other words, an investment is a kind of decision an individual or organization has to be made by deploying some resources with the hope of gain in the future.

An act of investment is similar with doing business in the market. In business within the market, people are trying to buy something with low price and sell it with higher price and have gains. That is the main idea. The same idea applies to an investment, people do invest today with an expectation of future gain. In the area finance and investment, the term resource and something are meant to be asset. An act of investment is an activity which is deliberated to increase the future value of an asset.

2.1.1. Investment Management Process

The investment management process comprises five steps (Fabozzi, 1999)

- Setting investment objectives
- Establishing investment policy
- Selecting a portfolio strategy
- Selecting the assets
- Measuring and evaluating performance

The first step is depending on the institution. It means the investment objective will vary according to the type of institution. For example, fund in a security company can

be invested in the marketable securities. The objective would then be to earn a return on invested funds that is higher than entry fee to the security company.

The second step is a guideline to satisfy the investment objectives. This is related to the asset allocation decision, means the investor should decide how to allocat the funds into several assets available in the market, according to the regulation, preference, and investment strategies.



The third step is selecting certain strategy of investment amongst available strategies. Generally it comprises active and passive strategy, the rest are just the enhancement. In an active strategy, it uses available information and forecasting techniques in order to obtain better performance. Otherwise, in a passive investment strategy, it involves minimal expectation of input and really relies on diversification to outperform the performance of some indices in the market.

The fourth step is selection of asset. After the strategy is defined, the next step is to choose to specific assets to be included in the investment. Pooling those assets together usually called as investment portfolio or simply portfolio. This requires a thorough evaluation of assets in portfolio.

The fifth step is measuring and evaluating the performance of assets in portfolio and portfolio itself. It can be done by comparing the result of the portfolio with some kind of benchmark or reference in order to make the comparison. The result of a portfolio investment usually described in term of return that can be obtained and compared with gain an investor can have by supposedly hold the fund in time deposit or other cash equivalent assets.

2.1.2. Investment Versus Speculation

Generally, investment is distinguished from speculation by the time horizon of the investor and often by the risk-return characteristics of the investment (Fischer & Jordan, 1991). As defined, an investment is a commitment of funds made by investors in the hope of some rate of return in the future. If the investment is well performed, the return will worth the risk the investor assumed prior to the decision.

The true investor is interested with the good rate of return, earned on a consistent pattern in a long period of time. Otherwise, the people who do speculation (speculator) seek the opportunities promising very large and fast earning or return. The speculator is less interested in consistent performance and more interested in an abnormal rate of return in such short period of investment. The longer an investor holds an asset, the more important are the return while the investor owns it and the less important is the price when he sells the assets (Williams, 1997).

2.2. Asset Classes

Let every man divide his money into three parts, and invest a third in land, a third in business, and a third let him keep in reserve (Talmud, circa 1200 B.C.-500A.D).

Long before the time of stock exchange was born as we know today, historically there had been kind of asset classes existed in the market for the purpose of investment. In general, asset class is defined as a class of assets that have similar characteristics, including risk factors and how returns are created. In current market, there are financial asset and real asset. In this research, the relevant asset involved are the variety in the financial assets such as stocks, bonds, cash (equivalent), mutual funds, etc. The physical material wealth of a society is ultimately driven by the productive capacity of its economy, which is the goods and services its member able to generate. On the contrary, financial assets (such as stock, bond, cash) are no more than sheets or pile of papers or more likely computer entries and do not contribute directly to the economic productivity (Bodie & Kane & Markus, 2008).

In this research, there are three financial assets are to be focused, stock, bond and money market securities. They are assumed and considered as the available asset classes in the market an investor can manage to allocate their funds into. Each of assets has some degree of risk embedded. The higher the potential return on an investment, the higher the potential risk and volatility is. Also similar, an investment that offer lower returns are generally lower in risk. It is natural to want to expect the highest possible return on investment, nevertheless it is also important to appreciate the levels of risk associated with the different asset classes. Stock, bond and cash are different asset class from the risk-return characteristics point of view. Stock is commonly the most volatile and risky asset among then all but in the same time also

has the potential highest return as well. Bond and cash are lower in risk and return compared to the stock, but it is cash that is usually generate the lowest return on investment to the investor but not necessarily.

Each asset class has a typical level of risk and return characteristics. Therefore, the step of asset selection will have face the situation where the investor has to make decision whether to chose a specific single asset or a combination of them. Choosing the specific assets can in a form of single asset (stock only or bond only or cash only) or combination with some degree of weighting for each of available asset class such as 60% stock, 30% bond, 10% cash (dominant stock). The fund could also be allocated in a different weighting such as 10% stock, 20% bond, 70% cash. These choices of weighting also provide investor with degree of risk and level of return of the portfolio investment. Generally, the more weighting in stock, the more risky a portfolio will be, but the higher probability to gain the higher risk. The relationship between risk and return for three assets can be shown as below:



Figure 2.2 Asset Class Risk-Return Characteristics

2.2.1. Stock in Equity Market

Stock is the representation of ownership in a corporation in the form of common stock or preferred stock. This is a kind of asset that signifies ownership in a company and represents a claim on part of the assets and earnings of the company. There are two categories of stock, they are common stock and preferred stock. Common stock provides the owner (investor) to vote at meetings of stockholders and dividend payments. Preferred stock does not have voting rights, but absolutely has higher claim on assets and earnings than the common stock. In other words, owners of preferred stock receive dividends before common shareholders and have priority in the event that a company goes bankrupt, liquidated or default.

In the equity market, stock is a marketable and available asset to the investors. Common stocks are known as securities or equities. These kinds of stock represent ownership shares in a company (Bodie & Kane & Marcus, 2008). This is the kind of stock is yet to be focused in this research along with other kind of asset classes (bond and cash). An owner of stock (a shareholder or stockholder or equity holder) has claim to the part of the assets and earnings of a particular company. A stockholder is an owner of a company in a legal and investment point of view. Ownership is determined by the number of shares of an investor owns relative to the number of outstanding shares. Stock is the basis of almost every portfolio of investment. Stock is historically and usually has outperformed other asset classes in the long term time horizon.

It is the capital market where shares are issued and traded either through exchanges or over-the-counter markets. It is one of the most important activity and aspect in an economy as it provides companies with access to capital and investors

with ownership in companies and potential of gains based on the company's future performance. Stocks are listed and traded on stock exchanges which are entities a corporation or mutual organization specialized in the business of bringing buyers and sellers of the organizations to a listing of stocks and securities together. The stock market in the United States includes the trading of all securities listed on the NYSE, NASDAQ, and the Amex. European examples of stock exchanges include the London Stock Exchange, the Deutsche Börse and the Paris Bourse, now part of Euronext. In Indonesia the stocks are marketable and available at BEI (Bursa Efek Indonesia or Indonesia Stock Exchange).

Each of stock exchanges in the world has its own index that reflects the price movement of the market. As the NYSE has its Dow Jones, Japan Stock Exchange has its Nikkei as the price index, and then in Indonesia the price index of BEI is JCI (Jakarta Composite Index). The JCI comprises hundreds of stocks listed in the exchange which are available to the investors to be traded to amongst them. Some of the stocks listed in the BEI within the JCI stocks set were considerably liquid in daily trading. These stocks are pooled into one specific index called LQ-45, because it comprises 45 liquid stocks. In this research, the stock selection will be conducted and used LQ-45 as the stock population which needs to be filtered in to the process of asset and portfolio selection.

2.2.2. Bond in Fixed Income Market

Bond is a kind of debt security in which the authorized issuer owes the holders a debt and, depending on the terms of the bond, is obliged to pay interest (the coupon) and/or to repay the principal at a later date, termed maturity. It is a formal contract to repay

borrowed money with interest at fixed intervals (Sullivan, 2003). Bond is issued by a private or government in order to raise the fund for specific reasons. It could be for capital expenditure, business expansion, covering deficit or something else which should be related to the institution's activity and productivity.

Bondholder is a creditor whereas stockholder is company's owner. Bond is usually higher in level of security compared to stock. However the level of returns also usually lower by investing in bond than stock. In common sense, bond is characterized with its stability and security. That is the main reason to recommend the inclusion of bond in the portfolio. By combining bond and stock in a portfolio of investment, the return of portfolio may be reduced slightly but in the same time also reduce the risk of portfolio investment. Share proportion or portfolio weighting can be managed and all of that will depend on investor's risk appetite. The more the risk an investor can burden or fine with, the more the portion of stock in portfolio can be added. On the other hand, a conservative investor may consider adding the portion of into the portfolio since it will provide investor with the less risk of portfolio.

Private and government can issue the bond in the fixed-income securities market. Private or company or corporation issues bond to finance their business activity or other company's initiatives. This kind of security is usually called corporate bond. The length of tenure prior to the maturity of corporate bond is usually less than 40 years. Corporate bond is usually listed on the exchanges and the coupon is also usually taxable (except with the new regulation applied in the Indonesia for at least up to the year of 2011). The other kind of bond security is government bond. It is a bond issued by the government itself (such as FR00002, the second series of fixed rate government bond of Indonesia). These kinds of bonds represent the safest bonds

since the Indonesia government guarantees them all. A government is usually issued and denominated in the country's own currency. Bonds issued by national governments in foreign currencies are normally referred to as sovereign bonds. Republic of Indonesia USD-denominated government bonds are considered as sovereign bond and the MTN (medium term notes) as well. The currency of these sovereign bonds is in USD and they are traded and cleared in the European exchange market.

Investors that invest in fixed-income securities or bond market are typically looking for a regular and stable return on investment. This is the reason for the importance of the bond rating in the market. Since the government bonds are countryissued, the ratings of those kinds of bonds are usually referred to the country's grade, whether it is investment grade or speculative grade. Usually the government bonds are preferred by the investor more than corporate bonds although it is not necessary. Some corporate bonds just showed the good performance and have investment grade rating from international rating companies such as Moody and Fitch. In current fixedincome securities market, there are some available corporate bonds that have investment grade, stable look and relatively secure such as HM Sampoerna Corporate bond, Indosat Corporate Bond, etc.

2.2.3. Cash in Money Market

Money market securities are usually referred to cash and others cash equivalent asset. In the simplest definition, cash is a legal tender in notes and coins (Cooper, 2004). Money market security comprises many kind of instruments such as bankers' acceptance (a bank-issued draft that will be accepted for payment, effectively the

same as a cashier's check), certificate of deposit (a time deposit of a bank with a specific date of maturity), repurchase agreements(a kind of short-term loans which normally less than two weeks), commercial paper(an unsecured promissory notes with a fixed maturity of one to 270 days and usually sold at a discount), or other marketable securities with length of tenure less than one year.

2.3. Portfolio Theory

Portfolio theory is an enhance investment approach that won a Nobel Prize for its author in 1990. It enables investors to classify, estimate, and control both the type and amount of expected risk and return as measured statistically. This approach usually called as "Modern Portfolio Theory" or "Portfolio Management Theory."

2.3.1. History And Background

Portfolio theory originates from conventional security analysis in changing emphasis from analyzing the timing and value of individual investments to determining the statistical movement of price relationships between the individual securities that comprise the overall portfolio. In March, 1952, Harry Markowitz wrote and published an article entitled "Portfolio Selection," (Markowitz, 1952) which explains how to combine assets into efficiently diversified portfolio. In 1990 he entitled to the Nobel Prize in Economics for this theory. This theory explained that investors failed to account correctly for the covariance among security returns. Holding securities that tend to move in concert with each other does not lower one's risk. It means the average risk of a portfolio is not the average of the individual asset of the portfolio if all of their values move in tandem or in concert with each other. Therefore, what was

perceived to be the low risk portfolio could be ended up with a high-risk portfolio. Modern portfolio theory embodies concepts that have been employed succesfully by fund managers for that last few decades in the market (Vince, 1996).

2.3.2. Return and Risk

The fact that there is strong relationship between risk and return on the investment is a very significant factor for the decision that investors made. When facing investment decision, there should be an offer of a return that is at least as high as the return on a similarly risky investment on financial markets. It means, for every level of return on the investment made, there should be risk contained within it (Richard and Stewart and Franklin, 2008). Statistically, return on investment usually stated as expected return. It is the weighted average of possible outcomes where the weights represent the outcome probabilities.

On the other side, risk is the possibility of loss in the future as may deviate from the investor's expectation or hope. That is the reason risk and standard deviation terms were used as similar in most literature. There are two major kinds of risk, they are universal (market or systematic or non-diversifiable) risk, and unique (firm or unsystematic or diversifiable) risk. Universal risk is a risk that affects a large number of assets in the whole country or area of an economy. Uncertainties and volatility in the general economy, such as GDP, interest rates, inflation, unemployment could severely affect significantly the universal risk. Market risk cannot be eliminated by holding whatever well-diversified portfolio because this risk is non-diversifiable in nature. On the contrary, unique risk affects only a single or specific firm or a small number of firms. Uncertainties in the certain industries regulation, labor contracts or

suppliers are part of unsystematic risk concern. Unique risk describes specific risk related to the market and can be diversified away. It can be reduced significantly from the investment by constructing a well-diversified portfolio (Fischer and Jordan, 1991). The relationship between the universal risk and unique risk is described below :



Figure 2.3 Relationships between Number of Assets and Standard Deviation

In common sense, it can be stated that the larger the number of assets combined or pooled in a portfolio of investment, the smaller the total portfolio risk can be although the market risk (non-diversifiable risk) is irrelevant. In other words, forming the welldiversified portfolio can eliminate the unsystematic risk.

2.3.2.1.Expected Return and Mean

Expected return is the weighted-average most likely outcome in theory of probability. In other words, it is the average of a probability distribution of possible returns (Barron, 1991). It is perceived to mean the statistically obtainable return based on

historical data and future probability assumptions over some period of time. Expected returns are perceived also as theoretical returns. The expected rate of return is the level of return that a realistic investor attempts to maximize at certain accepted level of risk (Damodaran, 2002). This definition can also be explained and formulated mathematically as below:

Where:

 $E(r_p)$ = expected return of the portfolio

- w_i = weighting or portion (share) of asset in the portfolio
- r_i = expected return of asset i in the portfolio
- n = number of assets combined in the portfolio

2.3.2.2.Coefficient of Correlation & Covariance

Coefficient of correlation measures the probability of two or more assets whether have movement in the same direction at the same time. The correlation coefficient of +1 implies that the value of assets move in lockstep with each other, although not necessarily by exactly equal increments. A measure of -1 means assets move in opposite directions against each other. By combining asset classes which having low correlation, volatility can be reduced while enhancing risk-adjusted rates of the return on portfolio investment. The negative correlation may give investors a good opportunity in having the effective diversification. A correlation coefficient of zero means that there is no linear relationship between the variables. (Gibson, 1996).

Covariance is measure of the variance of two variables whether move in the same mean time period. Covariance and correlation are related parameters that indicate the extent to which two random variables co-vary. For example there are two stocks in a portfolio. If both stocks are affected by the same industry trends, then their movement will tend to move together. It means both stocks are co-vary and the parameter able to measure such tendency (Levin and Rubin, 1998).

Below is the simple formula that shows relationship between coefficient of correlation and covariance of two different assets:

Where,

$\rho_{X,Y}$	= coefficient of correlation of asset X and asset Y
$\operatorname{cov}(X,Y)$	= covariance of asset X and asset Y
σ_{χ}	= standard deviation of asset X
σ_{γ}	= standard deviation of asset Y

2.3.2.3. Variance and Standard Deviation

Risk is the possibility of loss or uncertainty of future gain. Standard deviation as explained previously is the term which is actually the risk itself. It is derived from the fact that future event can not be precisely known prior to happen. Standard deviation and variance are the parameter of measurement for the volatility of portfolio investment movement. Historical variance or volatility (risk) of an asset or portfolio can be statistically calculated and measured by using standard deviation parameter. The expected rate of return on a portfolio investment can be set according to its perceived risk. If the risk is lower, then the return should be likewise. Harry Markowitz entitled with a Nobel Prize for his theory that showed that to the extent a diversified portfolio has assets that do not move together (in concert) with each other, risk is actually can be diversified away while maintaining and increasing the expected return (Fabozzi, 1999). In finance, the variance and standard deviation of expected returns are common measures of investment risk. Mathematically, standard deviation is square root of the variance itself.

 $Var[\bar{r}_{P}] = variance of portfolio$

2.3.3. Asset Allocation & Diversification

Asset allocation is the placement of fund among categories of assets in certain weight into the portfolio of investment. Asset allocation affects both risk and return and is a central concept in portfolio investment management.

The extent to which investments chosen for allocation move dissimilarly will determine whether the allocation of assets provides effective diversification (Gibson, 1996). Diversification is a method to manage investment risk of a portfolio.
Nevertheless, not all diversification is necessarily effective. If all assets in the portfolio are tend to be downtrend at the same time, and then diversification would be not effective at all. Diversification among assets that move together is ineffective diversification. Effective diversification should reduce portfolio risk and smoothes out returns. In other words, any type of diversification that reduces portfolio risk or volatility, it increases expected return of portfolio. In order to obtain an effective diversification, investor should select and combine assets that are statistically not moving together along some period of time.



Figure 2.4 Single Asset versus Portfolio Investment

From the figure above, it seems an investor can manage to select whether it is going to be merely in single asset investment (select assetX or assetY only) or in form of portfolio instead (combine assetX and assetY in certain proportion). The rational

investor should select the portfolio since the effective diversification is exist in price movement of both assets (coefficient of correlation between asset = -1). The rest, investor only needs to decide the portion or weighting of both assets in the portfolio in order to have the highest expected return possible to the investment.

2.3.4. Portfolio Management

Modern portfolio analysis differs in emphasis from conventional portfolio analysis. The previous one usually gives more focus on risk-and-return estimates whereas the latter emphasizes on the calculation of an intrinsic value. Portfolio management is characterized by an old and new way of portfolio problem solving.

Portfolios are combinations of assets, they are consists of set of security or asset classes (Fischer and Jordan, 1991). Conventional portfolio planning called for the selection of those assets that best fit the investor needs and desires. Otherwise, modern portfolio theory suggests that the traditional approach to portfolio analysis, selection and management may well yield less than optimum result. Portfolio management is the process of maintaining and allocating set of assets to meet the investment objectives of investor.

2.3.4.1.Basic Assumptions

Nobel laureate Harry Markowitz had made the assumptions about investor behavior in the investment framework. Those assumptions were:

- Return distributions. Investor looks at each investment chance as a probability distribution of expected rate of return of investment over a given investment horizon.

- Utility maximization. Investor behaves such that they maximize their expected utility over a given investment horizon.
- Risk is variability. Investor measures risk as the variance (standard deviation) of expected returns.
- Risk and Return. Investor makes all the investment decisions by considering only the risk and return of an investment opportunity.
- Risk aversion. Investor prefers the any investment with the lower risk if there were options available to be selected.

2.3.4.2.Portfolio Return & Volatility

The expected return with historical data is simply the average return over n years. Formula 2.1 has shown the mathematical expression for calculating expected return in given time horizon.

In world of finance and investment, the volatility is measured by variance and/or standard deviation. Standard deviation is solely square root of variance. Variance and standard deviation of expected returns are common measures of risk. Both these related measures determine the variability of a distribution of returns about its mean or average. The variance and standard deviation of returns from historical data are calculated as shown by formula expression 2.3 previously. More detail formula can be expressed as below

Where,

 R_t = return in period t

\overline{R} = average return (expected return)

As for the portfolio the expression will have to combined with the weight of each assets allocated in the investment. Below is the formula for portfolio variance expression thus also obtaining the value of standard deviation (square root of variance).

where,

- w_i = weighting of the-i asset
- w_j = weighting of the-j asset
- i,j = integer value commencing 1 to number of assets in the portfolio

This variance portfolio (portfolio standard deviation) becomes the central issue in this research since some weighting structures will be structured and compared in order to have the lowest risk possible conceived to the portfolio of investment.

The theory of Markowitz based on the following concept:

"If two portfolios have the same expected return, the one with the lower volatility will have the greater compound rate of return."

It means, by reducing variance, investors are also reducing risk that comes from volatility. Reduction of portfolio variance reduction can only be obtained through effective diversification. Actively trading or substituting securities within a portfolio

will not only lessen the potential benefits of the variance reduction but will also increase transaction costs (Papp, 1991).

2.3.4.3.Efficient Frontier

Modern portfolio theory states that diversification is a tool for the rational investors to optimize their portfolios. Markowitz theory is based on method of diversification which further visualized with the efficient frontier, the locus of all optimal risk-return of the portfolio investment (Gibson, 1996).

The return of portfolio is a random variable and consequently has an expected value and a variance whereas risk is the portfolio standard deviation of portfolio. The model assumes that investors are risk averse. An investor will accept the higher risk if, and only if compensated by higher expected return as logic consequence. In other words, an investor who eager for higher returns should willingly to burden more risk.

Every possible portfolio can be plotted in risk-return quadrant, and set of all such possible portfolios (or locus) defines a region in this space. The boundary line along the upper edge of this region is visualized as the efficient frontier or Markowitz Frontier. The set of portfolios in this Markowitz frontier line represent portfolios where is the lowest risk for a given level of return. Or can be stated as for a certain level of risk, the portfolio exist on Markowitz frontier represents the set of portfolios which offer the best possible return. In dimensions of expected return and standard deviation, the efficient frontier is a locus of efficient portfolios. The rational investors limit their selection of a portfolio to those which appear on the efficient frontier and to the specific portfolio that represents their own risk tolerance level and their target return of the portfolio investment (Kritzman,1990).

Still related with the Markowitz Theory, there is a specific term called capital allocation line (CAL). Capital allocation line (CAL) is the locus of all possible combinations of the risk-free asset and the risky asset in investment quadrant. This can be drawn only a risk-less asset involved in the portfolio of investment. By plotting the tangency portfolio within the efficient frontier (the one with the best or optimal portfolio) and the risk-free rate (represents the rate an investor would expect from an absolutely risk-free asset over a specified period of time), and then the CAL can be drawn combined with the efficient frontier as below:





The slope of CAL is the Sharpe ratio of the best portfolio, the tangency portfolio within the efficient frontier.

 $CALslope = sharpe ratio = \frac{portfolioreturn - riskfreerate}{portfoliorisk}$

Sharpe ratio indicates whether returns of portfolio are due to smart investment decisions or merely as a result of additional portfolio risk. This measurement is very useful because although one portfolio can obtain higher portfolio return, it is only as good as long as no more additional risk which burdens significantly the investment. The greater the Sharpe ratio, the better the performance of the portfolio should be. A negative Sharpe ratio indicates that a risk-less asset would perform better than the asset being analyzed.

2.4. Monte Carlo Concept and Linear Programming

The term "Monte Carlo" which was suggested by John von Neumann and S. M. Ulam, in the 1940's, refers to process simulation by using random numbers. The term Monte Carlo (a city known by its gambling casinos) originated from the fact that "numbers of chance" were used in order to solve some of the complex equations involved in the design of the first nuclear bombs.

2.4.1. History of Monte Carlo Simulation

The first documented account of Monte Carlo simulation seems to date back to Buffon's needle(1768), at when the technique was used to estimate the value of Π by throwing needles on a striped floor and counting the proportion of needles that intersect a line(Dupire, 1998).

Nowadays Monte Carlo simulation is often utilized for risk management. It use utilized to help make decisions given uncertainties in future market trends, fluctuations, and other uncertain factors. In are of finance and investment, Monte Carlo methods are used to valuate and analyze investment portfolios by simulating the

uncertainty of expected return in the future. It is first introduced into the world of finance and investment at year 1964 by David B. Hertz in "Risk Analysis in Capital Investment" (Harvard Business Review).

2.4.2. The Flaw of Average

The Flaw of Averages (Savage, 2009) states "Plans based on average assumption are wrong on average." It means, prediction which is based on the historical average value were wrong on average. In other words, using average value in order to forecast the future value of a certain variable is usually wrong in average. In simple explanation, investor can not depend on single average number in order to make investment decision in the future.

This is related to the expected return of portfolio in the future of investment portfolio that investor has. This form of the flaw of averages results from ignoring the effects of diversification and statistical dependence. This is one of the problems addressed by Harry Markowitz and Bill Sharpe in Modern portfolio Theory. As stated by Roman scholar Pliny the Elder, "The only certainty is that nothing is certain", therefore logically no accurate prediction or forecasting can be made based on single value (in this case the average) in order to make plan and decision regarding investment. What will happen in the future event can only be modeled and simulated by providing a large possible number of certain values which may occur in the future event. By this method, there may be some level of probability some numbers predicted within some range may be occurred in the future event.

2.4.3. The Advantage of Simulation

The term simulation refers to any analytical method meant to imitate a real-life system, especially when other ways are too complex or too difficult to generate. Monte Carlo simulation is a form of simulation that randomly generates values for uncertain variables over and over to simulate a model. Simulation is the other way around better than only depend on single average number (Savage, 2009). Investors need the ability to forecast and assess what its future event performance will be for their investments. In most institutions, this is done using a deterministic model, which is a model which does not consider the uncertainty inherent in all the inputs to the model. What the simulation does is to model the relationship between variables, the probability of different weighting amongst the portfolio, and to analyze the portfolio results as a complex whole.

By the advantage of powerful computer nowadays, the simulation can be done by conducting massive repetition in terms of millions of trials within very short of time. Statistically, the larger the number of trials or repetitions conducted in a simulation in order to obtain the outcomes, the smaller the level of error. The relationship between the error and the number of iterations can be seen at this formula:

Where,

 ε = standard error of the mean of the distribution.

Z = the confidence multiplier of a TWO tailed normal distribution

σ_p = portfolio standard deviation

N = number of repetitions (runs)

The larger the number of iterations (runs), the smaller the standard error, thus the higher the confidence level. In this research, the number of runs 10,000 will be conducted to populate the expected rate of return in the future event.

2.4.4.Uniform Random Number

The forecast rate of expected returns on the portfolio can be generated according to statistical distribution which defines it. In this research, since the historical values are assumed can not be accurately used to predict the future value by only using average return, then certain statistical approach will have to be applied in order to have the series of massive random number.

In this research, uniform distribution is utilized to generate those random numbers. By knowing the maximum and the minimum figures of the historical value of each asset, the random number (which in term of probability may represent the possible event in the future) can be produced and later calculated. A uniform distribution is one for which the probability of occurrence is the same for all values of population. It is also called a rectangular distribution. For example, if the number of repetition of asset X is about to be 10,000, then the probability of obtaining any one of the 10,000 possible outcomes is 1/10,000. Since all outcomes are equally probable, the distribution is uniform. If a uniform distribution is divided into equally spaced intervals, there will be an equal number of members of the population in each interval (McLeish, 2004).

2.4.5.Monte Carlo in Finance

The Monte Carlo approach can be utilized to obtain solutions to quantitative problems which need forecast and simulation. Monte Carlo approach can provide an optimal solution to an optimization problem by directly simulating the process and then calculating the statistics results. Monte Carlo simulation is a method for evaluating a model using sets of random numbers as inputs. Monte Carlo approach is often utilized when the model is complex and involves massive uncertain parameters. A simulation can be done and evaluate in a massive number of runs by using computer's processor. Monte Carlo simulation generates random numbers from certain type of distributions, generates those numbers and stores the model outcomes. This process is then being repeated many times before the results are displayed as a new combined distribution. The general approach of Monte Carlo Simulation can be described as diagram below:



This process can be actually can be done in more descriptive, mathematical or algorithmic way, but the principle of conducting simulation of Monte Carlo is just

similar with the above flowchart. Defining a domain of possible inputs is one of the input parts which are determine by the investor. In this case, it may come to decision of investor regarding the portfolio weight selection in order to have effective diversification. The next step will deal with generating random number with certain predetermined type of distribution. In this research the large number of expected returns will be generated in the basis of uniform distribution.

2.4.6.Linear Programming With Solver

A linear programming problem can defined as the problem of maximizing or minimizing a linear function subject to linear constraints. The constraints may be equalities or inequalities (Vince, 1990).

In the area of implementation, linear programming can be applied by utilizing Solver of Excel. Solver is part of a commands sometimes called as what-if analysis tools. By utilizing Solver, optimal value of certain problems of optimization can be found. Solver works with a group of cells that are related, either directly or indirectly to the formula in the target cell. Solver tries to find the values in the adjustable cells in order to generate the result specified in the target cell formula. Some constraints and requirments can be added to restrict or limit the values in the certain boundaries. These constraints can refer to other cells that affect the target cell formula. In this research, Solver will be utilized to determine the maximum return of portfolio as well as minimum risk of a certain structured weighting.

CHAPTER 3

MODEL CONSTRUCTION

3.1. Basic Framework

Managing investment portfolios is a dynamic and an ongoing process. It consists of many steps such as specifying the investor's investment objectives and constraints, developing investment strategies, evaluation of portfolio composition and performance, monitoring investor and market conditions, and finally implementing any necessary rebalancing (Fischer and Jordan, 1991). In general, the very basis of those steps can be described as below:



This research is based on theory in probability and statistics to better the decision made when dealing with risk and uncertain events in the future by building a model prior to a tool or instruments. This model is simply the derivation of IPO (Input Process Output) model framework.

37

3.2. Model Requirement

In an optimization model, there should be input and constraints definition in purpose to meet the model objective. The input can be defined by the investor together with the empirical data prior to the model execution.

3.1.1. Historical Data

Historical data is the empirical data of some asset classes as part of the input to the model. This can be done if the assets have been defined and the timeframe as well, to mention also the importance of the availability of empirical data of each asset in the market. Therefore, even in the input stage, the constraints have already been applied to the model. The figure below is the input side of the graph-based model representation:



In the historical data definition, there will 12 assets (9 stocks, 2 bonds, 1 cash) with 36 month of historical net earnings data for each asset.

3.1.2. Data Preparation

Data preparation is part of the historical data definition. But rather than merely taken from the certain sources, those are data which have already been statistically calculated prior to the model execution. There are two tasks need to be done in this part. The first task is to have the three years historical monthly net earnings of each asset selected. The second task is to have the statistically-related data based on the results obtained from the first task.

Figure 3.3 Tasks in Historical Data Definition



Maximum and minimum data are needed in purpose to generate the random data based on uniform distribution. The reason for this is to have the same probability of the value which may exist in the future from the large number of runs simulated later (Levin and Rubin, 1998). The mean average and standard deviation are actually generated in order to compare with the figures obtained from the outcomes of optimization and simulation in the next phase of this research. The mean return uses the arithmetic average for the sake of simple calculation and the relevancy as well. The standard deviation for each asset is calculated by using the standard routine

function in the excel-based tool as a representation of volatility of each asset in the past.

3.3. Model Objective

Generally there two type of objectives in the optimization model, they are maximization and minimization. The first one needs to be maximized is usually the expected return of the portfolio whereas the portfolio risk is to be minimized. Therefore, the investors need to aware and also ought to select which of both main objectives fit preference of investor. Usually the investor will fall to the final portfolio which has the highest return with the lowest risk possibly constructed. This is the challenge of the portfolio management actually.

3.2.1. Lowest Portfolio Risk

Lowest risk portfolio is the possible minimum of volatility or standard deviation that can be reached from certain diversification or portfolio weight structure. The portfolio weight structures are going to be defined in the constraints part of the model.

As formulated in the expressions 2.3, 2.4 and 2.5, the calculation of portfolio risk needs only two sets of data, they are the portfolio weight structures and the portfolio variance. The portfolio expected returns data is nothing to do with the process of calculating the portfolio risk. Since it only deals with the portfolio risk, then at this part the minimization is the only task needs to be done.



At figure 3.4, the goal is to have lowest portfolio risk possible from adjusting the weight structure. This is the part of the process in the portfolios selection.

Since no investor will know what will happen in the future, then the most rational thing to do is trying to obtain the weight structure that will have the lowest portfolio risk can be reached.

3.2.2. Highest Portfolio Expected Return

The portfolio expected return is simply had from the multiplication of weighting to the expected return of each asset selected. The expected returns of each asset are a function of random in uniform distribution.



Since there will be many weighting structures involved in the model as well as the random expected returns of portfolio, then there will be many portfolio expected returns will be populated from process described as figure 3.5.

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3.2.3. Objective Selection

The main part of the first phase of this model is the process minimizing the portfolio risk for every weighting structure defined in the constraints part of the model definition. It is the risk that needs to be minimized prior to the simulation of the random expected returns possibly constructed in the uniform distribution. The principle objective of this model is actually to have a single weighting structure which is statistically able to provide investor with the maximum portfolio rate of return on investment with the lowest risk based on the forecasted expected returns of each asset.

3.4. Model Constraint

There are boundaries in the process of optimization that model should be subjected to. Those are set to limit the process in order to have the single solution at the final stage of the model.

3.3.1. Basic Constraint

The basic constraint is applied to certain parameter in the model. In this research were applied to the weighting of portfolio constructed. In mathematical expression, the basic constraints are defined as below:

 $\sum_{i=1}^{n} w_i = 100\% \dots 3.1$

Where,

 $w_i \ge 0$ where $i = 1, 2, 3, 4, \dots n$ and i is integer.

 w_i = the series of weight structure

n = number of assets

In this expression, the w_i should be equal and greater than zero since it was assumed that no minus proportion exist in the portfolio weighting structures.

3.3.2. Conditional

The asset classes comprise stocks, bonds and cash within each of portfolio which eventually need to be selected as the best one. Prior to that, investors (both personal or fund managers) may categorize the weighting of the portfolio into several structures. The basis of categorizing the weighting is in the how much fund will be allocated in all asset classes respectively, for example how much fund in stocks, portion in bonds and rest in cash. This is actually the main best practice of fund managers in the current market, dynamic reallocating or changing the weight structures of portfolio dynamically or periodically.

This is actually part of the constraints with conditions set by the investor. In general, there about 17 weighting structures are going to be build as conditional constraints. In simple explanation, some investors are just use the terms 'dominant stocks, less in bonds and cash', or 'dominant bonds and stocks, less and rest in cash', or else. All the list of 17 weighting structures can be seen at attachment (refer to table section). All these weighting structure are going to be optimized in terms of its risk. The respective portfolio risk is going to represent the weighting structure with the lowest risk possible. The weighting structure is placed as part of the constraint in model as described below:



where j = 1 to 17 each of them represents the specific weighting structure.

3.3.3. Total Constraints

The basic and conditional constraints are combined together prior to the execution of the model. These are the whole constraints applied as the boundaries the model is subjected to:

- maximum and minimum value of expected return
- uniform distribution of random number generation
- total random series generated = 10,000
- total shares of in portfolio weight = 100%
- each of shares of weight is at minimum zero % and maximum 100%
- The 17 weighting structures as conditional constraints
- Minimum target return, in this research is set about 18% pa or 1.5% pm.

All the constraints above should be applied in AND method instead of OR. It means the solution should satisfy each of the constraints and not even single constraint is violated.

3.5. Model Format

Format of the model can be described in several ways although still explain the same meaning and the same result. In this research, the model definition can be described in

descriptive, flowchart, mathematical, algorithmic and solver depends on the need and simplicity. In this research, linear programming is simply applied by Excel's Solver.

3.4.1. Flowchart

In this research, the model is mostly described by using flowchart since it visualizes the model and relatively easier to understand and elaborate.



3.4.2. Descriptive

This is how the model is showed in descriptive way to reach the objective of investor. The objective is to find the optimal or best weighting structure with the lowest risk possible in order to deal with the uncertainty of future event by utilizing the defined historical data and powerful statistical parameter of measurement. The constraints are to build such boundaries where the model is going to be executed. The basic and conditional constrains are applied into the historical input and investors preference (in this case the 17 weighting structures of portfolio as results of optimization). The next stage of the model is to simulate the outcomes by using the defined weighting structures and random expected returns and statistically analyzed the result. Each of result will have different characteristic and proximity to the solution needed. The selected portfolio should be the one with the lowest portfolio risk but with the expected return is equal or greater than target return defined by the investor since the first time.

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CHAPTER 4

DATA ANALYSIS AND RESULT INTERPRETATION

4.1. Data Input

There are two types of relevant data for this research, first is the historical data which comprises the empirical data of asset's net earnings from the past three years in monthly period, and the second is the statistical-based data which comprises parameters such as mean or average, standard deviation, covariance, coefficient of correlation and else.

4.1.1. Asset Picking

Assets picking can be a very difficult and complex matter to do (Fischer and Jordan, 1991). That is because nobody and no single foolproof method to forecasting assets price movements in the future. Nevertheless, by examining some factors or variables, investors may perceive a better sense of future asset prices or their behavior rather than purely relying on some kind of speculation or advices from some relatives or sources.

The analytical components that most commonly utilized by equity investors to select good investment prospects might include some or many categories (Fischer & Jordan, 1991). Industrial or sector analysis may involve identification and analysis of various variables in the economy that are likely to gain superior performance. Scholars indicate that the healthiness of an asset's in particular sector or industry is as important as the performance of the individual asset itself. In other words, even the best asset located in a weak sector will probably may perform poorly because that

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sector is out of favor or some assets looked like bullish but eventually bearish instead. Each sector or industry is unique in terms of its customer base, market share among firms, industry growth, competition, regulation and business cycles (Baumohl, 2008).

There are three types of empirical data involved in the research, they are from equity market (represented by selected stocks), fixed income market (represented by selected government and corporate bonds) and money market (single instrument of cash). The list is taken from LQ-45 population list as listed in the table 4.1 as attached. Those stocks are considerably leading the industries in terms of liquidity and volume of trading. All the stocks in the population were categorized into nine sectors as stated in the table above. Therefore there should be nine representing top stocks taken from LQ-45 list of stocks.

Based on the volume and frequency together (which was stated as V x F in terms of mathematic as stated in the header part of last column), the nine top representing stocks should be BUMI, TLKM, ASII, BMRI, UNSP, UNTR, ELTY, INDF, INKP. Those stocks are representing stocks of the industry of mining, infrastructure, miscellaneous, finance and banking, agriculture, trade and services, construction, consumer goods, basic industry, respectively.

 Table 4.2 List of Selected Stocks Out of LQ-45

	CODE	COMPANY	SECTOR	VALUE(V)	FREQUENCY(F)
-	BUM	Bumi Resources Thk	Mining	250,800,000,000,000	1,131,839
		Dullin Resources for	Infractoucture	59 500 000 000 000	289 625
2	TLKM	Telekomunikasi Indonesia TDK	Initasuuciure	33,300,000,000,000	200,020
3	ASI	Astra International Tok	Misc Industry	37,600,000,000,000	252,915
	DIADI	Deak Mandid (Parcara) Thk	Finance	26,900,000,000,000	258,069
•	BMRI	Bank Manuli (Persero) Tok	Accievations	21 700 000 000 000	386 253
5	UNSP	Bakrie Sumatra Plantations Tbk	Agriculture	21,700,000,000,000	000,200
R	LINITO	Lipited Tractors Thk	Trade & Services	21,500,000,000,000	219,880
		Onneu Tractore Tex	Construction	17 500 000 000 000	211.370
7	ELTY	Bakrieland Development 10K	Construction	11,000,000,000,000	010 510
R		Indofood Sukses Makmur Tok	Consumer Goods	13,900,000,000,000	212,540
ا م		had block Concest Internet	Basic Industry	12,500,000,000,000	220,943
9	INKP	Indah Kiat Pulp & Paper Tok	TOTAL	461 000 000 000 000	3 183 434
1			I IUIAL	401,900,000,000,000	5,105,454

Below are profile summaries of selected nine stocks retrieved from Realtime Investor. BUMI stands for Bumi Resources. The company was established in 1973, and has a primary business in the hotel and tourism industry. There were unfavorable news and rumors regarding this company since it owned by Bakrie. But there were two considerations behind this asset picking, the first was the price has already been discounted significantly, and the second was there were a transition of ownership.

TLKM stands for PT. Telkom. The company represents a continuation of an enterprise owned by the government of the Dutch East Indies. This is the biggest telecommunication state-owned enterprise in Indonesia.

ASII stands for PT Astra International Tbk is now one of the largest conglomeration business group in Indonesia.

BMRI stands for Bank Mandiri. BMRI was able proceed net profit of IDR603.37 billion in 2005 or down sharply by 88.52% versus IDR5.26 trillion in 2004.

UNSP stands for United Sumatera Plantations. The history of the company can be tracked to as early as 1911, when NV Hollandsch Amerikaanse Plantage Maatschappij, a rubber plantation company was established. In 1986 Bakrie Group acquired the whole ownership from Uniroyal Sumatera Plantations, which was then owned by Uniroyal and changed the name into United Sumatera Plantations.

UNTR stands for United Tractors. It was founded in 1972 under the name of PT Inter Astra Motor Works, the company has co-operational contracts with Komatsu Forklift, John Deere Internasional and Bomag Koehring Gmbh.

ELTY stands for Elang Realty. As implied by the company's name, the company runs in the property sector. It is founded in mid-1990 under the name PT Purilestari Indah Pratama. Management of this property is in the hands of Aquila International Hotels

and Resorts Management of Singapore. In 1994, occupancy of the hotel reached a satisfactory 68.30%.

INDF stands for PT Indofood. The company products are marketed under the Indomie, Sarimi, Supermi, Pop Mie dan Top Mie brands and control 90% of the instant noodle market in Indonesia. In April 1994, Global Mark International Limited, one of the shareholders, floated US \$ 500 million worth of 3-year mandatory Exchangeable Bonds (MEB) on the Luxembourg Stock Exchange.

INKP stands for PT Indah Kiat Pulp&Paper. It was established in 1976 and was listed on both the Jakarta and Surabaya Stock Exchange in the middle of 1990. Indah Kiat is one of Asia Pulp & Paper Co. Ltd's indirect subsidiaries and one of the largest pulp and paper producer in Asia.

Bonds are another instruments included in the portfolio investment. There are two types of bonds included in this research, government bond and corporate bond. FR00002 represents the government bond and HMSP03 (HM Sampoema corporate bond) represents corporate bonds.

There are some reasons behind the selection of both bonds in this research. First is the liquidity. The maturity of FR00002 is near, which will be matured in year 2009. It made this bond easy to transact and liquid in fixed-income market. The second is Coupon-bearing bond type. FR00002 is one of the bonds with highest coupon available in current Indonesia fixed-income market. It has 14% gross coupon rate per year. As shown in the next table (table 4.4), FR00002 is still the top government bond instrument in the fixed-income market in terms of coupon rate with length of tenure less than one year. The third is the data availability. FR00002 has already traded in the market for more than three years. Therefore the historical data

are available to be retrieved and analyzed together with other instruments involved in this research. The whole list of these government bonds is available in the attachment (table 4.3).

The corporate bond is represented by HMSP03, stands for HM Sampoerna Corporate Bond. Rating-wise, bond is considered to be in the level of investment grade. It can be shown by part of documents as below:

Figure 4.1 HM Sampoerna Corporate Bond Rating Statement



Those were reasons behind the selection of FR00002 and HMSP03. Both bonds are

assumed to represent top government and corporate bonds of fixed-income market.

For money market instrument, this research only uses the government-issued money market, it is called SBI (Bank of Indonesia Certificate). The terms of the SBI used in this research was 1 month, therefore the name is SBI 1-month. The reason behind this was purely based on the total market demand for this SBI 1-month which considered as the biggest amongst all SBIs available in the money market. This can be seen at table below that mentioned SBI 1-month as the cash instrument with the highest absorbed amount at year-end 2008.

PARAMETERS of INSTRUMENTS		SBI		SBIS
Tenor	24	87	178	28
Overall Indicative Target		57	7.5	
Received Offer	44.3	4.45	6.1	0.92
Range of Bid Rate	9.25% - 11.25%	11.00% - 11.20%	11.70% - 12.00%	
Absorbed Amount	29.48	3.59	5.46	0.92
Stop Of Rate	10.90% (FA)	11.15% (FA)	11.90% (FA)	
Weighted Average SBI's Auction	10.83	11.08474	11.82	-
Return of SBIS		A-100		10.83381
Settlement Date	5-Jan-09	5-Jan-09	5-Jan-09	31-Dec-08
Due Date	29-Jan-09	2-Apr-09	2-Ju⊢09	28-Jan-09
Frequency of Auction	184	27	26	16

Table 4.4 Auction Result of SBI dan SBIS at 31 December 2008

Description: - tenor in days amount

- overall indicative target, received offer and absorbed amount in billion rupiah

- range of bid range, weighted average sbi's auction, and sbis rate of return in % (percent)

- frequency of auction in transaction unit

source : Bank of Indonesia (BI)

4.1.2. Historical Timeframe

It needs three years of monthly historical data of asset's net earnings for the research to complete the analysis and evaluation prior to obtaining the best and expected result. Three years backward can exhibit roughly three kind of world economic conditions which was totally different. By analyzing the world economic data (especially for total GDP or world output), it is obvious that the Y2006 was an uptrend year, Y2007

was a bullish year, Y2008 was the top of the peak and also the beginning of recession era, as shown by table below.

SELECTED AREAS	¥2005	Y2006	Y2007	Y2008
United States	12,397,900,000,000	13,163,900,000,000	13,811,200,000,000	14.334.034.000.000
United Kingdom	2,231,900,000,000	2,376,990,000,000	2,727,810,000,000	2,787,371,000,000
Euro Area	10,083,550,000,000	10,637,310,000,000	12,179,250,000,000	19,195,080,000,000
China	2,243,850,000,000	2,657,880,000,000	3,280,050,000,000	4,222,423,000,000
Japan	4,549,110,000,000	4,368,440,000,000	4,376,710,000,000	4,844,362,000,000
India	808,710,000,000	916,250,000,000	1,170,970,000,000	1,232,946,000,000
Indonesia	286,970,000,000	364,460,000,000	432,820,000,000	488,149,000,000
TOTAL SELECTED AREAS	32,601,990,000,000	34,485,230,000,000	37,978,810,000,000	47,104,365,000,000
TOTAL WORLD	44,433,002,000,000	48,244,879,000,000	54,584,918,000,000	60,109,392,000,000
WORLD CYCLE PHASE	RECOVERY	UPTREND	BULLISH	END of PEAK
source : tradingeconomics.com				

Table 4.5 GDP Growth Y2005-2008

National Bureau of Economic Research (NBER) of US has declared that United States had been in recession in year 2008 and several economists expressed that recovery may not appear until as late as 2011 (Foldvary, 2007). It means that the year 2008 is the starting point of the recession cycle as explained above. That completes the recovery-bullish-recession cycles of the economy, thus completes the three economic condition of the world. That is the reason behind the three years historical data retrieval that will be utilized as the main input the model.

If the world is definitely in recession, the question remains whether Indonesia has already been in recession also. While this research is being conceived, the government of Republic of Indonesia has not yet clearly declared that Indonesia already in recession although the world had has. Nevertheless, regardless Indonesia has already entered the recession cycle or not, one thing should be considered is the pattern of capital market cycle in Indonesia.

JCI (Jakarta Composite Index) represents the price movement of total equity in Indonesia capital market. This JCI movement is closely related to the movement of

GDP in certain way since it comprises hundreds of vital companies within it.



Figure 4.2 JCI Historical Prices Y2005-Y2008

JCI vehicle comprises more than 300 companies and have strong relationship with the Indonesia Gross Domestic Product (GDP). At a glance see, it can be analyzed that from the year 2005 up to year 2007, the market trend of Indonesia capital market was in bullish. Commencing year 2008, the market drop significantly. Logical consequence, it can be concluded that the year of 2006 was in a bullish year, the peak of market was in year 2007, and the drop commenced at year 2008. This might enough for the research to retrieve the last three years of historical data as a representation of three different types of capital market cycle, they are bullish, peak, bearish.

4.1.3. Additional Data Requirement

Investors are rational (Gibson, 1996) and they expect the certain rate of return on their investment portfolio for sure. Therefore they have their own target return for their investment portfolio. The target return should be different amongst investors, and it depends on investor's risk appetite and preferences. In this research, the target return

should be defined and the rate is about 18% net per annum, equal to the 1.5% per annum. Reason behind this is because at the time this research is commenced, the yield to maturity of some government bonds were about 14-16% at that time. The figure 18% is a slightly taken above the average YTM of Indonesia government bond. The other additional data needs to be considered is the risk-free rate. At year 2008, HSBC applied the rate of time deposit at level 9.25% per annum for Rupiah currency. Thus is simply assumed to be the risk-free rate for the whole parts of the research. The currency is set to Rupiah since all assets defined in the portfolio will be an onshore type of investment, it means that all funds to be allocated to the portfolio are in Rupiah currency also.

4.1.4. Data Collection

Retrieval process of data from the certain resources has been completed, now all the data are set and ready to be calculated. The last three years (2005-2008) historical net earnings data is displayed in monthly basis per asset as shown by table 4.6 in the attachment. All the data shown in the table were net earnings. It means that for stock, the figures were derived from percentage of prices changes between two consecutive months. As for the bonds, the figures were derived from the prices of bond changes between two consecutive months. It was slightly different with the SBI-1month, the percentages are calculated by simply divide the SBI-1month with twelve since one year comprises 12 months.

Back to the reason of assets picking as defined previously, one other additional reason to pick these assets together were also regarding the data availability in the current market in terms of timeframe.

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4.2. Statistical Data Calculation

The historical data, investor's target return and risk-free rate have been defined and the model is now moving to the next stage. Some parameters need to be calculated statistically prior to the optimization and simulation of the model.

4.2.1. Statistical Parameters

The model needs the statistical parameters calculated from the defined historical data such as maximum value, minimum value, mean or average and standard deviation. By using formulas and expressions as defined in previous chapter, it can be managed to provide the numbers as shown below.

Table 4.7 Statistical Parameters

Parameters	BUMI	TLKM	ASII	BMRI	UNSP	UNTR	ELTY	INDF	INKP	FR0002	HMSP03	SBI-1
Minimum	-53.56%	24.48%	-45.32%	-41.13%	-61.97%	-66.67%	-67.23%	-44.39%	-48.43%	0.62%	1.05%	0.66%
Maximum	40.20%	17.95%	33.79%	35.91%	58.33%	33.54%	122.22%	26.97%	139.32%	1.39%	1.38%	1.06%
Mean	2.24%	0.43%	1.05%	0.90%	2.76%	1.79%	3.76%	1.06%	2.83%	0.82%	1.17%	0.82%
Std Deviation	20 10%	9.30%	13.90%	13.22%	22.27%	16.07%	29.03%	14.10%	28.33%	0.17%	0.10%	0.14%

4.2.2. Coefficient of Correlation and Covariance

After the standard deviation of the historical data for each asset is defined, the twelve assets can be displayed in terms of their correlation and covariance in one table respectively. As previously described in formula expressions, the covariance, coefficient of correlation and standard deviation are all parameters in single formula. Covariance is actually the multiplication of standard deviations with its coefficient of correlation of the pair variables. It means, if the standard deviation of each assets are already known, the coefficient of correlation can be calculated, then covariance can be derived by using those both parameters.

Table 4.8 Coefficient of Correlations

ASSETS	BUMI	TLKM	ASI	RMPI	LINGS							
BUMI	1.000000	0.090074	0.411605	0.226650	UNSP	UNTR	ELTY	INDF	INKP	FR0002	HMSP03	SBL1
TLKM	0.090074	1.000000	0.615837	0 747054	0.500697	0.336622	0.356743	0.615977	0.289736	-0 686909	-0.500880	-0.403033
ASII	0.411605	0.615837	1,000000	0.716604	0.170317	0.503846	0.102783	0.352198	-0.028306	-0.238225	-0.387428	0 137386
BMRI	0.226659	0.747954	0.716694	1,000000	0.392185	0.696529	0.340343	0.617895	0.281944	-0.467562	-0 347023	-0.064465
UNSP	0.500697	0.170317	0.392185	0.263234	0.263234	0.584444	0.212763	0.478866	0.211777	-0.384160	-0.487087	0.015605
UNTR	0.336622	0.503846	0.696529	0.584444	1.000000	0.536381	0.749788	0.511952	0.451631	-0.236570	-0.255489	0.217558
ELTY	0.356743	0.102783	0.340343	0 212763	0.536381	1.000000	0.248696	0.698606	0.370941	-0.425010	-0.375439	-0.035726
INDF	0.615977	0.352198	0.617895	0.478866	0.149788	0.248696	1.000000	0.297063	0.384324	-0.256742	-0.143943	0.095333
INKP	0.289736	-0.028306	0.281944	0211777	0.511952	0.698606	0.297063	1.000000	0.433811	-0.491270	-0.477787	-0.079515
FR0002	-0.686909	-0.238225	-0.467562	-0.384160	0.451631	0.370941	0.384324	0.433811	1.000000	-0.123398	0.010462	-0.126499
HMSP03	-0.500880	-0.387428	-0.347023	-0 487087	-0.230370	-0.425010	-0.256742	-0.491270	-0.123398	1.000000	0.480114	0.724363
SBI-1	-0.403033	0.137386	-0.064465	0.015605	0 217550	-0.375439	-0.143943	-0.477787	0.010462	0.480114	1.000000	-0.002844
				0.010000	0.217000	-0.035726	0.095333	-0.079515	-0 126499	0 724363	-0.002844	1.000000

Table 4.9 Covariance

POOD LUNCDOD L COLL
RUUUZ HMSPUS SBF1
1.000239 -0.000102 -0.000116
000038 -0 000036 0 000018
000112 -0.000049 -0.000013
000088 0.000055 0.000003
1000091 -0 000058 0 000069
000118 -0.000061 -0.000006
000129 -0.000642 0.000640
at000120 A 0000081 A 000016
000003 0 000001 0 000002
000001 0 000001 0 000000
000002 0 000000 0 000002

4.2.3. Scenarios of Weighting

There are about 17 possible weighting structures which investors need to select.

WEIGHTING STRUCTURES#	CONDITIONAL CONST	RAINTS &	BOUNDARIES
1	Portfolio comprises with merely stocks		
2	Portfolio comprises with merely bonds		
3	Portfolio comprises with merely cash		
4	Share of stock ≥ (bond + cash)	AND	share of bond ≥ cash
5	Share of stock ≥ (bond + cash)	AND	share of bond ≤ cash
ß	Share of bond ≥ (stock + cash)	AND	share of stock ≥ cash
	Share of bond ≥ (stock + cash)	AND	share of stock ≤ cash
8	Share of cash ≥ (stock + bond)	AND	share of stock ≥ bond
0	Share of cash ≥ (stock + bond)	AND	share of stock ≤ bond
	Share of stock = share of bond	AND	share of bond = share of cash
10	Share of stock \leq (bond + cash)	AND	share of bond ≥ cash
11	Share of stock ≤ (bond + cash)	AND	share of bond ≤ cash
12	Share of bond \leq (stock + cash)	AND	share of tock ≥ cash
13	Share of bond \leq (stock + cash)	AND	share of stock ≤ cash
14	Share of cash \leq (stock + bond)	AND	share of stock ≥ bond
15	Share of each < (stock + bond)	AND	share of stock ≤ bond
16	Share of cash a shock to bondy	is the weig	hting with the lowest risk)
47	The etvie (nas no specific fue, but are anget		

Table 4.10 The Possible 17 Weighting Structures

Each of those weighting structures yet still in verbal description of the investor. They need to be quantified in terms of value respectively. By using excel-based tool called Solver, the figures can be provided even to each asset as defined previously. This is the part where the risk minimization takes place for each of the weighting structure.

4.2.4. Risks Minimization

Stocks comprises nine selected assets, bonds comprises two (government and corporate bond), and SBI-1month represents cash. Each of the weighting structure (17 possible structures) will have different share or portion for each 12 asset. Solver found the weightings by conducting risk minimization to all weighting structures. This table below is the result of risk minimization process done by solver with 32,767 times of trials (repetitions).

			-		The second se	-										
WGT	BUMI	TLKM	ASI	BMRI	UNSP	UNTR	ELTY	INDF	INKP	FR0002	HMSP03	581-1	STOCK	BOND	CASH	RISK
1	10.58%	80.28%	0.00%	0.00%	0.00%	0.00%	0.38%	1.79%	6.97%	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%	8.466401%
15	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	7.80%	92.20%	0.00%	0.00%	100.00%	0.00%	0.100365%
H÷-	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%	100.00%	0.143359%
H÷-	0.00%	30.00%	0.00%	0.00%	0.00%	0.00%	0 19%	0.93%	3,439	50.00%	0.00%	0.00%	50.00%	50.00%	0.00%	4.196487%
L	3.55%	138.84.96	0.00%	0.00%	0.0070	0.00%	0.150	0.930	3 4894	25 00%	0.00%	75 00%	50.00%	25.00%	25.00%	4.214640%
5	5.53%	40.02%	0.00%	0.00%	0.00%	0.00%	0.13%	0.02%	3. 40 70	23.00%	70.039	0.669	0.669	98 684	0.66%	0.065869%
6	0.30%	0.10%	0.00%	0.23%	0.00%	0.03%	0.00%	0.00%	0.00%	27.85%0	70.83%	0.00%	0.00%	67 640	31 320	0.0502819
1	0 249	0.00%	0.00%	0.17%	0.00%	0.00%	10.00%	0.00%	0.00%	0.00%	67.84%	31.76%	0.41%	07.84%	31.70%	0.059381%
►÷	0.2094	0.00%	0.000	0.009	0.00%	0.00%	0.00%	0.00%	0.01%	0.00%	0.30%	99.40%	0.30%	0.30%	99.40%	0.130352%
┣-╬	0.29%	0.00%	0.00%	0.00 %	0.00%	0.000	0.0094	0.0094	0.00%	0.00%	49.65%	50.00%	0.35%	49.65%	50.00%	0.067734%
டீ	0.26%	0.00%	0.00%	0.09%	0.00%	0.00%	0.00%	0.00 %	2 219	77 3294	0.00%	1 3 3 3 3 96	33, 33%	33.33%	33.33%	2.797923%
10	3.83%	26.58%	0.00%	0.00%	0.00%	0.00%	0.08%	0.53%	2.31%	33.337	60.30%	30 319	0.419	60 38%	30 21%	0.059338%
11	0.24%	0.00%	0.00%	0.17%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	09.38%	30.21%	0.4170	09.00%	40.030	0.067505%
17	0.769	0.009	0.009	0.0094	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	49.83%	49.83%	0.35%	49.83%	49.83%	0.007333%
- 16	0.20%	0.00%	0.0070	0.00%	0.000	0.00%	0.06%	0.42%	1.70%	50.00%	0.00%	25.00%	25.00%	50.00%	25.00%	2.080900%
13	2.99%	19.82%	0.00%	0.00%	0.00%	0.00 %	0.000	0.009	0.00%	0.00%	50.00%	49.65%	0.35%	50.00%	49.65%	0.067456%
14	0.26%	0.00%	0.00%	0.09%	0.00%	0.00%	0.00%	0.00%	0.00 %	0.00%	25 00%	50 00%	25.00%	25.00%	50.00%	2.104564%
15	2.86%	19.89%	0.00%	0.00%	0.00%	0.00%	0.00%	0.48%	1./5%	0.00%	10.00%	30.40%	0.41%	60 19%	30 40%	0.059337%
16	0 24%	0.00%	0.00%	0.17%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	69.19%	30.4076	0.4170	20.09%	30.514	0.050338%
10	0.2 70	0.00 %	0.00 /0	0.50	0.000	0.0094	0.00%	0.00%	0.00%	0.00%	69.08%	30.51%	0.41%	09.08%	30.21%	0.0333336

Table 4.11 The Lowest Risks For Each Weighting Structures

It can be seen that each weighting structure has its own lowest risk in particular. That is because each of them has its own variance and standard deviation of portfolio as already defined. All those figures have yet nothing to do with the rate of expected return since it will be done in separate process prior to the simulation. The table above

can be displayed together with the verbal explanation of each weighting structure as table below. The structure number 16 has the lowest risk weighting amongst all.

WS	CONDITION	AL CONSTRAINTS & BOUNDARIES	L STOCK	BOND	CASH	LOWEST RISK
1	Portfolio comprises with merely	stocks	100 00%	0.00%	0.00%	8 46540194
2	Portfolio comprises with merely	0.00%	100.00%	0.00%	0.100365%	
3	Portfolio comprises with merely	cash	0.00%	0.00%	100.00%	0 143359%
4	Share of stock ≥ (bond + cash)	AND share of bond ≥ cash	50.00%	50.00%	0.00%	4 196487%
5	Share of stock ≥ (bond + cash)	AND share of bond ≤ cash	50.00%	25.00%	25.00%	4,214640%
6	Share of bond ≥ (stock + cash)	AND share of stock ≥ cash	0.66%	98.68%	0.66%	0.066869%
7	Share of bond ≥ (stock + cash)	AND share of stock ≤ cash	0.41%	67.84%	31.76%	0.059381%
8	Share of cash ≥ (stock + bond)	AND share of stock ≥ bond	0,30%	0.30%	99.40%	0.130352%
9	Share of cash ≥ (stock + bond)	AND share of stock ≤ bond	0.35%	49.65%	50.00%	0.067734%
10	Share of stock = share of bond	AND share of bond = share of cash	33.33%	33.33%	33.33%	2.797923%
11	Share of stock ≤ (bond + cash)	AND share of bond ≥ cash	D.41%	69.38%	30.21%	0.059338%
12	Share of stock ≤ (bond + cash)	AND share of bond ≤ cash	0.35%	49.83%	49.83%	0.067595%
13	Share of bond ≤ (stock + cash)	AND share of tock ≥ cash	25.00%	50.00%	25.00%	2.080900%
14	Share of bond ≤ (stock + cash)	AND share of stock ≤ cash	0.35%	50 00%	49.65%	0 067456%
15	Share of cash ≤ (stock + bond)	AND share of stock ≥ bond	25.00%	25.00%	50 00%	2.104564%
16	Share of cash \$ (stock + bond)	AND share of stock ≤ bond	0.41%	69.19%	30.40%	0.059337%
17	free-style (has no specific rule,	but the target is the weighting with the lowest risk)	0.41%	69 08%	30.51%	0 059338%
	veichting structure					

Table 4.12 Conditional Constraints and Lowest Risk WS

The method of obtaining the lowest risk is by utilizing solver of excel add-ins. The solver definition can be seen in the table 4.13 at the attachment, which represents the risk minimization of one weighting structure.

4.2.5. Random Number Generation

Random numbers are generated to forecast the possible value occurred in the future for each asset in the portfolio. They are defined by using uniform distribution for about 10,000 figures, represents the large number of repetitions in order to have the high level of confidence or low level of error in terms of statistics. The partial results of the random number generation can be seen at table 4.14 in the attachment section. The results are shown in partial because the 10,000 numbers are too large to be attached in this research.

4.2.6. Expected Return of Portfolio

The expected return of portfolio can be derived from the multiplication of the weighting structure and the expected return of each asset. The weighting structures have already been defined through risk minimization process and the expected returns of each asset have already been generated by random number generation in previous part. So the data has already completed in order to move on to the process of simulation.

4.2.7. Monte Carlo Basic Simulation

The basic simulation of Monte Carlo is actually done through 10,000 times of repetitions according to the large numbers generated by random function within uniform distribution. These massive repetitions are done respectively to each weighting structures as previously defined. The results of the repetitions should provide the model with all the statistical figures of each weighting structures, in this case the mean, standard deviation, minimum and maximum returns possible calculated and simulated.

Each of the simulation to the respective weighting structure is displayed in the attachment section. The results of the simulation will be graphically displayed in terms of its statistics of the end results, for each of the weighting structures. The tables are similar since the processes are all the same for each weighting structures, only the variables are different such as the weighting, and the expected rate of return of each asset in the portfolio of investment. As for sample, the outcome of the first weighting structure is analyzed by constructing about 100 bins in order to see the pattern of portfolio expected returns distribution for this weighting structure.
Table 4.15 Simulation Result : Weighting Structure 1

ITERATION	RETURN	RISK				- · · · · · · · · · · · · · · · · · · ·	
1	-11.700503%	8.466401%	#	BINS	COUNTS	SCALE	TOTAL
2	21.158751%	8.466401%		-28.410465%	1	0.017885	0.000100
3	-19.173581%	8.466401%	2	-27.851324%	0	0.000000	0.000100
4	-15.146648%	8.466401%		-27.292184%	2	0.035769	0.000300
5	11.901303%	8.466401%	- 4	-26.733043%	2	0.035769	0.000500
6	-9.549030%	8.466401%		-26.173903%	5	0.089423	0.001000
7	19.808932%	8.466401%		-25.614762%	5	0.089423	0.001500
8	6.657370%	8 466401%	/	-25.055622%	4	0.071538	0.001900
9	7.872280%	8.466401%	0	-24.496481%	16	0.286153	0.003500
10	12.424001%	8 466401%	9	-23.937341%	19	0.339807	0.005400
11	-5.830677%	8 466401%	10	-23.378200%	16	0.286153	0.007000
12	-4.673872%	8 466401%	11	-22.819060%	23	0.411346	0.009300
13	12 231674%	8 466401%	12	-22.259919%	27	0.482884	0.012000
14	-8 230867%	8 466401%	13	-21.700779%	20	0.357692	0.014000
15	3 163263%	8 466401%	14	-21.141638%	24	0.429230	0.016400
15	-15 350464%	8 466401%	15	-20.582498%	38	0.679614	0.020200
17	-4 694606%	8 466401%	10	-20.023357%	37	0.661730	0.023900
19	-9.183007%	8 466401%	1/	-19.46421/%	59	1.055191	0.029800
10	-9.18309276	8.466401%	18	-18.905076%	58	1.037306	0.035600
19	0.32363476	8.400401%	19	-18.345936%	64	1.144614	0.042000
20	9.2030/8%	8.466401%	20	-17.786795%	76	1.359229	0.049600
21	21.105035%	8.466401%	21	-17.22/654%	76	1.359229	0.057200
22	-0.539927%	8.466401%	22	-16.668514%	83	1.484421	0.055500
23	8.953261%	8.466401%	23	-16.1093/3%	97	1./34805	0.075200
24	4.031924%	8.466401%	24	-15.550233%	96	1./16921	0.084800
25	-7.856506%	8.466401%	25	-14.991092%	110	1.967305	0.095800
						1 005767	
9977	7.749477%	8.466401%	77	14.084215%	106	1.895767	0.091400
9978	-6.320813%	8.466401%	78	14.643356%	100	1.095/0/	0.902000
9979	17.462346%	8.466401%	/9	15.202496%	100	1.700439	0.912000
9980	18.131973%	8.466401%	80	15./6163/%		1.905190	0.923100
9981	-7.224158%	8.466401%	81	16.320777%	76	1.302300	0.931300
9982	-15.792929%	8.466401%	82	16.879918%	70	1.539229	0.939100
9 983	18.757628%	8.466401%	83	17.439058%	64	1.302300	0.947.500
9984	-8.835635%	8.466401%	84	17.998199%		1.144014	0.953500
9985	-18.121087%	8.466401%	85	18.55/339%	/1	1 216152	0.901000
9986	12.042991%	8.466401%	86	19.116480%	50	1.055101	0 973700
9987	- 3.4 56056%	8.466401%	87	19.6/5620%		0 715394	0 977700
9988	2.153330%	8.466401%	88	20.234/61%	40	0.679614	0.981500
9989	-14.179571%	8.466401%	89	20.793901%	30	0.796022	0.985900
9990	15.101994%	8.466401%	90	21.353042%	25	0.700922	0.989400
9991	-7.339581%	8.466401%	91	21.912182%	35	0.023901	0.992100
9992	0.595863%	8.466401%	92	22.471323%	2/	0.40200-	0.992100
9993	14.771922%	8.466401%	93	23.030463%	21	0.375576	0.004200
9994	0.742694%	8.466401%	94	23.589604%	21	0.106731	0.997400
9995	21.531163%	8.466401%	95	24.148/45%		0.150/51	0.059700
9996	1.568729%	8.466401%	96	24.707885%	9	0.10090	0.998900
9997	-12.493075%	8.466401%	97	25.267026%	5	0.00342.	0.990400
9998	9.832246%	8.466401%	98	25.826166%		0.107300	0.000000
0000	11.821156%	8.466401%	99	26.385307%		0.00342	1 00000
10000	-9.552992%	8.466401%	100	26.944447%	i	0.01788.	11.000000
	2.202020210						

STATISTICA	LSUMMARY			Sed Deviation	Probability	UCL	LCL
Minimum	Maximum	Median	Mean	11 01%	45.10%	-0.61%	0.24%
-28.41%	26.94%	-0.26%	-0.18%	11.01/0			

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As can be seen from the above table, the 10,000 massive iterations which represent the possible expected returns on portfolio can be displayed in a simple statistical view. That view will show the investor regarding the probability of the expected rate of return of the portfolio may fall with such weighting structure. The view of the statistical result can be seen as figure below.





In above table, the absis represents the bins, which is the range distribution of expected rate of returns of weighting structure 1 portfolio. The minimum return is around -28% and the maximum return is around 27%. The ordinate represents the count or frequency of certain bin occurred. At glance see, the pattern is kind of

normal distribution, which has some level of skewness and kurtosis. These below is the WS1 statistical measurement which also will be presented by other weighting structures (the other 16 weighting structures).

- Maximum = 26.94%
- Minimum = -28.41%
- Mean = -0.18%
- Standard deviation = 11.01%

By using the statistical routine function of the excel (percentrank), the probability of some level of target return can be calculated with this weighting structure. It was stated that the target return of the investor is about 1.5% per month net. Therefore, the calculation of the probability has come to the level of 45% chance to get the level of that target return.

4.3. Optimal Result Determination

After the simulations are done to the rest of the weighting structures, then there should be about 17 outcomes of simulation which are going to be selected, regarding the one that will be the best options of all weighting structures. The complete process of optimization and simulations may provide investor with this table summary as shown in the next table.

The lowest risk of portfolio has already determined, it is the weighting structure 16. But that was historical. In terms of forecasting by using the simulation, the lowest volatility of portfolio return is actually derived by the weighting structure 2 eventually. This will be emphasized more in the efficient frontier plotting part later.

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63

Wat	Portfolio Weight Structures	Min	May	Mana			
	all stocks	-28 410/	25.0.00	mean	Stdev	r(Return ≥ 1.5%	Remarks
1	All Stocks	20.4176	26.94%	-0.18%	11.01%	45.10%	Highest probability, blobest return & risk
2	All bonds	1.02%	1.38%	1.20%	0.09%	Out of range	Highest possible return the lowest sick
3	All cash	0.66%	1.06%	0.86%	0 1 7 94	out of range	ingnest possible return, the lowest risk
4	stock ≥ bond + cas and bond ≥ cash	-13.66%	13.97%	0 38%	0.12 /0	OUL OF range	
1 e	stock ≥ bond + cas and bond ≤ cash	-13.81%	14 1194	0.30%	0.34%	4.1.40%	
	hand > stock + cas and stock > cash	0.6004	14.1170	0.36%	0.31%	43.30%	and the second
6	DOING 2 stock I can and stock 2 cash	0.09%	1.51%	1.12%	1.12%	0.10%	A set a second a second and
7	bond 2 stock + cas and stock s cash	0.77%	1.41%	1.08%	1.08%	out of range	
8	cash ≥ stock + bon and stock ≥ bonc	0.51%	1.19%	0.85%	0.85%	out of range	
9	cash ≥ stock + bon and stock ≤ bond	0.71%	1.33%	1.02%	1 0 2 %	Out of range	all the second second second second second second
10	stock = bond = cash	-8.93%	9.79%	0.54%	0 51%	41 60%	
11	stock ≤ bond + cas and bond ≥ cash	0.77%	1.42%	1.09%	1 00%	41.00%	the bishest shares price to simulation
12	stock \leq bond + cas and bond \leq cash	0.71%	1 3 3 94	1 0 7 %	1.03%	outorrange	the highest sharpe prior to simulation
	hand c stock + cas and stock > cash	-6 430	7.50%	1.0270	1.0270	out or range	
13	DONG S SLOCK I CAS AND SLOCK E CASH	-0.4376	7.58%	0.63%	0.63%	39.80%	
14	bond s stock + cas and stock s cash	0.71%	1.33%	1.02%	1.02%	out of range	a set of a second s
15	cash ≤ stock + bon and stock ≥ bonc	-6.62%	7.61%	0.65%	0.64%	40.10%	and the state of the state
16	cash ≤ stock + bon and stock ≤ bond	0.77%	1.42%	1.09%	1.09%	out of range	the lowest risk prior to simulation
17	free-style	0.77%	1.42%	1.09%	1.09%	out of range	- meny menodes has been provided by the

Table 4.32 Weighting Structures Simulation Result

As can be seen, that the first weighting structure resulted with the highest return possible but also with the highest risk although the probability of gaining the target return still there, about 45% of chance to achieve 1.5% target return per month. For rational investor, especially for risk-averse kind of investor, this can be very risky. The lowest risk resulted by the second weighting structure with bond-dominated portfolio. Although the probability of earning 1.5% target return were out of range (since the minimum is only about 1.02% and maximum is about 1.38%), but with mean average of return about 1.25, particularly for risk-averse type of investor, this is a kind of best portfolio that investor can earn.

Therefore, the selection of portfolio will fall to the second weighting structure where the proportion is zero percent in stocks, zero percent in cash, but 7.8% in FR00002 and 92.20% in HMSP03. Based on the last three years of historical asset's data, then its better to allocate the entire fund in second weighting structure. In terms of probability and statistics, this weighting structure will provide investor with lowest standard deviation of portfolio return.

4.4. Efficient Frontier Plotting

Once expected returns, standard deviation and correlation coefficients have been determined, then the list of "optimal" portfolios can be created. These portfolios lie on a graph line called the "efficient frontier," which represents the asset mix with the highest expected returns for each given level of risk. By plotting every portfolio representing a given level of risk and expected return, it can be able to trace a line connecting all the efficient portfolios, all this dots usually known as locus. This line forms the efficient frontier. Rational investors limit the selection in the efficient frontier and to the specific portfolio that represents their own risk tolerance level.

Therefore, the other way to find out the optimal portfolios is by utilizing efficient frontier using parameters of the portfolio selected. As shown by the table before, the lowest risk amongst the structures is about 0.0593% and this figure can be plotted in the area of efficient frontier in the investment quadrant. This figure below represents the efficient frontier of the optimal portfolios.

65



Figure 4.4 Efficient Frontier of The Lowest Risk WS

As shown above, the efficient frontier can be used to find out the lowest risk portfolio and the best one amongst all of then (tangency portfolio should be located in right side). Referring to the graph above, the rational investor can pinpoint a single portfolio weighting (within the area of efficient frontier) which is actually better than other optimal portfolios from some point of view (return, risk or sharpe ratio).

Anyway this is the current view by using historical data of the portfolio. The objective as initially defined in this research was to find out the single weighting structure amongst all structured weightings with lowest volatility of its portfolio return or mean. By combining the modern portfolio theory with solver and basic Monte Carlo for simulating the future event, the weighting structure with the lowest standard deviation of portfolio mean can be possibly obtained.

By only depending on historical view, the investor may finally misled selecting the portfolio with the highest sharpe ratio weighting structure or the lowest risk one, or even the highest return. By fully utilize the simulation of random data which will be probably occured in the future events (in terms of probability using uniform distribution), the decision might end up differently for the investors. As shown by table above, the weighting structure with highest sharpe ratio is located in the tangency portfolio (WS-11 at table below), but the structure with the lowest risk is shown by WS-16.

WEIGHTING STRUCTURES	CONDITIONAL	ONSTRAINTS	RISK	RETURN	SHARPE
1	Portfolio comprises all stocks		8.47%	0.81%	0.0049
2	Portfolio comprises all bonds	N. 1883 (S. 17)	0.10%	1.14%	3.7128
3	Portfolio comprises all cash	THE REP AS	0.14%	0.82%	0.3618
4	Share of stock ≥ (bond + cash)	AND share of bond ≥ cash	4.20%	0.82%	0.0117
5	Share of stock ≥ (bond + cash)	AND share of bond ≤ cash	4.21%	0.82%	0.0115
6	Share of bond ≥ (stock + cash)	AND share of stock ≥ cash	0.07%	1.07%	4.5195
7	Shareo of bond ≥ (stock + cash)	AND share of stock ≤ cash	0.06%	1.06%	4.9088
8	Share of cash ≥ (stock + bond)	AND share of stock ≥ bond	0.13%	0.83%	0.4390
9	Share of cash ≥ (stock + bond)	AND share of stock ≤ bond	0.07%	1.00%	3.3720
10	Share of stock = bond = cash		2.80%	0.82%	0.0182
11 11 11 11 11 11 11 11 11 11 11 11 11	Share of stock ≤ (bond + cash)	AND share of bond ≥ cash	0.06%	1.07%	5.0023
12	Share of stock ≤ (bond + cash)	AND share of bond ≤ cash	0.07%	1.00%	3.3879
13	Share of bond ≤ (stock + cash)	AND share of tock ≥ cash	2.08%	0.82%	0.0251
14	Share of bond ≤ (stock + cash)	AND share of stock ≤ cash	0.07%	1.00%	3.4039
15	Share of cash \leq (stock + bond)	AND share of stock ≥ bond	2.10%	0.91%	0.0655
	Share of cash ≤ (stock + bond)	AND share of stock ≤ bond	0.06%	1.07%	4.9914
10-20-20-20-20-20-10-02-20-20-20-20-20-20-20-20-20-20-20-20	free shile		0.06%	1.07%	4.9851

Table 4.33 Risk, Return and Sharpe Ratios of Each WS

From historical point of view, choice of portfolios may fall to the WS-11 and WS-16. Nevertheless, using the simulation to forecast the future events, the weighting structure with lowest standard deviation of its portfolio mean is eventually the WS-2.

CHAPTER 5

CONCLUSION & ADVICE

5.1. Conclusion

The research has come to a certain conclucion based on the three issues which mentioned in the very beginning part of this thesis. These below three points are the concluded solution of all those issues:

- 1. Stocks can be allocated much in a portfolio of investment but it should be done in a way that do not harm or jeopardize the portfolio as whole in terms of its risk or volatility. After assessing the high volatility of some asset classes which had been pooled together within an investment portfolio, it surely does not very wise for investors to keep the portfolio weighting in dominant stock instead of dominant bond or cash. By making the decision to switch the portfolio into much more in bond or cash, the risk of portfolio can be significantly reduced but also in the same time limited the potential return of portfolio that can be earned. As for the risk-averse type of investor, the dominant bond and cash may be more preferred.
- 2. As the portfolio should be dominated by the fixed income instrument, then the next issue will be the share figure for each one of them. Based on the calculation done in this research, the best structured weighting should be the number two (WS-2) since it can provide investors with lowest risk of its forecasted mean return. The choice of portfolio comprises zero percent in stocks, zero percent in cash, but 7.8% in FR00002 and 92.20% in HMSP03.

68

3. The world market is now in recession and people are currently living in it. Prior to the recession, investors are all enjoying the great earnings they have got from trading stocks and other high-risk instruments when market is in bullish trend. Therefore, if it merely based on the historical figure or nothing to do with the forecasting figures of the returns, then investors should have different choices of best portfolio. Based on the risk minimization process, the investor should be selecting the one with the greatest sharpe ratio of all structured weightings, that is the 11th WS. It comprises 0.41% stocks, 69.38% bonds and 30.21% cash. The portfolio risk of this choice of portfolio is the lowest among them all but with the highest level of sharpe ratio.

5.2. Advice

Modern portfolio theory combined with the optimization-simulation basic concept is a simple but a very useful model that enables investor to find efficient portfolio. Nevertheless, surely yet it still has limitations.

The bigger the number of repetition, the smaller the error in terms of statistics. In this research, the repetitions are done up to 10,000 times. The results will probably different if the repetitions were conducted in the scale of 100,000, in millions, or even larger number. It means, the mean and standard deviation of the result could be different but at least, in this research, the proximity to the optimal solution can be earned through the selection of best portfolio weighting structure from the optimal portfolios as constructed.

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ATTACHMENTS - LIST OF TABLES



University of Indonesia

Table 4.1 LQ-45 List of Stocks

•	CODE	COMPANY	SECTOR				
1	UNSP	Bakrie Sumatra Plantations Tok	Andoulture	VALUE(V) (in bio)	FREQUENCY(F)	VxF	Selected
2	AALI	Astra Agro Lestari Tbk	Apriculture	21,700	386,253	8.38	v
3	LSIP	PP London Sumatera Tok	Agriculture	15,800	226,545	3.58	×
4	SGRO	Sampoerna Agro Tok	Agriculture	7,800	162,844	1.89	×
5	CPRO	Central Proteinaprima Tbk	Agriculture	7,800	159,7/2	1.25	×
6	BISI	Bisi International Tbk	Agriculture	3,300	132,997	0.73	×
7	INKP	Indah Klat Pulp & Paper Tok	Basic Industry	12 500	70,839	0.55	×
eĮ	CPIN	Charoen Pokphand Indonesia Tok	Basic Industry	4 700	220,943	2/6	
Ŋ	SMCB	Holcim Indonesia Tbk	Basic Industry	2 700	96,599	0.41	Î
	SMGR	Semen Gresik (Persero) Tok	Basic Industry	3,800	64 014	0.24	
1	ELTY	Bakrieland Development Tok	Construction	17.500	211.370	3.70	v
2	LPKR	Lippo Karawaci Tok	Construction	4.500	111.391	0.50	×
I	KLIA	Kawasan Industri Jababeka Tbk	Construction	1,800	126,713	0.23	×
l	CTRA	Ciputra Development Tok	Construction	1,600	63,699	0.10	×
I	INDF	Indofood Sukses Makmur Tok	Consumer Goods	13,900	212,540	2.95	v
ĺ	TBLA	Tunas Baru Lampung Tok	Consumer Goods	5,100	165,771	0.85	×
	BMRI	Bank Mandiri (Persero) Tok	Finance	26,900	258,069	6.94	×
ł	BBRI	Bank Rakyat Indonesia (Persero) Tok	Finance	27,700	219,320	6.08	×
þ	BBCA	Bank Central Asia Tok	Finance	17,500	141,227	2.47	x
7	BNII	Bank International Indonesia Tok	Finance	28,600	70,927	2.03	×
2	BBNI	Bank Negara Indonesia Tbk	Finance	8,800	145,569	1.28	×
ł	BNGA	Bank CIMB Niaga Tok	Finance	11.200	70,023	0.78	×
3	BDMN	Bank Danamon Indonesia Tok	Finance	7,100	83,925	0.60	×
4	PNBN	Bank Pan Indonesia Tok	Finance	4.800	53,656	0.26	×
s	TLKM	Telekomunikasi Indonesia Tbk	Infrastructure	59,500	289,825	17.23	۷
6	PGAS	Perusahaan Gas Negara (Persero) Tok	infrastructure	33,700	451,921	15.23	×
7	ISAT	Indosat Tok	Infrastructure	19,500	134,793	2.63	×
9	MIRA	Mitra Rajasa Tok	Infrastructure	10,100	158,096	1.60	×
8	TRUB	Trube Alam Manunggal Engineering Tok	infrastructure	10,200	146,005	1.49	×
0	DEWA	Danna Henwa Tok	infrastructure	4,500	162,268	0.73	×
1	BTEL	Bakrie Telecom Tbk	Infrastructure	4,200	118,263	0.50	×
2	BLTA	Berlian Laju Tanker Tok	Infrastructure	1,900	24,769	0.05	×
3	BUMI	Burni Resources Tok	Mining	250,800	1,131,839	283.87	+ · · ·
4	ANTIM	Aneka Tambang (Persero) Tok	Mining	42,000	717,2/1	30,13	×
5	PTBA	Tambang Batubara Bukit Asam Tbk	Mining	29,700	296,723	2.01	+
6	NCO	International Nickel Indonesia Tok	Mining	20,900	352,990	1.30	-
4	TINS	Timah Tok	Mining	14,800	330,120	2 72	Û Û
7	ENRG	Energi Mega Persada Tbk	Mining	16,900	101,500	2.75	l î
Ð	ITMG	Indo Tambangraya Megah Tbk	Mining	16,200	150 847	1 70	t û
0	MEDC	Medco Energi International Tbk	Mining	11,300	262.047	9.64	v
1	ASI	Astra International Tbk	Misc Industry	37,600	202,313	4.75	
3	UNTR	United Tractors Tbk	Trade & Services	21,600	164 021	431	×
2	BNBR	Bakrie & Brothers Tbk	Trade & Services	26,300	132 165	0.44	5 x
н	AKRA	AKR Corporindo Tbk	Trade & Services	3,400	17 443	0.0	X
5	MNCN	Media Nusantara Citra Tbk	Trade & Services	/61	1,		A

Table 4.3 List of Government Bonds

	SERIES	BOND NAMES		
1	FR0002	Fixed Rate Government Bond	MATURITY	COUPON RATE)%)
2	VR0016	Variable Rate Government Bond	15-Jun-09	14.00
3	OR 1001	Retail Government Bond	25-Jul-09	11.00
4	FR0010	Fixed Rate Government Bond	9-Aug-09	12.05
5	OR 1002	Retail Government Bond	15-Mar-10	13.15
6	FR0011	Fixed Rate Government Bood	28-Mar-10	9.28
- 7	FR0012	Fixed Rate Government Bond	15-May-10	13.55
-	FR0013	Fixed Rate Government Bood	15-May-10	12.63
-	FR0024	Fixed Rate Government Bond	15-Sep-10	15.43
	FR0014	Exed Rate Government Bond	15-Oct-10	12.00
	EB0021	Fixed Rate Government Bond	15-Nov-10	15.58
	ER0015	Fixed Rate Government Bond	15-Dec-10	14.50
14	VB0032	Vatiable Rate Government Bond	15-Feb-11	13.40
	VR0012	Variable Rate Covernment Band	25-Apr-11	11.00
14	EROOIE	Find Bate Covernment Band	25-Jun-11	11.24
15	ORION	Retail Covernment Bond	15-Aug-11	13.45
16	CRIOS	Rudal Government Bond	12-Sep-11	9.40
17	FROUZZ	Fixed Rate Government Bond	15-Sep-11	12.00
18	FR0025	Fixed Rate Government Bond	15-Oct-11	10.00
19	FR0017	Fixed Rate Government Bond	15-Jan-12	13.15
20	OR1004	Ketas Government Bond	12-Mar-12	9.50
21	FR0018	Fixed Rate Government Bond	15-Jul-12	13.18
22	VR0018	Variable Rate Government Bond	25-Oct-12	11.00
23	FR0023	Fixed Rate Government Bond	15-Dec-12	11.00
24	FR0033	Fixed Rate Government Bond	15-Mar-13	12.50
25	FR0019	Fixed Rate Government Bond	15-Jun-13	14.25
26	ORIDOS	Retail Government Bond	15-Sep-13	11.45
27	FR0049	Fixed Rate Government Bond	15-Sep-13	9.00
28	FR0020	Fixed Rate Government Bond	15-Dec-13	14.28
29	FR0026	Fixed Rate Government Bond	15-Oct-14	11.00
30	VR0019	Variable Rate Government Bond	25-Dec-14	11.21
31	VR0020	Variable Rate Government Bond	25-Apr-15	11.50
32	FR0027	Fixed Rate Government Bond	15-Jun-15	9.50
-	VR0021	Variable Rate Government Bond	25-Nov-15	11.00
귻	VR0022	Variable Rate Government Bond	25-Mar-16	11.21
-	FR003C	Fixed Rate Government Bond	15-May-16	10.75
긃	FR0028	Fired Rate Government Bond	15-Jul-17	10.00
	V80025	Variable Rate Government Bond	25-Sep-17	11.00
	VR0026	Variable Rate Government Bond	25-Jan-18	11.00
픪	590033	Eved Rete Government Bond	15-Jul-18	15.00
	VR0002	Verticitie Rote Community Bond	25-Jul-18	11.00
	FR0021	These Rate Concernment Bond	15-Aug-18	11.60
-	PROUSE	Filled Kate Government Bond	25-Aug-18	11.50
42	VROUZE	Variable Rate Government Bond	15-Sep-18	9.00
43	FROOAE	Fixed Rate Government Bond	25-Aug-19	11.50
4	VROCZS	Variable Rate Government Bond	15-Sep-19	11.50
45	FR0036	Fixed Rate Government Bond	25-Dec-19	11.24
46	VR0030	Variable Rate Government bong	25-Jul-20	11.00
47	VR0031	Variable Rate Government Bond	15-Nov-20	11.00
48	FR0031	Fixed Rate Government Bong	15-Jun-21	12.80
49	FR0034	Fixed Rate Government Bond	15-Jun-22	12.90
50	FR0035	Fixed Rate Government Bond	15-Jul-22	10.25
51	FR0043	Fixed Rate Government Bond	15-Jul-23	9.50
52	FR0046	Fixed Rate Government Bond	15-Aug-23	11.75
53	FR0039	Fixed Rate Government Bond	15-Sep-24	10.00
54	FR0044	Fixed Rate Government Bond	15-Sec-25	11.00
55	FR004C	Fixed Rate Government Bond	15-Sen-26	12.00
58	FR0037	Fixed Rate Government Bond	15-lui-27	10.25
57	FR0047	Fixed Rate Government Bond	16 Eah 28	10.00
5.8	FROD47	Fixed Rate Government Bond	15 May 37	9.75
50	FRODAS	Fixed Rate Government Bond	15-11-28	10.50
	110040		10-00-00	

Table 4.6 The Historical Data (2005-2008)

MONTH	BUMI	TLKM	ASII	BMRI	LINSD	I BOTT						
Jan-06	-11.16%	-13.79%	-8.41%	-14.82%	58 339	UNTR	ELTY	INDF	INKP	FR0002	HMSP03	SBI-1
Feb-06	-1.18%	-1.59%	-5.77%	-8.99%	40 499	-16.35%	122.22%	-8.66%	45.95%	1.03%	1.32%	1.06%
Mar-06	5.95%	11.29%	16.84%	7.41%	15 25 %	3.92%	-3.13%	-4.55%	-6.48%	1.00%	1.32%	1.06%
Apr-06	2.25%	9.42%	4.37%	10.34%	23.53%	10.69%	3.23%	5.95%	2.97%	0.99%	1.33%	1.06%
May-06	-8.79%	-8.62%	-17.99%	-11.98%	14 2994	23.86%	12.50%	26.97%	9.62%	0.96%	1.05%	1.06%
Jun-06	-6.07%	4.26%	3.40%	2.76%	B 3294	-0.92%	2.78%	-16.81%	-14.04%	1.00%	1.06%	1.04%
Jui-06	7.79%	4.45%	-1.54%	2.33%	20.22%	2.14%	-16.22%	-6.38%	-10.20%	0.99%	1.06%	1.04%
Aug-06	-9.64%	6.04%	15.62%	19.32%	-10 28%	3.70%	6.45%	19.92%	1.14%	0.95%	1.06%	1.02%
Sep-06	-1.33%	6.96%	12.16%	10.71%	8 3394	2.08%	0.00%	13.33%	3.37%	0.93%	1.07%	0.98%
Oct-06	4.05%	-0.59%	8.84%	17.20%	-2 27%	9.000	-9.09%	5.04%	-2.17%	0.86%	1.07%	0.94%
Nov-06	5.20%	17.86%	19.03%	1.83%	-2 3394	0.98%	0.00%	6.40%	4.44%	0.80%	1.08%	0.90%
Dec-06	11.11%	2.02%	-1.57%	4.50%	15 48%	1.53%	-10.00%	5.26%	0.00%	0.77%	1.08%	0.85%
Jan-07	20.00%	-6.44%	-5.41%	-11.21%	4 12%	1.00%	44.44%	-3.57%	0.00%	0,75%	1.08%	0.81%
Feb-07	12.04%	-5.82%	-5.39%	-9.71%	11 88%	2.05%	5.13%	25.18%	-7.45%	0.66%	1.09%	0.79%
Mar-07	9.92%	10.67%	-6.05%	7.53%	1 77%	6.470	14.63%	-7.69%	2.30%	0.66%	1.09%	0.77%
Apr-07	3.76%	6.60%	9.09%	23.00%	25 22%	0.4/% 8.76%	2.13%	-2.56%	-2.25%	0.67%	1.10%	0.75%
May-07	26.81%	-9.05%	13.89%	5.69%	5 56%	4.42%	4.35%	7.90%	22.99%	0.65%	1.11%	0.75%
Jun-07	33.11%	3.14%	4.90%	-1.73%	0.97%	10.469	31.23%	5.49%	8.54%	0.64%	1.11%	0.73%
Jul-07	18.68%	16.32%	10.95%	12.80%	21 71%	4 2 4 %	4./0%	17.05%	-0.88%	0.62%	1.12%	0.71%
Aug-07	-4.22%	-3.13%	-4.80%	-7.80%	-22 70%	5.91%	10.40%	1.80%	0.00%	0.65%	1.13%	0.69%
Sep-07	40.20%	1.38%	7.84%	8.46%	7 69%	1 2 3 94	-19.39%	-7.00%	-17,70%	0.70%	1.13%	0.69%
Oct-07	34.27%	-2.27%	33.79%	7.09%	29 22%	33 54%	11 32%	3,10%	1.06%	0.68%	1.14%	0.60%
Nov-07	17.71%	-5.14%	-2.34%	-5.96%	10.55%	2 74%	3 3094	14 77%	-2.13%	0.69%	1.13%	0.69%
Dec-07	6.19%	0.00%	9.20%	-1.41%	3 41%	3 1 1%	1.64%	1 0.9%	-0.70%	0.00%	1.10%	0.03 %
Jan-08	6.67%	-8.87%	-0.18%	-5.00%	10 99%	22 02%	0.00%	9 71%	0.50%	0.63%	1 18%	0.873
Feb-08	20.31%	5.95%	2.20%	-1.50%	0.99%	-0.38%	8.06%	3.54%	0.00%	0.68%	1.20%	0.66%
Mar-08	-19.48%	-1.53%	-12.93%	-3.82%	-30,20%	-5.28%	-22 39%	-20 51%	1.09%	0.76%	121%	0.56%
Apr-08	7.26%	-8,29%	-17.53%	-8.73%	-9.55%	-3 98%	-24 04%	-2 15*	25.81%	0.87%	1 73%	0.67%
May-08	21.05%	-8.47%	5.00%	0.87%	21.12%	19 92%	5.06%	23.08%	139.32%	0.87%	1.24%	0.69%
Jun-08	1.86%	-9.88%	-8.33%	-10.34%	-3.59%	-15 92%	-14.46%	-14.29%	-9 82%	0.86%	1 24%	0.73%
Jul-08	-17.68%	5.48%	17.14%	14.42%	-26.06%	-8.17%	7.04%	-5.21%	21.78%	0.79%	129%	0.77%
Aug-08	-18.52%	3.90%	-7.76%	-5.04%	-23.74%	-9.21%	-7.89%	-1,10%	-23.58%	0.85%	1.31%	0.77%
Sep-08	-41.82%	-10.63%	-17.79%	-6,19%	-33.02%	-8.70%	-32.86%	-12.89%	-32.34%	0.94%	1.34%	0.81%
Oct-08	-32.03%	-24.48%	-45.32%	-41.13%	-61.97%	-66.67%	-67.23%	-44.39%	-48.43%	1.39%	1.38%	0.92%
Nov-08	-53.56%	8.33%	9.09%	-4.49%	-9.26%	26.19%	-2.60%	-11.01%	-2.44%	1.13%	1.34%	0.94%
Dec-08	-9.90%	17.95%	3,43%	35.91%	6.12%	10.69%	-4.00%	-4.12%	-7.50%	0.86%	1.10%	0.90%
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University of Indonesia

Applying Monte Carlo..., Tumpal M. Sihombing, author, FEB UI, 2009

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0.41% 69.08% 31.51% 100.00%	30.51×	69.787	2000	000	00%	1200.1	0.00%	00%	211	0.00%	2.00%	24	٦
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Table 4.13 Solver Display of Risk Minimization

Table 4.14 Uniform Distribution Random	Numbers (partial)
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TERATIONS	12 81%	-21.61%	-28.019	BMRI	UNSP	LINTE						
7	8.51%	13.30%	24 15%	-5.30%	25.86%	-65 10	ELTY	INDP	INKP	Enonen 1		
3	10.16%	-71.85%	22.66%	-10.03%	51.20%	-43.19%	55.73%	10.66%	81.14%	1154	HMSPOI	501-1
4	29 69%	-19.77%	-41.81%	26.205	-49.45%	28.61%	10 354	-3.31%	132.67%	0.91%	1.15%	0.09%
5	39.89%	0.19%	-33.10%	5.00%	4.10%	15.31%	2405	3.90%	-40.92%	0.72%	1.06%	0.79%
6	-7 52 %	-20.07%	-11.59%	21.22	26.65%	16.63%	27.824	7.87%	-32.78%	0.84%	1.13%	0.61%
7	25,14%	12.33%	-36 63%	-15.81%	-60.46%	20.62%	60.17%	10.68%	103.74%	0.83%	1.17%	0.76%
A	23.30%	9.26%	-41.63%	15.58%	39.74%	21.69%	-50.73%	-16 02%	105.33%	1.30%	1.19%	0.91%
9	18.07%	11.71%	4.95%	-19.09%	17 74 1	15.59%	43.71%	-28.41%	116.07%	1.28%	1.09%	0.93%
10	0.74%	15.99%	-37.83%	11.00%	-19 71 -	-4.59%	-38.15%	-40.77%	-1.3/%	0.81%	1.20%	0.98%
11	-1.4/ %	-14 26 %	23.16%	-22.45%	-44.56 %	28.99%	23.56%	21.80%	-13 91%	0.94%	1,18%	0.81%
11			12.70%	33.75%	-17.59%	-10.66%	-36.95%	22.47%	79.01%	0.075	1,08%	1.03%
	-26.94%	14.16%	39.72%	-18.25%	-46.52%	-30.345	121,59%	-13.70%	-1.97%	0.22%	1 71 1	0.07%
14	1114	10.00	-13.10%	14.87%	46.04%	18 41 1	97.67%	-7.55%	72.76%	0.79%	1 36 %	0.02%
15	10 99%	17154	1.02 0	5.37%	32.02%	-37 20%	111.41%	-15.93%	75.79%	1.34%	1.13%	0.99%
	11 92%	-12 91%	1.147	-24.09%	46.23%	-55,93%	62 62 6	-0.64%	137.12%	1,70%	1,16%	0.79%
J	11,12%	-14.63%	-11 0.94	-7.58%	-15.96%	-43.29%	69 96 4	-3/.67%	13.78%	1.05%	1.31%	0.92%
19	36.42%	-4.92%	17.67%	21 556	B.95%	-54.65%	-27.19%	-34.58%	35.23%	1.18%	1.29%	C.70%
201	16.58%	9.63%	5 57%	6 124	41.98%	-63.55%	29.84	1.30 %	31.97%	1.00%	1.36%	0.80%
21	10.07%	16.44%	-23.33%	-13 30%	-37.40%	-40.22%	30.40%	-26 75%	7.076	1.36%	1.21%	0.81%
22	3.67%	2.01%	15.19%	30.67%	0 40 %	12.85%	83.56%	-2.45%	125.66%	0.00%	1.34%	0.90%
23	33.27%	13.91%	-20.80%	-31 00 %	-19.07%	-36.32%	64.41%	17.93%	-14.62%	1.18%	1.10%	0.85%
24	-2.59%	6.49%	-43.29%	-26.84%	-34 80%	19.87%	95.52%	25.76%	6.97%	0.77%	1.32%	0.85%
25	21.17*	-13.47%	-14.55%	-13.83%	30.77%	10.00%	76.66%	-7.66%	-15.15%	1.04%	1.16%	0.78%
26	-18.15	10.95%	-26.02 %	26.17%	-41.39%	-29 84%	49 19%	25.44%	65.02%	1.00%	1.13%	0.91%
27	39.76%	-7.948%	2.90%	-34.50%	-46.04%	-31.37%	17 05 0	26.30%	30.62%	0.62%	1.20%	0.99%
28	11.10%	-17464	-4.82%	11.62%	-33.34%	27.78%	115 21 %	21 100	103.34%	0.72	1.27%	0.88%
	11 76	4 26 1	0.35%	-12.87%	36.14%	6.15%	18.54%	19.79	-9 452	1.32%	1.38%	0.67%
32	-7 51 %	6 19%	-17 674	-10.23%	45.54%	20.06%	100.43%	4.50%	-16 87%	1315	1.11%	1.00%
├	43.97%	17.81%	-15 11%	12 02 4		3.31%	62.57%	25 04%	7.66%	1.07%	1.27%	0.85%
	12.93%	-14.61%	-27.90%	-23.58%	2 2 2 2 2 %	3.41%	66.87	21 38%	40.33%	0.85	1.07%	0.69%
14	23.89%	1.16%	-13.53%	-21.87	-44 110	3.68%	37.60%	-29.80%	93.30%	1.27%	1.29%	0.67%
251	-11 44 %	-20.97%	27.12%	-16 535	51.06%	-50 93%	25.06	-28.27%	116.87%	1.22%	1.18%	0.94%
26	29.71%	15.33%	-8.81%	-27 90 %	-22 65%	-25 84.	10.38	-15.14%	-29.45	0.99%	1.25%	0,73%
17	-6 67%	-12.46 %	-27.13	- 19 : 5 %	-46 94 %	19.87	48 244	1385%	22 48 %	C 88.0	1.09%	0.78%
29	. 9 00		-17 225	467	-4: 27%	- 39.94%	36 31 5	-31 22 %	-24 1:5	0.015	1 35.0	0.75%
	11.16		75 346	9.62%	-58 75	52 33	14.82	-29	-15 125	1 36 5	1 355	0.96%
	16 46 5	16 59 8	1. 41.	11616	-6: 64%	-55.02%	7.95	567	-24.96%	0.8 **	1175	0.78%
4.	- 36 59	8.96	26.615	15 74 1	- 52 0-	-3.75	-15.02	-11 32	129 65 2	: 26 -	119%	0.67%
47	10 01 5	11 59 51	-14 45%	29 68 5	192	19.00	-02 85	23.76	122.22	0 72	1275	1.01%
44	-42 43	-1.04%	. 6. 5		47	-46 15 -	77.74	112			1112	0.84%
45	-17.57	11 21%	-21 66 3	11 325	4 2 %	33.415	-2 40%	4 0.00	-10 435	1.075	1745	0.215
- 46	0 62	15.64%	22 485	-37 63	- 315	-10.24	-17 91	-21 52 %	94 07	067%	1 25%	0.73%
4*	-5127	-19 17	29.24	495	28 47%	- 36 55%	66 100	C 454	44 09%	0.95%	1 364	0.67
	11.4.4			11 11	.5 78 %	-11 10	46 30 %	22.10%	1.26.95	C.85%	1115	0.99%
	21 46 %	14.09%	-29 815	21 38%	10.17%	74 45 4	20 60 5			0.79%	1 255	0.74
951	-46 05 %	0.87%	14.08%	0.36 %	19.195	22.87%	102 21%	-19 74%	R4 51%	1125	1 1 2 %	0.86%
952	31.03*	-15 95%	-15.41%	-6.79%	-25.43%	-20.02%	40.33%	22 16%	14.38%	1,28%	1 24%	1.00%
952	-43.71%	10.78%	-10,78%	30.26%	2.04%	-6,95%	65.16%	33,30%	116.08%	0.65%	1.06%	0.88%
954	15.07%	0.69%	-1.28	32.22%	30.08%	2.52%	39.05%	22 48 %	92.37%	0.73%	1.06 %	0.85%
9551	-23.92%	-6.86%	-17.45%	-0.66%	-6.79%	24.03%	20.93%1	-29.74%	95.09%	0.94%	1.19%	0.79%
	10./07	17.20 70	-18 00 %	0 52%	54 70 %	\$ 17%	46.63%	1169%	122 19%	0.93%	1 19%	0.96%
	-17.66%	5.84%	1.56%	37.34%	-25.42%	-34.77%	-13,48%	-20.67%	65.80%	1.08%	1.37%	0.94%
959	-13.61%	11.41%	-37.99%	32.32%	-41.17%	13.24%	83.87%	-13.96%	92.25%	0.74%	1.27%	0.88%
960	-30.65%	15.84%	-29.06%	-24.68%	-51.39%	-25.12%	37.39%	15.58%	44.81%	0.66%	1.06%	Q.86%
961	-6.47%	-24.47%	-37.87%	-20.88%	-48.91%	-18.90%	99.24%	-22.69%	21.20%	1.06%	1.22%	1.00%
	-35 66 %	-1.27%	-4,94%	-8.39 %	-54.86%	-20.71%	33.13%	-21.99%	133.90%	1.13%	1.30%	0.83%
963	-11.30 %	1.94%	20.44%	9.12%	-60.80%	-46.95%	2.13%	-21.65%	10.24%	1.13%	1.0/%	0.74%
964	-7.06 %	-9.21%	-23.59*	0.34%	29.87%	-23.88%	27.01%	17.09%	73.74 74	1 29%	1 20%	0.95%
965	35.29%	-18.30%	13.09%	-5.33%	9.09%	4.19%	86 94 9	-22 56 %	44 43%	1.01%	1.07%	0.84%
266	-20,29%		3.95%	-2.72%	-66.0270	-56 90%	38 83 **	-9,10%	58 41%	0.87%	1,16%	0.87%
- 207		-1.01-5	-13.48%		0 74%	-22 145	121.22%	-30.61%	130.62%	1.31%	1.35%	0.77%
		18 00%	-34 674	0.27%	-24.04%	-14.62%	3.92%	-41.52%	65 73%	0.68%	1.33%	0.87%
971	-16.02%	23.56%	33.57%	-1.59%	-52.44%	-38.25%	-15.04%	10.96%	-22.96%	1.32%	1.25%	1.02%
971	30.96 %	15.14%	1.02%	8.70%	10.07%	3.67%	-65,07%	-14.69%	53.12%	1.10%	1.3/79	0.79%
972	29.83%	-11.16%	28.50%	-26.47%	15.33%	25.68%	21.607	-19 06 %	27.87%	1.35%	1.25%	0.85%
973	-9.92%	12.30%	5.34%	25,18%	44,60%	40.51%	1117%	13,71%	66.86%	0.83%	1.34%	0.72%
974	17.03%	13.81%	-13.64%	-23.52%	-21.0/791	1 909	77.62%	8.90%	-17.20%	0.63%	1.18%	1.01%
975	-49.77%	-6.57%	-41.86 %	24.29%	12 744	-17.48%	27.00%	-22.84%	102.77%	0.91%	1.33%	1.05%
976	-45.37%	15.18%	-12.97%		-56.06%	5.52%	46.35%	-22.39%	38.33%	1.28%	1.19%	0.85%
212	-1/.03%	-11.55%	-10 78%	8.86%	-19.27%	-64.71%	98,10%	-24.08%	-7.40%	1.13%	1.29%	0.79%
978	100 10	-1 20 %	-12.21%	20.14%	18.55%	-44.25%	-25.72%	-1.70%	55.33%	0.07%	1.06%	0.67%
980	34 56 %	.5 21%	-30.45%	19.61%	29.87%	-30.45%	43.32%	-75 776	83 154	0.64%	1.37%	1.03%
981	-45.87%	1.62%	-4.78%	-28.94%	57.97%	24.46%	-02.33	-25 25%	74.35%	288.0	1,23%	0.63%
962	-17.65%	9.94%	-19,71%	-21.66%	1.59%	10.56%	5 5 7 %	-30, 37%	92.87%	1.19%	1.31%	0.97%
983	20.01 %	11.15%	11.26%	11.07%	16.54%	9.80%	-6.14%	6.18%	-44.38%	1.28%	1.33%	0.83%
984	-25.89%	-21.63%	16,00%	30.45%	58 15%	-59.35%	-44.11%	-1.55%	77.86%	1.18%	1.15%	1.03%
985	-42.80%	6.09%	-6,53%	27 014	17.85%	-45.56%	26.07%	16.82%	-23.11%	0.82%	1.78%	0 78%
906	-10.23%	/.87%	0 10%	-36 16%	18.42%	16.30%	110.24%	2.69%	61 18%	127%	1.06%	0.95%
907	19.18%	-36 001	12 27%	4.97%	23.18%	-58.53%	-6.20%	-23.46%	38 31%	0.75%	1.25%	0.75%
900	11 62 %	-22 36 %	-7.02%	-7.47%	48.54%	-20.89%	13 31 8	-4.07%	-39.60%	1.07%	1.06%	1.02%
990	-20 76.4	11.98%	-8.38%	22.84%	23.45%	-28.97%	7 10%	9.07%	51.85%	1.07%	1.37%	0.74%
991	-23.86%	-1.58%	-4.51%	-17.60%	54.72 %	53 54 94	-51.58%	3.92%	70.24%	0.80%	1.30%	0.75%
992	-17.51%	-19.97%	2.17%	-1.69%	-0.07 %	4.18%	7.38%	15.36%	126.02%	(L89%)	1148	1 055
100	-29.09%	-12.03%	-33.40%	-26.49%	27 989	-16.18%	-15.94%	10.01%	11.40%	1 36%	1.38%	0.88%
994	4.79%	10.71%	25.48%	71 07%	24.29%	30.13%	-53.90%	14 078	48 67%	1.05%	1.23%	0.98%
995	-33.81%	4.37%	-38.88%	-10.84%	-21.44%	-65.46%	-50.83%	29 10%	71.73%	1.37%	1.08%	0.77%
996	17.27%	-12.47%	31.15%	-1.09%	-27.00%	-4.42%	0 47%	-3.01%	35.76%	277%	1.16%	1 02 %
906	-42 41%	10 594	-1.79%	-16.70%	44.57%		55.72%	26.75%	91.59%	1.14%	1.23%	0.000
999	32 034	-18 83%	30.63%	-15.75%	-14.32%	12 424	45.72%	12.33%	63.83%	0.65%	1.09	0.89 1
		11 011	4 74%	34.33%	-38,47%							

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TERATIONS	BUM	TUKH	ASII	DMD1	LINCO							
1001	-27 25%	20.15%	-14 91%	-23.61%	-36.93%	-44.53%	ELTY OD BOW	INDE	INKP	FR0002	HMSP03	581-1
1003	-17 87%	7.95%	-23.12%	-15 53%	8.86%	-31.75%	0.71%	26.55	102.06%	1.16%	1.19%	0.79%
1604	3 83%	5 25 %	-70 60%	26 04%	20 66%	-59.44%	16 48%	0.70%	4 83%	1.28%	1.37%	0 69%
1006	-16 11%	4.08%	28 75%	23 86 %	9 1 9 %	-56.16%	43 45%	-30 B1 %	64.07%	0.70%	1.37%	0 89%
1000	-41 09%	-16.34%	-10 18%	-30 53%	5.46%	-11.86%	36.62%	25.18%	68 20%	0.63%	1.18%	0.83%
1009	27.71	10.10%	-39 67%	20 48%	0.72%	26 78%	4.80%	-3.19%	21.12%	0.81%	1.38%	0.69%
1010	12.95%	5.61%	7.48%	34.11%	33.57%	32.00%	-26.45%	-32.00%	17.39%	1 18%	1.35%	0.99%
1012	361%	-22.70%	-15.57%	-24.11%	40 94%	-34 48%	20.54%	9.39%	43.66%	0.90%	1.30%	0.72 %
1013	-26 02 %	-17.25%	-17 61%	-32 91 %	-57.55%	30.98%	92.69%	-32.77%	36.23%	1.07%	1.24%	0.96%
1015	-51.38%	1.00%	-5.57%	19.02 %	17 89 4	-14.97%	16.53%	-7.00%	-6.04%	0.67%	1.16%	0.75%
10161	24.02%	12.12 %	29.82%	-14.43%	-43.01%	0.18%	74.77%	-41.97%	7.28%	0.84%	1.10%	0.85%
10181	15.35%	-18.19%	21.82%	-15.85%	7.79%	-11.44%	61.13%	-10.90%	16 42%	1.18%	1.20%	0.69 %
10191	-19.02*	10.73%	31,93%	-30.29%	52.48%	4.37%	-27 82%	-7.63%	80.66%	0.68%	1.35%	0.69%
1021	5.97%	1.71%	27.67%	-17.08%	-15.73%	-12.34%	-42 06%	31 55%	109.83%	1.18%	1.20%	0.92%
10221	-23.27%	-4.56%	-40.30%	9.53%	31 08%	12.25%	-7.71%	-16.24%	-44.70%	1.23%	1.35%	0.94%
1024	-2.34%	-0.62%	20.03%	0.67%	-33 04%	-10.96%	16.16%	23.54%	89.96%	0.91%	1.14%	0.98%
1025	-4.25%	-10.46%	-14.01%	22.34%	-28 39%	32.02%	-10.04%	25.57%	97.69%	0.99%	1.20%	0.75%
1027	18.07%	6.51%	-31.01%	-32 29%	-57 05%	24.12%	72.39%	-17.91%	15.16%	0.80%	1.20%	0.86%
1079	-36 29%	7.14%	14.47%	-11.65%	28.94%	31.04%	115.56%	15.10%	-11.19%	1.12%	1.23%	0.95%
1010	-28 61 %	-15.21%	-17.89%	-34.24%	29 75 %	-2.50%	-52.05%	26.58%	81.41%	0.62%	1.29%	0.98%
1031	-47.35%	5 46%	-19 52%	2 64%	-49 59%	-32.21%	70.79%	23.51%	136.90%	0.95%	1.37%	0.96%
1011	-15 92%	-16 53 %	23.42%	-7.54%	39.13%	-64 68%	80 19%	3.46%	30.76%	1.29 %	1.18%	0.71%
1034	0.33%	-15 47%	-4 86%	25 44 %	47 73 %	- 36.04%	19 11%	-]4.84%	43.06%	0.68%	1.35%	0.94%
10161	-11.22%	-0.87%	28.21%	-35 87%	-16 94%	31.90%	-14 94%	25.63%	75 87%	0.81%	1.18%	0.96%
1037	-40 80 %	-12 85%	-27 86%	27 51%	-58 26 -	-29 60 %	82 68%	-39.34%	6.82%	1.31%	1.08%	0.77%
1039	761	-4 28 %	30 77	1465	-51 8: >	65 65%	95 09%	9,62%	86.59%	0.63%	1.115	0.91%
1040	12 21%	-0 64 %	20 34	17.56	-19 55	-25 18	119 51%	-0.28%	1.75%	0.67%	1.20%	0.77%
1042	763	134%	23.97%	-13 195	2 49 %	-50 22 ×	-18 24%	-39.72%	-36.78%	0.95%	1.17%	0 97%
1541	-74 56 5	-12 /0	11 2751	-29 00 -		12 72	47 79%	-13.03%	63.29%	1.26%	1.29%	0.87%
1245	-17 31	-7 62	0 375	-21.09%	-40.45%	14 25 %	-59 72%	22 92*	-15.26%	1.07%	1.32%	0 93 %
1046	9 48 5	-16 12 %	-23 975	6675	46 19 %	9 29%	31 81%	-8.07%	-45,31%	1.27%	1.17%	0.95
1248	29 22	-11 92 5	-30 325	-19 27	4 75 5	-46 44%	111 84%	26.37%	32.97%	1.23%	1 29%	0 95 %
1049	13 35	-20 00 %	12 15%	25.41	47 54 5	4 31 5	78 96%	10.86%	3.00%	0.87%	1.165	0 92 %
1951	-34 02 %	2.03%	-16 25%	-30 44 -	-17 77	-7 54%	19 85	23.56%	107.00%	1.18%	1.10%	0.95
1957	4.89%	14.25%	28.44%	-33.47%	3.74%	-5 63 %	-32 93%	-24.62%	60.52%	0.72%	1.16%	0 81%
1954	-0.54%	7.60%	5.63%	20.06%	57 72 %	-13 84%	17.64%	21.33%	-2.91%	0.67%	1.13%	0.78%
1955	-41.72%	-1.37%	3.39%	-12.78%	38.78%	-5.36%	-65.29%	7.81%	80.81%	1.30%	1.19%	1.00%
1957	29.96%	-8.32%	-26.24%	-12 42%	9.25%	-6.66%	-48 23%	-26.35%	115.69%	0.67%	1.32%	0.90%
1958	1.315	0.10%	-17.44%	14.37%	-32.06%	-37.75*	-9.78%	-27.33%	101.24%	1.17%	1.36%	0.86%
1960	-8.77%	-3.33%	-18.57%	1.91%	30.58%	-16 28%	26 21%	-12.04%	2.81%	1.01%	1.27%	0.97%
1961	28.56%	11.125	3.38%	21 73%	-36 08%	40 99 %	15 46%	-2.62%	-44.59%	1.27%	1.30%	0.80%
1963	-41.91%	-15.85%	16 81%	-30.96 %	34.20%	-14.83%	25 48%	-18.49%	- 39.55%	0.63%	1.13%	0.69%
1964	-36.94 %	14.92%	-23.40%	-34.04%	6.72%	-23 15%	-31.93%	-30 82%	7.07%	0.97%	1.12%	1.02%
966	10 00 %	-6.34%	31.14%	16 15%	-2.28%	-52.08%	-14 28%	21,23%	92.99%	1.03%	1.25%	0.95%
1967	-45.46%	-22.94%	19.08%	7.37%	31.56%	14.18%	72.84%	-1.23%	108.55%	0.70%	1.15%	0.97%
1926	-50.52%	-15.81%	-28.93%	26 18%	48.59%	33.28%	32.82%	23.14%	75.92%	0.99%	1.28%	1.02%
1970	-28.83%	15.96 %	12.53%	12.82%	-49 85%	-29.44%	-48 28%	-9.81%	64.45%	0.78%	1.23%	0.74%
1972	15.64%	-12.87%	-11.53%	-11.36%	-33.53%	-65.24%	91.66%	-40.88%	52.60%	1.01%	1.32%	0.86%
1874	23.04%	-13.82	-4.34%	13.07%	21175	-23.31%	93.70%	6.48%	-41.47%	1.39%	1.07%	1.00%
1975	-30 69%	17 61%	-17.98%	8 40%	-29 86%	1.89%	-9.01%	7.42%	132.08%	1.19%	1.06%	0.74%
1976	26.80%	2.29%	7.27%	-2.71%	57.12%	5.40%	82.14%	-12.17%	96.93%	0.81%	1.23%	0.86%
1976	-16.77%	-7.95%	28.92%	-17.17%	-15 71%	-24.77%	37.14%	6.98%	136.62%	1.00%	1.32%	0.91%
1979	-48 92%	12 32%	6.28%	19.73%	43 60%	26.77%	76 82%	-33.62%	17.56%	1.15%	1.31%	0.83%
1981	12.30%	12.34%	1.94%	-6.42%	20.77	18.71%	-11.08%	14.73%	13.80%	1.32%	1.11%	0.90%
1982	-40.92%	-0.08%	30.68%	15.05%	-23.45%	62.24%	31.98%	-23.58%	104.90%	0.97%	1.08%	0.83%
1984	-48 89%	-5.85%	29.65%	11.75%	17.99%	29 16%	7.03%	-41.01%	131.39%	1.22%	1.32%	0.76%
1985	-41.21%	-10,58%	-12.09%	-21.33%	-10.41%	52.08%	81.54%	-0.99%	54.51%	0.79%	1.37%	0.67%
1987	-33.93%	6,18%	5.39%	-39.34%	41.95%	60.17%	46.49%	15.19%	29.02%	0.69%	1.16%	0.89%
1988	-38 65%	4,86%	-31.23%	-2.11%	28.60%	57.15%	80.76%	2.06%	111.04%	1.25%	1.07%	1.02%
1989	-0.43 %	14.06%	-9.62%	-31.76%	13 28%	25.70%	-62 58%	2.39%	51.89%	1.29%	1.11%	0.68%
911	Inen	8.94M	d Delm	18 25%	57.97%	1.65%	-53.49%	-7.00%	22.37%	0.87%	1.25%	0.90%
1992	13.41%	-15.95%	23.25%	24.66%	-33.24%	-16.24%	79.71%	7.41%	134.46%	0.65%	1.14%	0.98%
1994	-34.71%	8.65%	-6.79%	-6 89%	39.33%	10.13%	33.24%	-13.10%	134.82%	1.15%	1.06%	0.91%
1995	-41 20%	4 18 %	-31.13%	-10 46%	22 39%	12 12 %	-16.19%	18.21%	32.90%	1.14%	1.17%	0.75%
1997	-28.17%	-9.48%	9.99%	19 90%	31.72%	-58.25%	93.97%	-11.47%	-44.03%	1.33%	1.15%	0.94%
1998	0.25%	-11.66%	11.68%	-21.34%	-4.30%	15.61%	97.93%	-15.41%	17,48%	1.04%	1.18%	0.90%
2000	-16 99%	1.61%	0.60%	32.89%	-49.12%							

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THATIONS	BUMI	TLKM	ASII	Rent						(1)	
2000	-16.99%	1.61%	-0.60%	32.89%		UNTR	ELTY	INDE	THE P			
2001	50.155	-11.05%	-17.92%	5.31%	41.25%	-19.43%	97.93%	15.41%	37.48%	FR0002	HMSP03	SB1-1
2023	32 54%	9.70%	13.01%	-36.90%	-15.95%	-61.43%	-33.15%	-18.59%	-37.83%	0.91	1.09%	1.04%
2004	-49.05%	10.25%	-24.10%	10.13%	-23.42%	-32.43%	-20.00%	8.26%	-12 44%	1.15%	1.25%	0 69%
20065	-29.24%	-21 37%	-41.96%	33.47%	-19.03%	-22.13%	25 83%	10.17%	87.17%	0.80%	1.30%	0.93%
2007	-52.59%	-14 96 %	21.15%	31.03%	57.01%	-9.20%	-22.52%	-4.69%	9.74%	0.93%	1.35%	0 84%
2009	-19-15%	-18 29%	-0.10%	-38 54%	14.06%	-36.15%	51.57%	-41.17%	-8.18%	0.69%	1.17%	0.85%
2010	20 98%	13.30%	-3.39%	-29.76%	46.36%	30.11%	50.09%	-3.59%	28.42 %	1.08%	1.17%	0.69%
20111	24.42%	5.99%	31.06%	-13.22%	46.97%	-28.77%	94.87%	-6.71%	133.35%	1.15%	1.09%	0.93%
201 31	16.66%	-12.82%	-41.04%	-16.89%	9.00%	32.05%	49.11%	18.83%	123 93%	1.24%	1.26%	0.68%
2014	-34.42%	17.72 %	-10.68%	-23.20%	-24.58%	-63.65%	-16.45%	-13.15%	108.23%	1.14%	1.32%	0.72%
2016	-44.56%	13.77%	11.53%	22.31%	46.05%	60.08%	59 47%	-38.23%	49.20%	0.74%	1.06 %	0.93%
2017	-4 19%	-21 13%	-11.49%	-22.66%	-12.42%	-54,42%	-18.66%	-7.42%	135.91%	1.29%	1.09%	1.02 %
2018	20.19%	-23.34%	9.96%		-12.41%	-26.60%	86.99%	-28.95%	21.96%	0.77%	1.38%	0.94%
2010	20 76%	-22.09%	-40.20%	-70.79%	58 985	46 10%	101.47%	-43.79%	-17.37%	1.30%	1.09%	1.06%
2021	19.38%	-11.21%	0.03%	20.75%	-30.18%	-24.81%	-1.20%	1.00%	39.54%	0.75%	1.34%	0.92%
2023	28.21%	-16.71%	-20.43%	-14.98%	35.86%	-58.12%	-36 BO%	18.59%	62.80 %	0.68%	1.27%	0.67%
2024	-18,30%	-19.55%	-17.77%	-40.42%	41.40%	-45.69%	94 89%	-4.70%	10.64%	1.11%	1.38%	0.89%
2025	-0.59%	-13,15%	-30.35%	-3.95%	51.67%	-6-1.65%	-24.94%	-3.32%	71.33%	0.71%	1.08%	0.73%
2027	5.29%	16.28%	-21.34%	-15.98%	-61.51%	-30 24%	107.36%	13.92%	127.93%	0.89%	1.30%	0.85%
1028	25.26%	-1.34%	8.68%	-29.36%	-60.86%	24.29%	7.79%	-35.12%	21 02%	1.23%	1.11%	0.67%
2019	19,46%	11.74%	-6.09%	-33.10%	-27.56%	-27.59%	54.96%	5 425	-16.08	1.13%	1.215	0.72%
2031	31.38%	-1.89%	17.56%	26.72%	37.02%	-17.20%	-9.64%	20.92%	-16.73%	1.14%	1.24%	0.79%
2012	6,70%	12.07%	31.61%	-21 74%	-36.32%	62.94%	43.41%	-17.53%	74.39%	1 21%	1.20%	0.69%
2934	14.48 %	-11.85%]	17.30%	2.84%	51.34%	-4.15%	46.82%	-25.67%	94.99%	1 14%	1.23%	0 71
20.15	13.28%	12 14%	3.31%	34.31%	-53.33%	-7.52%	60.91%	19.27%	130.31%	1.20	1 25 %	0.94%
20.7	-46 68 %	6.96%	-11.26%	20.05%	-47.63%	18.35%	112 57%	-24.96%	128 84 %	1.205	1 22	C 9: 5
2035	-38 59 %	-12.56%	-34.85%	35.65%	5.61%	10.44%	-7.44	16.60 %	-33.00	1.36	1 185	27:
2019	29 39	-8.03%	17.91%	10 89%	52 65%	-39.02%	55.68%	13.50%	49.06	0.72	1.19%	2.7: >
2241	8.87%	6.19%	-14.00%	10.38%	4.95%	12.46%	37.59%	-37 45%	-32 59%	1 17	1.16 %	
241	-19.76 %	2.91%	11 64%	34.30%	16 81%	-43.44%	29.87%	13.18%	46.29	0.77	117	: 23
1044	17 39	8.79%	-9.30%	31.96%	22.05%	-26.21%	92.44%	24.96	58 34 %	0.91	1 145	
2545	24 13	-13.37%	-32.31%	1.19%	-59.31%	20.59%	68.59	24.46%	-41.475	0.79	25%	2.55
2:47	11.15%	-20 17%	30.70%	35.73%	-15 65%	16.62 %	-1.57	25.42	72 44%	1:45	1.164	
2:44	-15.08	0.58%	14 29 %	-36.35%	-6.99 %	-52.09	-11.5	-6.25 %	123 98%	1 27	1.04	2.002
2050	-16 53%	4.35%	32.09%	32.03%	40.42%	-59.60%	58.92%	16.90%	126.54%	0.65%	1 745	68.0
2951	- 18.46 %	-12.67%	21.84%	-11 19%	-19.79%	28.06%	10.02%	-11 74%	-41.01%	0.74	1.195	0.77%
2952	26.16%	-17.01%	1.07%	33.82%	0.93%	-45.92%	-27 39%	-14.29	136 75%	0.81%	1.29%	1.00%
2954	-13 47%	9.72%	-39.41%	11.86%	-55.43%	18.00%	-29.21%	-9.83*	101.75%	0,71%	1.22%	0.92%
2955	-51.01%	-19.95%	-16.95%	-16,79%	-27.62%	-23.48%	68,80 %	20.46%	96.92% 45.25%	0.82%	1.30%	0.93%
2957	-4.67%	-5.73%	-0.75%	-38.55%	27.52%	26.22%	-41.16 %	-26.13%	102.91%	0.66%	1.37%	0.93%
2958	-22.79%	5.58%	-22.91%	-3.90%	-59.48%	-38.20%	-44.20%	17.59%	102.75%	0.89%	1.14%	0.90%
2959	-16.57%	-11.02%	8.30%	32,34%	-37.05%	-10,15%	33.69%	-11.45%	-25.10%	1.12%	1.12%	0.96%
2961	14.41%	9.84%	25.09%	27.73%	36.46%	-19,07%	29.47%	-25.05%	68,31%	0,89%	1.28%	0.66%
2962	5.46 %	10.01%	-39.93%	-15.06%	47.34%	-11.46%	3.58%	24.34%	121.35%	0.64%	1 1 3 %	0.73%
1964	11.33%	-17.89%	10.71 1	16.65%	51.20%	-24.85%	17.95%	15.96%	104.55%	0.74%	1.17%	0.96%
2965	24.72%	-1.40%	-26.00%	-32.22%	-32.85%	-7.09%	-10 81%	17.50%	28.64%	1.17%	1.33%	0.93%
296.6	26.04%		100.00-00	-12.60%	9.07%	-9.53%	90.16%	26.19%	18,62%	1.18%	1.25%	0.68%
968	-36.13%	16.51%	27.83%	7.711	-1.74%	-21.24%	23.05%	24.31%	-46.47%	0,83%	1,27%	0.87%
19691	2124%	1.51%	5.91%	76.69%	26.34%	-26.50%	37.01 %	5,48%	63.97%	0.80%	1.37%	0.72%
2971	-40.82%	-15.04 %1	4.95%	-29.45%	-53.36%	-49.88%	-13.86%	-14.35%	30.47%	0.95%	1.17%	0.97%
2972	9.83%	-7.15%	-19.03%	-34.05%	54.01%	-19.33%	110.59%	-39.13%	-12.45%	0.95%	1.31%	0.90%
2973	12 19 1	11.46%	6.36%	18.01%	-22.59%	-22.34%	7.32%	4.80%	110.43%	1.37%	1.31%	0.75%
29751	35.64%	9.14%	29.45%	21.81%	-21.18%	5.01%	-71.71%	8.59%	68.21%	0.75%	1.11%	0.85%
2976	9.27%	17.23%	-0.08%	26 60%	-40.26%	-27.22%	37.89%	-19.65%	31.32%	0.64%	1.35%	0,78%
2978	-46.97%	10.47%	26.38%	-5.84%	29.98%	-63.63%	25 68%	15.79%	-9.43%	1.26%	1.14%	# PB.0
2979	30.28%	-22.69%	5.63%	-18.98%	21.30%	27.63%	46.75%	15.20%	41.29%	1.24%	1.37%	0.95%
2900	23.29%	13,88%	-43.86%	-11.50%	-9.13%	-30.98%	112.43%	-27.37%	62.29%	0.98 %	1.34%	1.01%
2982	-20.22%	5.36%	-23.65%	18.31%	-48.96%	-59.56%	-5.03 %	-28.61%	73.02%	1.08%	1,31%	1.00%
2983	-17.48%	17.71%	5,88%	11.48%	-29.41%	-29.66%	13.91%	-6.18%	45.22%	1.32%	1.29%	0.93%
2905	-9.09%	-5.40%	-24.42%	-26.83%	-21.10%	10.47%	74.66 %	-13.99%	13.78%	0.88%	1.24%	(1.84%
2986	22.71%	-3.36%	-40.18%	-24.78%	15.40%	-40.77%	50.73%	-37.11%	40.96%	1.21%	1,16%	0.92%
2987	-35.45%	-3.21%	-43.15%	-22.11%	-23.34%	-21.11%	-52 80%	19.33%	110.88%	1.00%	1.12%	1.05%
2989	-13.02%	-24.30%	-12.06%	-36.56%	42.15%	22.93%	19.89%	-36.28%	90.56%	0.95%	1.08%	0,70%
2990	-53.54%	8.50%	-1.92%	-28.05%	-8,57%	19.23%	19.62%	-5.81%	-17,78%	1.01 %	1.27%	0.74%
2992	-40,72%	12.16%	1.94%	11.74%	37.91%	-12 45%	74.97%	7.99%	-3.64%	1.32%	1,21%	0.88%
2593	-26.22%	-10.60%	-24 36%	-3.10%	3 50%	12.75%	-34.33%	-26.69%	12.50%	1.31%	1.24%	0.96%
1994	15.06%	-12 49%	28.26%	23.83%	19.57%	24.03%	-38.57%	-13.99%	-42.89%	0.69%	1.22%	0.89%
2996	-0.72%	14.35%	33.36%	-41.11%	43.04%	26.00%	117.76%	-16.74%	56. 30%	1.09%	1.12%	1.05%
2997	17.55%	-13.40%	19 51%	3.11%	20.05%	27.26 %	28.66%	-4.46%	132.20%	1.24%	1.33%	0.87%
2999	-11.45%	-14.10%	-35.63%	-36.54%	-11.28%	-37.63%	-64.88%	-14.27%	49.10%		1.744	
3000	8.96%	14.55%	-25.97%	-36.13%								

hitmic s	BUR:	-21 99%	12 10%	EMILT	UNSP	UNTO							
3001	-2 26%	9.88%	18.13%	-34.15%	-45.94%	20.40%	ELTY	IND/	INKP	FR0002	HINE DOD		
3001	-50 72%	-15.20%	-21 26%	-22 39%	-56 10%	24 49%	21 08%	14.51%	-28 83%	1.37%	1.28%	0.99%	
1005	36 65%	-16 13%	21.14%	-4 04 %	27 35%	24 15%	-3 07 %	14.96%	69 415	0.79%	1.09%	0.88%	
3:564	47.81	9.66%	2.12%	20 51%	56 0.7%	15 85%	62 69%	-16 79 %	120 62%	0.99%	1 22%	0.86%	
1997	-25 72 %	-17.53%	25,25%	-30 92%	32.75%	16 27 5	11 31 %	-28 28%	125.54%	0.89%	1.13%	0.94%	
1009	-12 32%	-20 116 %	-32.79%	12.46%	-2 62%	-12 74%	-18.52%	-15 17 5	49 24%	121%	1.11%	0 81 4	
3010	-30.91	-24.23%	19.91	7.12%	40.75%	-1.70%	3.85%	-25.43%	-0 10%	0.96%	1.128%	0.98%	
3012	0 48%	-22.40%	-9.17%	-15.62%	19.40%	9 24%	108.94	-3.77%	5.61%	0.65%	1.22%	0.81%	
3013	29 98%	-11.67%	-5.29%	35.45%	2.27%	16.60%	17.67%	22 56 %	31.11%	0.82 %	1.07%	0.95%	
3015	32.94%	1 91%	7.16%	7.39%	6.34%	24.09%	26 82 %	42 66%	33.73%	0 69%	1.31%	1.01%	
3016	-17 84 %	9.01%	-23.66%	-15.28%	-22.02%	-13 82%	87.13%	-34.79%	20.74%	0.74%	1.21%	0.83%	
3017	-20 17 %	2.14%	22 23%	-34.05%	50.71%	-31.74%	66 38%	12 51%	-5 17%	0.92%	1.12%	0.89%	
1019	0.33%	6.51%	20.79%	-10 06%	14,11%	26 79	22 51%	-32.07%	49.19%	0.65%	1.13%	0.70%	
1020	2 61%	-6.36%	-44.90 %	-40.12%	19.98%	17.39%	24.03%	-35.64%	-31.95%	0.66%	1.34%	0.68%	
3022	14.55%	13.17%	30 86%	30.94%	35.18%	-15 134	102.32%	-41.81%	16.35%	1.16%	1.16%	1.06%	
3023	15 87 %	8.96%	10.95%	22.83%	-37.66%	30.59%	-0.23%	19.81%	21.67%	1.22%	1.27%	0.68%	
1025	28.62%	-18.77%	-21.70%	-41.00%	41.26%	-9.23%	-24 05%	13.65%	65.17%	1.26%	1.10%	0.70%	
3026	19.40%	-20.09%	-5.27%	13.01%	-5.02%	30.12%	84.98%	-8.31%	65.87%	1.24%	1 29%	0.85%	
3028	17.03%	17.61%	6.86%	4 09%	37.40%	-28 96%	97 58%	-19.55%	130 67%	0.78%	1.12%	0.95%	
1029	6 46 %	-12.17%	27.42%	4.74%	-2.23%	-27.91%	9E 29%	-39 72%	56.17%	0.81%	1.15%	0.85%	
3031	30.15%	2.25%	4.11%	21.87%	-37 09%	-65 61%	7 69%	13.96%	104.58%	0.70%	1.21%	0.81%	
3032	-2.65%	11.47%	-6.90%	-36.22%	7.16%	13 83%	100 19%	-31.59%	31.18	1.30%	1.38%	0.89%	
3033	41.13%	-0.72%	-45.03%	21.47%	37 20%	6 07%	44 91 %	3 16%	72.68	1.13%	1 26%	0.72%	
3035	16.87%	9.34%	1.73%	-4.72%	-23.70*	10 63 %	59 71	-21 04 %	59.00%	0.85%	1.11%	0.76%	
1016	35.24%	-1.94%	-19.53%	0.745	-4.16%	-24 50%	42 15%	-22.68%	76 26%	1.15%	1.175	0 67%	
3018	-28 82%	15.76%	-41.04%	8.735	-10 19	-3 00 %	-32 42 4	-5 32 5	89 67	0 91%	1 19	0.83	
3039	-39.48%	4.27%	-33 19%	29 75	74 31 5	- 56 95 -	104 89	15 79 %	109 15%	1175	1:55	2.525	
3041	3 68 %	-2 98%	-13 05%	-18 22	32 71	21 01 5	58 25 5	-15 94 4	6 75		1 345	50 4	1.1
3042	-7.81%	2.92%	-11 115	-40 81	-53 51	-41 22 5	1.055	28 34 2	-10 05	:35	135	(38 \	10 N -
3044	-45.05%	7.91%	-2.13	-1 145	22 7:5	-1965	119 3		57 2.5		1192		
3045	35.95%	-8.78%	10 87%	-20 62	15 88	-50 16 %	-57 50 %	.2 200	76 76 %	2875	1115		7 R
3047	-24 02%	-11.16%	-23 36 -	-23 57 %	- 16 71	-48.26%	-48 72 -	1.4%	111 66	1 35%	1.85		
1048	8 6 4	0.03%	6.54	-7 92	51 52	.55 91		26 34 %	- 36 : 2 %	1105	1225	5785	1.1
3050	-19 92 %	-6 52 %	24 63	-9 46	24 55%	5 72 %	31.425	21 35	114 33%	0.66	1215		
3951	15 98%	-16.65%	-2.19	-37 09	-37 31 %	-36 01%	-11 45 %	42 38 %	41 63%	134%	1 36 %	0 4 4	1
3952	29.34%	7.20%	-14 58 %	-36.13%	-12.29%	-40.47%	53 67	-27 47%	48.74%	1.115	1.11%	0.83%	-
1954	30.87%	-15.64%	-32.10 %	7.22	11.70%	6.09%	-50 22%	-16 81 %	46 59%	1.03%	1.15%	0.97%	
1955	-17.54%	-0.44%	28.94 %	-19.35%	35.67%	30.41%	36.88%	-11.04 %	131.81%	0.71%	1.08%	0.88%	11
	-14.49%	13.15%	-23.46%	-7.32%	21.19%	-6.21%	-18.59%	-29.62%	131.93%	0.99%	1.20%	1.06%	
3958	-23.02%	-2.34%	1 12%	9.35%	-10.19%	58 05 1	-12.61%	0.31%	112.68%	1.04%	1.06%	0.79%	
1960	17.52%	7.94%	-29 56%	-11.32%	6.40%	12.62 %	8 86 %	-30.80%	87.99%	1.33%	1.28%	0.96%	
1961	1 55%	-0.17%	-14.61%	9.45%	23.93%	0.43%	89 96 %	10.23 %	90.85%	1.06%	1.12%	0.78%	1
3963	12.71%	-1.64%	-29.09%	-12.11%	-33.73%	-27.46%	10 58 %	-16.59%	-7.52%	0.91%	1.28%	0.75%	100
1964	29.81%	-11.70%	-26.11%	-19.11%	27.92%	-40.53%	2.79%	1.52%	69 46 %	1.14%	1.32%	0.74%	
39(6)	-35 06 %	4.13%	-41.22%	27.96%	-51.68%	62 59 %	5.55%	-14.59%	19.03%	1.36%	1.23%	0.90%	
3957	3.48%	- 49%	4.24%	13.68%	-17.58%	30 52 %	10.10%	-42.93%	27.47%	0.66%	1.24%	0.90%	
3969	1.04%	14.06%	4.22%	-6.30%	-24.00%	-44.86	-38.78	26.04%	92,79%	1.21%	1.32%	0.91%	
1970	-10.83%	6.08%	-7.56%	-10 32%	-14.78%	1.74%	22.11%	-3.25%	84.81%	1.16%	1.20%	0.79%	10
3972	43.58%	6.69%	-14.98%	0.13%	-59.75%	-62.82%	0.20%	-25.40%	-40.18%	1.00%	1.29%	0.77%	
1973	-7.00%	2.67%	21.86%	-18.13%	-38.58%	-17.33%	47.61%	-32.99%	12.19%	0.26%	1.29%	0.78%	
3975	31.47%	2.35%	-27.54%	18.35%	-59 86%	6 26%	17 51%	24.39%	24.03%	0.63%	1.28%	0.66%	
3976	2.87%	-2.20%	11 44%	-36,EI1%	-15.21%	14.63%	22.48%	-1.70%	99.42%	0.20%	1.33%	0.99%	
3978	-21.14%	-9.90%	-13.66%	-14.17%	-42.14%	-50.21 %	56.72%	18.84%	84.31%	0.83%	1.19%	0.91%	1
3979	-11.63%	-12.36%	6.11%	-3.64%	49.10%	-17.07%	83.57%	-18.45%	98.04%	0.82%	1.17%	0.81%	
3991	-40.44%	9.85%	-33.63%	-35,30%	12.00%	-31.94 %	-5.41%	11.38%	45.23%	1.15%	1.34%	0.70%	
3982	3 69%	-22 29%	-3.67%	-38.35%	23 50%	23.49%	48.99%	18.71%	68.54%	1.30%	1.15%	0.66%	
2880 2880	-36.11%	-4.12%	-8.10%	-4.17%	-42.02%	4.80%	-58.06%	26.84%	89.63%	12 %	111%	0.73%	
3985	11.78%	-20.32%	-25 27%	9.53%	17.60%	-14.36%	20.64%	3.14%	85.27%	1.16%	1.05%	0.87%	
1986	22.91%	-1.72%	-0.92%	-27.46%	42.52%	-21.90%	18.57%	-14.29%	80.46%	1.26%	15%	0.79%	
1988	31.94%	8.44%	29.71%	-0.67%	5.59%	31.76%	107.26%	-29.20%	-44.57%	1.23%		1.06%	
1909	-B.28%	-12.68%	744	14 15%	-16.97%	-29.78%	-48.52%	19.45%	44.93%	0.69%	1.16%	0.87%	
1991	13.34%	-10.30%	-9.93%	-18 51%	45.80%	-22 30%	61.73%	16.19%	6.29%	1.23%	1.13%	0.71%	
3992	17.44%	2.07%	16.79%	-16 81%	30.51%	54.02%	111.11%	9.62%	8 80%	1.25%	.12%	¥ 86.0	
3993	12.52%	-3.46%	25.66%	30.10%	-15.09%	4.80%	82.45%	-9.95%	0.66%	1.26%	1.32%	0.73%	
3995	-10.66 %	-5.68 %	-15.11%	2.91%	-18.00%	-43.96%	-16 96%	-17.94%	59.29%	1.00%	1.16%	1.05%	
1996	36.17%	1.85%	0.06%	-20.81%	-52.66%	47 11%	0.83%	-25.74%	112.27%	0.74%	1.23%	0.79%	1
9-49	-9 76%	-3.38%	-28.47%	-24.43%	44.31%	-21.02%	4.66%	-29.90%	44.91%	0.69%	1.29%	0.93%	1
4000	-12.92%	1.24%	-7.52%	-13.77%	-11.89%	17.85%	-3.20 76						
	1.0.0		The second se										

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TTERATIONS	(UUR1	TUKM	ASII	AMRI	INCO						-	
4001	25 85%	3.29%	-28.15	801	-36.50%	UNTR - S9 JOK	ELTY	IND	INKP	EBOORD T		
4001	-25 61 %	4 09 👟	-40 96 %	23 63	57 98%	4 00%	58 60%	-15 36 %	23.31%	0.80%	1.32%	0.88%
4234	-18 89 % I	-11 415	23 58%	-2 26%	8 33 %	10 17	107.91%	-22.71%	18 56 94	0 67%	1.16%	0.79%
4006	-52 43%	2 52 5	-32 49%	33 00 %	-23 03	27 02 %	40 25%	-7 54%	43 27%	1.35%	1 25%	1.05%
4007	-40 64 %	16 72 5	-17 14%	066%	30 13%	12 04%	41 12%	18 99%	120 72%	0 97%	1.20%	0.73 %
4009	16 52 %	8 05%	21 05 %	12 08	20 71%	25 19%	2 51%	15 93%	82 93%	0 67%	1.11%	0.22%
4010	11 15%	9.00%	-34.18%	26 94%	-29 57 5	53 46%	105.76%	39.15%	67.52%	0.87%	1.31%	0 81 %
4012	-7.60%	-18 47%	-31.12%	86%	-20 13%	4 95%	32.47%	-11.81%	87 84%	0.81%	1.33%	0.81%
4013	-40 22 %	23 48 %	-14.02 %	-13 16	38 16%	-5.73%	8.31%	27.00 %	26.30%	0.72%	1.32%	0 98 %
4014	7.93%	-18 29 %	-36 135	- 19 49%	-15 96%	-19 07%	23.09%	19 79%	-32 81 %	1.37%	1.19%	0.68%
4016	19.03%	8.81%	35.87%	-25 48%	-31.44%	-29 05%	29.34%	1.98%	42 96%	0.78%	1.31%	0.78%
4017	16.25%	-6.08%	5.63%	33.04%	59 13%	-63.41%	116.92%	19 08 %	43.37%	0 84%	1.10%	0.90%
4019	9.90%	7.00%	-19.54%	-19.75	-5.29%	30 83%	-39.73%	8 58%	8.64%	1.32%	1.34%	1.05%
4020	27.99%	-6.74%	7.39%	-9.87%	-15 24%	-26 71%	-47.46%	-3.53%	- 10 08%	1.125	1.34%	0.91%
4021	-51.33 %	-3.78%	22.17%	-14.12%	54 68%	-55 53%	100 85%	43 80%	132 68%	0.69%	1.34%	0.99%
4023	-30 47%	0.78%	5 66%	-9.12%	-57.99%	-66.21%	28 21 %	42.84%	129.17%	1.26%	1.16%	0.83%
4024	19.45%	6 49%	-10.28%	-37 58%	-59 43%	0.03%	-8.87%	-27.30%	56.88%	1.00%	1.32%	0.85%
4026	.87%	12.39%	-1155		-51.61%	-18 81%	-62 67%	-6.51%	120 51%	0.71%	1.05%	0.95%
4027	35.74%	7.94%	23 04 %	-25.00%	101%	11 42%	83 61 %	-12.34%	77.96%	0.88%	1.27%	0.90%
4029	12 63%	-11 99 % [-40 47%	5 64%	30.02%	-31.27%	49.16%	-23 54%	120 02%	0.64%	1.09%	0,85%
4010	-12.13%	-3.05%	28.85%	23 92%	50 98 5	-24 46%	94.07%	22 81%	34 97%	1 12%	1.09%	D 90 %
4031	16 21 %	3 20%	6 07%	-13.415	34.54%	-56 22%	-18.21%	25.15	90.85%	0.76%	1.16%	0.79%
4633	1.78%	4.95%	-11.41%	-7.12%	-28 88%	-61.75%	-58 82 %	-16 75%	17 53%	0.86%	1 24%	0 89%
4034	10 59%	-19,21%	9 66%	7 70%	25 03%	10 82%	117 46%	-B 03 %	90 39%	0.68%	1 26%	0.76%
4016	-26.65%	-17 62%	32 34 5	-2.01	-55 46%	15 23 5	22 79 m	-10.57%	-15.68%	0.63%	1 06 %	1.05%
4637	12 825	5 80%	-15 705	30 11 5	47 55	-274	0 295	16 18%	92 33 %	1 06 %	1 29 5	0.91
4239	E5 95H	-2 62	20 57	74 50		20 67	63 23 -	7 63%	-29 99%	0 91	10	0 54 5
4540	445	-14 36 %	-25 28	-32.25	-25 XX	-35 58	-52.79	-26.15	106 51	0645	- 633	0 93
4042	-12 175	6 46 %	16 93	30.26	4 5 5 1	-36 92	98 35%	40 55 5	58 45 N	1:65	125	2.25
4541	18 295	-19 925	6 44	12 25 5	15 5 1 5		45 94 1	-16 90 %	92 35	1 365	100	2.92
4744	14 210	11 6 5	-13 475		16 4 2		-42 59 6	5 53 5	69 57	1 22 5	115	181
4046	26 9:5	1 22 1	-27 45	-10 72	10 11 5	15 24%	17:95	17 69	27.5	0.755	235	2615
4047	23 74 5	-11 64 6	11 10	10 91	198	-49 2: 5	556:5	20.29%	- XC 41 %	1 17	1 36	2 22 5
4049	-18 17	445	-21 695	-15:35	47 125		75 93	30 19	92 96	1 325	1 12	0 75
40.50	-45 16 %	7 24 5	-40 01	34 11 5	23.00%	-48 94 %	48.41%	9475	28 58%	1245	1 10	0 %
4952	-34 64 %	17 27	26 71%	14 63 %	-59 60%	-56 27	-45 25 %	20.05	-15 14%	0 90 %	1.15%	1 05%
4953	-24.78%	14 25%	-27.72	1 89 %	45 90%	28.44%	38 70 %	-2.96%	102 23%	1 36%	1.32%	1.04%
4954	48 42 5	0.04%	-18,19%	6.11%	-51 40%	-10 01 %	-48 70%	-15.37%	-33 23%	1 06%	1.23%	0.99%
49%	8.72 %	15.14%	11.63%	23.90 %	-22.08%	10.94%	9.36%	-31.33%	17.84%	1.04%	1.26%	C.86 %
4957	15.93 %	-21.18%	8.43%	-7.37%	3.35%	2.22%	56.76%	-43.28%	-22 48 %	1.31%	1.22%	0.68%
4959	24.59%	-21.56%	16 35%	1.03%	1.29%	5.97%	-6.37%	-17.99%	-1.81%	1.17%	1,31%	1.06 %
4,968	19.38%	5.92%	-24.13%	6.57%	-2.64%	23.65%	48.19%	12.80%	46.75%	1.11%	1.38%	0.87%
4962	-14 82%	13 82%	1.28%	-24.17	23.12%	1 02%	92 92%	9 69%	120.01%	1.01%	1.10%	1.01%
4963	-47.90%	8.79%	-5.54%	-3.62%	-25.29%	2.32%	-52.10%	7.08%	-24.18%	0.97%	1.17%	0.81%
4964	-46.53%	-17.04%	-2.17%	-24.63%	-18.33%	-1.51%	38.38%	11.52%	-0.39%	0.72%	1.26%	0.90%
4966	-17 65%	9.12%	6.40%	24.41%	-23 15%	29.17%	72.49%	16.02%	92.25%	1.05%	1.28 %	0.87%
4967	-12.31%	17.43%	-27.00%	-37.99%	45 64%	7.84%	27.11%	-1.60%	56 75%	0.76%	1.27%	0.89%
496-9	36 40%	9.98%	3.80%	6.07	47.31%	17.70%	119.94%	11.35%	130.07%	0.93%	1.38%	0.22%
4970	47.14%	-1.73%	-24.08%	-26.13 %	-10.12%	-63.79%	98.18%	-13.57%	26.60%	0.69%	1.23%	1.05%
4973	-42.34%	-2.55%	31.92%	4 98%	0.51%	-4,04%	-85.32%	9.13%	13 10%	1.27%	1.06%	0.89%
4973	18.55%	-23.19%	-4.71%	-14 62%	-46.44%	-8.64%	76 86%	5.15%	27.21%	0.82%	1.36%	0.71%
4974	-1 24%	-14.82%	-9.06%	-14.45%	50.82%	-20.76%	27 35%	22.11%	93 48%	1.10%	1.37%	0.98%
4976	-30.86%	8.26%	15.06%	0.20%	11.78%	21.21%	93.36%	-5.83%	-40.12%	1.00%	1.28%	1.06%
4977	-34.40%	4.86%	19.86%	-6.69%	26.20%	-30.53%	10.74%	-17.23%	85 58%	1.37%	1,10%	1.06%
4979	11.25%	-10.54%	26.42%	-28.29%	16.16%	-61.62%	49.52%	16.89%	5 66 %	1.06%	1.09%	0.73%
4,960	11.48%	12.39%	-38.19%	-35.51%	10.91%	1.46%	12.66%	12.55%	96.72%	0.89%	1.19%	1.03%
4981	-0.06%	11.66%	26.71%	-13.65%	-41.66%	-62.82%	50 26 %	15.51%	53.65%	0.64%	1.12%	1.0255
4983	14.67%	-6.67%	-17.57%	-35.51%	48.69%	-42.27%	33.51%	-8 83%	-30.47%	1.35%	1.33%	0.75%
4984	3.92%	1.20%	24.11%	-29.03%	-\$1.52%	-14.63%	-16.32%	-4.37%	7.97%	0.95%	1.11%	0.77%
4910	0.19%	1.34%	-18.95%	6.95%	48.69%	-50.65%	98.61%	-2.34%	48 83%	0.83%	1.19%	0.87%
4987	-38 28%	4.75%	-41.80%	-15.94%	14.21%	-42.16%	-17.45%	-7.20%	16.17%	0.81%	1.12%	0.71%
49091	4.08%	1.92%	1.08%	-40.71%	1.10%	-41.29%	9.38%	-16.45%	-33.96%	0.87%	1.34%	0.86%
1990	11.63%	0.89%	-2.72%	-19.83%	-32.54%	2.73%	78.51%	-5.14%	-36.98%	1.38%	1.18%	0.27%
4991	10 29%	0.34%	22.62%	-25.77%	-51.24%	-33.57%	-27.28%	-16.54%	-0.75%	0.89%	1.24%	0.67%
49931	-11.16%	1.45 10	-28.06%	-0.82%	48.06%	-9.58%	58.33%	4.25%	-24.31%	0.78%	1.27%	0.67%
4994	-3.03%	4.94%	-91.53%	17.62%	47.26%	18.91%	62.61%	12 65%	7.16%	1.08%	1.13%	1.06%
49.00	0.68%	-24.07%	12.18%	3.80%	19.69%	-16.06%	19.90%	24.07 %	16.71%	0.70%	1.09%	1.04%
4907	-29.11%	-20.55%	-0.34%	5.86%	15.29%	-56.12%	-10.51%	23.06 %	43.28%	0.27%	1.23%	0.68%
4999	16.41%	-13.10%	8.34%	-17.11%	28.87%	-5.32%	-49.75%	-5.89%	97.18%	1,10%	1.00%	V./ A 79
5000	37 8 744	0.04%	-24 39%	31.02 %	- 10.07							

Table 4.14 Uniform Distribution Random Numbers (partial)

	ITTENTIONS BUN	TUKM	ASII	BMRI	UNSP								
	5001 1.424	9 01%	-44.43%	22.04%	16.55%	-66 14M	ELTY	INDF	INKP	FROMO	LINCAS		
	S007 19 52 %	17.51%	2.21%	-10.86%	36.27%	-51 80%	78.22%	-0.68%	20.09%	1.13%	1.22%	1.03%	
	\$224 9 11 %	-20 15%	-20.34%	-31.42%	28 45%	19.46%	-47 23%	-22.72%	16.72%	0.96%	1.20%	0.98%	
	5005 34 51 K	-19.98%	32.36%	33 89%	14.77%	30 11%	18.13%	20.17%	139.24%	1.35%	1.16%	0.88%	
	5002 24 69%	14 39%	28.00%	34 43%	0.96%	-55.68%	-4 42%	-16.34%	108.42%	1.20%	1.06%	0.87%	
	5008 -10 06 -	-0.47%	8.53%	11.32%	49.11%	-0.61%	116.52%	5 84%	-6.29%	1.17%	1.36%	0.70%	
	5009 -6.07%	-17.88%	-31.49%	10.95%	-15.48%	-49 30%	\$3.38%	-38.85%	-34.46%	1.19%	1.29%	0.98%	
	9010 7.65 M	-21.08%	-43.57%	-19.25%	45.08%	-41.14%	103 61%	-32.14%	61.54%	1.10%	1.08%	0.75%	
	3012 -17 80 %	9.91%	12.13%	-7.23%	35.17%	19.31%	-55.56%	21.02%	79.81%	0.86%	1.07%	0.96%	
	5013 -7 91%	15 89%	-37.93%	-37.11%	-12.75%	-37.50%	38.77%	13.45%	-9.24%	0.75%	1.35%	0.71%	
	5014 23.53	-77 48%	-15.53%	-28.49%	-57.70%	3.88%	31 35%	-38.29%	59.89%	1.08%	1.34%	0.70%	
	5.49%	-13.51%	-14.02 %	-30.52%	-49.00%	-14.02%	19.16%	-16.98%	35.27%	0.79%	1.29%	0.72%	
	5017 -52.77%	16.02%	0.68%	-28.70%	56.74%	-31.68%	47.04%	-36.78%	76.38%	0.64%	1.14%	1.01%	
	3018 -32.85%	-21.82%	-44.58%	-11.14%	-42.25%	-4.46%	-39.21%	10.12%	49.54%	0.75%	1.23%	0.70%	
		11.60%	-40 47%	28 64%	14.23%	-17.85%	-43.66%	-10.73%	71.40%	1.04%	1.33%	0.82%	
	Sall MILEN	-18.23%	-31.49%	1.79%	-44.56%	-18.70%	-10.59%	13.74%	50.23%	0.98%	1.14%	0.67%	
	5022 19.26%	-18.22%	8.40%	0.07%	38.30%	-62.69%	74.90%	-14.16%	1.77%	0.91%	1.38%	0.88%	
	5023 5 15 %	11.24%	15 28 %	8.49%	2.26%	26.93%	-57.23%	1.35%	103.08%	1.09%	1.11%	0.77%	
	5025 39 97%	4 88%	-15.74%	-31.85%	-19 58%	13.99%	121.51%	-19.80 %	-0.68%	0.93%	1.23%	0.67%	
	5026 15.33%	-0.55%	-18.14%	22.67%	-23.71%	-7.00%	46.58%	-5.20%	45.23%	1.09%	1,17%	0.97%	
	5027 19.47%	12 19%	20.29%	-33.99%	-16.45%	-35.67%	-28.32%	-35.63%	99.49%	1.06%	1.24%	0.71%	
	5029 -24 02%	14.25%	-11 24%	22.49%	43 56%	-47.61%	-5.62%	-24.42%	76.71%	1.03%	1.38%	0.95%	
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	5030 24 91 %	-12 06 %	31.72%	14.59%	5.84%	-44.62%	-48 55%	20.54%	33.81%	1.30%	1.12%	0.80%	
$\begin{array}{ $	50111 2.92%	-71 26*	25.87%	-0.78%	45.26%	-33.45%	25.51%	-43.05%	-45.02%	1.37%	1.37%	0.66%	
	B0114 -5 19%1	-6.58%	15.62%	28.63%	-12.77%	-42.56%	50.14%	16 08%	127.97%	0.83%	1.17%	1.02%	
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	5034 11 41%	-21.25%	7.17%	-14 18%	21 90%	3.66%	45 97%	-19.84%	94.97%	1.11%	1.12%	0.72%	
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	\$315 -0.52%	5 35%	16.81%	18.34 %	-8 01%	30 76%	61.26%	1.05%	117.17%	1.05%	1.24%	1.02%	
Eta 11 20 10	517 18 875	1 60 5	-44 18%	-1.13%	43.53%	-19 61%	17 58%	16.19%	73.27%	1.06%	1.11%	0.76%	
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	5038 .22 20 .	-10 05	-40.74%	23.715	-40 43%	-26 575	84 84 %	-16 26%	39.53 % 94.12 ×	1.25%	1.22%	0.70%	
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	5191 11.99	-6 49	26 86	-37 17	75 615	11 425	3 79	-44 23%	32 86%	1.19%	1.07%	0.96%	
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	<u>5.4</u> <u>71.96</u>		19 40 %	27 25	-6: 72%	31 42 5	-20 -5	12 62 -	94.29%	0.85%	1.17%	0.96%	100
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	531 22 24 5	-12 935	-26 44 5	-11 42 5	37 64 5	24 21	46.95	-0.96	58 69%	0.91%	1 31%	0.69%	100
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$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	SH 1085	1 20	-4 77	24 16	25 194	-17.76 %	119	25 81%	29.97%	0.63%	1.19%	0.85%	
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$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	5:40 1645	-1525	12 84 3	1 69 %	49 77	30 01	103 07	4 49%	69 47%	1.35%	1.14%	0.89	
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$ \begin{array}{c} 353 \\ 358 $	5956 -0 99%	6.65%	-40.98%	13 85%	34.17%	-9.07%	-42.08%	-4.60 %	47.51%	0.91%	1.28%	0.89%	
$\begin{array}{c} 1333 \\ 1333 \\ 1333 \\ 1347 \\ 13$	5957 11 84%	-0.50%	-31.05%	-28.55%	22.30%	-60.53%	49.11%	15.56 %	107.02%	1.18%	1.25%	0.76%	1
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	5959	1.95%	-12 76 %	22.77%	-14.12%	21.76 %	-41.56%	-35.09%	17.92%	1.37%	1.12%	0.91%	
66(1) 6 (4%) -12 (7%) -12 (1%) -12	5960 7.50%	5.41%	-39.39%	17.29%	9.95%	-49.54%	44.77%	-5.92%	121.76%	0.95%	1.08%	1 00%	
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101 1	5975 27 21%	15.25%	- 30.85%	-29.57%	57.81%	-61.42%	20 59%	-16.08%	178 024	1.15%	1.12%	1.06%	
2978 210% 2212% 12978 22078 12078 100%	5377 -20 48 4C	1112	28.41%	-38.50%	-19.11%	10.88%	57 21%	-17.10%	-32.06%	1.26%	1.13%	0.78%	
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19.4.

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6933 3 5 1 - 7 95 4 7 31 0 46 % 31 5 4 7 4 7 11 1.66 % - 21 99 % 108 00% 0.25	% 1.37% 1.06%
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6938 37 45% -5 91% -18.52% 14 43% -45 45% 14.92% 48.11% -37 45% -35 90% 0.88	1.06% 0.21%
69 59 -40 14 % 0 39 % -41 71 % -5 34 % -25.72% 26.09 % 32.76 % -18.64 % 97.31 % 0.99	1.38% 0.79%
69%0 7.18% -1.31% -26.07% 9.70% -1.51% -1.07% -1.10% -22.35% 109.54% 0.75	% 1.39 % 0.77 %
6902 4 84% - 71 - 1.90% - 25,88% - 10.87% - 21,34% 7.75% - 33	% <u>1.12% 0.80%</u>
6963 - 33 95 - 4665 - 607	1.36% 1.03%
6924 45 /1	% 1.08% 0.78%
6966 22 59% -19 89% 19 72% -22 67% 16 75% 46 69% 7756% 7.24% -112% 0.53	1.28% 0.70%
6907 - 41 227% - 3.76 % 24.51 % - 37.32 % - 61.97% 26.62% 20.78% - 26.59% 40.14% 0.94	% 1.16% 1.02%
9 17 5 1 10 1 10 1 10 1 10 10 10 10 10 10 10 1	1.23% 0.84%
6170 289% -12 274 -18 48% 0.98% -199% 6.35% 112 01% -26 57% 6.65% 0.99	1.16% 0.99%
6211 -7 28% 1 00% 32 87% 41 88% -11.65% 0.08% 25.63% 12.28% 1.22	1.11% 0.74%
69721 29 41 1 - 20.05% -13 51% -3.60% -12 01% -13 50% -33.20% -39.00% 28.04% 0.98	1.25% 0.93%
6374 -45 549 -21.17% 21.50% 27.67% -19.29% -56.10% -46.50 78 -28.51% -32.66% 100	1.30% 0.97%
5275	1.13% 0.84%
6976 -7.43% 7.10% 7.10% 7.10% 7.12.27% 38.23% -5.885% 49.28% 15.54% 44.01% 12/2	× 1.30 × 0.98 ×
6978 -24 43 % -18 19 % -16 91 % 9 85 % -27 64 % -2 19% 111 30 % 40.02 % -2 94 % 0.74	1.09% 0.96%
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6986 39 68% -1.57% 2.65% 13.00% -32.86% 22.76% 2.84% 82.54% 0.88	1.15% 0.67%
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Seven 12 6.6 % 7.4 % 7.2 13 % 7.6 8 55% 30.7 13 % 7.0 14 % 7.2 13 % 7.6 8 55% 30.7 13 % 7.0 14 % <th7.0 %<="" 14="" th=""> <th7.0 %<="" 14="" td=""><td>1.15% 0.69% % 1.31% 1.04% % 1.11% 0.67%</td></th7.0></th7.0>	1.15% 0.69% % 1.31% 1.04% % 1.11% 0.67%

Table 4.14 Uniform Distribution Random Numbers (partial)

ITERATIONS	BUNG	112.66%	ASII	UMRI	UNSP	111.00.1							
7001	-40 92%	3.45%	-21 23%	-5.64%	51.47%	-47 814	ELTY	INDF	INVE				
7693	33 93%	-0.31%	-2.53%	40 40%	-54.31%	20 64%	38 53%	2.98%	35.95%	FROOD2	HIMSP03	581-1	
7604	-15 36%	-0.55%	29 38%	.9 75%	33.10%	B 41%	92 75%	2.74%	130 41%	1175	1 76%	1.03%	
7505	-28 36 %	4.94%	-32 84%	-41.13%	26 48%	-3.77%	-18 43%	3 56 %	40.61%	0.72%	1.35%	0.88%	
1002	13 41%	-23.52%	29.97%	25.96%	10.06%	1125%	-4 96 %	-17 83%	4 94%	0 84%	1 28%	0 71 %	
7608	-28 57%	10.49%	-15 20%	-22.91	26.83%	-14 BZ %	16 97%	4.43%	82 22%	0.93%	1 25%	0.94%	
7009	11 56 %	-5.21%	23.96%	-40.55%	-16 07%	11 56%	12 95%	-15 25%	15 67%	1.34%	1 30%	1.00%	
7010	14.19%	12.3/%	2.67%	15.77%	19.17%	61 000	-52.79%	22.69%	127 674	0.80%	1.30%	0.26%	
701	26 64%	10.22%	-16.45%		47 51%	-14 39%	118.67%	5.05%	69.33%	0.91%	1 23%	1.01%	
7013	2.11%	-16.54%	8.94%	33.61%		16 81%	26.47%	-14 70 %	8 09 %	0.67%	1.13%	0.90%	
7014	-50.71%	12.99%	-30.32%	10.49%	-23.87%	-36,49%	-23 17%	-1.44%	107 08%	1.19%	1.16%	0.96 %	
7015	49.82%	15 57%	74 994	33.68%	56.11%	-50.48%	65 69%	-3.03%	115 62%	0.67%	1 22	0.90%	
7016	29.24%	9.72%	2.61%	12 005	0.40%	-15.91%	59 11%	-2 86 %	136.79%	1.14%	1.32%	0.77%	
7018	16.61%	-22.34%	-0.71%	17.24%	31.92%	-22.70%	6.68%	-28,79%	78 94%	1.25%	1.26%	0.96%	
7019	9.72%	16.61%	-44.42%	-10.02%	-34.10%		-42.28%	16 77%	75.06%	1.19%	1 23%	0.86%	
7070	-16.71 %	11 10%	1.35%	36.09%	32.40%	-30.24%	11.99%	-25.30%	122.32%	0.86%	1.25%	0.74%	
2022	-41.46%	17.37%	-15.07%	11 14%	29.85%	21.96%	54.71%	19 38%	79 90%	1.14%	1.22%	0.80%	
7923	26.84%	6.89%	18.05%	13.68%	27 12%	-31.21%	32.47%	-8 77%	40.93%	1.06%	1.15%	0.71%	
7024	12.18%	-20.47%	32.56%	-29.20%	57.14%	-5.05%	41.13%	17.21%	69.04%	0.99%	1.30%	0.93%	
7025	0.2370	1.00%	- 37 23%	16.77%	15.17%	-19 22%	53 21%	-32.24%	39.46%	1.16%	1.07%	0.92%	
7027	-37.96%	-19.60%	20.01%	17 51%	-25.70%	33.22%	89.98%	-0.77%	113.96%	0.71%	1.24%	0 69 %	
7025	-28.58%	-4.81%	10.77%	9.36%	-15.65%	- 38 41%	120.96%	-22 %	82 84%	0.92%	1 27%	0.96%	
7029	11.56%	-10.16%	10 23 %	5,14%	-36.54%	-9.28%	26 10 -	-23.24%	98 23 %	1.14%	1.38%	0 80%	
7030	26 10 %	-9.62%	-24 44	-13.72%	27.23%	-41.27%	32.70%	23 725	44 50%	0 73%	1 25%	0.95%	
7012	1 34%	-13.28%	42.16%	-32.46%	-21.04%	10.57%	44 12%	23 69%	-23.58%	1 26 %	1.19%	0.85%	
7033	30.62%	-13.37%	18.68%	23.65%	-58.33%	29.17%	26 944	-0 %6 %	-45 03%	1 39%	1 26%	0.82%	
7034	20 9.37%	12 26	-11.20%	0.84%	29.53%	27 49%	89.75%	16 62%	\$2 56%	1.13%	1.19%	0 77 %	6
7035	-16 88 %	-14.64%	22.57%	12 07	9.77%	-64.19%	-23.41%	16 47%	120 24	1 C8%	1 38%	0 79 %	
7017	-19.54%	13.50%	-9.51%	-17 48 %	45.11	35 50~	47.615	20.30%	-25 85%	1.19%	1.37%	0.69%	1
7038	4.60%	16.85%	-42.01%	-10 44%	54.48%	-40 :8 -	69 70 %	-13 67	53 15%	0.97	1235	2915	P
7039	-1.18%	17.68	-15 77%	35 85%	-16.71%	23 28%	43 97%	-21 62 5	104 95%	0.655	215		
7041	-36.32%	-22.55%	-15 30%	7.55	-14 01%	-19 16	-31 16*	23 51	116 015	1 11 5	1.45	1925	
7042	3.06%	2.29%	-9.58%	-2,98%	-52.94%	-30.18%	56 22	27 02	131.755				
7043	-11 27%	-12.96%	9.48%	20 83 %	-26 30	-28 06 -	27 49	77.85	44 944	115	115	1 37 2	
7045	14.72%	16.88%	3.78%	-0.15%	13 415	-49 -99%	37.49%	19 34	1.9 500			10 1	6 10
7046	-6.35%	12.47%	2 97%	-38 53%	55 60%	-42 38%	43 53 %	-18 62 %	17.635	1 146	195	1010	
7047	- 4.47%	6.16%	9.52%	-16.17%	-18.49%	-18.15	22 47	6 335	121 70%	575	1:95	269	
7048	-14 89%	1 79%	1145%	13 40 %	33 83%	-0.76	104 22 %	:0:2	56 32 5	145	225	2.87	191
7050	-43 86 %	12 68 %	31 56 %	19 94 %	14 80%	4 96 %	48 44 %	1175	32.90%	2.79	215	1	
7951	-14.53%	12.20%	-18.66%	27 59%	20.51%	-19 81%	63 52 %	23 :65	80 27	3955	.95	2 77	
7952	-2.30%	-13 59%	-40.41%	16 87%	-23 08	11.50%	- 10 04	.9 .9%	103 76%	0.97	123%	0 94 %	
7933	48.07%	5 42 %	-16 62 %	1.79%	-11.19%	-10.74%	76 34%	-17 35 %	- 39 56 %	0.93%	1.32%	0 77 %	
7955	-20 51 %	5.17%	-42.29%	23.99%	-56.30%	-49.30%	20 86 %	-21.10%	37.04%	1.11%	1.11%	0.70%	
7956	29.18%	6.89%	-40.09%	-35.61%	-42.21%	-24.89%	20.23%	-23.22%	107.75%	1.26%	1.07%	0.83%	
7957	-27.78%	16 64 %	2.68%	- 36 65%	9 71%	-0.25%	84.22%	10.40%	92.00%	0.96%	1.26%	0.82 %	
7959	-51.40%	-8.41%	-36 21%	-11.38%	-54.58%	16.37%	57.38%	9.89%	78.22%	0.94%	1.26 %	0.75%	
7960	25.05%	15.74%	-5.18%	4.26%	-37.19%	6.19%	-27.61%	-11.59%	-27.93%	1.32%	1.06%	0.94%	
7961	-2.62%	-14.17%	-36.20%	-11.81%	-42.69%	25.65%	-11 66 %	25.15%	12.16%	1.01%	1.31%	0.87%	
7963	-11.95%	4.025	19.39%	-22.64%	-45.58%	-33.39%	-46 48 %	-1.21%	-4.96%	0.90%	1.26%	1.02%	
7964	1.59%	-9.21%	-11 24%	27.08%	34.78%	1.12%	-24.37%	-30 69%	120.80%	1.13%	1 08%	0.73%	
7965	4.48%	6.14%	15.06 %	2.13%	-28.38%	-10.82%	10.39%	25.35%	117.27%	0.97%	1.18%	0.91%	
7956	2.53%	-20.54%	-12.28%	11 17%	-61.73%	-7.40%	24.36%	-9.96%	42.95%	0.92%	1.34%	0.76%	l
7958	-18 38%	5.06%	6.61%	-18.71%	35.07%	-47.65	66 28%	-0 40 %	114.70%	0.99%	1 1 1 1 1	0.73%	
7969	-13.05%	-15.44%	2.26%	-4.49%	24.83%	20.51	17 35%	14.33%	123.72%	0.94%	1.18%	0.89%	L
7970	5.51%	8.90%	15.99%	-0.70%	12 794	57.01%	57.15%	-4.44%	13.16%	G.85%	1.13%	0.92%	
7972	-20.27%	-23.50%	10.93%	-12.61%	34.40%	-54.09%	47.01%	11.58%	134.66%	0.77%	1.31%	0.74%	
79731	-45.26%	-0.92%	32.14%	-4.32%	-52.61%	16.93%	-13 82%	.7.78%	51.16%	0.82%	1.28%	0.96%	
7974	-11.09%	-16.10%	15.33%	-35.06%	53.53%	-38.56%	36.17%	16.02%	92 80%	1.20%	115%	1.02%	
7975	15.72%	-5.40%	-14.54%		30.21%	64.89%	61.59%	18.39%	18 15%	0.92%	1.10%	0.98%	E .
7977	38.05%	-7.39%	28.97%	-29.27%	-47.14%	2.50%	74.00%	16.59%	138 88%	1.21%	1.26%	1.04%	
7978	24.01%	-18.15%	31.36%	-10.32%	-34.68%	59.36%	-18 31%	-1.07%	80.34%	1.08%	1.16%	0.98%	1
7979	1.97 51	4.10%	-35.23%	-34.31%	28 70%	8.92%	-43.80%	-3.18%	46.01%	1.34%	1.05%	0.75%	1
7950 2981	-45.76%	-0.88%	1.587	16.63%	-15.95%	-15.75%	104.44%	14.49%	194%	1.35%	1.21%	0.93%	
7992	-4.75%	14.48%	-24.74%	-32.06 %	-18 98%	0.71%	117.56%	6.82%	-33.40%	0.95%	1.22%	0.91%	
7963	-47.11%	16.59%	-2.44%	11.12%	24 19%	19.55%	61.89%	11.51%	-11.11%	0.69%	1.24%	0.725	1
7984	-31.99%	-1.93%	-5.66%	-39.44%	23.65%	-55.57%	45.31%	7.71%	113.63%	1.30%	1.15%	0.84%	1
7985	-12 20%	-15 44%	16.05%	-16.08%	-12.44%	9.11%	102 41	14.21%	28.12%	1.35%	1.08%	0.62%	1
7987	-42.42%	-1.16%	-17.33%	29.36%	-59.93%		83.66%	-12.00%	127.95%	0.65%	1.22%	1.01%	
Toron I	34 34 %	-20.42%	4.42%	-35.92%	19 86%	6.44%	31.04%	15.60%	47 69%	0.86%	1.19%	0.94%	
7989	1.61%	6.28%	-44.88%	-4.28%	-51.78%	19.70%	4.37%	-36.80%	-35.47%	1,32%	1.13%	0.77%	
7991	11 10%	7 6 3 14	30 43%	-15.24%	-13.23%	-6.46%	-12.15%	1.75%	28.73%	1.26%	1.27%	0.72%	1
7992	19.89%	-23.96%	31.13%	36.34%	42.04%	5.49%	47.53%	22.04%	16.61%	1.38%	131%	0.73%	1
7993	-11.32%	2.90%	11.06%	-31 80%	-9.46%	-15.99%	56.73%	24.03%	28.66%	0.64%	1.18%	0.79%	1
7994	16 21%	9.92%	-30.65%	1.96%	-42.22%	6.17%	-19.36%	-24.93	11.13%	0.65%	1.17%	0.67%	1
79 36	1187%	4.02%	-16.53%	11.21%	21 68%	-54.77%	115.89%	15.74%	74.48%	0.78%	1.09%	1.06%	1
7997	21.22%	-5.88 %	-13.36%	.9.13%	19.99%	20.30%	30.99%	1 46%	111.15%	1.06%	1.32%	0 84%	1
7998	11.02	-8 25%	-16.35%	A 97%	48.12%	2.76%	-29.77%	18.06%	-2.51%	0.69%	1.16%	CIERIN	i i
0000	6 556	-0.33%	-27 88 %	34.25%	51.99%	-22.78%							
	X.22 71	4.30 %											

84

University of Indonesia

Table 4.14 Uniform Distribution Random Numbers (partial)
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8001	-38 85%	-11.29%	28.17%	0.334	UNSP	UNTR T	EI THE						
8002	36.45%	13.20%	-41 28%	0.32%	-23.61%	-34 10%	ELIY	INDF	INKP	FROMA T	ILC DOD T	4.1.1	
8001	33 98%	-3.74%	26 81%	32.36%	43.58%	4 76 %	10.18%	26.21%	69 49%	1004	MSPUJ	561-1	
0004	.76 98%	-17 55%	14 51 8	13 20%	-59.33%	4 749	-67.12%	-22.24%	90 75%	1.09%	1.20%	0.94%	
000	20 164	9.07%	5 3 5 70	-15 54%	51 73%	10.044	41.08%	-19.70%	35 36 -	1.2370	1.12%	0.79%	
9005	16 078	15 44 8	-5 / 5 %	-24.36%	34 74%	10 04 %	98.95%	·30 86 %	41 164	1.19%	1.18%	0.69%	
6006	-45 0/%	13 40%	-19.12%	-19.81%	-74 56 4	-13 76%	-29.94%	-13 00%	11 10%	0.75%	1 18%	0.78%	
6007	-39 62 %	-9.51%	18.43%	9.72%	10 (04)	-17.32%	45 29%	1 40%	-23.52%	0.85%	1.28%	0.73%	
8009	-15.45%	1.58%	-17.91%	-4.10%	10.09%	-64.14%	-66 20%	.7 10 4	11.12%	1.15%	1.34%	0.78%	
8009	19.82%	-22.32%	-0.35%	33.074	33.27%	-6.19%	16 87%	-4.38	26 21%	0.75%	1.16%	1.06%	
8010	12.78%	5.95%	-31 76%	31 344	-35.68%	30.67%	4 794	23.68%	-13.59%	1.24%	1.27%	0.98%	
0011	.38 16%	12 974	.11 774	21.74%	44.11%	-43 31%	13 304	1.91%	-48.42%	1.10%	1 35%	0 69%	
	7 71 %	1 90%	14 03 1	34.25%	50.80%	0 37%	32.39%	-41.14%	58.42%	0.84%	117%	0.70%	
8017		-3.30 %	-10.02%	7.57%	-38.73%	24 46 2	-53.62%	23.93%	25.71%	1 38%	1 354	0.70%	
8013	-0 20 70	-19.33	23.06 %	23.50%	34 01%	27.70%	70.11%	-4.60%	125 78%	1.014	1.35%	0.00 %	
8014	8.86%	-11.41%	-45.12%	10.94%	12 474	-37.70%	22.92%	-36.30%	-9.60%	0.86 %	1.38%	0.71%	
8015	-26.54%	6.09%	20.50 %	14.55%	.76 31.0	-21.05%	-24.57%	18,41%	12 514	1 3 3 8	1.297	1.02 %	
8016	-26.91 %	0.59%	-13.62 %	-9 35%	46 53176	-66.44%	50.70%	12.68%	SE 494	0.0/10	1.30%	0.85%	
8017	-16.53 %	-3.20%	-7.59%	11 464	40.52%	-61.43%	94.69%	11 77 %	33 4876	0.96%	1.15%	0.00 %	
6018	39.35%	-14.38%	28 87 W	16 33 %	47.56%	-14.89%	-10 60%	31 61 2	-20.75%	1.28%	1.12%	1.06%	
8019	7 23%	-71.57%	15 51 4	10.32%	54.71%	23.58%	66 66 %	42.01%	-33.50%	1.17%	1.27%	0.84 %	
8017	16 605	12.05%	13.317	-30.51%	-22.53%	-52.43%	- B 04 N	-43.24%	138.35%	0.75%	1.27%	1.05%	
6070	30 07 %	12.7376	16.09%	-35.16%	32.73%	29 25 4	-0.80%	5.30%	54.67%	1.08%	1.35%	0.85%	
8021	10.117	-14.72	12.88%	-27.32%	30.95%	-15 574	01.50%	-21.34%	31.06%	1.09%	1.08%	0.68%	
8022	13.53%	9.18%	-40.76%	-11.37%	-29 40%	53.05%	88.65%	24.98%	63.94%	0.78%	1.32%	0.96%	
80.23	5.26%	-22.08%	25.96%	31 21%	40 524	-57.85%	6.56%	-43.85%	-4.14%	0.69%	1 20%	0.62%	
8024	37.16%	6.51%	-26.78%	-74 16 %	-40.33%	-52.55%	62.29%	4.62%	115 60%	1124	1.120	0.07 %	
8025	16 58 %	-23.39%	3414	16 754	4.84%	-34.87%	B0.99%	23.20%	-6.07%	0.70%	1.1/76	0.0276	
80.26	1.03%	0 01%	-24 41 4	-30.35%	-20.27%	32.59%	8.70%	8 40%	50.37%	0.79%	1.30%	0.77 %	
0010	22.03%	21 70 m	22.70	-0.45%	-31.84%	-1.16%	84 15%	-12 00 4	50.37%	1.1/%	1.07%	0.79%	
	1 100	- 14 01 0	-23.70%	•30.40%	-48.56%	20.27%	25 55%	10.00 %	39.48%	1.05%	1.15%	0.79%	
8078	11.07 4	-24.01%	-7.82%	24.08%	-22.34%	26 14%	-54 434	-10 00%	12.97%	0.92%	1.11%	0.94%	
8029	-20 14 -	-15.83%	-17.97%	31 81%	-41 08%	30 10%		-20.08%	79.43%	0.82%	1.29%	0.76%	
BUBD	-22.34%	-20.89%	-24.77%	11.26%	2 87%	-30 0.20	1 4 3 40	-36.85%	3.93%	0.85%	1.27%	0.99%	
8031	-18.50%	-15.25%	8.99%	-33 89%	60 24	5502%	-38 21%	-30.33%	21.60%	1.12%	1.19%	0.98%	
8012	-4 65%	-23 89%	-36 30%	-1 00%	-00 24 %	-51.82%	93.98%	-11.06%	10.07%	1.35%	1.29%	0.91%	
8011	-28 /5%	10 80 %	. 27 774	41.048	41.30%	-14.11%	-27 61%	3.48%	127 52%	0 77%	1 27%	1 04 %	
	0.51%	.7 114	0.038		49.54%	-58 77%	1.32%	-10.52 %	11.83%	0.85%	115%	0.96%	
0024	140	11 742	-0.03%	2 30%	-15.57%	-66 60%	121 78%	10.27%	51 88 %	1.00	1.06%	0.97%	
8035	0.02%	-11.79%	-5.97%	-12 35	-51.30%	-6.67%	104 09%	20 85%	-13 915	1,174	1.2451	0.84 %	
0076	7.14%	-13.05%	-43.12%	6 83%	52.26%	-19.47%	116 68 %	-8.68 %	-11 115	1165	1 199-	0.05.04	
8037	12 04	-19 59 %	- 34 86 %	3 88 5	21 735	-51 175	25 66 4	4 18	41 36 5	1.065	1 10.0	0.93%	
8036	-46 91%	12 90 %	6 39 %	29.65	25:24	29415	47 644	16 36 8		1.00 %	1 30 4	97. 4	
8019	-5 10	-10 44%	-42 22	35 36 5	A STA	.75676		40 10 10	29 20 %	1 25	1.14	G BC	
BO4C	37.735	-14.65%	31 76 5	755	16 326	1202			110 56	0.58%	1 32 5	0 99%	
8341	.27 71	16 84 %	24 11%	10 64 8	10 776	- 10 -		-26 52	30 62 %	1:65	1.34 %	0.99%	
80.4 4	1 645	-20 215	21 625				2.13	64.	-15 20%	1 30 1	1.29 %	0.95 %	
00-1		-20 21 4	41 27 1		50 10 1	-40.36	. 56 . 9 .	3 28 %	25 92	0.92%	1 22 %	0975	
8043	9 61 %	-14 /9	21 08 5	9 2 5 5 1	. 4 550	-60 7. %	1:50	19 24 %	37 24 2	2.93	1.25	2 85 5	
8044	1/ 20	17 47	-0 27 5	3 29	45 X 4	6:60	44 . 6	11.94%	124 525	0.75%	1.05	1 68 %	
8045	-4 17	-18 42 %	-16 02 5	11.56 %	42.25%	18 49 2	1.0 5 5	-17.725	\$4 CO \$	200	115	0.015	
8046	-36 74 %	-2 06 %	3 22 %	-19 27 5	27 64 6	-18 74 5	69	-15 415	-14 875	2.245	1.765	1.45	
8047	-19 51 51	6 64 %	-14 97%	34 6	-12 81%	18 815	04 16 5	11 01 4	74 . 5 %	0.04.94	1.74%	275	
80.48	22.064	13 325	-14 415	445	74 115	27 6 19	7 8 3 6	36 76 8		0.588	1112	2 416	
BC.AG	11 4 4		6 475		17 44 5		87400	42 -20 %		0 75 %	1 10 5	0 775	1.11
BV *7		13 335	13 855		11	1	8/07	42 33 %	10 34 1	3 30 %	1.0		
60 X	22 11	-12 // 5	-12 29		1.24	-4.71	35 40 1	-35 57 %	10.00.01	1 21 1	111	0 8.	1 A A
8951	-50 24 s	-11 20 -	191	16 43 N	-14 60%	11 96 %	32 09 %	-24.54%	-24 39%	0.62%	1 17	0.96 %	
8952	-0.51	-24 47%	-44 92%	32.85	-53 14%[-65 19%	4 98 %	-19 54 5	63 84 m	0.90%	119%	0 77 %	
8953	-8.95%	10 87%	-24 75%	-28 42 -	-56.33	-9.74%	-13.53 %	-43.94%	31 97%	0.68 %	1.19	0.67%	
89.54	-47.27%	-1.19%	-28.13	-22.27	-21.56%	-39.92%	46.62%	-17.24%	25.38%	0.66%	1.34	0.75%	
8955	26.02%	16 705	-14 84%	-30 58%	54 99%	-19.61%	76 30%	22.10%	72.00%	1.03%	1.14%	0.97%	1.1
8054	11 12 -	0.40%	1 715	7.84%	55 68%	-511%	41415	7 735	114 78%	0.71%	1.24%	0.90%	12 A S
07.00	11.10 %	12.057	20 (20	24.204	10.00%	A 11M	20 86 8	1 99 %	50 65%	0.79%	1.17%	1.05%	
8957	1.77%	13.90 %	20.0270	4 30 70	-10.00 -	0.117	10 00 %	13.47 %	20 226	0.054	1 30 %	0.82%	
89.58	12.54%	10.39%	-5.00%	-9.8/76	-10.04%	0.75%	10.407	75.049	14.07%	1145	1.08%	0.26%	
89.59	-20.43%	14.64%	13.11%	22.81	40 00 %	17.49%	20.40%	22 04 7	100.77%	1.15.6	1 100	0.00.94	
8960	-14.10%	-11.49%	-14.16%	-16.97%	17.33%	-63.4/%	53.50%	-38.47%	100.77%	1.2376	1.19	0.90 %	
8961	4.98%	-15.09%	-20 88%	20.11 %	34.57%	4.14%	-9.25%	•9.75 ×	4.15%	1.09%	1.29%	0.84	
8967	-17 07 %	12.01%	30 82%	-19.85%	51.39%	-32.01%	35.95%	-26 25%	69.88%	0.90%	1.09 %	0.92%	1.1
1041	SOTA	0.02%	-41.11%	-20.32	-31.27%	6.86%	98.87%	23.04%	-37.37%	1.32%	1.29%	1.02%	
8044	15 30 4	15 45%	11 76 4	72 85%	48 15%	-15 63%	-17.46%	-14.30 %	45.56%	0.89%	1.28%	0.78%	
17.04	13.30 %		10.176	50 626.1	20 4454	0 71%	64.30%	-29.40%	25.79%	1.05%	1.33%	0.75%	
8965		11.20%	19.1/ 1	16 00 1	74 45%	14 89%	9 9 7 %	-30.97%	118.95%	1.04%	1.12%	1.05%	
9966	-43.68%	16.51%	0.06 %	-12 09 46	44.43%	9.01*	154ikika	I HAN	64 22%	1.14%	1.11%	0./1%	
8967	7.81%	-24.45%	-1.52%	-31.9376	-3.00 %	7 71 47	67 81 84	12 10%	4.78%	0.64%	1.23%	0.79%	22
8968	10.07%	-0.06 %	17.96%	15.50%		1.7.8	-29 474	42 04 %	51 01%	0.88%	1.23%	0.90%	10
8969	38.49%	-0.99%	30.51%	-11.39%	17.06%	-32.01	1	100.00	121 68%	1,23%	1.28%	0.72%	
8970	3.62%	4.62%	-0.23 %	+35.11%	55.55%	-43.70%	31.32%	100 %	.44.07%	1 28%	1.17%	0.85%	
8971	-26.97%	-16.54%	-12.10%	-15.57%	-16.81%	-12.49%	00.04%		27 60%	0.86%	1.26 %	0.68%	
8977	-48 57%	-18.96%	-17.01%	-16.30%	42.19%	-52.15%	48.27%	24.00%	31 70%	1 28%	1.74%	0.95%	
80 71	14 014	12 114	0 39%	16.87%	4.15%	-65.39%	62.23%	1.0%		0.014	1 104	0 96%	
40.77		1014	12 504	-32.28%	-25.21%	-13.30%	16.32%	-3.26%	02.00%	0.7276	1.24%	1 015	
09/4	10.13%	4.91 7	7 004	27 1 1 1	-30 96%	6.95%	-13.15%	34.93 %	68 38%	9.793		0.01.0	
1975	16.10%	-0.40%	1.70 %	12944	27.33%	-17.10%	37.47%	-17,17%	44.24%	0.00%	1.00 %	0.70%	
0976	28.84%	-15.10%	-44.07%	33 404	36 16%	-64.48%	-63.90%	-20 49%	86.95%	0.85%	1.10%	0.78%	
8977	-35.95%	-21.51%	-22.96%	22.40%	10 170	-21064	-59.81%	-26.43%	-45.70%	0.68%	1.20%	0.78%	
8978	-9.79%	-20.36%	24.55%	-19.80%	-30.37%	21.264	1769%	-27.81%	14.80%	1.30%	1.11%	0.72%	
6975	-0.45%	14.21%	-10.90%	21.22%	-40.78%	41.33%	76 844	7.01%	11.28%	0.69%	1.32%	0.99%	
BOOM	23 10%	-70 64%	29 74%	13.09%	-49.78%	-32 23%	30.31%	JZ OZ	1 75%	1.26%	1.29%	0.80%	
8000	38 600	18 614	-17.32%	-9.72%	50.04%	-40.70%	39.03	0454	119 68%	1.04%	1,18%	0.87%	
0981	43.50%	12.2376	10 145	.7.13%	-37.22%	17.13%	13 26%		25 06.9	1.02%	1.16%	0.78%	
0982	-31.70%	13.50%		-11 21%	-24.65%	-11.99%	41.54%	1.93%		1000	1.18%	0.74%	
8983	-44.63%	5.25%	9.01%	73 109	-11 40%	-66.29%	8.51%	14.03%	-20.53		1.10%	0 66%	
8984	6.46%	-2.39%	-12.59%	10.00	14 384	3.01%	107.96%	6.08%	96.82%	0.94 %	1 17 4	0.71 %	
8935	11.46%	11.49%	0.33%	-34.85%		5 10%	-63.03%	4.88%	7.90%	0.87%	1.1376	1.00 %	
89:06	31.52%	6 66%	0.93%	31.02%	0.40%	55 014	104.25%	-38.75%	69.93	0.87%	1.12%	1.00 %	
8997	4 67 14	A 09%	-36.15%	-0.74%	- 16.26%	-10.01 %	.55 19 %	-14.82%	94.29%	1.11%	1.13%	0.67%	
80.00	11120	174	11 02%	32.47%	52.64%	22.10%	10 174	26 71%	-1.39%	0.96%	1.14%	0.76%	
0.950	34.30%	1.1/78	0.20%	27.85%	-1.47%	15.79%		18 56 8	93.35%	1.33%	1.16%	0.58%	
8989	-19.61%	-13.53%	14 00 -	29 16 %	-17.63%	-\$0.55%	10.52%	10 774	-47 07%	1.33%	1.14%	1.06%	
04.60	-48.71%	9.83%	*40.93%	10 10 1	-61.55%	-10.93%	25.27%		60 93 %	0.90%	1.35%	0.89%	
8991	13.93%	0.21%	-4.42%	19.39 %	-34 22%	21.39%	29%	1.02%	12 12 12	0 40 41	1 32 023	0.98%	
8992	33.87%	-1.43%	17.81%	10.27 %	51 66941	5.36%	-62.08	10.72%	/3./0%	0.01	1 364	0 04 %	
8931	24 76 %	12.13%	-43.23%	0.56%	-11.00 %	-15 66 4	7.76%	-7.13%	-0.06%	0.9370	1 1 2 2	6.52	
8904	-10 20 %	4 57%	2.56%	10.92%	-20.33%	4614	-39.32%	1.12%	-15.43%	0.67%	1.13%	0.97 1	
8347	1	40%	. 18 55%	14.77%	38.63%	4.03 %	105 15%	-1.52%	-40.71%	0.90%	1.16%	0.83%	
0995		-0.973	12 00%	-31.53%	20 87%	-20.68%	124%	4.31%	62.09%	1.32%	1.25%	0.74%	
0996	3.84%	-0.88%	- 14 - 14 -	14.15%	32.69%	-19.79%	107.05	11 58%	121.35%	0.78%	1.16%	0.95%	
8997	45.79%	6.96%	18.1**	-B 14%	0.69%	-65.45%	107.85%	-11 81 %	129.72%	0.73%	1.33%	1.01 %	
8998	1 1 6 1 %	5 80%	7.99%	11 30 4	-19.89%	-23.00 %	10./3 %	1 14 1	- B 84 %	1,2191	1.12%	0.97%	
8999	4.59%	-2.67%	-8.20%	-31.49 %	43 73%	10.22%	-6.34%	3.193	1.9 × 1.				
		A D D D D		30.10 11									

ITERATIONS	BUHI	TUKM	ASII	BMRI	UNSP							
9001	-17 65 4	1 01%	-24 67%	29.91%	-13.98%	22 17 M	ELTY	INDF	INKP	FROOTZ	HHSP01	Cal.
1009	10 85 40	-5.28	4 19%	1 1 9 44	-60 92%	-23.32%	45.91%	-18.61%	-10 76%	0.71%	1.17%	0.73%
9204	17 56 %	16 91	14 87%	12 53%	-10 91%	16.14%	65 19%	25 19 %	23.62%	103%	1.24%	0.26%
9005	51 17	-2 97%	23 62 5	23 12%	29 17%	51 61 %	87.01%	23 02%	55 89%	0.70%	1.07%	0.74%
9007	-20 03 %	-5 38%	-21 77%	-29 66 4	56 24%	-43.91%	92 81%	17.49%	-38.86 %	1.14%	1.15%	0.95%
9006	10.15%	-1.80%	15 85%	-25 09%	5 10%	-51.84%	35 01%	14 52 %	-27.16%	1.36%	1.10%	0.96%
9009	10 415	-10.42%	-10 63 %	27.73%	58 07%	-26.31%	83.64%	-12 90%	2 70 %	1.03%	1.09%	0.96%
9011	-30 90 %	108%	21 02 %	-11.98%	46.14%	0.72%	69.79%		28.17%	1.30%	1.10%	0.90%
9012	-5.22%	0.59%	2.48%	5.99%	-45 64%	17.91%	58 43%	41.40%	108 67%	0.88%	1.37%	1.03%
9011	16.72%	-24 21%	-21.79%	-16 60%	-53.31%	-15 20%	16 35%	0.81	-0.85%	1.25%	1.10%	0.92%
9015	-10 00 %	15 85%	-2.78%	-32.61%	40.71%	-25 08%	20.55%	-12 93 2	56 16%	1.26%	1.19%	0.95%
9016	10 00%	-4.66%	-16 77%	-34.94%	-1.20%	29.58%	107 85	2.16%	124.88%	0.91%	1.21%	1.05%
9017	32.93%	16.71%	10.84 %	-2.37%	47.19%	12.06.5	15 16%	-27.16%	101 40%	1.24%	1.11%	C.25%
1010	-29.25	-11.6%	34.15%	18.78%	24.78%	-29 18%	2.12%	26.67	49 83%	1.20%	1.15%	0.83%
9020	3.56%	1 0 M	32.10%	5 40%	55.09%	18.96%	96.56%	13 76%	133.01%	1.20%	1.06%	1.02%
9021	41.60%	4.42%	-1.01%	13.08%	-18 56%	-24.10%	-46 716	21.99%	-37 20%	1.22%	1.15%	1.03%
9023	1 81%	-6.31%	-26 27%	-13 12%	-57.08%	-26 23%	-48.10%	-4.08%	92.48%	1.15%	1.18%	0.00%
9074	0.52%	16.62%	-44 04%	20 27%	8.05%	14.59%	0.53%	7.12%	63 37%	1 12%	1.27%	1.03%
9025	-53 14%	-3.91%	23 83%	20 28%	3 64%	-38 55%	28.66%	-23.01%	78.29%	1.38%	1.10%	1.04%
9077	-20 54 %	16.49%	19 87%	28.47	-16.92%	-34.67%	-41 86%	-4.55%	5.59%	1.35%	1.16%	0.91%
9028	10 51 %	5.93%	19.25%	23 60%	5 69%	-27 11%	10.87%	8.19%	60 98 %	1.33%	1.28%	0.87%
9029	32 90%	-18 96 %	7 86 %	11.40%	-4.98%	-52 95%	116.10%	-32 45%	52 02 M	0.86%	1.12%	0.89%
9030	-19 89 %	12.76%	-32.93	-23.15	8 55%	-17 16 %	-22.23%	-3.36%	113 16%	1.33%	1.16%	0.91%
9032	-43 87%	-16 39%	9.79%	-16 00%	41.62%	7114	61.51%	-0 29%	132 50%	1.15%	1.12%	0.68%
9033	-12 49%	0 53%	7.20%	34 34%	7.17%	1.75%	72.05%	14.40%	9 72 4	0.76%	1.34%	1.00%
90151	12 705	2 89%	-7 58 -	-29 20%	-24.05%	-32.33%	99 03 %	-21.74%	15 23%	0.81%	1.10%	0.76%
9036	-10 86 %	9.76%	-29 65 %	-31 15%	-12 93%	2.85%	-62.41%	5.15 N	46.11%	1.02%	1.29%	0.83%
9637	111	2 175	-13 01	-20 435	-1 84%	-16 16%	64 99	-35 24%	35 55	6 58	1.10%	0.97%
9239	13 21 5	12 71 5	26 40%	-21 58	-53 54%	-10 65 %	117 02 %	-16 0-	57 245	0 93 💊	1.22%	0.75%
¥A.	33 5 5	3 78 %	-13 24%	24.42%	25 81	-46 17	5 67	-25 27	21 7		1.37%	0.96%
9241		-12 26 -	-44 76 -	15 94 %	14 97	-15 02 -	:7545	15 275		Ç 65%	1 13%	0.67%
9643		17 25 5	4 2 3	26.74	17 01	-42 24 5	5.64 %	21.85%	63 40%	1 105	1 23 %	0.87%
9:44	14 345		4 54 %	10 47 5	46 73 %	12.72	2.35	11111		59 5	1 32 %	0.70%
WAC .	19 4: 5	-2 54%	16 5.	1765	43.67	6 85%	-62 9. %	-60:5	30 41%	345	1 26 %	0.67%
R.4.	15 10	-11 -1 %	11 28 5	19 79 8	-50 875	21 225	92.72		-2 12	0.99		0.98%
9048	0 71 -	79 -	-42 19%	18.26	-57 35%	22 01	-28 49	2 24 5	46	25	1 25 5	0.96%
90,47	27 69	-1115	-32 75	-:6 54 %	52 225	-6 74 %	-1 62	13 71	13 92	0 69 %	1 30~	1 02 %
9951	37 78	-1 26 %	-2 01 %	35.85	-39 89%	28 91	26 47 %	1 10 %	50 61 *	1.06	1 08 %	0 91 %
9952	5 38 %	2 19%	-10 02 5	-19 31 %	42.13%	-27 07	-15 07 %	20 59 %	132.13%	0.64%	1 28,5	0.64%
9951	-11.07%	-10.55	33 05	34.19%	-31.78%	11.24%	-53.23%	9.24	23.16%	0.68%	1.14%	0.67%
9955	35.46%	11 66 %	-16.43%	9.75%	38.89%	-37.04%	-40.30%	-25 38 %	27 92 %	1.38%	1.07%	0.79%
9956	-15.18%	-0.35%	-37.23%	-20.41%	58.09%	-56.15%	-35.75%	21 99%	10.58 %	0.83%	1.36%	0.76%
9957	-29.63 %	-24 1154	-13.60%	-14.57%	1 93%	28.87%	12.21%	19.67%	117.53%	1.12%	1.33%	1.00%
9959	8 27%	-23.65%	33 46%	-16 95%	\$1.54%	-36.87%	-5 66%	-4.76%	-29.11%	1.17%	1.07%	0.92%
9960	33.81%	-10.50%	-45.10%	9.22%	24.18%	19.59%	-64.86%	12.72	-31.90 %	1.16%	1.24%	1.03%
9961	25.75%	10.09%	19 23 %	13.44%	-57.01%	1.15%	-60.35%	26.55%	89 80%	1.16%	1.34%	0.76 %
9963	- 55.15-	-14.09%	42.74 %	8.06%	-50.88%	-32.04%	-63.14%	-33.15%	-2.59%	1.19%	1.33%	0.68%
8844 7704	-44.19%	5.21%	10.91%	33 36%	-55 69 %	-34.19%	-18 94%	-40.34%	-21 92%	0.99%	1.35%	0.85%
9965	-31.82%	19 0.8 %	-17 65 1	-20 20%	37.83%	30.71%	2 29 %	6.57%	131.60%	1.35%	1.38%	0.88%
9967	-40.27%	22.30%	18115	28 07%	-50.26%	-62.07%	110.32%	1.24%	108.78%	0.69%	1.31%	0.79%
9949	-20 38 %	2.38%	11 51%	30 96 %	7.53%	-56 81 %	41.40%	9.59%	96.59%	1.20%	1.25%	0.80%
9369	-13.40 %	-11.06%	-12.35%	-9.31%	10.10%	-55.70%	-3.53%	11.27%	8.01%	1.25%	1.172	0.68%
9971	18 20%	2.72%	3.96%	-15.31%	24.58%	-46.71%	51.43%	-27.17%	20 59%	0.75%	1.27%	1.00%
872	-4.58%	11.318	16.00%	9.54%	27.39%	-36.51%	86.23%	16 88%	6 62%	0.87%	1.14%	0.88%
6472	10 41 4	11 20%	-4.14%	31.19%	-4.27%	26.97%	101.67%	18.14%	70 98	1.25%	1.32%	0.96%
9975	-42 52%	15 03 %	-28.46%	20.91%	-54.41%	20.27%	1.29%		126 87%	0.91%	1.26%	C.81%
9976	-48.38%	1.35%	-1.59%	-21 87%	27 784	2.01%	-47.42%	-41.33%	-38 99%	1.05%	1.23%	0.88%
9977	12 24 1	11.72%	-38 24%	-8.51%	-51 80%	-55.61%	-18.46%	-13 92%	55 78%	1.14%	1 100	0.20%
9979	16 16%	11.40%	-10.06%	17.11%	-30.30%	-2.76%	158.01%	18.36%	80.48%	1.06%	1.09%	0.87%
9980	10 44%	16.84%	-27.64%	-15.21%	-10 56%	31.83%	-5.77%	-26 07%	21.72%	1.18%	1.17%	0.93%
9981	-43.74%	-0.74%	18 59%	-22 17%	41 25%	21.22%	72.21%	-29 42%	0 2 %	1.35%	1.14%	0.68%
99 3	13.145	13,81 %	23.06%	23.58%	-12.28%	16.27.2	4.85%	-36 32%	53.78%	0.78%	1.19%	0.94%
9984	14 19%	-19.39%	-39.99%	28.43%	31.06%	-56.02%	-12.94%	-29 28%	-16.74%	1.04%	1.28%	0.76%
9985	1 46 4	-23.83%	6.14%	14.59%	-56.90%	21.92%	42 86%	14.31%	44 49%	0.68%	1.18%	0.99%
99 71	-21 02 %	5 48%	-38.83%	25.24%	6.63%	-2.56%	46.72%	-24.99%	89.05%	0.89%	1.12%	0.93%
9968	-4.26%	4.15%	17.11%	-27.82%	-22 34%	-63.93%	80.89%	-2.24%	126.82%	1.25%	1.31%	0.90%
99:19	-41.66%	-23.51%	17.55%	-33.79%	-20.04%	-36.96%	-4.44%	-10.31 %	47.66%	0.64%	1.36%	0.69%
9991	-10 48%	0.43%	1.80%	21.21%	27.53%	21 88%	90.47%	-19.60%	61.73%	1.18%	1.16 %	0.70%
99.92	16 69%	-6.98	10.50 %	9.49%	54 654	-2.87	88.35%	14.02%	2.52%	1.02%	1.16%	0.91%
9993	33.00%	13.10%	4.03%	27 65%	-12.18%	-43.30%	-27.26%		101.45%	0.76%	1.09%	0.92%
2000			32.47%	9.99%	20.98%	37.61 %	-3.27%	19.45%	-5.10%	1.11%	1.10%	0.97%
99%	-17.41%	8.44%	-0 53%	10.03%	-25.49%	-26.26%	-11.92%	-16.81 %	-34.73%	0.78%	1.08%	0.95%
9997	-11.96%	6.59%	28.31%	-1.48%	-15.20%	-57.35%	28.35%	20.16%	129.07%	0.91%	1.27%	0.67%
9999	-23 00 %	0 89%	-33.26%	-4.63%	57.12%	-57.63%	33.59%	0.38%	76.10%	0.70%	1.23%	0.92%
10000	48 03 %	-12 24%	0.08%	17.19%	2.26%							

Table 4.15 Simulation Result : Weighting Structure 1

11 11 28.1665 BINS COUNTS SCALE TOTAL 2 21.1587518 8.466401% 2 -28.414655% 1 0.017885 0.000100 4 -15.146648% 8.466401% 4 -26.733043% 2 0.035769 0.000500 5 11.901303% 8.466401% 5 -26.173903% 2 0.035769 0.000500 6 9.593030% 8.466401% 6 -25.14762% 5 0.089423 0.001500 7 19.30933% 8.466401% 7 -25.055522% 4 0.021538 0.001900 9 7.872280% 8.466401% 10 -23.378200% 16 0.286153 0.003900 11 -5.230627% 8.466401% 11 -22.159919% 20 0.41146 0.003900 12 -4.673872% 8.466401% 12 -21.70079% 20 0.412461 0.429210 0.141261 12 -2.047398 8.466401% 12 -21.70079%	TTERATION	RETURN	RISK					
2 21.159751% 8.466401% 2 -28.410465% 1 0.017865 0.000100 3 19.73581% 8.466401% 3 -27.751324% 0 0.000000 4 15.146648% 8.466401% 5 -26.73903% 2 0.035769 0.000500 6 9.549030% 8.466401% 7 -25.05522% 4 0.01980 7 19.08932% 8.466401% 7 -25.05522% 4 0.01980 7 19.08932% 8.466401% 9 -24.49543% 16 0.028423 0.001900 9 7.472280% 8.466401% 11 -23.37341% 19 0.33800 0.003800 11 5.830677% 8.466401% 12 -22.1991% 27 0.48153 0.002200 12 4.23027% 8.466401% 13 -21.7079% 20 0.137820 0.14000 13 1.53264% 8.466401% 15 -20.5824984% 8 0.29201 14	1	-11.700503%	8.466401%	#	BINS	COUNTS	SCALE	TOTAL
3 19.173581% 8.466401% 2 -27.85124% 0 0.000000 0.000100 4 15.146648% 8.466401% 4 -26.733043% 2 0.035769 0.000500 5 11.901303% 8.466401% 5 -26.17303% 5 0.008423 0.001000 6 -9.599030% 8.466401% 6 -25.614762% 5 0.088423 0.001000 8 6.657370% 8.466401% 8 -24.496481% 16 0.286153 0.003000 9 7.872280% 8.466401% 10 -23.378200% 16 0.286153 0.003000 11 -22.819060% 23 0.411346 0.003000 12 -4.673872% 8.466401% 13 -21.700779% 20 0.35769 0.014000 13 15.220354 8.466401% 15 -20.23357% 37 0.661713 0.022800 14 6.4308606 8.466401% 16 -20.03357% 37 0.651710 0.022800	2	21.158751%	8.466401%		-28.410465%	1	0.017885	0.000100
4 15.146648% 8.466401% 3 -27.292184% 2 0.035769 0.000300 5 11.901303% 8.466401% 5 -26.173903% 5 0.085769 0.000300 6 -9.549030% 8.466401% 7 -25.055622% 4 0.075150 0.001500 7 19.808932% 8.466401% 7 -25.055622% 4 0.075150 0.01300 9 7.872280% 8.466401% 9 -23.378200% 16 0.2386153 0.00700 10 12.342401% 8.466401% 11 -22.3378200% 16 0.2386163 0.007000 13 12.231674% 8.466401% 12 -22.259919% 27 0.48284 0.01200 14 -5.230662% 8.466401% 16 -20.033776 37 0.66173 0.02200 15 -13.152230 8.466401% 16 -20.053776 37 0.66173 0.02200 16 -15.350464% 8.466401% 16 -20.053200 <td>3</td> <td>-19.173581%</td> <td>8.466401%</td> <td></td> <td>-27.851324%</td> <td>0</td> <td>0.000000</td> <td>0.000100</td>	3	-19.173581%	8.466401%		-27.851324%	0	0.000000	0.000100
\$ 11.901303% 8.466401% 5 -26.173903% 2 0.035769 0.000500 6 -9.549030% 8.466401% 6 -25.514762% 5 0.089423 0.001000 8 6.657370% 8.466401% 8 -24.496481% 16 0.23820.001500 9 7.872280% 8.466401% 9 -23.3937341% 19 0.339807 0.005400 11 -22.819060% 23 0.411346 0.009300 12 -4.673872% 8.466401% 11 -22.819060% 23 0.411346 0.009300 13 12.21674% 8.466401% 13 -21.700779% 20 0.45826 0.012000 14 8.230862% 8.466401% 15 -20.58249% 38 0.679614 0.023500 15 3.163263% 8.466401% 16 -20.073357% 37 0.661730 0.023800 16 -1380445% 16 -23.78298% 38 0.675761 0.035766 18	4	-15.146648%	8.466401%	3	-27.292184%	2	0.035769	0.000300
6 -9.549020% 8.466401% 2 -26.173903% 5 0.089423 0.001000 7 19.808932% 8.466401% 7 -25.055622% 4 0.071538 0.001900 9 7.872280% 8.466401% 9 -23.937341% 19 0.338007.0.05400 10 12.424001% 8.466401% 10 -23.378200% 16 0.33807.0.05400 11 -5.830677% 8.466401% 12 -22.3378200% 16 0.33807.0.05400 12 24.673872% 8.466401% 12 -22.239913% 27 0.48284 0.012000 13 12.231674% 8.466401% 14 -21.141638% 24 0.429230 0.015400 15 31.53263% 8.466401% 16 -20.03357% 37 0.661730.0.023900 16 -15.350464% 8.466401% 16 -20.03357% 10.03730 0.02300 17 -49.44217% 59 1.03730 0.05730 0.02300 0.0223357% 1.03730 <	5	11.901303%	8.466401%		-26.733043%	2	0.035769	0.000500
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8 6.657300% 8.466401% 7 -25.055522% 4 0.071538 0.001900 9 7.872280% 8.466401% 9 -23.937341% 19 0.339807 0.003500 10 12.424001% 8.466401% 10 -23.37800% 16 0.286153 0.003500 11 -5.830677% 8.466401% 11 -22.37800% 16 0.286153 0.00300 12 2.4.673872% 8.466401% 11 -22.259919% 27 0.482884 0.01200 13 12.31674% 8.466401% 14 -21.141638% 24 0.429230 0.016400 14 8.330862% 8.466401% 16 -20.532498% 38 0.679614 0.023900 15 9.183027% 8.466401% 17 19.464217% 59 1.055191 0.023900 18 -9.80075% 58 1.037306 0.035509 58 1.037306 0.035800 19 9.2363678% 8.466401% 20 -17.76679576	7	19.808932%	8 466401%	0	-25.614762%	5	0.089423	0.001500
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11 -13.378200% 16 -23.378200% 16 0.286153 0.007000 12 4.673872% 8.466401% 12 -22.259919% 27 0.41346 0.099300 13 12.231674% 8.466401% 13 -21.700779% 20 0.337692 0.014000 14 -8.230862% 8.466401% 14 -21.141638% 24 0.429230 0.016400 15 3.163263% 8.466401% 15 -20.582498% 38 0.679614 0.022800 16 15.3504649% 8.466401% 16 -20.02357% 37 0.661730 0.023800 18 -9.183092% 8.466401% 17 -19.464217% 59 1.055191 0.023800 20 9.263678% 8.466401% 20 -17.786795% 76 1.359229 0.049600 21 1.165035% 8.466401% 21 -16.665514% 83 1.44641 0.045500 22 0.53927% 8.466401% 22 -16.665514% <t< td=""><td>10</td><td>12,424001%</td><td>8 466401%</td><td>9</td><td>-23.937341%</td><td>19</td><td>0.339807</td><td>0.005400</td></t<>	10	12,424001%	8 466401%	9	-23.937341%	19	0.339807	0.005400
11		-5.830677%	8 466401%	10	-23.378200%	16	0.286153	0.007000
11 12 -22.259919% 27 0.422884 0.012000 14 6.230662% 8.466401% 14 -21.141638% 24 0.429230 0.016400 15 3.163263% 8.466401% 14 -20.582498% 38 0.679514 0.022900 16 -15.350464% 8.466401% 16 -20.023357% 37 0.661730 0.023900 17 -4.694605% 8.466401% 16 -20.023357% 59 1.055191 0.023800 19 0.923834% 8.466401% 18 -18.90576% 58 1.037306 0.035600 20 9.263678% 8.466401% 20 -17.786795% 76 1.359229 0.657200 212 -0.539927% 8.466401% 22 -16.668514% 63 1.484421 0.065500 23 8.953261% 8.466401% 23 -15.19373% 97 1.734805 0.075200 24 0.31524% 8.466401% 25 -14.91092% 110 1.9673	12	-4 673872%	8 466401%	11	-22.819060%	23	0.411346	0.009300
13 12.121074% 3.450401% 13 -21.700729% 20 0.357692 0.014000 15 3.163263% 8.466401% 14 -21.141638% 24 0.429230 0.016400 16 -15.350464% 8.466401% 16 -20.023357% 37 0.661730 0.023900 18 -9.183092% 8.466401% 17 -19.464217% 59 1.055191 0.023800 19 0.923834% 8.466401% 18 -18.345936% 64 1.144614 0.42000 21 21.165035% 8.466401% 20 -17.786795% 76 1.359229 0.657200 22 -0.539927% 8.466401% 21 -17.227654% 76 1.359229 0.657200 22 -0.539927% 8.466401% 23 -15.109373% 97 1.7369757 0.93800 24 4.031924% 8.466401% 25 -14.991092% 110 1.967305 0.95800 25 -7.856506% 8.466401% 77	12	12 23167494	8.455401%	12	-22.259919%	27	0.482884	0.012000
14 -0.120802*0 0.84001% 14 -21.141638% 24 0.429230 0.016400 16 -15.350464% 8.466401% 15 -20.582498% 38 0.679614 0.022000 17 -4.694606% 8.466401% 17 -19.464217% 59 1.055191 0.023800 18 -18.905076% 58 1.037306 0.035600 20 9.263678% 8.466401% 10 -17.786795% 76 1.359229 0.049600 21 21.165035% 8.466401% 21 -17.227654% 76 1.359229 0.057200 22 -0.539927% 8.466401% 23 -16.668514% 83 1.84421 0.065500 23 8.953261% 8.466401% 24 -15.55023% 96 1.71.69210 0.084800 24 -0.35246% 8.466401% 25 -14.991092% 110 1.967305 0.95800 25 -7.856506% 8.466401% 78 14.643356% 106 1.895767	14	-8 22096204	8.466401%	13	-21.700779%	20	0.357692	0.014000
13 3.102037% 38 0.679614 0.020200 16 -15.350464% 8.466401% 16 -20.023357% 37 0.661730 0.023800 17 -4.694606% 8.466401% 17 -19.464217% 59 1.055191 0.023800 18 -9.183092% 8.466401% 18 -18.95936% 64 1.144614 0.042000 20 9.2236378% 8.466401% 20 -17.786795% 76 1.359229 0.049600 21 21.165035% 8.466401% 22 -16.668514% 83 1.48421 0.065500 22 0.2539927% 8.466401% 23 -16.109373% 97 1.734805 0.075200 23 8.953261% 8.466401% 24 -15.550233% 96 1.716921 0.084800 25 -7.85550% 8.466401% 77 14.084215% 106 1.895767 0.90200 26 -7.85550% 8.466401% 77 14.084215% 106 1.895767 0.90200 29 7.442346% 8.466401% 77 14.084215%	14	3 16 3 26 204	8.466401%	14	-21.141638%	- 24	0.429230	0.016400
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11 -19.464217% 59 1.055191 0.029800 18 -9.1830920% 8.466401% 18 -18.905076% 58 1.037306 0.035600 19 0.923834% 8.466401% 19 -15.345936% 64 1.144614 0.042000 20 9.263678% 8.466401% 20 -17.785795% 76 1.359229 0.049600 21 21.165035% 8.466401% 22 -16.668514% 83 1.44421 0.065500 22 -0.539927% 8.466401% 23 -16.109373% 97 1.734805 0.075200 23 8.953261% 8.466401% 24 -15.550233% 96 1.716921 0.084800 25 -7.856506% 8.466401% 77 14.084215% 106 1.895767 0.891400 9977 7.749477% 8.466401% 79 15.202496% 100 1.788459 0.912000 9980 18.131973% 8.466401% 81 16.527978 111 1.985190 0.923100 9981 7.224158% 8.466401% 81 16.5279	10	-15.350404%	8.466401%	16	-20.023357%	37	0.661730	0.023900
18 -9.183092% 8.466401% 18 -18.905076% 58 1.037306 0.035600 20 9.263678% 8.466401% 19 -18.345936% 64 1.144614 0.049000 21 21.165035% 8.466401% 20 -17.786795% 76 1.359229 0.057200 22 -0.539927% 8.466401% 22 -16.668514% 83 1.484421 0.065500 23 8.953261% 8.466401% 23 -16.109373% 97 1.734605 0.075200 24 4.031924% 8.466401% 25 -14.991092% 110 1.967305 0.995800 25 -7.856506% 8.466401% 25 -14.991092% 100 1.788757 0.902000 9977 7.749477% 8.466401% 78 14.643356% 106 1.895767 0.902000 9978 -6.320813% 8.466401% 79 15.202496% 100 1.788459 0.922000 9980 18.131973% 8.466401% 80 15.761637% 111 1.985190 0.923100 9981 -	1/	-4.694606%	8.466401%	17	-19.464217%	59	1.055191	0.029800
19 0.923834% 8.466401% 19 -18.345936% 64 1.144614 0.042000 20 9.263678% 8.466401% 20 -17.786795% 76 1.359229 0.049600 21 21.165035% 8.466401% 21 -17.227654% 76 1.359229 0.055200 22 -0.539927% 8.466401% 22 -16.668514% 83 1.484421 0.065500 23 8.953261% 8.466401% 23 -16.109373% 97 1.734605 0.075200 24 4.031924% 8.466401% 24 -15.550233% 96 1.716921 0.068430 25 -7.856506% 8.466401% 25 -14.991092% 110 1.967305 0.095800 26 -7.856506% 8.466401% 77 14.084215% 106 1.895767 0.891400 9978 -6.320813% 8.466401% 79 15.202496% 100 1.788459 0.912000 9980 18.131973% 8.466401% 80 15.761637% 111 1.985190 0.923100 0.9381500 <td< td=""><td>18</td><td>-9.183092%</td><td>8.466401%</td><td>18</td><td>-18.905076%</td><td>58</td><td>1.037306</td><td>0.035600</td></td<>	18	-9.183092%	8.466401%	18	-18.905076%	58	1.037306	0.035600
20 9.263678% 8.466401% 20 -17.786795% 76 1.359229 0.049600 21 21.165035% 8.466401% 21 -17.227654% 76 1.359229 0.057200 22 0.53927% 8.466401% 22 -16.668514% 83 1.484421 0.055200 23 8.953261% 8.466401% 23 -16.109373% 97 1.734805 0.075200 24 4.031924% 8.466401% 24 -15.550233% 96 1.716921 0.084800 25 -7.856506% 8.466401% 25 -14.991092% 110 1.967305 0.095800 26 -7.749477% 8.466401% 77 14.084215% 106 1.895767 0.891400 9978 17.462346% 8.466401% 78 14.643356% 106 1.895767 0.902000 9978 17.462346% 8.466401% 80 15.761637% 111 1.985190 0.923100 9981 -7.224158% 8.466401% 82	19	0.923834%	8.466401%	19	-18.345936%	64	1.144614	0.042000
21 21. -17.227654% 76 1.359229 0.057200 22 -0.539927% 8.466401% 22 -16.668514% 83 1.484421 0.065500 23 8.953261% 8.466401% 23 -16.109373% 97 1.734605 0.075200 24 4.031924% 8.466401% 24 -15.550233% 96 1.716921 0.084800 25 -7.856506% 8.466401% 25 -14.991092% 110 1.967305 0.95800 20	20	9.263678%	8.466401%	20	-17.786795%	76	1.359229	0.049600
22 -0.539927% 8.466401% 22 -16.668514% 83 1.484421 0.065500 23 8.953261% 8.466401% 23 -16.109373% 97 1.734805 0.075200 24 4.031924% 8.466401% 25 -14.991092% 110 1.967305 0.095800 25 -7.856506% 8.466401% 25 -14.991092% 110 1.967305 0.095800 26 -7.49477% 8.466401% 77 14.084215% 106 1.895767 0.891400 9977 7.749477% 8.466401% 78 14.643356% 106 1.895767 0.891400 9979 17.462346% 8.466401% 80 15.761637% 111 1.985190 0.923100 9980 18.131973% 8.466401% 81 16.32077% 84 1.502306 0.931500 9981 -7.224158% 8.466401% 83 17.439058% 84 1.502306 0.947500 9984 -8.835635% 8.466401% 85	21	21.165035%	8.466401%	21	-17.227654%	76	1.359229	0.057200
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24 4.031924% 8.456401% 24 -15.550233% 96 1.716921 0.084800 25 -7.856506% 8.466401% 25 -14.991092% 110 1.967305 0.095800 9977 7.749477% 8.466401% 77 14.084215% 106 1.895767 0.891400 9978 -6.320813% 8.466401% 78 14.643356% 106 1.895767 0.92000 9979 17.462346% 8.466401% 80 15.761637% 100 1.788459 0.923100 9980 18.131973% 8.466401% 81 16.320777% 84 1.502306 0.923100 9981 -7.224158% 8.466401% 82 16.879918% 76 1.359229 0.939100 9983 18.757628% 8.466401% 83 17.439858% 84 1.502306 0.947500 9984 -8.835635% 8.466401% 85 18.557339% 71 1.268806 0.961000 9985 <td>23</td> <td>8.953261%</td> <td>8.466401%</td> <td>23</td> <td>-16.109373%</td> <td>97</td> <td>1.734805</td> <td>0.075200</td>	23	8.953261%	8.466401%	23	-16.109373%	97	1.734805	0.075200
25 -7.856506% 8.466401% 25 -14.991092% 110 1.967305 0.095800 .	24	4.031924%	8.466401%	24	-15.550233%	96	1.716921	0.084800
<td>25</td> <td>-7.856506%</td> <td>8.466401%</td> <td>25</td> <td>-14.991092%</td> <td>110</td> <td>1.967305</td> <td>0.095800</td>	25	-7.856506%	8.466401%	25	-14.991092%	110	1.967305	0.095800
99777.749477%8.466401%7714.084215%1061.8957670.8914009978-6.320813%8.466401%7814.643356%1001.7884590.902000997917.462346%8.466401%7915.202496%1001.7884590.912000998018.131973%8.466401%8015.761637%1111.9851500.9231009981-7.224158%8.466401%8116.32077%841.5023060.9315009982-15.792929%8.466401%8216.879918%761.3592290.939100998318.757628%8.466401%8317.439058%841.5023060.9475009984-8.83535%8.466401%8417.998199%641.146140.953900998518.121087%8.466401%8518.557339%711.2698060.961000998612.042991%8.466401%8619.116480%681.2161520.96780099882.153330%8.466401%8719.675620%591.0551910.9737009989-14.179571%8.466401%8920.793901%380.6796140.981500999015.101994%8.466401%9121.912182%350.6259610.984009991-7.339581%8.466401%9222.471323%270.482840.99210099920.595863%8.466401%9323.030463%210.3755760.994200999911.568729								
9978-6.320813%8.466401%7814.643356%1061.8957670.902000997917.462346%8.466401%7915.202496%1001.7884590.912000998018.131973%8.466401%8015.761337%1111.9851900.9231009981-7.224158%8.466401%8116.32077%841.5023060.9315009982-15.792929%8.466401%8216.879918%761.3592290.939100998318.757628%8.466401%8317.439058%841.5023060.9475009984-8.835635%8.466401%8417.998199%641.1446140.9539009985-18.121087%8.466401%8518.557339%711.2698060.961000998612.042991%8.466401%8619.116480%681.201520.9678009987-3.456056%8.466401%8719.675620%591.0551910.97770099882.153330%8.466401%8920.793901%380.6796140.981500999015.01994%8.466401%8920.7933042%440.7869220.9859009991-7.339581%8.466401%9323.030463%210.3755760.9963009991-7.39581%8.466401%9524.148745%110.1967310.997400999314.771922%8.466401%9524.107885%90.1609610.99830099940.74269	9977	7.749477%	8.466401%	77	14.084215%	106	1.895767	0.891400
997917.462346%8.466401%7915.202496%1001.7884590.912000998018.131973%8.466401%8015.761637%1111.9851900.9231009981-7.224158%8.466401%8116.220777%841.5023060.9315009982-15.792929%8.466401%8216.879918%761.3522290.939100998318.757628%8.466401%8317.439058%841.5023060.9475009984-8.835635%8.466401%8417.998199%641.1446140.9539009985-18.121087%8.466401%8518.557339%711.2698060.961000998612.042991%8.466401%8619.116480%681.2161520.9678009987-3.456056%8.466401%8719.675620%591.051910.97370099882.153330%8.466401%8920.793901%380.6796140.981500999015.101994%8.466401%9021.353042%440.7869220.9859009991-7.339581%8.466401%9121.912182%350.6259610.98420099920.595863%8.466401%9222.471323%270.482840.992100999314.771922%8.466401%9323.030463%210.3755760.99420099940.742694%8.466401%9524.148745%110.1967310.998300999521.53116	9978	-6.320813%	8.466401%	78	14.643356%	106	1.895767	0.902000
998018.131973%8.466401%8015.761637%1111.9851900.9231009981-7.224158%8.466401%8116.320777%841.5023060.9315009982-15.792929%8.466401%8216.879918%761.3592290.939100998318.757628%8.466401%8317.439058%841.5023060.9475009984-8.835635%8.466401%8417.998199%641.1446140.9539009985-18.121087%8.466401%8519.116480%681.2161520.967800998612.042991%8.466401%8619.116480%681.2161520.9678009987-3.456056%8.466401%8719.675620%591.0551910.97370099882.153330%8.466401%8920.793901%380.6796140.981500999015.101994%8.466401%9021.353042%440.7869220.9859009991-7.339581%8.466401%9121.912182%350.6259610.99420099920.595863%8.466401%9222.471323%270.4828440.992100999314.771922%8.466401%9423.589604%210.3755760.99420099941.568729%8.466401%9524.148745%110.1967310.997400999521.531163%8.466401%9624.707885%90.1609610.99830099991.568729	9979	17.462346%	8.466401%	79	15.202496%	100	1.788459	0.912000
9981-7.224158%8.466401%8116.320777%841.5023060.9315009982-15.792929%8.466401%8216.879918%761.3592290.939100998318.757628%8.466401%8317.439058%841.5023060.9475009984-8.835635%8.466401%8417.998199%641.1446140.9539009985-18.121087%8.466401%8518.557339%711.2698060.961000998612.042991%8.466401%8518.557339%711.2698060.9610009987-3.456056%8.466401%8719.675620%591.0551910.97370099882.153330%8.466401%8820.234761%400.7153840.9777009989-14.179571%8.466401%8920.793901%380.6796140.985900999015.101994%8.466401%9021.353042%440.7869220.9859009991-7.339581%8.466401%9121.912182%350.6259610.98590099920.595863%8.466401%9222.471323%270.4828840.992100999314.771922%8.466401%9323.589604%210.3755760.99630099940.742694%8.466401%9524.148745%110.169610.998300999521.531163%8.466401%9624.707885%90.1609610.99830099991.568729%	9980	18.131973%	8.466401%	80	15.761637%	111	1.985190	0.923100
9982-15.792929%8.466401%8216.879918%761.3592290.939100998318.757628%8.466401%8317.439058%841.5023060.9475009984-8.835635%8.466401%8417.998199%641.1446140.9539009985-18.121087%8.466401%8518.557339%711.2698060.961000998612.042991%8.466401%8619.116480%681.2161520.9678009987-3.456056%8.466401%8719.675620%591.0551910.97370099882.153330%8.466401%8820.234761%400.7153840.9777009989-14.179571%8.466401%8920.793901%380.6796140.981500999015.101994%8.466401%9021.353042%440.7869220.9859009991-7.339581%8.466401%9121.912182%350.6259610.9840099920.595863%8.466401%9222.471323%270.482840.992100999314.771922%8.466401%9423.589604%210.3755760.99630099940.742694%8.466401%9524.148745%110.1967310.99740099951.568729%8.466401%9624.707885%90.1609610.99830099951.568729%8.466401%9825.826166%60.1073080.99940099951.821156% <td>9981</td> <td>-7.224158%</td> <td>8.466401%</td> <td>81</td> <td>16.320777%</td> <td>84</td> <td>1.502306</td> <td>0.931500</td>	9981	-7.224158%	8.466401%	81	16.320777%	84	1.502306	0.931500
998318.757628%8.466401%8317.439058%841.5023060.9475009984-8.835635%8.466401%8417.998199%641.1446140.9539009985-18.121087%8.466401%8518.557339%711.2698060.961000998612.042991%8.466401%8619.116480%681.2161520.9678009987-3.456056%8.466401%8719.675620%591.0551910.97370099882.153330%8.466401%8820.234761%400.7153840.9777009989-14.179571%8.466401%8920.793901%380.6796140.981500999015.101994%8.466401%9021.353042%440.7869220.9859009991-7.339581%8.466401%9121.912182%350.6259610.98940099920.595863%8.466401%9222.471323%270.482840.992100999314.771922%8.466401%9323.030463%210.3755760.99630099940.742694%8.466401%9524.148745%110.1967310.997400999521.531163%8.466401%9624.707885%90.1609610.99830099961.568729%8.466401%9725.267026%50.0894230.9980099961.568729%8.466401%9825.826166%60.1073080.999400999911.821156%	9982	-15.792929%	8.466401%	82	16.879918%	76	1.359229	0.939100
9984-8.835635%8.466401%8417.998199%641.1446140.9539009985-18.121087%8.466401%8518.557339%711.2698060.961000998612.042991%8.466401%8619.116480%681.2161520.9678009987-3.456056%8.466401%8719.675620%591.0551910.97370099882.153330%8.466401%8820.234761%400.7153840.9777009989-14.179571%8.466401%8920.793901%380.6796140.981500999015.101994%8.466401%9021.353042%440.7869220.9859009991-7.339581%8.466401%9121.912182%350.6259610.9840099920.595863%8.466401%9222.471323%270.482840.992100999314.771922%8.466401%9323.030463%210.3755760.99420099940.742694%8.466401%9524.148745%110.1967310.997400999521.531163%8.466401%9624.707885%90.1609610.99830099961.568729%8.466401%9725.267026%50.0894230.998009997-12.493075%8.466401%9825.826166%60.1073080.99940099989.832246%8.466401%9925.826166%60.0084230.999900999911.821156%<	9983	18.757628%	8.466401%	83	17.439058%	84	1.502306	0.947500
9985-18.121087%8.466401%8518.557339%711.2698060.961000998612.042991%8.466401%8619.116480%681.2161520.9678009987-3.456056%8.466401%8719.675620%591.0551910.97370099882.153330%8.466401%8820.234761%400.7153840.9777009989-14.179571%8.466401%8920.793901%380.6796140.981500999015.101994%8.466401%9021.353042%440.7869220.9859009991-7.339581%8.466401%9121.912182%350.6259610.9840099920.595863%8.466401%9222.471323%270.482840.992100999314.771922%8.466401%9323.030463%210.3755760.99420099940.742694%8.466401%9524.148745%110.1967310.997400999521.531163%8.466401%9624.707885%90.1609610.99830099961.568729%8.466401%9725.267026%50.0894230.99840099989.832246%8.466401%9825.826166%60.1073080.999400999911.821156%8.466401%9926.385307%50.0894230.999900999910000-9.552992%8.466401%10026.944447%10.0178851.000000	9984	-8.835635%	8.466401%	84	17.998199%	64	1.144614	0.953900
998612.042991%8.466401%8619.116480%681.2161520.9678009987-3.456056%8.466401%8719.675620%591.0551910.97370099882.153330%8.466401%8820.234761%400.7153840.9777009989-14.179571%8.466401%8920.793901%380.6796140.981500999015.101994%8.466401%9021.353042%440.7869220.9859009991-7.339581%8.466401%9121.912182%350.6259610.9840099920.595863%8.466401%9222.471323%270.4828840.992100999314.771922%8.466401%9323.030463%210.3755760.99420099940.742694%8.466401%9524.148745%110.1967310.997400999521.531163%8.466401%9624.707885%90.1609610.99830099961.568729%8.466401%9725.267026%50.0894230.9984009997-12.493075%8.466401%9825.826166%60.1073080.99940099989.832246%8.466401%9926.385307%50.0894230.999900999911.821156%8.466401%9926.385307%50.0894230.999900999910000-9.552992%8.466401%10026.944447%10.0178851.000000	9985	-18,121087%	8,466401%	85	18.557339%	71	1.269806	0.961000
9987-3.456056%8.466401%8719.675620%591.0551910.97370099882.153330%8.466401%8820.234761%400.7153840.9777009989-14.179571%8.466401%8920.793901%380.6796140.981500999015.101994%8.466401%9021.353042%440.7869220.9859009991-7.339581%8.466401%9121.912182%350.6259610.98940099920.595863%8.466401%9222.471323%270.4828840.992100999314.771922%8.466401%9323.030463%210.3755760.99420099940.742694%8.466401%9423.589604%210.3755760.996300999521.531163%8.466401%9524.148745%110.1967310.99740099951.568729%8.466401%9624.707885%90.1609610.99830099961.568729%8.466401%9725.267026%50.0894230.998009997-12.493075%8.466401%9825.826166%60.1073080.99940099989.832246%8.466401%9926.385307%50.0894230.999900999911.821156%8.466401%9926.385307%50.0894230.9999009000-9.552992%8.466401%10026.944447%10.0178851.000000	9986	12 042991%	8.466401%	86	19.116480%	68	1.216152	0.967800
5303.153330%8.466401%8820.234761%400.7153840.97770099882.153330%8.466401%8920.793901%380.6796140.981500999015.101994%8.466401%9021.353042%440.7869220.9859009991-7.339581%8.466401%9121.912182%350.6259610.98940099920.595863%8.466401%9222.471323%270.4828840.992100999314.771922%8.466401%9323.030463%210.3755760.99420099940.742694%8.466401%9423.589604%210.3755760.996300999521.531163%8.466401%9524.148745%110.1967310.99740099951.568729%8.466401%9624.707885%90.1609610.99830099961.568729%8.466401%9725.267026%50.0894230.9988009997-12.493075%8.466401%9825.826166%60.1073080.99940099989.832246%8.466401%9926.385307%50.0894230.999900999911.821156%8.466401%9926.385307%50.0894230.99990010000-9.552992%8.466401%10026.944447%10.0178851.000000	9987	-3 456056%	8.466401%	87	19.675620%	59	1.055191	0.973700
93002.13530100.1160401%8920.793901%380.6796140.9815009989-14.179571%8.466401%9021.353042%440.7869220.985900999015.101994%8.466401%9021.353042%440.7869220.9859009991-7.339581%8.466401%9121.912182%350.6259610.98940099920.595863%8.466401%9222.471323%270.4828840.992100999314.771922%8.466401%9323.030463%210.3755760.99420099940.742694%8.466401%9423.589604%210.3755760.996300999521.531163%8.466401%9524.148745%110.1967310.99740099951.568729%8.466401%9624.707885%90.1609610.99830099961.568729%8.466401%9725.267026%50.0894230.9988009997-12.493075%8.466401%9825.826166%60.1073080.99940099989.832246%8.466401%9926.385307%50.0894230.999900999911.821156%8.466401%9926.385307%50.0894230.99990010000-9.552992%8.466401%10026.944447%10.0178851.000000	0088	2 153330%	8 466401%	88	20.234761%	40	0.715384	0.977700
393814.17/371%0.460/01%9021.353042%440.7869220.985900999015.101994%8.466401%9121.912182%350.6259610.9894009991-7.339581%8.466401%9121.912182%350.6259610.98940099920.595863%8.466401%9222.471323%270.4828840.992100999314.771922%8.466401%9323.030463%210.3755760.99420099940.742694%8.466401%9423.589604%210.3755760.996300999521.531163%8.466401%9524.148745%110.1967310.997400999521.531163%8.466401%9624.707885%90.1609610.99830099961.568729%8.466401%9725.267026%50.0894230.9988009997-12.493075%8.466401%9825.826166%60.1073080.99940099989.832246%8.466401%9926.385307%50.0894230.999900999911.821156%8.466401%9926.385307%50.0894230.99990010000-9.552992%8.466401%10026.944447%10.0178851.000000	0090	14 179571%	8 466401%	89	20.793901%	38	0.679614	0.981500
999015.101994%0.40001%2021.912182%350.6259610.9894009991-7.339581%8.466401%9121.912182%270.4828840.99210099920.595863%8.466401%9222.471323%270.4828840.992100999314.771922%8.466401%9323.030463%210.3755760.99420099940.742694%8.466401%9423.589604%210.3755760.996300999521.531163%8.466401%9524.148745%110.1967310.99740099961.568729%8.466401%9624.707885%90.1609610.9983009997-12.493075%8.466401%9725.267026%50.0894230.99880099989.832246%8.466401%9825.826166%60.1073080.999400999911.821156%8.466401%9926.385307%50.0894230.99990010000-9.552992%8.466401%10026.944447%10.0178851.000000	9989	-14.179371%	8 466401%	90	21.353042%	44	0.786922	0.985900
9991-7.339381%6.466401%9222.471323%270.4828840.99210099920.595863%8.466401%9323.030463%210.3755760.994200999314.771922%8.466401%9323.589604%210.3755760.99630099940.742694%8.466401%9423.589604%210.3755760.996300999521.531163%8.466401%9524.148745%110.1967310.99740099961.568729%8.466401%9624.707885%90.1609610.9983009997-12.493075%8.466401%9725.267026%50.0894230.99880099989.832246%8.466401%9825.826166%60.1073080.999400999911.821156%8.466401%9926.385307%50.0894230.99990010000-9.552992%8.466401%10026.944447%10.0178851.000000	9990	7 2205 81%	8 455401%	91	21.912182%	35	0.625961	0.989400
9992 0.595863% 3.466401% 92 23.030463% 21 0.375576 0.994200 9993 14.771922% 8.466401% 93 23.589604% 21 0.375576 0.996300 9994 0.742694% 8.466401% 94 23.589604% 21 0.375576 0.996300 9995 21.531163% 8.466401% 95 24.148745% 11 0.196731 0.997400 9996 1.568729% 8.466401% 96 24.707885% 9 0.160961 0.998300 9997 -12.493075% 8.466401% 97 25.267026% 5 0.089423 0.998800 9998 9.832246% 8.466401% 98 25.826166% 6 0.107308 0.999400 9999 11.821156% 8.466401% 99 26.385307% 5 0.089423 0.999900 9999 11.821156% 8.466401% 99 26.385307% 1 0.017885 1.000000 9000 -9.552992% 8.466401% 100 26.944447% 1 0.017885 1.000000 1.000000 <td>9991</td> <td>-7.33950170</td> <td>9.466401%</td> <td>97</td> <td>22.471323%</td> <td>27</td> <td>0.482884</td> <td>0.992100</td>	9991	-7.33950170	9.466401%	97	22.471323%	27	0.482884	0.992100
9993 14.7/1922% 8.466401% 92 23.589604% 21 0.375576 0.996300 9994 0.742694% 8.466401% 94 23.589604% 21 0.107531 0.997400 9995 21.531163% 8.466401% 95 24.148745% 11 0.196731 0.998300 9996 1.568729% 8.466401% 96 24.707885% 9 0.160961 0.998300 9997 -12.493075% 8.466401% 97 25.267026% 5 0.089423 0.998800 9998 9.832246% 8.466401% 98 25.826166% 6 0.107308 0.999400 9999 11.821156% 8.466401% 99 26.385307% 5 0.089423 0.999900 10000 -9.552992% 8.466401% 100 26.944447% 1 0.017885 1.000000	9992	0.595803%	0.46640104	93	23.030463%	21	0.375576	0.994200
9994 0.742694% 8.466401% 97 24.148745% 11 0.196731 0.997400 9995 21.531163% 8.466401% 95 24.148745% 9 0.160961 0.998300 9996 1.568729% 8.466401% 96 24.707885% 9 0.160961 0.998300 9997 -12.493075% 8.466401% 97 25.267026% 5 0.089423 0.998800 9997 -12.493075% 8.466401% 98 25.826166% 6 0.107308 0.999400 9998 9.832246% 8.466401% 98 25.826166% 6 0.089423 0.999900 9999 11.821156% 8.466401% 99 26.385307% 5 0.089423 0.999900 9000 -9.552992% 8.466401% 100 26.944447% 1 0.017885 1.000000	9993	14.771922%	8.400401%	04	23.589604%	21	0.375576	0.996300
9995 21.531163% 8.466401% 9.5 24.707885% 9 0.160961 0.998300 9996 1.568729% 8.466401% 96 24.707885% 9 0.160961 0.998300 9997 -12.493075% 8.466401% 97 25.267026% 5 0.089423 0.998800 9997 -12.493075% 8.466401% 98 25.826166% 6 0.107308 0.999400 9998 9.832246% 8.466401% 98 25.826166% 6 0.089423 0.999900 9999 11.821156% 8.466401% 99 26.385307% 5 0.089423 0.999900 10000 -9.552992% 8.466401% 100 26.944447% 1 0.017885 1.000000	9994	0.742694%	8.400401%	05	24.148745%	11	0.196731	0.997400
9996 1.568729% 8.466401% 96 21.00 97 0.089423 0.998800 9997 -12.493075% 8.466401% 97 25.267026% 5 0.089423 0.998800 9997 -12.493075% 8.466401% 98 25.826166% 6 0.107308 0.999400 9998 9.832246% 8.466401% 98 25.826166% 5 0.089423 0.999900 9999 11.821156% 8.466401% 99 26.385307% 5 0.089423 0.999900 10000 -9.552992% 8.466401% 100 26.944447% 1 0.017885 1.000000	9995	21.531163%	8,466401%	96	24,707885%	9	0.160961	0.998300
9997 -12.493075% 8.466401% 97 25.826166% 6 0.107308 0.999400 9998 9.832246% 8.466401% 98 25.826166% 6 0.007308 0.999400 9998 9.832246% 8.466401% 98 25.826166% 5 0.089423 0.999900 9999 11.821156% 8.466401% 99 26.385307% 5 0.017885 1.000000 10000 -9.552992% 8.466401% 100 26.944447% 1 0.017885 1.000000	9996	1.568729%	8.466401%	90	25,267026%	5	0.089423	0.998800
9998 9.832246% 8.466401% 95 2.0325207% 5 0.089423 0.999900 9999 11.821156% 8.466401% 99 26.385307% 5 0.089423 0.999900 10000 -9.552992% 8.466401% 100 26.944447% 1 0.017885 1.000000	9997	-12.493075%	8.466401%	97	25.826166%	6	0.107308	0.999400
9999 11.821156% 8.466401% 95 20.505011 10000 -9.552992% 8.466401% 100 26.944447% 1 0.017885 1.000000	9998	9.832246%	8.466401%	96	26 385307%	5	0.089423	0.999900
10000 -9.552992% 8.466401% 100 20.5444775	9999	11.821156%	8.466401%	33	26 944447%	1	0.017885	1.000000
	10000	-9.552992%	8.466401%	100				

STATISTICAL	SUMMARY			Let Deviation	Probability	UCL	La
Minimum	Maximum	Median	Mean	11 01%	45.10%	-0.61%	0.24%
-28.41%	26.94%	-0.26%	-0.18%	11.01/0			

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4

Table 4.16 Simulation Result : Weighting Structure 2

TTERATION	RETURN	RISK					
1	1.114306%	0.100365%	#	BINS	COUNTS	SCALE	TOTAL
2	1.133220%	0.100365%		1.021156%	1	2.728775	0.000100
3	1.030030%	0.100365%		1.024820%	4	10.915101	0.000500
4	1.103784%	0.100365%	3	1.028485%	14	38.202852	0.001900
5	1.143857%	0.100365%		1.032149%	26	70.948154	0.004500
6	1.196988%	0.100365%	5	1.035814%	31	84.592030	0.007600
7	1.104429%	0.100365%		1.039479%	42	114.608557	0.011800
8	1.172718%	0.100365%	~ ~ ~	1.043143%	40	109.151006	0.015800
9	1.162632%	0.100365%		1.046808%	60	163.726510	0.021800
10	1.084093%	0.100365%	10	1.050473%	41	111.879782	0.025900
11	1.275302%	0.100365%	11	1.054137%	62	169.184060	0.032100
12	1.265840%	0.100365%	12	1.057802%	84	229.217114	0.040500
13	1.311699%	0.100365%	12	1.061467%	78	212.844463	0.048300
14	1.150543%	0.100365%	14	1.065131%	63	171.912835	0.054600
15	1.164982%	0.100365%	15	1.068/96%	97	264.691191	0.064300
16	1.290926%	0.100365%	15	1.072461%	93	253.776090	0.073600
17	1.278850%	0.100365%	17	1.076125%	107	291.978942	0.084300
18	1.332639%	0.100365%	19	1.0/9/90%	115	313.809144	0.095800
19	1 225254%	0.100365%	10	1.083455%	121	330.181795	0.107900
	1 315652%	0.100365%	- 19	1.08/119%	121	330.181795	0.120000
	1 292732%	0.100365%	20	1.090784%	135	368.384647	0.133500
	1 107241%	0.100365%	21	1.094448%	119	324.724244	0.145400
	1.10724170	0.100365%	22	1.098113%	114	311.080368	0.156800
23	1.15454594	0.100365%	23	1.101778%	126	343.825670	0.169400
	1.134345%	0.100365%	24	1.105442%	120	327.453019	0.191400
25	1.123032%	0.100305%	25	1.10910/%	129	352.011990	0.194300
	1 21675094	0.10036594		1 2006608/		221 005465	0.81 5000
9977	1.226750%	0.100365%	79	1.299009%	122	225 620245	0.819900
9978	1.335258%	0.100365%	78	1.303333%	123	335.039345	0.828200
99/9	1.370529%	0.100365%	/9	1.300998%	117	319.200094	0.853900
9980	1.084837%	0.100365%	80	1.310003%	119	373.233747	0.865700
9981	1.100542%	0.100365%	81	1.314327%	127	346 554446	0.878400
9982	1.150810%	0.100365%	82	1.31/992%	117	319 266694	0.890100
9983	1.150059%	0.100365%	03	1 225221%	98	267 419966	0.899900
9984	1.155110%	0.100365%	04	1.32332170	109	297,436493	0.910800
9985	1.260633%	0.100365%	85	1.323565194	104	283 792617	0.921200
9986	1.187918%	0.100365%	07	1 226315%	97	253,776090	0.930500
9987	1.138569%	0.100365%	0/	1 339980%	101	275.606291	0.940600
9988	1.102310%	0.100365%	80	1.333500%	88	240.132214	0.949400
9989	1.305210%	0.100365%	00	1 347309%	89	242.860989	0.958300
9990	1.197880%	0.100365%	90	1 350974%	72	196.471812	0.965500
9991	1.301417%	0.100365%	91	1.354638%	64	174.641610	0.971900
9992	1.161362%	0.100365%	92	1 358303%	60	163.726510	0.977900
9993	1.147143%	0.100365%	93	1.358303%	61	166.455285	0.984000
9994	1.193316%	0.100365%	94	1.36563204	60	163.726510	0.990000
9995	1.064663%	0.100365%	95	1 369297%	38	103.693456	0.993800
9996	1.100360%	0.100365%	96	1.30325776	26	70.948154	0,996400
9997	1.053617%	0.100365%	97	1.372502%	15	40.931627	0.997900
9998	1.295542%	0.100365%	98	1 390 201%	16	43.660403	0.999500
9999	1.244660%	0.100365%	99	1 20205604	5	13.643876	1.000000
10000	1.191279%	0.100365%	100	1.363930%			

STATISTICAL	SUMMARY			Ctd Deviation	Probability	UCL	LCL
Minimum	Maximum	Median	Mean	0.09%	n/a	1.20%	1.21%
1.02%	1.38%	1.20%	1.20%	0.0070			

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Table 4.17 Simulation Result : Weighting Structure 3

TTERATION	RETURN	RISK					
1	0.688486%	0.143359%	#	BINS	COUNTS	SCALE	TOTAL
2	0.774728%	0.143359%	1	0.660854%	1	2 465249	101AL
3	0.791894%	0.143359%	2	0.664910%	86	212 010048	0.000100
4	0.805243%	0.143359%	3	0.668966%	131	322 960618	0.008/00
5	0.755077%	0 143359%	4	0.673023%	105	258 861564	0.021800
6	0.909019%	0 143359%	5	0.677079%	83	204 623903	0.032300
	0.932492%	0 143359%	6	0.681135%	104	256 396216	0.040000
8	0.975351%	0 143359%	7	0.685191%	101	249.000171	0.051000
	0.808629%	0 143359%	8	0.689248%	98	241.604127	0.070900
10	0.733799%	0 143359%	9	0.693304%	95	234,208082	0.080400
	1 023777%	0.143359%	10	0.697360%	97	239.138778	0.090100
	0.973706%	0.143359%	11	0.701416%	99	244.069475	0.100000
12	0.973746%	0.143359%	12	0.705472%	84	207.089251	0.108400
13	0.923240%	0.143359%	13	0.709529%	100	246.534823	0.118400
14	0,300134%	0.143359%	14	0.713585%	114	281.049698	0.129800
15	0.730720%	0.143359%	15	0.717641%	99	244.069475	0.139700
10	0.524405%	0.143359%	16	0.721697%	99	244.069475	0.149600
	0.099259%	0.143359%	17	0.725754%	100	246.534823	0.159600
18	0.798908%	0.143359%	18	0.729810%	105	258.861564	0.170100
19	0.807390%	0.143359%	19	0.733866%	108	266.257609	0.180900
20	0.904852%	0.143359%	20	0.737922%	104	256.396216	0.191300
21	0.941192%	0.143359%	21	0.741978%	105	258.861564	0.201800
22	0.849257%	0.143359%	22	0.746035%	103	253.930868	0.212100
23	0.847905%	0.143359%	23	0.750091%	94	231.742734	0.221500
24	0.781840%	0.143359%	24	0.754147%	105	258.861564	0.232000
25	0.912436%	0.143359%	25	0.758203%	126	310.633877	0.244600
9977	0.878108%	0.143359%	77	0.969127%	104	256.396216	0.763800
9978	0.697269%	0.143359%	78	0.973183%	98	241.604127	0.773600
9979	0.970509%	0.143359%	79	0.977239%	95	234.208082	0.783100
99 80	0.874348%	0.143359%	80	0.981296%	115	283.515047	0.794600
9981	0.930247%	0.143359%	81	0.985352%	100	246.534823	0.804600
9982	0.917187%	0.143359%	82	0.989408%	101	249.000171	0.814700
9983	0.684967%	0.143359%	83	0.993464%	110	271.188305	0.825700
9984	0.938489%	0.143359%	84	0.997520%	107	263.792261	0.836400
9985	0.756053%	0.143359%	85	1.001577%	112	276.119002	0.847600
9986	0.665074%	0.143359%	86	1.005633%	92	226.812037	0.856800
9987	0.986822%	0.143359%	87	1.009689%	94	231./42/34	0.866200
9988	0.927555%	0.143359%	88	1.013745%	90	221.881341	0.875200
9989	0.903070%	0.143359%	89	1.017802%	111	2/3.653654	0.886300
9990	0.850857%	0.143359%	90	1.021858%	111	2/3.653654	0.897400
9991	0.692546%	0.143359%	91	1.025914%	102	251.465520	0.907600
9992	0.700441%	0.143359%	92	1.029970%	104	256.396216	0.918000
9993	0.906592%	0.143359%	93	1.034026%	105	258.861564	0.928300
9994	0.668699%	0.143359%	94	1.038083%	103	253.930868	0.938800
9995	0.915717%	0.143359%	95	1.042139%	96	236.673430	0.948400
0004	0.91.91.74%	0.143359%	96	1.046195%	103	253.930868	0.958700
0007	0.910124%	0.143359%	97	1.050251%	91	224.346689	0.90/800
0000	0.333213%	0 143359%	98	1.054308%	109	208.722957	0.978700
9998	0.730410%	0 143359%	99	1.058364%	106	261.326913	0.989300
9999	0.000189%	0.143359%	100	1.062420%	107	263.792261	1.000000
10000	0.919643%	0.14335570					

STATISTICAL	SUMMARY			Cod Deviation	Probability	UCL	LCL
Minimum	Maximum	Median	Mean	Std. Deviation	n/a	0.86%	0.87%
0.66%	1.06%	0.86%	0.86%	0.12/0			

Table 4.18 Simulation Result : Weighting Structure 4

TTERATION	RETURN	RISK	#				
1	-5.232779%	4.196487%		BINS	COUNTS	SCALE	TOTAL
2	10.951915%	4.196487%		-13.660016%	1	0.035820	C 000100
3	-9.130295%	4.196487%		-13.380912%	0	0.000000	0.000100
4	-7.020745%	4.196487%	4	-13.101807%	2	0.071658	0.000100
5	6.402802%	4.196487%	5	-12.822703%	5	0.179144	0.000300
6	-4.162609%	4.196487%	6	-12.543598%	3	0.107487	0.001100
7	10.493718%	4.195487%	7	-12.264494%	5	0.179144	0.001600
8	3.788625%	4.196487%	8	-11.985389%	8	0.286631	0,002400
9	4.431085%	4.196487%		-11.706284%	13	0.465775	0.003700
10	6.765474%	4.196487%	10	-11.427180%	21	0.752406	0.005800
11	-2.515979%	4.196487%	11	-11.148075%	18	0.644920	0.007600
12	-1.983322%	4.196487%	12	-10.868971%	25	0.895722	0.010100
13	6.377250%	4.196487%	13	-10.589866%	23	0.824064	0.012400
14	-3.458507%	4.196487%	14	-10.310762%	22	0.788235	0.014600
15	2.173874%	4.196487%	15	-10.031657%	25	0.895722	0.017100
16	-7.177695%	4.196487%	15	-9.752553%	34	1.218182	0.020500
17	-1.676736%	4 196487%	10	-9.473448%	50	1.791444	0.025500
<u>-</u>	-4 068714%	4 196487%	1/	-9.194344%	54	1.934759	0.030900
	1 217665%	4 19649704	18	-8.915239%	61	2.185561	0.037000
	E 1547404	4.19040/70	19	-8.636135%	63	2.257219	0.043300
	3.1344/470	4.19048/%	20	-8.357030%	68	2.436363	0.050100
	10.09572570	4.19048/%	21	-8.077926%	78	2.794652	0.057900
	4.7624079/	4.19048770	22	-7.798821%	96	3.439572	0.067500
	4./0340/70	4.19048/76	23	-7.519717%	86	3.081283	0.076100
24	2.52556/%	4.196487%	24	-7.240612%	96	3.439572	0.085700
25	-3.475312%	4.196487%	25	-6.961507%	120	4.299464	0.097700
9977	4.3052/376	4.196487%	77	7.551928%	94	3.367914	0.893800
9978	-2.581649%	4.196487%	78	7.831033%	109	3.905347	0.904700
9979	9.410720%	4.196487%	79	8.110137%	105	3.762031	0.915200
9980	9.489234%	4.196487%	80	8.389242%	94	3.367914	0.924600
9981	-3.122181%	4.196487%	81	8.668346%	84	3.009625	0.933000
9982	-7.336484%	4.196487%	82	8.947451%	82	2.937967	0.941200
9983	9.965083%	4.196487%	83	9.226555%	86	3.081283	0.949800
9984	-3.948945%	4.196487%	84	9.505660%	55	1.970588	0.955300
9985	-8.425936%	4.196487%	85	9.784764%	71	2.543850	0.962400
9986	6.777925%	4.196487%	86	10.063869%	68	2.436303	0.969200
9987	-1.454634%	4.196487%	87	10.342973%	51	1.82/2/2	0.974300
9988	1.463620%	4.196487%	88	10.622078%	40	1.433155	0.978300
9989	-6.585147%	4.196487%	89	10.901182%	42	1.504813	0.982500
9990	8.089498%	4,196487%	90	11.180287%	38	1.301497	0.986300
9991	-3,431342%	4.196487%	91	11.459391%	37	1.325008	0.990000
9992	0.905564%	4.196487%	92	11.738496%	23	0.824064	0.992300
9993	7.953608%	4.196487%	93	12.017601%	22	0.788235	0.994500
9994	0 744719%	4.196487%	94	12.296705%	17	0.609091	0.990200
9995	11 072469%	4.196487%	95	12.575810%	15	0.53/433	0.997700
3996	1 220101%	4 196487%	96	12.854914%	8	0.286031	0.996500
9997	-5 977997%	4 196487%	97	13.134019%	6	0.2149/3	0.999100
9999	5.52/337/0	4 196487%	98	13.413123%	3	0.10/46/	0.999400
9990	5.2040/470	4 196487%	99	13.692228%	5	0.179144	0.999900
10000	0.33410470	4.196487%	100	13.971332%	1	0.035829	1.000000
10000	-4.55/520%	4.19040770					

STATISTICAL	SUMMARY			Land Deviation	Probability	UCL	La
Minimum	Maximum	Median	Mean	Sta. Deviation	43.40%	0.16%	0.59%
-13.66%	13.97%	0.34%	0.38%	5.4570			

Table 4.19 Simulation Result : Weighting Structure 5

TTERATION	RETURN	RISK					
1	-5.364571%	4.214640%		BINS	COUNTS	SCALE	
2	10.961933%	4.214640%		-13.808464%	1	SLALE	TOTAL
3	-9.169154%	4.214640%		-13.526510%	0	0.035467	0.000100
4	-7.060394%	4.214640%	3	-13.244555%	2	0.000000	0.000100
5	6.418697%	4.214640%		-12.962600%	2	0.070933	0.000300
6	-4.235489%	4.214640%	5	-12.680646%	5	0.070933	0.000500
7	10.547968%	4.214640%	0	-12.398691%	6	0.177333	0.001000
8	3.827401%	4.214640%		-12.116736%	5	0.177333	0.001600
	4.452122%	4 21464094	8	-11.834782%	16	0.567467	0.002100
10	6.637191%	4 214640%	9	-11.552827%	14	0.496534	0.003700
	-2.445227%	4 214640%	10	-11.270872%	21	0 744801	0.003100
12	-1 965178%	4.214640%	11	-10.988918%	25	0.886667	0.007200
	6.478618%	4.214640%	12	-10.706963%	28	0.993067	0.003700
	2 552075%	4.214640%	13	-10.425008%	16	0.567467	0.012300
	2 1229204	4.214640%	14	-10.143054%	22	0 780267	0.016300
	2.133029%	4.214640%	15	-9.861099%	37	1.312268	0.020000
10	-7.204880%	4.214640%	16	-9.579145%	43	1.525068	0.024300
1/	-1./82/42%	4.214640%	17	-9.297190%	54	1,915202	0.029700
18	-4.056311%	4.214640%	18	-9.015235%	60	2,128002	0.035700
19	1.124446%	4.214640%	19	-8.733281%	67	2,376269	0.042400
20	5.151700%	4.214640%	20	-8.451326%	69	2,447202	0.049300
21	10.960658%	4.214640%	21	-8.169371%	77	2,730936	0.057000
22	0.204734%	4.214640%	22	-7.887417%	86	3.050136	0.065600
23	4.727256%	4.214640%	23	-7.605462%	96	3,404803	0.075200
24	2.433253%	4.214640%	-24	-7.323507%	94	3.333869	0.084600
25	-3.524193%	4.214640%	25	-7.041553%	123	4.362404	0.096900
9977	4.325227%	4.214640%	77	7.620090%	95	3.369336	0.896300
9978	-2.616339%	4.214640%	78	7.902044%	104	3.688536	0.906700
9979	9.355521%	4.214640%	79	8.183999%	111	3.936803	0.917800
9980	9.510496%	4.214640%	80	8.465954%	85	3.014669	0.926300
9981	-3.165491%	4.214640%	81	8.747908%	84	2,979202	0.934700
9982	-7.424961%	4.214640%	82	9.029863%	89	3.156536	0.943600
9983	9.890393%	4.214640%	83	9.311818%	75	2.660002	0.951100
9984	-3.859159%	4.214640%	84	9.593772%	58	2.057068	0.956900
9985	-8.491828%	4.214640%	85	9.875727%	75	2.660002	0.964400
9986	6.570163%	4.214640%	86	10.157682%	62	2.198935	0.970600
9987	-1 378965%	4,214640%	87	10.439636%	51	1.808801	0.975700
9999	1 574638%	4.714640%	88	10.721591%	43	1.525068	0.980000
9980	-6 658890%	4 214540%	89	11.003546%	38	1.347734	0.983800
9909	-0.03883070	4.214640%	90	11.285500%	38	1.347734	0.987600
	2.4127060	4.214640%	91	11.567455%	31	1.099468	0.990700
9991	-3.412/80%	4.214040%	92	11.849410%	21	0,744801	0.992800
9992	0.794488%	9.21404070	93	12.131364%	23	0.815734	0.995100
9993	7.884684%	4.214040%	94	12,413319%	15	0.532000	0.996600
9994	0.687140%	4.214040%	05	12.695274%	13	0.461067	0.997900
9995	11.201366%	4.214640%	95	12 977228%	7	0.248267	0.998600
9996	1.243034%	4.214640%	90	13 259183%	6	0.212800	0.999200
9997	-5.886900%	4.214640%	9/	13 541137%	5	0.177333	0.999700
9998	5.188035%	4.214640%	98	13 823092%	2	0.070933	0.999900
9999	6.288099%	4.214640%	99	14 105047%	0	0.000000	0.999900
10000	-4.489554%	4.214640%	100	14.10504770			

STATISTICAL	SUMMARY			Lord Doviation	Probability	UCL	LCL
Minimum	Maximum	Median	Mean	Std. Deviation	43.30%	0.14%	0.57%
-13.81%	14.11%	0.31%	0.36%	5.5170			

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Table 4.20 Simulation Result : Weighting Structure 6

TTERATION	RETURN	RISK	#				
1	1.094165%	0.066869%		BINS	COUNTS	SCALE	
2	1.011777%	0.066869%		0.685456%	1	1 205471	IUIAL
3	0.918967%	0.066869%	2	0.693752%	0	0.000000	0.000100
4	1.172221%	0.066869%		0.702047%	0	0.000000	0.000100
5	1.200803%	0.066869%		0.710343%	1	1 205471	0.000100
6	1.222357%	0.066869%		0.718638%	0	0.000000	0.000200
7	1.192183%	0.066869%		0.726934%	4	4 821886	0.000200
	1.133523%	0.066869%		0.735229%	1	1.205471	0.000800
	1.124974%	0.066869%		0.743525%	4	4,821886	0.001100
10	1.070052%	0.066869%		0.751820%	2	2,410943	0.001300
11	1.088891%	0.066869%	10	0.760116%	10	12.054714	0.002300
12	1.181262%	0.066869%	11	0.768411%	5	6.027357	0.002800
	1.065060%	0.066860%	12	0.776707%	6	7.232828	0.003400
	1 199605%	0.056869%	13	0.785002%	7	8,438300	0.004100
	1 214719%	0.06686094	14	0.793298%	10	12.054714	0.005100
16	1.077692%	0.0668600	15	0.801593%	11	13.260185	0.006200
17	1 31 30 7092 /0	0.000869%	16	0.809889%	15	18.082071	0.007700
	1 25524004	0.000809%	17	0.818184%	20	24.109428	0.009700
	1.255240%	0.066869%	18	0.826480%	25	30.136785	0.012200
19	1.376909%	0.066869%	19	0.834775%	21	25.314899	0.014300
20	1.301080%	0.066869%	20	0.843071%	32	38.575085	0.017500
21	1.159243%	0.066869%	21	0.851366%	26	31.342256	0.020100
22	1.185305%	0.066869%	22	0.859662%	36	43.396970	0.023700
23	0.994959%	0.066869%	23	0.867957%	46	55.451684	0.028300
24	1.041162%	0.066869%	24	0.876253%	54	65.095455	0.033700
25	0.983159%	0.066869%	25	0.884548%	50	60.273570	0.038700
9977	1.045082%	0.066869%	77	1.315915%	97	116.930725	0.929000
9978	1.265437%	0.066869%	78	1.324210%	82	98.848654	0.937200
9979	1.505167%	0.066869%	79	1.332506%	72	86.793940	0.944400
9980	1.024581%	0.066869%	80	1.340801%	77	92.821297	0.952100
9981	1.091208%	0.066869%	81	1.349097%	74	89.204883	0.959500
9982	0.989025%	0.066869%	82	1.357392%	59	71.122812	0.965400
9983	1.194183%	0.066869%	83	1.365688%	52	62.684512	0.970600
9984	1.200397%	0.066869%	84	1.373983%	39	47.013384	0.974500
9985	1.246913%	0.066869%	85	1.382279%	34	40.986027	0.977900
9986	1.301940%	0.066869%	86	1.390574%	31	37.369613	0.981000
9987	1.017879%	0.066869%	87	1.398870%		36.164142	0.984000
9988	0.947541%	0.066869%	88	1.407165%	27	32.547728	0.980700
9989	1.099750%	0.066869%	89	1.415461%	24	28.931313	0.989100
9990	1.137558%	0.066869%	90	1.423756%	19	22,903956	0.991000
9991	1.003490%	0.066869%	91	1.432052%	19	22,903956	0.992900
9992	1.157325%	0.066869%	92	1.440347%	15	16.082071	0.996400
9993	1.265337%	0.066869%	93	1.448643%	20	24,103420	0.997000
9994	0.934052%	0.066869%	94	1.456938%	6	7,232828	0.997600
9995	1.006486%	0.066869%	95	1.465234%	6	7.232828	0.997000
9996	1.021833%	0.066869%	96	1.473529%	3	3.010414	0.997500
9997	0.919298%	0.066869%	97	1.481825%	6	9.439300	0.999200
	1.084285%	0.066869%	98	1.490121%		4 931996	0.999600
999981	· · · · · · · · · · · · · · · · · · ·	0.0000000000000000000000000000000000000		1 498416%	- 4	4.021080	0.00000
9998	1 173706%	0.066869%	99	1.45011010	-	4 971996	1.0000001
9998	1.173706%	0.066869%	99 100	1.506712%	4	4.821886	1.000000

STATISTICAL	SUMMARY			Lord Deviation	Probability	UCL	LCL
Minimum	Maximum	Median	Mean	Std. Deviation	0.10%	1.11%	1.12%
0.69%	1.51%	1.12%	1.12%	0.15 %			

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Table 4.21 Simulation Result : Weighting Structure 7

1 0.994115% 0.059381% 1 0.766470% 1 1.53 2 0.984269% 0.059381% 2 0.772998% 2 3.06 3 0.967904% 0.059381% 3 0.772998% 2 3.06 4 1.134002% 0.059381% 4 0.786056% 1 1.53 5 1.137357% 0.059381% 5 0.792585% 3 4.59 6 1.112510% 0.059381% 6 0.799113% 5 7.65 7 1.068796% 0.059381% 7 0.799113% 5 7.65	E 1691 3383 5074	TOTAL 0.000100 0.000300
2 0.984269% 0.059381% 2 0.766470% 1 1.53 3 0.967904% 0.059381% 2 0.772998% 2 3.06 4 1.134002% 0.059381% 3 0.779527% 3 4.59 5 1.137357% 0.059381% 4 0.786056% 1 1.53 6 1.112510% 0.059381% 6 0.79913% 5 7.65 7 1.068796% 0.059381% 7 0.799113% 5 7.65	1691 3383 5074	0.000100 0.000300
3 0.967904% 0.059381% 2 0.772998% 2 3.06 4 1.134002% 0.059381% 3 0.779527% 3 4.59 5 1.137357% 0.059381% 4 0.786056% 1 1.53 6 1.112510% 0.059381% 6 0.792585% 3 4.59 7 1.068796% 0.059381% 7 0.799113% 5 7.65	3383 5074	0.000100
4 1.134002% 0.059381% 3 0.779527% 3 4.59 5 1.137357% 0.059381% 5 0.792585% 1 1.53 6 1.112510% 0.059381% 6 0.792585% 3 4.59 7 1.068796% 0.059381% 7 0.799113% 5 7.65	5074	0.000300
5 1.137357% 0.059381% 4 0.786056% 1 1.53 6 1.112510% 0.059381% 5 0.792585% 3 4.59 7 1.068796% 0.059381% 7 0.799113% 5 7.65	1601	0 0006001
6 1.112510% 0.059381% 6 0.792585% 3 4.59 7 1.068796% 0.059381% 7 0.059381% 7 0.059381% 5 7.65		0.000600
7 1.068796% 0.059381% 7 0.799113% 5 7.65	5074	0.000700
7.00	8457	0.001000
8 1.155276% 0.05938194 0.805642% 3 4.59	5074	0.001300
9 1.069209% 0.059381% 8 0.812171% 4 612	6766	0.001000
10 0.948615% 0.059381% 40 0.818700% 9 13.78	5223	0.003100
11 1.175213% 0.059381% 10 0.825228% 9 13.78	5223	0.004000
12 1.236588% 0.059391% 1 0.831757% 9 13.78	5223	0.004900
13 118528% 0.55321% 12 0.838286% 18 27.57	0445	0.006700
14 1102028% 0.059391% 13 0.844814% 20 30.63	3828	0.008700
15 1098939% 0.059381% 14 0.851343% 16 24.50	7063	0.010300
15 1.095510% 0.059381% 15 0.857872% 34 52.07	7508	0.013700
17 117175% 0.552381% 16 0.864401% 20 30.65	3828	0.015700
17 1.17753% 0.059381% 17 0.870929% 34 52.07	7508	0.019100
18 1.203431% 0.059381% 18 0.877458% 38 58.20	4274	0.022900
19 1.20697% 0.059381% 19 0.883987% 45 68.92	6114	0.027400
20 1.246210% 0.059381% 20 0.890516% 50 76.58	4571	0.032400
21 1.152852% 0.059381% 21 0.897044% 50 76.58	4571	0.037400
22 1.076800% 0.059381% 22 0.903573% 60 91.90	1485	0.043400
23 1.035977% 0.059381% 23 0.910102% 96 147.04	2376	0.053000
24 0.987073% 0.059381% 24 0.916631% 69 105.68	6708	0.059900
25 0.984963% 0.059381% 25 0.923159% 89 136.3 2	0536	0.068800
9977 1.003400% 0.059381% 77 . 1.262653% 76 116.40	8548	0.957400
9978 1.153460% 0.059381% 78 1.269182% 61 93.43	3176	0.963500
9979 1.356340% 0.059381% 79 1.275711% 47 71.98	9497	0.968200
9980 0.964790% 0.059381% 80 1.282239% 53 81.12	9645	0.973500
9981 1.020222% 0.059381% 81 1.288768% 48 73.52	1188	0.978300
9982 0.918969% 0.059381% 82 1.295297% 25 38.25	2285	0.980800
9983 1.036828% 0.059381% 83 1.301826% 35 53.60	9200	0.984300
9984 1.232305% 0.059381% 84 1.308354% 29 44.4	9051	0.987200
9985 1.176439% 0.059381% 85 1.314883% 22 33.65	7211	0.989400
9986 1.062324% 0.059381% 86 1.321412% 23 35.2	8903	0.991700
9987 1.104386% 0.059381% 87 1.327941% 17 26.0	8754	0,993400
9988 0.997729% 0.059381% 88 1.334469% 14 21.44	3680	0.994800
9989 1.066660% 0.059381% 89 1.340998% 19 29.10	2137	0.996700
9990 1.070111% 0.059381% 90 1.347527% 7 10.7	1840	0.997400
9991 1.032496% 0.059381% 91 1.354055% 3 4.5	5074	0.997700
9992 1.032892% 0.059381% 92 1.360584% 4 6.1	6/60	0.998100
9993 1.184526% 0.059381% 93 1.367113% 5 7.6	045/	0.008900
9994 0.866659% 0.059381% 94 1.373642% 2 3.00	0140	0.990800
9995 1.041812% 0.059381% 95 1.380170% 6 9.19	0148	0.999400
9996 0.966255% 0.059381% 96 1.386699% 3 4.5	5074	0.999700
9997 0.986593% 0.059381% 97 1.393228% 0 0.00	10000	0.9999/00
0.560555 // 0.059381% 98 1.399757% 1 1.5	1091	0.000000
1.000250% 0.059381% 99 1.406285% 1 1.5.	1091	1.000000
10000 1005501 0.059301 0 100 1.412814% 1 1.5	1091	1.000000
10000 1,04050376 0.05550178		

STATISTICAL	SUMMARY			Loud Deviation	Probability	UCL	La
Minimum	Maximum	Median	Mean	Std. Deviation	n/a	1.08%	1.09%
0.77%	1.41%	1.08%	1.08%	0.10 %			

Table 4.22 Simulation Result : Weighting Structure 8

TTERATION	RETURN	RISK					
1	0.731747%	0.130352%		BINS	COUNTS	CONT	
2	0.809188%	0.130352%		0.508973%	1	SCALE	TOTAL
	0.816695%	0.130352%		0.515825%	1	1.459371	0.000100
4	0.887935%	0.130352%		0.522677%	10	1.4593/1	0.000200
5	0.879119%	0.130352%		0.529530%	7	10.215507	0.001200
6	0.893717%	0.130352%		0.536382%	15	21 890565	0.001900
	1.013103%	0.130352%		0.543234%	18	26 26 26 26 26 26 26 26 26 26 26 26 26 2	0.003400
	1.037850%	0.130352%	/	0.550087%	22	32 106162	0.005200
	0.857165%	0 130352%	8	0.556939%	26	37 943646	0.007400
10	0.733664%	0.130352%	9	0.563791%	38	55 456000	0.010000
	1 023838%	0.130352%	10	0.570643%	29	42 321 750	0.015300
	0.948130%	0.130352%	11	0.577496%	48	70 049809	0.021500
	0.848939%	0.130352%	12	0.584348%	36	52,537357	0.021300
	0.094165%	0.130352%	13	0.591200%	52	75 887293	0.020100
	0.963433704	0.130352%	14	0.598052%	51	74,427922	0.035400
	0.8557004	0.130352%	15	0.604905%	56	81.724777	0.041000
10	0.865799%	0.130352%	16	0.611757%	79	115.290310	0.048900
1/	0.800956%	0.130352%	17	0.618609%	70	102.155971	0.055900
18	0.833294%	0.130352%	18	0.625461%	78	113,830939	0.063700
19	0.914431%	0.130352%	19	0.632314%	69	100.696600	0.070600
20	0.952088%	0.130352%	20	0.639166%	66	96.318487	0.077200
21	0.920289%	0.130352%	21	0.646018%	88	128.424649	0.086000
22	0.854568%	0.130352%	22	0.652871%	81	118.209052	0.094100
23	0.750089%	0.130352%	23	0.659723%	97	141.558988	0.103800
24	0.771831%	0.130352%	24	0.666575%	103	150.315215	0.114100
25	0.853738%	0.130352%	25	0.673427%	92	134.262133	0.123300
9977	0.794979%	0.130352%	77	1.029745%	115	167.827667	0.894300
9978	0.737449%	0.130352%	78	1.036598%	86	125.505907	0.902900
9979	1.080354%	0.130352%	79	1.043450%	82	119.668423	0.911100
9980	0.848384%	0.130352%	80	1.050302%	89	129.884020	0.920000
9981	0.798531%	0.130352%	81	1.057154%	89	129.884020	0.928900
9982	0.787252%	0.130352%	82	1.064007%	73	106.534084	0.936200
9983	0.786227%	0.130352%	83	1.070859%	69	100.696600	0.943100
9984	1,040745%	0.130352%	84	1.077711%	72	105.074713	0.950300
9985	0.829909%	0.130352%	85	1.084563%	63	91.940374	0.956600
9986	0.761923%	0.130352%	86	1.091416%	61	89.021632	0.962700
9987	0.926602%	0.130352%	87	1.098268%	52	75.887293	0.967900
9988	0.920145%	0.130352%	88	1.105120%	51	74.427922	0.973000
9989	0.790088%	0.130352%	89	1.111972%	49	71.509180	0.977900
9990	0.895944%	0.130352%	90	1.118825%	44	64.212325	0.982300
9991	0.606818%	0.130352%	91	1.125677%	33	48.159244	0.985600
9992	0.753678%	0.130352%	92	1.132529%	26	37.943646	0.988200
5000	1 001292%	0.130352%	93	1.139382%	35	51.077986	0.991700
A000	0 53744104	0.130352%	94	1.146234%	26	37.943646	0.994300
0000	0.05609204	0.130352%	95	1.153086%	24	35.024904	0.996700
0006	0.956062%	0.130352%	96	1.159938%	11	16.053081	0.997800
06666	0.800137%	0.13035276	97	1.166791%	11	16.053081	0.998900
333/	0.825224%	0.13035276	98	1.173643%	7	10.215597	0.9999000
3338	0.000025%	0.130352%	99	1.180495%	3	4.378113	0.999900
9999	0.717034%	0.130352%	100	1.187347%	0	0.000000	0.999900
10000	0.781243%	0.130352%	100				

STATISTICAL	SUMMARY			Lost Deviation	Probability	UCL	LCL
Minimum	Maximum	Median	Mean	Std. Deviation	n/a	0.84%	0.85%
0.51%	1.19%	0.85%	0.85%	0.1470			

Table 4.23 Simulation Result : Weighting Structure 9

TERATION	RETURN	RISK	4				
1	0.924079%	0.067734%		BINS	COLINITS		
2	0.947241%	0.067734%		0.709335%	1	SCALE	TOTAL
3	0.933503%	0.067734%	2	0.715596%	0	1.597204	0.000100
4	1.061084%	0.067734%	3	0.721856%	0	0.000000	0.000100
5	1.065447%	0.067734%		0.728117%	4	0.000000	0.000100
6	1.044383%	0.067734%		0.734378%	3	0.388814	0.000500
7	1.057560%	0.067734%	<u>0</u>	0.740639%	3	4./91611	0.000800
8	1.130750%	0.067734%		0.746900%	6	4./91611	0.001100
	1.020037%	0.06773496	8	0.753161%	1	9.583221	0.001700
10	0.894924%	0.067734%	9	0.759422%	6	1.597204	0.001800
111	1.140385%	0.067734%	10	0.765683%	12	9.563221	0.002400
12	1 147945%	0.067734%	11	0.771944%	8	13,100442	0.003600
	1 049781%	0.067734%	12	0.778205%	22	25 129477	0.004400
	1.06309994	0.067734%	13	0.784466%	17	27 152460	0.006600
	1.003300%	0.067734%	14	0.790727%	18	27.132400	0.008300
	1.031427%	0.067/34%	15	0.796988%	25	20,749003	0.010100
16	1.040935%	0.067734%	16	0.803249%	31	49 51 3 200	0.012600
17	1.073344%	0.067734%	17	0.809510%	32	51 110512	0.015/00
18	1.106406%	0.067734%	18	0.815771%	42	67.092547	0.018900
19	1.118970%	0.067734%	19	0.822032%	37	59 096520	0.023100
20	1.165796%	0.067734%	20	0.828292%	59	94 235007	0.020800
21	1.091839%	0.067734%	21	0.834553%	55	87 846192	0.032700
22	1.008268%	0.067734%	22	0.840814%	60	95 922211	0.038200
23	0.968244%	0.067734%	23	0.847075%	58	92 63 790 2	0.044200
24	0.938440%	0.067734%	24	0.853336%	67	107 012635	0.056700
25	0.952364%	0.067734%	25	0.673427%	97	134 252133	0.123300
						154.202155	0.125500
9977	0.956661%	0.067734%	77	1.185166%	62	99.026618	0.943200
9978	1.043655%	0.067734%	78	1.191427%	63	100.623821	0.949500
9979	1.276491%	0.067734%	79	1.197688%	67	107.012635	0.956200
9980	0.936628%	0.067734%	80	1.203949%	54	86.248989	0.961600
9981	0.952377%	0.067734%	81	1.210210%	45	71.874158	0.966100
9982	0.888165%	0.067734%	82	1.216471%	60	95.832211	0.972100
9983	0.977032%	0.067734%	83	1.222732%	40	63.888140	0.976100
9984	1.171622%	0.067734%	84	1.228993%	36	57.499326	0.979700
9985	1.083266%	0.067734%	85	1.235254%	33	52.707716	0.983000
9986	0 987827%	0.067734%	86	1.241515%	30	47.916105	0.986000
9987	1.046905%	0.067734%	87	1.247776%	34	54.304919	0.989400
RAPP	0 984187%	0.067734%	88	1.254037%	15	23.958053	0.990900
0080	0.990270%	0.067734%	89	1.260298%	23	36.735681	0.993200
0000	1.02405794	0.067734%	90	1.266558%	14	22.360849	0.994600
0001	1.034337%	0.067734%	91	1.272819%	14	22.360849	0.996000
1000	0.9231/270	0.06773494	92	1.279080%	15	23.958053	0.997500
0007	1 12010000	0.067734%	93	1.285341%	4	6.388814	0.997900
7773	1.130109%	0.06773494	94	1.291602%	5	7.986018	0.998400
3334	0.783055%	0.06773476	05	1.297863%	4	6.388814	0.998800
3332	1.020463%	0.067734%	96	1.304124%	4	6.388814	0.999200
9996	0,918795%	0.067734%	97	1.310385%	3	4.791611	0.999500
9997	0.932367%	0.067734%	97	1,316646%	2	3.194407	0.999700
9998	0.972181%	0.067734%	30	1.322907%	1	1.597204	0.999800
9999	0.996334%	0.067734%	100	1.329168%	1	1.597204	0.999900
10000	0.962168%	0.067734%	100				

STATISTICAL	SUMMARY			Land Daviation	Probability	UCL	LCL
Minimum	Maximum	Median	Mean	Std. Deviation	n/a	1.01%	1.02%
0.71%	1.33%	1.02%	1.02%	0.1070			

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Table 4.24 Simulation Result : Weighting Structure 10

	PETURN	DICK T					
TTERATION	2 24815394	2 7070200	#	BING			
	2 EE471096	2.797923%	1	-8.9339500	COUNTS	SCALE	TOTAL
2	7.55471970	2.797923%	2	-8 7449540	1	0.052883	0.000100
3	-5.824833%	2.797923%	3	-8 5557570	0	0.000000	0.000100
4	-4.364284%	2.797923%	4	-8 3666600	1	0.052883	0.000100
5	4.583262%	2.797923%	5	-9.12756.00%	5	0.264415	0.000200
6	-2,467476%	2.797923%	6	-3.17/564%	5	0.264415	0.001200
7	7.429474%	2.797923%	7	-7.988467%	4	0.211532	0.001200
8	2.876235%	2.797923%	8	-7.799371%	6	0.317298	0.002200
9	3.293629%	2.797923%	9	-7.610274%	13	0.687479	0.002200
10	4.715198%	2.797923%	10	-7.421177%	16	0.846128	0.005100
11	-1.315212%	2.797923%	11	-7.232081%	19	1.004777	0.007000
12	-1.055752%	2.797923%	12	-7.042984%	28	1.480725	0.009800
13	4.493647%	2.797923%	12	-6.853888%	24	1,269192	0.012200
14	-1.994693%	2.797923%	13	-6.664791%	20	1.057660	0.014200
15	1.779472%	2,797923%	14	-6.475694%	23	1.216309	0.016500
16	-4.493035%	2 797923%	15	-6.286598%	33	1.745140	0.019800
17	-0.823193%	2 79792376	10	-6.097501%	49	2.591268	0.024700
19	-2 36454104	2 7970220		-5.908405%	53	2.802800	0.030000
10	1 176599%	2.797923%	18	-5.719308%	58	3.067215	0.035800
	2 76099694	2.737323%	19	-5.530211%	61	3.225864	0.041900
20	3.709800%	2.797923%	20	-5.341115%	68	3.596045	0.048700
21	7.551661%	2.797923%	21	-5.152018%	76	4.019109	0.056300
22	0.400/43%	2.797923%	22	-4.962921%	94	4.971004	0.065700
23	3.335146%	2.797923%	23	-4.773825%	89	4.706589	0.074600
24	1.903663%	2.797923%	24	-4.584728%	101	5.341185	0.084700
25	-2.068056%	2.797923%	25	-4.395632%	106	5.605600	0.095300
9977	3.168965%	2.797923%	77	5.437392%	90	4.759472	0.899000
9978	-1.401335%	2.797923%	78	5.626489%	118	6.240196	0.910800
9979	6.640771%	2.797923%	79	5.815586%	95	5.023887	0.920300
9980	6.629689%	2.797923%	80	6.004682%	88	4.653706	0.929100
9981	-1.814591%	2.797923%	81	6.193779%	89	4.706589	0.938000
9982	-4.636425%	2.797923%	82	6.382875%	82	4.336408	0.946200
9983	6.919520%	2.797923%	83	6.571972%	71	3.754694	0.953300
9984	-2.217074%	2.797923%	84	6.761069%	65	3.437396	0,959800
9985	-5.289891%	2.797923%	85	6.950165%	71	3.754694	0.966900
9986	4.748573%	2.797923%	86	7.139262%	47	2.485502	0.971600
9987	-0.685215%	2.797923%	87	7.328359%	58	3.067215	0.977400
9988	1.303948%	2.797923%	88	7.517455%	35	1.850906	0.980900
9989	-4.147243%	2,797923%	89	7.706552%	44	2.326853	0.985300
9990	5.708168%	2,797923%	90	7.895648%	30	1.586491	0.988300
0001	-2 104 260%	2 7979234	91	8.084745%	33	1.745140	0.991600
0007	0 85479004	2 79792304	92	8.273842%	18	0.951894	0.993400
0002	E 5033704	2 79792304	93	8.462938%	24	1.269192	0.995800
9993	3.3732/3%	2.75752570	94	8.652035%	13	0.687479	0.997100
9994	0.0/1830%	2./3/323%	95	8.841131%	10	0.528830	0.998100
9995	7.740040%	2.797923%	96	9.030228%	6	0.317298	0.998700
9996	1.120618%	2.797923%	07	9,219325%	6	0.317298	0.999300
9997	-3.682023%	2.797923%	09	9,408421%	5	0.264415	0.999800
9998	3.645773%	2.797923%	90	9.597518%	1	0.052883	0.999900
9999	4.443622%	2.797923%	100	9,786615%	0	0.000000	0.999900
10000	-2.796857%	2.797923%	100				

STATISTICAL	SUMMARY			Level Deviation	Probability	UCL	LCL
Minimum	Maximum	Median	Mean	Std. Deviation	41.60%	0.39%	0.68%
-8.93%	9.79%	0.51%	0.54%	3.0770			
Table 4.25 Simulation Result : Weighting Structure 11

TERATION	RETURN	RISK	-				
1	0.999364%	0.059338%	*	BINS	COUNTS		
2	0.988522%	0.059338%		0.771814%	1	SCALE	TOTAL
3	0.970361%	0.059338%		0.778356%	2	1.528504	0.00010
4	1.139063%	0.059338%	3	0.784898%	3	3.057008	0.00030
5	1.143371%	0.059338%	4	0.791441%	1	4.585512	0.00060
6	1.117235%	0.059338%	5	0.797983%		1.528504	0.00070
	1.070430%	0.059338%	6	0.804525%	6	3.057008	0.00090
	1 157932%	0.059338%	7	0.811068%	3	9.1/1024	0.00150
	1 074101%	0.059338%	8	0.817610%	3	4.585512	0.00180
	0.953883%	0.059338%	9	0.824152%	10	4.585512	0.00210
	1 17808994	0.059338%	10	0.830695%	12	19.265040	0.00310
	1.242222704	0.059338%	11	0.837237%	7	10.342048	0.00430
	1.124332770	0.059338%	12	0.843780%	18	27 51 2071	0.00500
13	1.1250/1%	0.059338%	13	0.850322%	20	27.513071	0.00680
14	1.104428%	0.059338%	14	0.856864%	21	32.008583	0.00880
15	1.104198%	0.059338%	15	0.863407%	31	47 282622	0.01090
16	1.099994%	0.059338%	16	0.869949%	25	38 21 2500	0.0140
17	1.179755%	0.059338%	17	0.876491%	32	48 01 21 23	0.0105
18	1.216599%	0.059338%	18	0.883034%	40	61 140159	0.0197
19	1.209248%	0.059338%	19	0.889576%	46	70 211192	0.02370
20	1.253229%	0.059338%	20	0.896118%	49	74.806604	0.0283
21	1.158793%	0.059338%	21	0.902661%	44	67 254174	0.0332
22	1.082118%	0.059338%	22	0.909203%	73	111 590799	0.0370
23	1.042720%	0.059338%	23	0.915745%	86	131 451 340	0.0449
24	0.991883%	0.059338%	24	0.922288%	77	117 694805	0.0533
25	0.987521%	0.059338%	25	0.928830%	94	143 679377	0.00120
						145.075572	0.07000
9977	1.008428%	0.059338%	77	1,269032%	71	108 523781	0.9573
9978	1.162487%	0.059338%	78	1.275574%	61	93 238742	0.9634
9979	1.363174%	0.059338%	79	1,282117%	55	84 067718	0.9689
9980	0.967991%	0.059338%	80	1 288659%	47	71.839686	0 9736
9981	1 025521%	0.059338%	81	1 295201%	43	65,725670	0.9779
9982	0 921328%	0.059338%	87	1 301744%	31	47.383623	0.9810
0092	1.042776%	0.059338%	83	1 308286%	36	55.026143	0.9846
9903	1.07277076	0.05933076	94	1 314828%	25	38,212599	0.9871
9904	1.230299%	0.059338%	07	1 221 271%	23	35,155591	0.9894
9985	1.183484%	0.059338%	05	1 327913%	23	41,269607	0.9921
3380	1.0092/2%	0.059338%	00	1 33445504	13	19,870551	0.9934
7381	1.108612%	0.059338%	0/	1 340998%	16	24,456063	0.9950
9988	0.999228%	0.059338%	00	1 347540%	17	25,984567	0.9967
9989	1.072453%	0.059338%	69	1 35409704	7	10,699528	0.9974
9990	1.074231%	0.059338%	90	1.360625%	4	6,114016	0.9978
9991	1.041853%	0.059338%	91	1.367167%	5	7,642520	0.9983
9992	1.038994%	0.059338%	92	1.307107%	3	4,585512	0.9986
9993	1.189218%	0.059338%	93	1.3/3/05%	4	6.114016	0.9990
9994	0.874102%	0.059338%	94	1.30023270	4	6,114016	0.9994
9995	1.044343%	0.059338%	95	1.300/94%		4,585512	0.9997
9996	0.970344%	0.059338%	96	1.393330%		1,528504	0.9998
9997	0.990381%	0.059338%	97	1.3998/9%		1,528504	0.9999
	1.096530%	0.059338%	98	1.406421%		0.000000	0.9999
9998	T'020220 \01			4 4 1 206 4 96 1	0		
9998 9999	1.109016%	0.059338%	99	1.41250470	1	1,528504	1.0000

STATISTICAL	SUMMARY			Level Deviation I	Probability	UCL	LCL
Minimum	Maximum	Median	Mean	Std. Deviation	n/a	1.08%	1.09%
0.77%	1.42%	1.09%	1.09%	0.1170			

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Table 4.26 Simulation Result : Weighting Structure 12

TTERATION	RETURN	RISK					
1	0.924712%	0.067595%	*	BINS	COUNTS	E CALE	
2	0.947089%	0.067595%		0.709226%	1	SUALE 1 CORDER	TOTAL
3	0.933656%	0.067595%	- 2	0.715500%	0	1.593879	0.000100
4	1.062253%	0.067595%	3	0.721774%	0	0.000000	0.000100
5	1.066361%	0.067595%	4	0.728048%	4	6.335545	0.000100
6	1.045269%	0.067595%	5	0.734322%	3	0.375515	0.000500
	1.057544%	0.067595%	6	0.740596%	3	4./81636	0.000800
	1 130854%	0.067595%	7	0.746870%	6	4.781636	0.001100
	1 020304%	0.067595%	8	0.753144%	2	3.3032/2	0.001700
	0.895269%	0.067595%	9	0.759418%	5	7 960204	0.001900
10	1 140380%	0.067505%	10	0.765692%	13	20 720422	0.002400
	1 14010494	0.067595%	11	0.771966%	7	11 157151	0.003700
12	1.149194%	0.067595%	12	0.778240%	20	31 877574	0.004400
13	1.050040%	0.067595%	13	0.784514%	18	28 689817	0.000400
14	1.004523%	0.067595%	14	0.790788%	18	28 689817	0.008200
15	1.032219%	0.067595%	15	0.797062%	25	39.846968	0.010000
16	1.041011%	0.067595%	16	0.803336%	28	44 628604	0.012300
17	1.074377%	0.067595%	17	0.809610%	34	54 191876	0.013300
18	1.107446%	0.067595%	18	0.815884%	41	65 349027	0.013700
19	1.120207%	0.067595%	19	0.822158%	39	62 161269	0.022000
20	1.166698%	0.067595%	20	0.828432%	57	90,851086	0.032400
21	1.092169%	0.067595%	21	0.834706%	56	89.257207	0.038000
22	1.009340%	0.067595%	22	0.840980%	62	98.820480	0.044200
23	0.968290%	0.067595%	23	0.847254%	59	94.038844	0.050100
24	0.938503%	0.067595%	24	0.853528%	67	106.789873	0.056800
25	0.952370%	0.067595%	25	0.859802%	68	108.383752	0.063600
9977	0.956583%	0.067595%	77	1.186050%	58	92.444965	0.943200
9978	1.044616%	0.067595%	78	1.192324%	63	100.414358	0.949500
9979	1.277628%	0.067595%	79	1.198598%	70	111.571509	0.956500
9980	0.936621%	0.067595%	80	1.204872%	52	82.881693	0.961700
9981	0.953121%	0.067595%	81	1.211146%	47	74.912299	0.966400
9982	0.887925%	0.067595%	82	1.217420%	56	89.257207	0.972000
9983	0.977407%	0.067595%	83	1.223694%	42	66.942906	0.976200
9984	1.172724%	0.067595%	84	1.229968%	37	58.973512	0.979900
9985	1.084304%	0.067595%	85	1.236242%	32	51.004119	0.983100
9986	0.988468%	0.067595%	86	1.242516%	34	54.191876	0.986500
9987	1 047684%	0.067595%	87	1.248790%	29	46.222482	0.989400
9988	0.983895%	0.067595%	88	1.255064%	16	25.502059	0.991000
00800	0.990708%	0.067595%	89	1.261338%	22	35.065332	0.993200
99900	1.02497794	0.067595%	90	1.267612%	15	23.908181	0.994700
99901	1,03407770	0.067595%	91	1.273886%	13	20.720423	0.996000
9991	0.923701%	0.067595%	92	1.280160%	15	23.908181	0.997500
9992	0.960824%	0.067595%	93	1.286434%	5	7.969394	0.998000
9993	1.131023%	0.067595%	94	1.292708%	4	6.375515	0.998400
9994	0.783233%	0.007555%	95	1.298982%	4	6.375515	0.998800
9995	1.020563%	0.007595%	96	1.305256%	4	6.375515	0.999200
9996	0.919209%	0.00/595%	07	1.311530%	2	3.187757	0.999400
9997	0.933115%	0.00/595%	98	1.317804%	3	4.781636	0.999700
9998	0.973120%	0.067595%		1.324078%	1	1.593879	0.999800
9999	0.997299%	0,067595%	100	1.330352%	2	3,187757	1.000000
10000	0.962909%	0.067595%	100				

STATISTICAL	SUMMARY			Loud Doulation	Probability	UCL	La	
Minimum	Maximum	Median	Mean	Sta. Deviation	n/a	1.01%	1.02%	J
0.71%	1.33%	1.02%	1.02%	0.10.0				

Table 4.27 Simulation Result : Weighting Structure 13

TION	RETURN	PICK					
TTERATION	-2 128546%	2 0809000	#	BINS			
	5 849011%	2.080900%	1	-6.425938%	COUNTS	SCALE	TOTAL
	-4 139049%	2.080900%	2	-6.284470%	1	0.070688	0.000100
	-2 998072%	2.080900%	3	-6.143003%	0	0.000000	0.000100
	3 659665%	2.080900%	4	-6.001535%	3	0.212063	0.000400
	-1 547161%	2.080900%	5	-5.860067%	4	0.282750	0.000800
0	-1.547101%	2.080900%	6	-5.718600%	4	0.282750	0.001200
	2.856517%	2.080900%	7	-5.57713294	7	0.494813	0.001900
8	2.385100%	2.080900%	8	-5.435665%	12	0.848251	0.003100
9	2.713823%	2.080900%	9	-5.294197%	8	0.565501	0.003900
10	3.815353%	2.080900%	10	-5.152730%	14	0.989626	0.005300
11	-0.78/209%	2.080900%	11	-5.011262%	25	1.767190	0.007800
12	-0.614157%	2.080900%	12	-4.869795%	25	1.767190	0.010300
13	3.500832%	2.080900%	13	-4.7283279/		1.555127	0.012500
14	-1.169314%	2.080900%	14	-4.586860%	19	1.343064	0.014400
15	1.625986%	2.080900%	15	-4.445392%		1.767190	0.016900
16	-3.122440%	2.080900%	16	-4.303925%	41	2.898191	0.021000
17	-0.286812%	2.080900%	17	-4.162457%	40	3.251629	0.025600
18	-1.516999%	2.080900%	18	-4.020989%	51	4.029193	0.031300
19	1.255709%	2.080900%	19	-3.879522%	01	4.311943	0.037400
20	3.085837%	2.080 90 0%	20	-3.738054%	72	4.099880	0.043200
21	5.818229%	2.080900%	21	-3.596587%	79	5.160194	0.050500
22	0.667692%	2.080900%	22	-3.455119%	82	5.513632	0.058300
23	2.649456%	2.080900%	23	-3 313652%	02	5.796383	0.066500
24	1.683309%	2.080900%	24	-3 172184%	112	0.4325/1	0.075600
25	-1.322459%	2.080900%	25	-3 030717%	97	7.987698	0.086900
						0.050097	0.096600
9977	2.590445%	2.080900%	77	4.325595%	112	7.917010	
9978	-0.767472%	2.080900%	78	4,467063%	107	7 563573	0.913100
9979	5.315903%	2.080900%	79	4.608531%	80	5 655007	0.921100
9980	5.182903%	2.080900%	80	4.749998%	95	6 71 5321	0.930600
9981	-1.115160%	2.080900%	81	4.891466%	90	6.361883	0.939600
9982	-3.198050%	2.080900%	82	5.032933%	84	5.937758	0.948000
9983	5.477956%	2.080900%	83	5.174401%	64	4.524006	0.954400
9984	-1.434424%	2.080900%	84	5.315868%	62	4.382631	0.960600
9985	-3.653372%	2.080900%	85	5.457336%	74	5.230882	0.968000
9986	3,939689%	2.080900%	86	5.598803%	40	2.827504	0.972000
9987	-0.377372%	2.080900%	87	5.740271%	55	3.887818	0.977500
9988	1.167791%	2.080900%	88	5.881738%	35	2.474066	0.981000
9989	-2 858279%	2.080900%	89	6.023206%	49	3.463692	0.985900
9990	4 54876004	2.080900%	90	6.164673%	22	1.555127	0.988100
0001	-1 45041704	2.000300%	91	6.306141%	33	2.332691	0.991400
9992	0.04177204	2.000900%	92	6.447609%	20	1.413752	0.993400
0002	4 47901004	2.000300%	93	6.589076%	27	1.908565	0.996100
9004	0.6016330	2.000900%	94	6.730544%	13	0.918939	0.997400
0005	5.051033%	2.000900%	95	6.872011%	9	0.636188	0.998300
0000	5.953806%	2.080900%	96	7.013479%	5	0.353438	0.998800
3330	1.056681%	2.080900%	07	7,154946%	6	0.424126	0.999400
9997	-2.600413%	2.080900%	09	7.296414%	3	0.212063	0.999700
3338	2.881449%	2.080900%	90	7,437881%	2	0.141375	0.999900
9999	3.542723%	2,080900%	100	7.579349%	0	0.000000	0.999900
10000	-1.986994%	2.080900%	100				
TATION	_						
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STATISTICAL	SUMMARY			Land Deviation	Probability	UCL	LCL
Minimum	Maximum	Median	Mean	Std. Deviation	39.80%	0.53%	0.74%
-6.43%	7.58%	0.63%	0.63%	2.75%			

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Table 4.28 Simulation Result : Weighting Structure 14

TTERATION	RETURN	RISK					
1	0.925355%	0.067456%	*	BINS	COUNTS	CONT	
2	0.946951%	0.067456%		0.709130%	1	SCALE	TOTAL
	0.933817%	0.067456%		0.715417%	0	1.590593	0.000100
4	1.063426%	0.067456%		0.721704%	0	0.000000	0.000100
5	1.067282%	0.067456%	4	0.727991%	5	0.000000	0.000100
6	1.046159%	0.067456%		0.734278%	2	7.952963	0.000600
7	1.057533%	0.067456%	0	0.740565%	3	4 771 770	0.000800
	1.130964%	0.067456%	/	0.746852%	6	9.542555	0.001100
	1.020582%	0.067456%	8	0.753139%	2	3 191195	0.001700
10	0.895623%	0.067456%	9	0.759426%	5	7 952962	0.001900
11	1 140382%	0.067456%	10	0.765713%	12	19.087110	0.002400
	1 150446%	0.067456%	11	0.772000%	8	12 724740	0.003800
	1.050311%	0.067456%	12	0.778287%	20	31,811850	0.006400
	1.050511%	0.067456%	13	0.784574%	18	28 630665	0.000400
	1.003033%	0.067456%	14	0.790861%	15	23.858888	0.009700
15	1.033019%	0.067456%	15	0.797148%	27	42,945998	0.012400
10	1.041099%	0.067456%	16	0.803435%	29	46.127183	0.015300
1/	1.075423%	0.067456%	17	0.809722%	33	52,489553	0.018600
18	1.108499%	0.067456%	18	0.816009%	39	62.033108	0.022500
19	1.121450%	0.067456%	19	0.822295%	39	62.033108	0.026400
20	1.167608%	0.067456%	20	0.828582%	55	87.482588	0.031900
21	1.092509%	0.067456%	21	0.834869%	59	93.844958	0.037800
22	1.010413%	0.067456%	22	0.841156%	64	101.797921	0.044200
23	0.968351%	0.067456%	23	0.847443%	56	89.073181	0.049800
24	0.938577%	0.067456%	24	0.853730%	70	111.341476	0.056800
25	0.952381%	0.067456%	25	0.860017%	68	108.160291	0.063600
9977	0.956517%	0.067456%	77	1.186939%	61	97.026143	0.943800
9978	1.045593%	0.067456%	78	1.193226%	59	93.844958	0.949700
9979	1.278770%	0.067456%	79	1.199513%	68	108.160291	0.956500
9980	0.936621%	0.067456%	80	1.205800%	51	81.120218	0.961600
9981	0.953867%	0.067456%	81	1.212087%	51	81.120218	0.966700
9982	0.887693%	0.067456%	82	1.218374%	53	84.301403	0.972000
9983	0.977796%	0.067456%	83	1.224661%	45	71.576663	0.976500
9984	1.173828%	0.067456%	84	1.230948%	35	55.670738	0.980000
9985	1.085354%	0.067456%	85	1.237235%	29	46.127183	0.982900
9986	0.989122%	0.067456%	86	1.243522%	38	60.442516	0.986700
9987	1.048464%	0.067456%	87	1.249809%	27	42.945998	0.989400
9988	0.983610%	0.067456%	88	1.256096%	18	28.630665	0.991200
9989	0.991156%	0.067456%	89	1.262383%	20	31.811850	0.993200
9990	1.034810%	0.067456%	90	1.268670%	15	23.858888	0.994700
9991	0.924368%	0.067456%	91	1.274957%	13	20.677703	0.996000
9992	0.961452%	0.067456%	92	1.281244%	15	23.858888	0.997500
9993	1 131940%	0.067456%	93	1.287531%	5	7.952963	0.998000
9994	0 783428%	0.067456%	94	1.293818%	4	6.362370	0,998400
9994	1 02066894	0.067456%	95	1.300105%	4	6.362370	0,998800
0004	0.01063494	0.067456%	96	1.306392%	4	6.362370	0.999200
2220	0.919024%	0.067456%	97	1.312679%	2	3.181185	0.999400
777/	0.933802%	0.067456%	98	1.318966%	3	4.771/78	0.999700
9998	0.974073%	0.067456%	99	1.325253%	1	1.590593	1.000000
10000	0.9982/9%	0.067456%	100	1.331540%	2	3.181185	1.000000
10000	0.963655%	0.00/450%					

STATISTICAL	SUMMARY			Lout Deviation	Probability	UCL	LCL
Minimum	Maximum	Median	Mean	Sta. Deviation	n/a	1.02%	1.02%
0.71%	1.33%	1.02%	1.02%	0.1070			

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Table 4.29 Simulation Result : Weighting Structure 15

TERATION	RETURN	RISK	#				
112011011	-2.275342%	2.104564%	#	BINS	COUNTS		
	5.870005%	2.104564%		-6.623306%	1	SCALE	TOTAL
	-4.090102%	2.104564%		-6.479541%	0	0.069558	0.000100
	-3.003291%	2.104564%	3	-6.335776%	0	0.000000	0.000100
	3.723156%	2.104564%	4	-6.192011%	2	0.000000	0.000100
	-1.671737%	2.104564%	5	-6.048246%	2	0.139116	0.000300
	5 774284%	2 10456496	6	-5.904481%	6	0.139116	0.000500
	2 440165%	2 1045649	7	-5.760716%	6	0.417347	0.001100
	2 71 274 7%	2.1045640	8	-5.616951%	5	0.417347	0.001700
	3 699001%	2.104564%	9	-5.473186%	8	0.347790	0.002200
	0.5405990	2.104564%	10	-5.329421%	21	0.556463	0.003000
	-0.549566%	2.104564%	11	-5.185655%	22	1.460/16	0.005100
12	-0.483186%	2.104564%	12	-5.041890%	23	1.530274	0.007300
13	3.682/4/%	2.104564%	13	-4.898125%	25	1.599832	0.009600
14	-1.362010%	2.104564%	14	-4.754360%	18	1./38948	0.012100
15	1.544199%	2.104564%	15	-4.610595%	21	1.252042	0.013900
16	-3.133376%	2.104564%	16	-4.466830%	38	2.642201	0.016000
17	-0.472097%	2.104564%	17	-4.323065%	45	3 1 20100	0.019800
18	-1.487275%	2.104564%	18	-4.179300%	59	4 102017	0.024300
19	1.057456%	2.104564%	19	-4.035535%	49	3,409220	0.030200
20	3.089863%	2.104564%	20	-3.891770%	74	5 147266	0.03510
21	5.968384%	2.104564%	21	-3.748005%	64		0.042500
22	0.511309%	2.104564%	22	-3.604239%	83	5 773307	0.048900
23	2.806248%	2.104564%	23	-3.460474%	91	6 329770	0.057200
24	1.596681%	2.104564%	24	-3.316709%	100	6 955792	0.00030
25	-1.282411%	2.104564%	25	-3.172944%	93	6 468886	0.07030
						0.100000	0.00500
9977	2.620062%	2.104564%	77	4,302841%	115	7 999160	0.89870
9978	-0.832079%	2.104564%	78	4.446606%	100	6.955792	0.90870
9979	5.180178%	2.104564%	79	4.590371%	107	7.442697	0.91940
9980	5.252189%	2.104564%	-80	4.734136%	82	5,703749	0.92760
9981	-1.155394%	2 104564%	81	4.877901%	90	6.260212	0.93660
9987	-3 351186%	2 104564%	82	5.021666%	76	5.286402	0.94420
0083	5 301181%	2 104564%	83	5,165431%	79	5.495075	0.95210
0084	-1 338355%	2.104564%	84	5.309196%	79	5.495075	0.96000
00.95	2 7252194	2.104564%	85	5 452961%	59	4,103917	0.96590
9905	-3.725219%	2.10456496	86	5 596726%	59	4.103917	0.97180
9980	3.0592/2%	2.104504%		5.740491%	49	3,408338	0.97670
9987	-0.192985%	2.10450470	89	5 884257%	43	2.990990	0.98100
9988	1.233692%	2.104504%	00	6.028022%	37	2.573643	0.98470
9989	-2.892941%	2,104564%	09	6 171787%	35	2.434527	0.98820
9990	4.512933%	2.104564%	90	6 215552%	30	2.086737	0.99120
9991	-1.286011%	2.104564%	91	6 4 59317%	26	1.808506	0.99380
9992	0.754001%	2.104564%	92	6.603082%	16	1.112927	0.99540
9 993	4.411477%	2.104564%	93	6.00300276	15	1.043369	0.99690
9994	0.753103%	2.104564%	94	6.74064776	12	0.834695	0.99810
9995	6.119413%	2.104564%	95	0.030012%	8	0.556463	0.99890
9996	1.056841%	2.104564%	96	7.03437770	4	0.278232	0.99930
9997	-2.461220%	2.104564%	97	7.1/8142%	5	0.347790	0.99980
9998	3.045611%	2.104564%	98	7.321907%	1	0.069558	0.99990
9999	3,580587%	2.104564%	99	7.465673%		0.069558	1.00000
10000	-1.742019%	2.104564%	100	7,609438%			
TISTICAL	SUMMARY				Brohability	UCL	LCL
inimum	Maximum	Median	Mean	Std. Deviation	40.10%	0.55%	0.76%
1	PIGYNIIAIII	Figurer	0 6 5 94	2.75%	40.10%		

7.61%

-6.62%

0.64%

0.65%

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Table 4.30 Simulation Result : Weighting Structure 16

TRATION	RETURN	RISK	#				
liewite	0.998823%	0.059337%		BINS	COUNTS		
2	0.987851%	0.059337%		0.771096%	1	SCALE	TOTAL
3	0.970130%	0.059337%		0.777638%	2	1.528585	0.000100
4	1.138600%	0.059337%	3	0.784180%	3	3.057170	0.000300
5	1,142647%	0.059337%		0.790722%	1	4.585755	0.000600
6	1.116805%	0.059337%		0.797264%	2	1.528585	0.000700
	1.070135%	0.059337%	0	0.803806%	6	3.057170	0.000900
- é	1.157528%	0.059337%	/	0.810348%	3	9.171509	0.001500
	1.073404%	0.059337%	8	0.816890%	3	4.585755	0.001800
	0.953139%	0.059337%	9	0.823432%	10	4.585755	0.002100
	1 177754%	0.059337%	10	0.829974%	10	15.285848	0.003100
12	1 242608%	0.059337%	11	0.836516%	8	17 2295848	0.004100
12	1 174173%	0.059337%	12	0.843058%	19	29.042112	0.004900
13	1.12417370	0.059337%	13	0,849600%	20	29.043112	0.006800
14	1.104250%	0.059337%	14	0.856142%	20	30 571697	0.008800
15	1.103018%	0.059337%	15	0.862684%	32	48 914715	0.010800
16	1.099472%	0.059337%	16	0.869226%	24	36 686036	0.014000
1/	1.178836%	0.059337%	17	0.875768%	32	48 914715	0.010400
18	1,215684%	0.059337%	18	0.882310%	40	61 143393	0.019600
19	1.208521%	0.059337%	19	0.888852%	44	67.257733	0.023000
20	1.252341%	0.059337%	20	0.895394%	50	76.429242	0.028000
21	1.157959%	0.059337%	21	0.901936%	46	70.314902	0.037600
22	1.081532%	0.059337%	22	0.908478%	73	111.586693	0.044900
23	1.041759%	0.059337%	23	0.915020%	86	131.458296	0.053500
24	0.991203%	0.059337%	24	0.921562%	76	116.172447	0.061100
25	0.987241%	0.059337%	25	0.928104%	92	140.629805	0.070300
9977	1.007667%	0.059337%	77	1.268288%	72	110.058108	0.957400
9978	1.161427%	0.059337%	78	1.274830%	60	91.715090	0.963400
9979	1.362326%	0.059337%	79	1.281372%	56	85.600751	0.969000
9980	0.967486%	0.059337%	80	1.287914%	46	70.314902	0.973600
9981	1.024934%	0.059337%	81	1.294456%	43	65.729148	0.977900
9982	0.921082%	0.059337%	82	1.300998%	31	47.386130	0.981000
9983	1.041928%	0.059337%	83	1.307540%	36	55.029054	0.984600
9984	1.235970%	0.059337%	84	1.314082%	25	38.214621	0.987100
9985	1.182746%	0.059337%	85	1.320624%	23	35.157451	0.989400
9986	1.068335%	0.059337%	86	1.327166%	27	41.271791	0.992100
9987	1.108183%	0.059337%	87	1.333708%	12	18.343018	0.993300
9988	0.999001%	0.059337%	88	1.340250%	17	25.985942	0,995000
9989	1.071846%	0.059337%	89	1.346792%	17	25,985942	0.996700
9990	1.073571%	0.059337%	90	1.353334%	7	10.700094	0.997400
9991	1.040703%	0.059337%	91	1.359876%	4	6.114339	0.997800
9992	1.038259%	0.059337%	92	1.366418%	5	7.642924	0.998300
9993	1 188628%	0.059337%	93	1.372960%	3	4,585755	0,998600
9994	0.873148%	0.059337%	94	1.379502%	4	6.114339	0.999000
9995	1 04303294	0.059337%	95	1.386044%	4	6.114339	0.999400
9006	0 96993704	0.059337%	96	1.392586%	3	4.585755	0.999700
9997	0.0000274	0.059337%	97	1.399128%	1	1.528585	0.999800
0000	1 00512004	0.059337%	98	1.405670%	0	0.000000	0,999000
0000	1.030103%	0.059337%	99	1.412212%	1	1.528585	1 000000
10000	1.10/912%	0.055337%	100	1.418754%	1	1.528585	1.000000
10000	1.045860%	0.05933776					
STATISTICAL	CLINDAA					110	10
Minimum	SUMMARY	Madlan	Mean	Std. Deviation	Probability	1 09%	1.09%
0.7794	maximum	median	1.09%	0.11%	n/a	1.08%	1.02 /4
0.7770	1.42%	1.09%	2100 10				

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1

Table 4.31 Simulation Result : Weighting Structure 17

TRATION	RETURN	RISK					
TIEROATTOIL	0.998473%	0.059338%	#	BINS	COUNTS		
2	0.987474%	0.059338%		0.770667%	1	SCALE	TOTAL
1	0.969944%	0.059338%		0.777209%		1.528517	0.000100
4	1.138315%	0.059338%		0.783752%	3	3.057033	0.000300
	1.142241%	0.059338%	4	0.790294%	1	4.585550	0.000600
	1.116537%	0.059338%	5	0.796836%	2	1.528517	0.000700
	1.069988%	0.059338%	6	0.803379%	6	3.057033	0.000900
	1 157304%	0.059338%	7	0.809921%	3	9.171099	0.001500
	1.073021%	0.059338%	8	0.816463%	3	4.585550	0.001800
	0.952746%	0.059338%	9	0.823005%	10	4.585550	0.002100
10	1 177515%	0.059338%	10	0.829548%	10	15.285166	0.003100
	1.1//313%	0.059338%	11	0.836090%	8	13.205106	0.004100
12	1.242203%	0.059338%	12	0.842632%	18	27 51 2200	0.004900
13	1.123009%	0.059338%	13	0.849175%	19	27.513298	0.006700
14	1,104129%	0.059338%	14	0.855717%	21	23.041815	0.008600
15	1.103278%	0.059338%	15	0.862259%	32	49.012520	0.010700
16	1.099125%	0.059338%	16	0.868801%	25	40.912530	0.013900
17	1.178296%	0.059338%	17	0.875344%	31	47 284012	0.016400
18	1.215139%	0.059338%	18	0.881886%	41	47.364013	0.019500
19	1.208122%	0.059338%	19	0.888428%	44	67.0691/9	0.023600
20	1.251860%	0.059338%	20	0.894971%	40	07.254729	0.028000
21	1.157507%	0.059338%	21	0.901513%	47	74.897311	0.032900
22	1.081226%	0.059338%	22	0.908055%	77	71.840278	0.037600
23	1.041216%	0.059338%	23	0.914597%	/5	111.581709	0.044900
24	0.990815%	0.059338%	24	0.921140%	76	129.923907	0.053400
25	0.987045%	0.059338%	25	0.927682%	97	140 632533	0.001000
				0.52700270	52	140.023523	0.070200
9977	1.007251%	0.059338%	77	1 267881%	77	110.053197	0.957300
9978	1.160800%	0.059338%	78	1 274423%	61	93 239510	0.957300
9979	1.361883%	0.059338%	79	1 280966%	55	84 068411	0.968900
9980	0.967224%	0.059338%	80	1 287508%	47	71 840278	0.973600
9981	1 024612%	0.059338%	81	1 294050%	41	67 254729	0.978000
9997	0.92089196	0.059338%	82	1 300593%	30	45 855497	0.981000
9902	1.04146994	0.059338%	93	1 307135%	35	53,498080	0.984500
9903	1.041400%	0.059338%	84	1 313677%	25	38,212914	0.987000
9904	1.235760%	0.059338%	04	1 320220%	23	35,155881	0.989300
9905	1.182280%	0.059338%	05	1 326762%	28	42,798464	0.992100
9986	1.067829%	0.059338%	00	1 333304%	12	18.342199	0.993300
9987	1.107935%	0.059338%	0/	1 339846%	17	25.984781	0.995000
9988	0.998843%	0.059338%	00	1 346389%	17	25.984781	0.996700
9989	1.071451%	0.059338%	69	1.352931%	7	10.699616	0.997400
9990	1.073211%	0.059338%	90	1 25047304	4	6.114066	0,997800
9991	1.040014%	0.059338%	91	1.35547576	5	7.642583	0.998300
9992	1.037830%	0.059338%	92	1.300010%	3	4.585550	0.998600
9993	1.188334%	0.059338%	93	1.372330%	4	6.114066	0.999000
9994	0.872583%	0.059338%	94	1.3/910070	4	6.114066	0.999400
9995	1.043722%	0.059338%	95	1.30304270	3	4.585550	0.999700
9996	0.969563%	0.059338%	96	1.39210370	1	1.528517	0.999800
9997	0.989825%	0.059338%	97	1.390/2/%	0	0.000000	0.999800
9998	1.094457%	0.059338%	98	1,40520378	1	1.528517	0.999900
9999	1.107288%	0.059338%	99	1.41101270	0	0.000000	0.999900
10000	1.045483%	0.059338%	100	1.41835490			

STATISTICAL	SUMMARY			T and D available D	Probability I	UCL	LCL	
Minimum	Maximum	Median	Mean	Std. Deviation	n/a	1.08%	1.09%	
0.77%	1.42%	1.09%	1.09%	0.1170				

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113