



***RISK MANAGEMENT APPROACH ON SELECTED KEY COMPANIES  
LISTED ON THE KUALA LUMPUR STOCK EXCHANGE***

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on the Kuala Lumpur Stock Exchange**

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**Abstract of thesis to the Faculty of Economic and Management, University Putra of Malaysia in partial fulfillment of the requirement for the degree of Master of Economics**

**Risk Management Approach on Selected Key Companies Listed  
on the Kuala Lumpur Stock Exchange**

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**September 2001**

**Supervisor : Prof. Madya Dr. Shamsheer Mohamad Ramadilli**

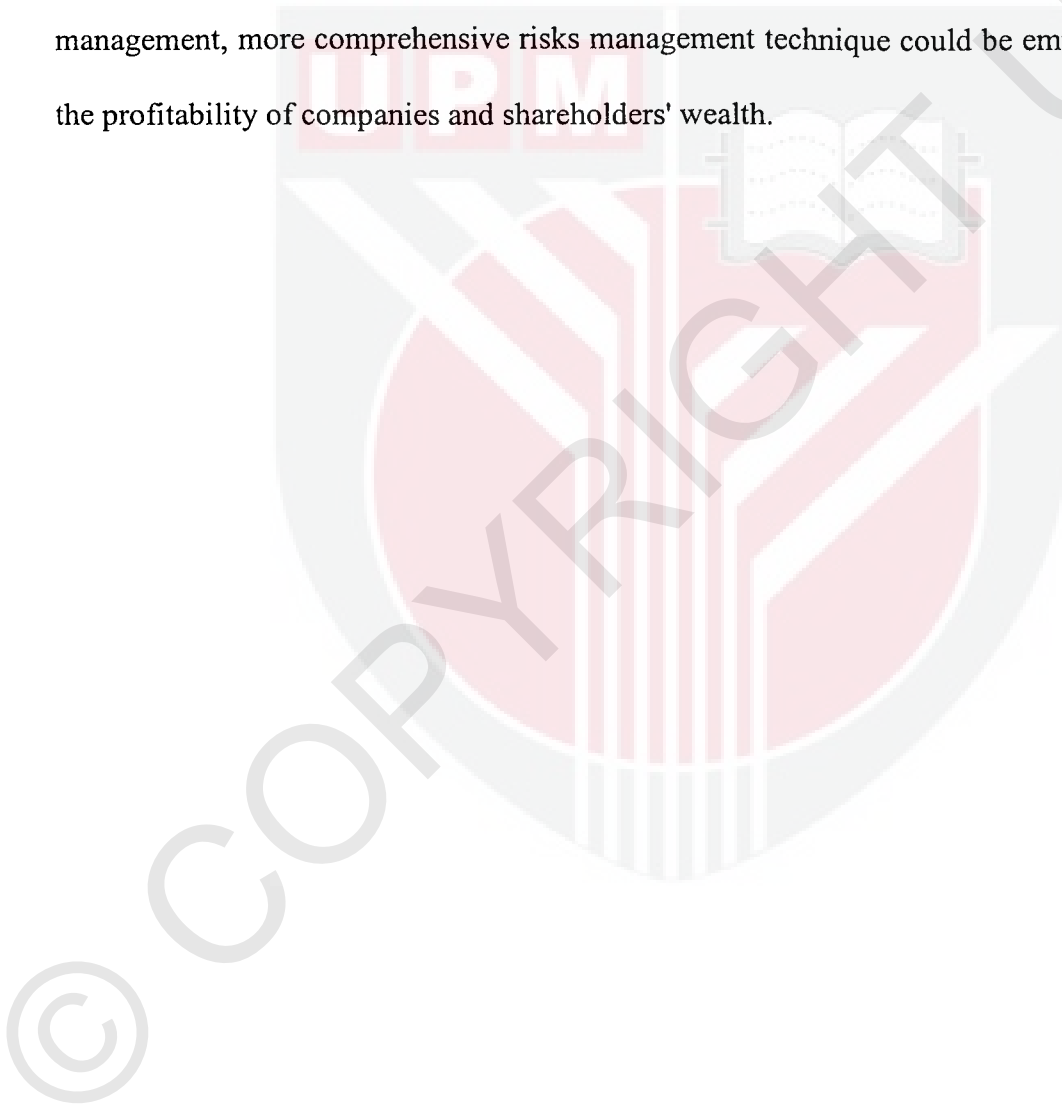
**Faculty :Economic and Management**

This study tries to identify risks and examines the vulnerability and the impact of companies listed on the KLSE exposed to various risk namely interest rates risks, currency risks, liquidity risks, business risks, commodity risks, market risks, credit risks and operational risks. Companies book and bottomlines are employed and compared against previous years or to their peers within the same sector in the country of against foreign countries.

The study tries to identify the necessary measures to be taken to manage risk effectively. Various forms of risk management to be taken include risk transfer, risk control, risk avoidance, risk reduction, risk financing, risk retention and risk sharing.



Based on the study, the result of the analysis indicate that companies that do not borrow excessively particularly in foreign currency denominated loans, employed hedging instruments, avoid aggressive expansion and diversified their business base fared far better than companies that have done otherwise. This is evident during the 1997~1998 Asian Financial Crisis that actually brought many troubled companies down to knees. With the understanding of risk management, more comprehensive risks management technique could be employed to safeguard the profitability of companies and shareholders' wealth.



**Abstrak untuk thesis yang dipersembahkan kepada Fakulti Ekonomi dan Pengurusan, Universiti Putra Malaysia untuk memenuhi sebahagian daripada syarat-syarat kepada Sarjana Ekonomi.**

**Pendekatan Pengurusan Risiko Pada Syarikat-syarikat Terpilih  
Yang Disenaraikan Di Bursa Saham Kuala Lumpur**

Oleh

**Pek Thian Kor**

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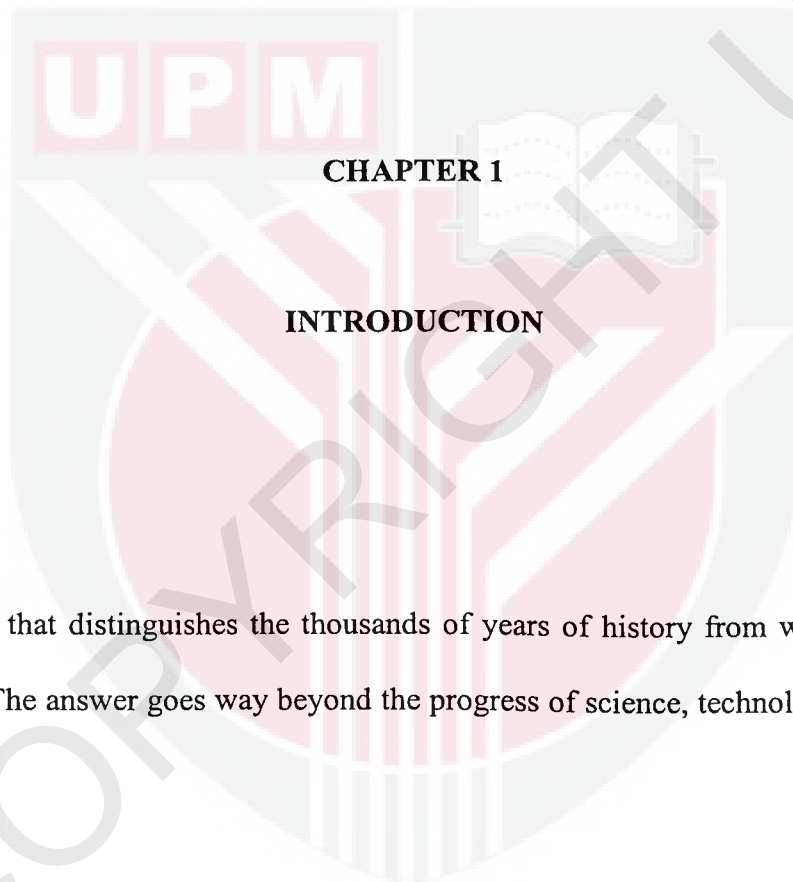
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Kertas projek ini bertujuan mengenalpasti risiko and mengkaji kelemahan dan kesan-kesan syarikat-syarikat yang disenaraikan di Bursa Saham Kuala Lumpur yang terdedah kepada berbagai risiko-risiko termasuk risiko kadar faedah, risiko matawang asing, risiko kecairan, risiko perniagaan, risiko komoditi, risiko pasaran, risiko kredit dan risiko operasi. Perbandingan keuntungan dan buku-buku dengan tahun-tahun lepas dan antara syarikat-syarikat dalam sektor yang sama di dalam dan luar negara.

Kajian ini cuba mengenalpasti keperluan mengambil langkah-langkah tertentu bagi menguruskan risiko secara berkesan. Berbagai bentuk-bentuk pengurusan risiko harus ditentukan termasuk pemindahan risiko, pengawasan risiko, penghindaran risiko, pengurangan risiko, pembiayaan risiko, penahanan risiko dan perkongsian risiko.

Berdasarkan kepada kajian, hasil analisis menunjukkan bahawa syarikat-syarikat yang tidak membuat pinjaman secara besar-besaran, menggunakan "hedging instruments", menghindarkan perkembangan agresif dan mempelbagaikan dasar perniagaan mempunyai pencapaian yang melebihi syarikat-syarikat yang tidak berbuat demikian. Ini amat ketara sekali ketika Krisis Kewangan Asia pada 1997~1998 di mana banyak syarikat-syarikat terjejas. Dengan pengetahuan pengurusan risiko, lebih teknik-teknik pengurusan risiko yang komprehensif dapat digunakan bagi memelihara keuntungan syarikat-syarikat serta kekayaan para pemegang-pemegang sahamnya.



## CHAPTER 1

### INTRODUCTION

#### 1.0 History

What is that distinguishes the thousands of years of history from what we think of as modern times? The answer goes way beyond the progress of science, technology, capitalism and democracy.

The distant past was studded with brilliant scientists, mathematicians, inventors, technologists and political philosophers. Hundreds of years before the birth of Christ, the skies had been mapped, the great library of Alexandria built, and Euclid's geometry taught. Demand for technological innovation in warfare was insatiable then it is today. Coal, oil, iron and copper have been at the service of human beings for millenia, and travel and communication mark the very beginnings of recorded civilization.

The revolutionary idea that defines the boundary between modern times and the past is the mastery of risk: the notion that the future is more than a whim of the gods and that men and women are not passive before nature. Until human beings discovered a way across that boundary, the future was a mirror of the past or the murky domain of oracles and soothsayers who held a monopoly over knowledge of anticipated events.

Some group of thinkers whose remarkable vision revealed how to put the future at the service of the present. By showing the world how to understand risk, measure it, and weigh its consequences, they converted risk-taking into one of the prime catalysts that drives modern Western society. Like Prometheus, they defied the gods and probed the darkness in search of light that converted the future from an enemy into an opportunity. The transformation in attitudes toward risk management unleashed by their achievements has channeled the human passion for games and wagering into economic growth, improved quality of life, and technological progress.

By defining a rational process of risk-taking, these innovators provided the missing ingredient that has propelled science and enterprise into the world of speed, power, instant communication, and sophisticated finance that marks our own age. Their discoveries about the nature of risk, and the art and science of choice, lie at the core of our modern market economy that nations around the world are hastening to join. Given all its problems and pitfalls, the free economy, with choice at its center, has brought humanity unparalleled access to the good things of life.

The ability to define what may happen in the future and to choose among alternatives lies at the heart of contemporary societies. Risk management guides us over a vast range of decision-making, from allocating wealth to safeguarding public health, from waging war to planning a family, from paying insurance premiums to wearing a seatbelt, from planting corn to marketing cornflakes.

In the old days, the tools of farming, manufacture, business management, and communication were simple. Breakdowns were frequent, but repairs could be made without calling the plumber, the electrician, the computer scientist – or the accountant and the investment advisers. Failure in one area seldom had direct impact on another. Today, the tools we use are complex, and breakdowns can be catastrophic, with far-reaching consequences. We must be constantly aware of the likelihood of malfunctions and errors. Without a command of probability theory and other instruments of risk management, engineer could never have designed the great bridges that span our widest rivers, homes would still be heated by by fireplaces or parlor stoves, electric power utilities would not exist, polio would still be maiming children, no airplanes would fly, and space travel would just be a dream. Without insurance in its many varieties, the death of the breadwinner would reduce young families to starvation or charity, even more people would be denied health care, and only the wealthiest could afford to own a home. If farmers were unable to sell their crops at a price fixed before harvest, they would produce far less food than they do.

If we had no liquid capital markets that enable savers to diversify their risks, if investors were limited to owning just one stock (as they were in the early days of capitalism), the great

innovative enterprises that define our age – companies like Microsoft, Merck, DuPont, Alcoa, Boeing, and McDonald's might never have come into being. The capacity to manage risk, and with it the appetite to take risk and make forward-looking choices, are key elements of the energy that drives the economic system forward.

The modern conception of risk is rooted in the Hindu-Arabic numbering system that reached the West seven to eight hundred years ago. But the serious study of risk began during the Renaissance, when people broke loose from the constraints of the past and subjected long-held beliefs to open challenge. This was a time when much of the world was to be discovered and its resources exploited. It was a time of religious turmoil, nascent capitalism, and vigorous approach to science and the future.

In 1654, a time when the Renaissance was in full flower, the Chevalier de Mere, a French nobleman with a taste for both gambling and mathematics, challenged the famed French mathematician Blaise Pascal to solve a puzzle. The question was how to divide the stakes of an unfinished game of chance between two players when one of them is ahead. The puzzle confounded mathematicians since it was posed some two hundred years earlier by the monk

Luca Paccioli. This was the man who brought double-entry bookkeeping to the attention of business managers of his day – and tutored Leonardo da Vinci in the multiplication tables. Pascal turned for help to Pierre de Fermat, a lawyer who was also brilliant mathematician. The outcome of their collaboration was intellectual dynamite. What might appear to have been a seventeenth-century version of the game of Trivial Pursuit led to the discovery of the theory of probability,

the mathematical heart of the concept of risk.

All the tools we use today in risk management and in the analysis of decisions and choice, from the strict rationality of game theory to the challenges of chaos theory, stem from the developments that took place between 1654 and 1760, with only two exceptions:

In 1875, Francis Galton, an amateur mathematician who was Charles Darwin's first cousin, discovered regression to the mean, which explains why pride goeth before a fall and why clouds tend to have a silver linings, Whenever we make any decision based on the expectation that matters will return to "normal", we are employing the notion of regression to the mean.

In 1952, Nobel Laureate Harry Markowitz, then a young graduate student studying operations research at the University of Chicago, demonstrated mathematically why putting all eggs in one basket is an unacceptably risk strategy and why diversification is the nearest an investor or business manager can ever come to a free lunch. That revelation touched off the intellectual movement that revolutionized Wall Street, corporate finance, and business decisions around the world; its effects are still being felt today.

The word "risk" derives from the early Italian *risicare*, which means "to dare". In this sense, risk is a choice rather than a fate. The actions we dare to take, which depend on how free we are to make choices, are what the story of risk is all about. And that story helps define what it means to be a human being.



## **1.1 The Problem of Risk**

### **1.1.1 The Concept of Risk**

#### ***Definition of Risk***

Risk is a condition in which there is a possibility of an adverse deviation from a desired outcome that is expected or hoped for.

#### ***Uncertainty and Its Relationship to Risk***

Uncertainty refers to a state of mind characterized by doubt, based on a lack of knowledge about what will or will not happen in the future. It is the opposite of certainty, which is a conviction or certitude about a particular situation.

#### ***The Degree of Risk***

The most commonly accepted meaning of "degree of risk" is related to the likelihood of occurrence. We intuitively consider those events with high probability of loss to be "riskier" than those with a low probability.

### **1.1.2 Classifications of Risk**

#### ***Financial and Nonfinancial Risks***

Financial risk involves the relationship between individual (or an organization) and an asset or expectation of income that may be lost or damaged. Thus, financial risk involves three elements:

- (1) the individual or organization who is exposed to loss,
- (2) the asset or income whose destruction or dispossession will cause financial loss
- (3) the peril that can cause the loss.

### ***Static and Dynamic Risks***

Dynamic risks are the result of unexpected changes in the economy. Changes in the price level, consumer tastes, income and output, and technology may cause financial loss to business entities in the economy. These dynamic risks normally benefit society in the long run, since they are the result of adjustments to misallocation of resources. Although these dynamic risks may affect a large number of individuals, they are generally considered less predictable than static risks, since they do not occur with any precise degree of regularity.

Static risks involve those losses that would occur even if there were no changes in the economy. If we could hold consumer tastes, output and income, and the level of technology constant, some individuals would still suffer financial loss. These losses arise from causes other than the changes in the economy, such as the perils of nature and the dishonesty of other individuals. Unlike dynamic risks, static risks are not a source of gain to society. Static losses involve either the destruction of the asset values or a change in its possession as a result of dishonesty or human failure. Static losses tend to occur with a degree of regularity over time and as a result, are generally predictable. Because they are predictable, static risks are more suited to treatment by insurance than are dynamic risks.

### ***Fundamental and Particular Risks***

The distinction between fundamental and particular risks is based on the difference in the origin and consequences of the losses. Fundamental risks involves losses that are impersonal in origin and consequence. They are group risks, caused for the most part by economic, social and political phenomena, although they may also result from physical occurrences. They affect large segments or even all of the population. Particular risks involve losses that arise out of individuals rather than by the entire group. They may be static or dynamic. Unemployment, war, inflation, earthquakes and floods are all fundamental risks. The burning of a house and the robbery of a bank are particular risks.

Since fundamental risks are caused by conditions more or less beyond the control of the individuals who suffer the losses and since they are not the fault of anyone in particular, it is held that society rather than the individual has a responsibility to deal with them. Although some fundamental risks are dealt with through private insurance, it is inappropriate tool for dealing with most fundamental risks. Usually, some form of social insurance or other government transfer program is used to deal with fundamental risks. Unemployment and occupational disabilities are fundamental risks treated through social insurance. Flood damage or earthquakes make a district a disaster area eligible for federal funds.

Particular risks are considered to be the individual's own responsibility and therefore inappropriate for action by society as a whole. They are dealt with by the individual through the use of insurance, loss prevention, or some other hedging technique.

### ***Pure and Speculative Risks***

One of the most useful distinction is that between pure risk and speculative risk. Speculative risk describes a situation where there is a possibility of loss, but also a possibility of gain. Gambling and entrepreneuring faces speculative risk in the quest for profit.

The term pure risk is used to designate those situations that involve only the chance of loss or no loss. The person who buys an automobile faces the possibility that something may happen to damage or destroy the automobile.

The distinction between pure and speculative risks is important as only pure risks are insurable. Insurance is not concerned with the protection of individuals against risk that is voluntarily accepted because of its two-dimensional nature, which includes the possibility of gain.

#### **1.1.3 The Burden of Risk**

Losses are the primary burden of risk and it is the primary reason why individuals attempt to avoid risk or mitigate its impact. The existence of risk may have a deterrent effect on economic growth and capital accumulation. Progress in the economy is determined to a large extent by the rate of capital accumulation, but the investment of capital involves risk that is distasteful. Investors as a class will incur the risks of a new undertaking only if the return on the investment is sufficiently high to compensate for both the dynamic and static risks. The cost of capital is higher in those situations where the risk is greater, and the consumer must pay the resulting higher cost of the goods and services or they will not be forthcoming.

## 1.2 Introduction to Risk Management

### 1.2.1 Risk Management Defined

Risk management is a scientific approach to dealing with pure risks by anticipating possibility accidental losses and designing and implementing procedures that minimize the occurrence of loss or the financial impact of the losses that do occur.

Risk management is therefore a solution to the challenges in dealing with pure risks. In fact, the distinguishing feature of risk management is the way in which it approaches the decision-making process in making the "best" decision to deal with a particular risk.

### 1.2.2 Risk Management Tools

Our definition of risk management states that it deals with risk by designing and implementing procedures that minimize the occurrence of loss or the financial impact of the losses that do occur. This indicates the two broad techniques that are used in risk management for dealing with risks. In the terminology of modern risk management, the techniques for dealing with risk are grouped into two broad categories: risk control and risk financing.

#### *Risk Control*

Broadly defined, risk control consists of those techniques that are designed to minimize, at least possible costs of those those risks the organization is exposed. Risk control methods include risk avoidance, and the various approaches at reducing risk through loss prevention and control efforts.

### ***Risk Avoidance***

Technically, avoidance takes place when decisions are made that prevent a risk from even coming into existence. Risks are avoided when the organization refuses to accept the risk even for an instant. Risk avoidance should be used in those instances in which the exposure has catastrophic potential and the risk cannot be reduced or transferred. Generally, these conditions will exist in the case of risks for which both the frequency and the severity are high and neither can be reduced.

While avoidance is the only alternative for dealing with some risks, it is a negative rather than a positive approach. If avoidance is used extensively, the firm may not be able to achieve its primary objectives. A manufacturer cannot avoid the risk of product liability and still stay in business. For this reason, avoidance is, in a sense, the last resort in dealing with risks that is when there is no other alternative.

### ***Risk Reduction***

Risk reduction consists of all techniques that are designed to reduce the likelihood of loss, or the potential severity of those losses that do occur. It is common to distinguish between those efforts aimed at preventing losses from occurring and those efforts aimed at minimizing the severity of loss if it should occur, referring to them respectively as "loss prevention" and "loss control". As the designation implies, the emphasis of "loss prevention" is on preventing the occurrence of loss, that is, on controlling the frequency, for example, diversification of business from plantation to property is a way to reduce risk should commodity prices of rubber and crude palm oil prices dropped.

### ***Risk Financing***

Risk financing, in contrast with risk control, consists of those techniques that focus on arrangement designed to guarantee the availability of funds to meet those losses that do occur. Fundamentally, risk financing takes the form of retention or transfer. All risks that cannot be avoided or reduced must, by definition, be transferred or retained. Frequently, transfer and retention are used in combination for a particular risk, with a portion of the risk retained and a part transferred.

### ***Risk Retention***

The forms that risk-financing techniques may assume can also vary considerably. Retention, for example, may be accompanied by specific budgetary allocations to meet uninsured losses and may involve the accumulation of a fund to meet deviations from expected losses. On the other hand, retention may be less formal, without any form of specific funding. A larger firm may use a loss-sensitive rating program (in which the premium varies directly with losses), various forms of self-insured retention plans, or even a captive insurer. The small organization uses deductibles, noninsurance, and various other forms of retention techniques. The specific programs may differ, but the approach is the same.

Risks retention may be conscious or unconscious (that is, intentional or unintentional). Because risk retention is the "residual" or "default" risk management technique, any exposures that are not avoided, reduced, or transferred are retained. This means that when nothing is done about a particular exposure, the risk is retained. Unintentional (unconscious) retention occurs when risk is not recognized. The firm unwittingly and unintentionally retained risk of loss arising



out of the exposure. Unintentional retention can also occur in those instances in which the risk has been recognized, but when the measures designed to deal with it are improperly implemented. If, for example, the risk manager recognizes the possibility of loss in connection with a particular exposure and intends to transfer that exposure through insurance, but then acquires an insurance policy that does not cover the total loss, the risk is retained.

Unintentional risk retention is always undesirable. Because the risk is not perceived, the risk manager is never afforded the opportunity to make the decision concerning what should be done about it on a rotational basis. Also, when the unintentional retention occurs as a result of improper implementation of the technique that was designed to deal with the exposure, the resulting retention is contrary to the intent of the risk manager.

Risk retention may be voluntary or involuntary. Voluntary retention results from a decision to retain risk rather than to avoid or transfer it. Involuntary retention occurs when it is not possible to avoid, reduce, or transfer the exposure to an insurance company. Uninsurable exposures are an example of involuntary retention.

A final distinction that may be drawn is between funded retention. In a funded program, the firm earmarks assets and holds them in some liquid or semiliquid form against the possible losses that are retained. The need for segregated assets to fund the retention program will depend on the firm's cash flow and the size of the losses that may result from the retained exposure.



### *Risk Transfer*

Transfer may be accomplished in a variety of ways. Transfer of risk through the purchase of insurance contracts is a primary approach to risk transfer. In consideration of a specific payment (the premium) by one party, the second party contracts to indemnify the first party up to a certain limit for the specified loss that may or may not occur.

Another example of risk transfer is the process of hedging, where an individual guards against the risk of price changes in one asset by buying or selling another asset whose price changes in an offsetting direction. For example, futures markets have been created to allow farmers to protect themselves against changes in the price of their crop between planting and harvesting. A farmer sells a futures contract, which is actually a promise to deliver at a fixed price in the future. If the value of the farmer's crop declines, the value of the farmer's future position goes up to offset the loss. [Hedging operations are made possible by speculators who buy and sell futures contract in the hope of making a profit as a result of a change in price. The speculator attempts to predict the prices months in advance of delivery and buys and sells on the basis of these estimates. It is the speculator's willingness to buy and sell futures that makes possible the hedging process, and it is to the speculator that the risk is transferred.]

Risk transfer may also take the form of contractual arrangements such as hold-harmless agreements, in which one individual assumes another's possibility of loss. For example, a tenant may agree under the terms of lease to pay any judgements against landlord that arise out of the use of the premises. Risk transfer may also involve subcontracting certain activities, or it may take the form of surety bonds.

### ***Risk Sharing***

While avoidance, reduction, retention, and transfer are the primary tools for dealing with risk, a fifth tool-risk sharing-is sometimes cited as a way of dealing with risk. Risk is shared when there is some type of arrangement to share losses. For example, a business may enter into a joint venture with another business, agreeing to share the profits and losses from the venture. Another noteworthy example of risk sharing is the corporation. Under this form of business, the investments of a large number of persons are pooled, and each investor bears only a portion of the risk that the enterprise may fail.

Risk sharing may be viewed as a special case of risk transfer and risk retention. It is a form of transfer, because the risk of the individual is transferred to the group. It may also be viewed as a form of retention, in which the risks of a number of individuals are retained collectively. Insurance may be viewed as a form of risk sharing. One basic characteristic of the insurance device is the sharing of risk by the members of the group.

### **1.2.3 Risk Management as a Business Function**

Risk management is a merger of the disciplines of decision theory, finance, insurance theory, and loss prevention and control specialties. Because risk management draws on these different disciplines, it is sometimes considered a subset of one of them.

### ***Risk Management's Contribution to the Organization***

Risk management can contribute to the organization's general goals in several ways. The

first and most important way is in guaranteeing, as far as possible, that the organization will not be prevented from pursuing its other goals as a result of losses associated with pure risks. If risk management made no contributions other than guaranteeing survival, this alone would seem to justify its existence. But risk management can contribute to corporate and organization goals in other ways.

Risk management can contribute directly to profit by controlling the cost of risk for the organization, that is, by achieving the economic objective. Since profits depend on the level of expenses relative to income, to the extent that risk management activities reduce expenses, they directly increase profits. There are several ways in which risk management activities can directly affect the level of costs. One is cost of purchasing insurance. To the extent that the risk manager is able to achieve economies in the purchase of insurance, the reduced cost will increase profits. In choosing between transfer and retention, the risk manager will select the most cost-effective approach. This means that expenses for risk transfer will generally be lower in organizations where the choice between transfer and retention considers the relative cost of each approach.

Risk management can also reduce expenses through risk control measures. To the extent that the cost of loss prevention and control measures is less than the dollar amount of losses that are prevented, the expense of uninsured loss is reduced. In addition, since loss prevention and control measures can also reduce the cost of insurance, risk control has a dual effect on expenses. Risk control measures that reduce the cost of losses include those measures that prevent losses from occurring as well as those that reduce the amount of loss when a loss does occur.

In addition to the reduction in expenses associated with losses, risk management can, in some instances, increase income. It can also be argued that when the pure risks facing an organization are minimized-through appropriate control and financing techniques-the firm has greater latitude in the speculative risks it can undertake. Although it is useful to distinguish between pure and speculative risks with respect to the manner in which they are addressed and the responsibility for dealing with them, there are inevitable trade-offs between pure and speculative risk in the overall risk portfolio of an organization. It has been argued that the total amount of risk that an organization faces is important, since firms with higher total risk are more likely to find themselves in financial distress than firms with lower total risks. When the organization faces significant pure risks that cannot be (or simply are not) reduced or transferred, its ability to bear speculative risk is reduced. By managing the amount of pure risk with which the organization must contend, risk management increases the firm's ability to engage in speculative risks.

Risk management can also permit an organization to engage in activities that involve speculative risk by minimizing the pure risks associated with such ventures. Consider, for example, the organization contemplating an entry into international markets. This decision will create both pure and speculative risks for an organization. If the combination of pure and speculative risks exceeds the risk threshold that management is willing to accept, the international venture may be abandoned. If, on the other hand, the risk manager can reduce the level of pure risk, the aggregate pure and speculative risk may be reduced to an acceptable level. To illustrate, suppose the corporation's top management is considering setting up a subsidiary in a politically troubled country. The threat of expropriation may appear to be too great and might

cause management to reject the opportunity in favor of a safer but less profitable alternative. However, if the risk manager reports that political risk insurance is available and reasonably priced, management may decide in favor of the opportunity and thereby generate an increased revenue and profits. The risk manager, who theoretically is responsible for managing all pure risks and can choose from many alternative risk treatment methods, is also in a position to contribute substantially to the operating results of the corporation.

### ***Risk Management and Speculative Risks***

The term risk management is increasingly used to describe the management of speculative risk, particularly by persons in the field of finance. The U.S. Department of Agriculture, for example, uses the term risk management in reference to risks related to commodity market prices and the management of these risks by hedging using derivatives contracts. Similarly, banks and other financial institutions define the term risk management of such financial risks as interest rate risk and credit risk. To preserve the distinction between risk management in its original sense (as an approach for dealing with pure risk) and the management of financial risk, the term financial risk management is often used for the latter.

Corporate treasurers who deal with interest rate and currency risks refer to their activities as risk management. But the expertise required for managing these risks is different from the expertise required for managing pure risks. Although some risk managers have the expertise to deal in derivatives instruments, there are others who feel sufficiently challenged by their existing responsibility.

### **1.3 The Risk Management Process**

The risk management process can be divided into a series of individual steps that must be accompanied in managing risks. Identifying these individual steps helps to guarantee that important phases in the process will not be overlooked. While it is useful for the purpose of analysis to discuss each of these steps separately, it should be understood that in actual practice the steps not mutually exclusive or overlap with one another. The six steps in the risk management process are:

1. Determination of objectives
2. Identification of the risks
3. Evaluation of the risks
4. Considering alternatives and selecting the risk treatment device
5. Implementing the decision
6. Evaluation and review

#### **1.3.1 Determination of Objectives**

The first step in the risk management process is the determination of the objectives of the risk management program – deciding precisely what it is that the organization would like its risk management program to achieve. Despite its importance, determining the objectives of the program is the step in the risk management process that is most likely to be overlooked. And hence the risk management efforts of many firms are fragmented and inconsistent.

Mehr and Hedges (1974), suggest that risk management has a variety of objectives, which they classify into two categories, pre-loss objectives and post-loss objectives in each category.

**Post-Loss Objectives**

Survival

Continuity of operations

Earning stability

Continued growth

Social responsibility

**Pre-Loss Objectives**

Economy

Reduction in anxiety

Meeting externally imposed obligation

Social responsibility

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***Value Maximization Objectives***

The ultimate goal of risk management is the same as the ultimate goal of the other functions in a business – to maximize the value of the organization. Modern financial theory suggests that this value that is to be maximized is reflected in the market value of the organization's common stock. According to this view, risk management decision should be appraised against the standard of whether or not they contribute to value maximization. It is a view that is not inconsistent with the objectives suggested by Mehr and Hedges. With limited exceptions, all of the Mehr and Hedges objectives do, in one way or another contribute to value maximization. Value maximization is the ultimate goal of the organization and is a reasonable standard for appraising corporate decisions in a consistent manner. At the same time, the value maximization objective has some limitations for risk management. The most important is that it is relevant primarily to the business sector. For other organizations and government bodies – value maximization is not particularly relevant.



### ***The Primary Objective of Risk Management***

The primary objective of risk management is to preserve the operating effectiveness of the organization, that is, to guarantee that the organization is not prevented from achieving its other objectives by the losses that might arise out of pure risk.

The risk management objective must reflect the uncertainty inherent in the risk management situation. Since one cannot know what losses will be, the arrangements made to guarantee survival in the event of loss must reflect the worst possible combination of outcomes. If a loss occurs and, as a result, the organization is prevented from pursuing its other objectives, it is clear that risks management objective has not been achieved. For this reason, the objective refers to losses that might arise out of pure risk.

### ***The Risk Management Policy***

Major policy decisions related to insurance should be made by the highest policy-making body in the organization – such as the board of directors – since these decisions are likely to involve large financial considerations, either in terms of premiums paid over the long term, or risks assumed if hazards are not insured. A formal risk management policy statement provides a basis for achieving a logical and consistent program by providing guidance for those responsible for programming and buying the firm's insurance.



### 1.3.2 Identifying Risk Exposures

Risk identification is the most difficult step in the risk management process. It is difficult because it is a continual process and because it is virtually impossible to know when it has been done completely.

#### *Risk Identification Techniques*

The first step in risk identification is to gain as thorough a knowledge as possible of the organization and its operations. The risk manager needs a general knowledge of the goals and functions of the organization – what it does and where it does it. This knowledge can be gained through inspections, interviews with appropriate persons within and outside the organization, and by an examination of internal records and documents.

#### *Analysis of Documents*

Analysis of the firms' financial statements, in particular, can aid in the process of risk identification. The asset listing in the balance sheet may alert the risk manager to the existence of assets that might otherwise be overlooked. The income and expense classification in the income statement may likewise indicate areas of operation of which the risk manager is unaware.

#### *Flow Charts*

Another tool that is useful in risk identification is a flow chart. A flow chart of an organization's internal operations views the firm as a processing unit and seeks to discover all the contingencies that could interrupt its processes. These might include damage to a strategic

asset located in bottleneck within the firm's operations or the loss of the services of a key individual or group through disability, death, or resignation. When extended to include the flow of goods and services to and from customers and suppliers, the flow chart approach to risk identification can highlight potential accidents that can disrupt the firm's activities and its profits.

### ***Tools of Risk Identification***

Exposure identification is an essential phase of both risk management and insurance management. Insurance companies developed insurance policy checklists, which identify the various risks for which they offered coverage. Although these tools focus on the perils and hazards against which insurers offered protection, they provide a base upon which risk identification methods could be constructed.

A few of the more important tools used in risk identification include risk analysis questionnaires, exposure checklists, and insurance policy checklists.

### **1.3.3 Evaluating Risks**

Once the risks have been identified, the risk manager must evaluate them. "Evaluation" implies ranking the risks in terms of importance, and ranking suggests measuring some aspect of the factors to be ranked. In the case of loss exposures, there are two facets that must be considered; the possible severity of loss, and the possible frequency or probability of loss. Evaluation involves measuring the potential size of loss and the probability that the loss is likely to occur.

#### 1.3.4 Consideration of Alternatives and Selection of the Risk Treatment Device

The next step is consideration of the techniques that should be used to deal with each risk. This phase of risk management process is primarily a problem in decision making: more precisely, it is deciding which of the available techniques should be used in dealing with each of the identified risk.

##### *Utility Theory and Risk Management Decisions*

Some theorists have suggested that utility theory be used as an approach to risk management decision, especially in regard to retention and transfer. They would use the expected value concept to compare an individual's preferences (utility) for different states of uncertainty. Once the individual's preference for different states of uncertainty (his or her "utility function") has been derived, it is used in a calculation that multiplies utility units by the probability that each level of loss might occur. This calculation is made for each decision being considered and the decision that produces the lowest expected loss of utility is selected.

The theory of marginal utility was constructed by economists in an attempt to explain the consumer choices. The theory does not and is not intended to provide guidance on the decision people should make. Using a utility function (real or hypothetical) as a basis for risk-related decisions, but there is no reason to believe that those decisions would be good. They might be consistent, but there is also a chance of making consistently bad decisions.

### ***Decision Theory and Risk Management Decisions***

The most appropriate approaches to risk management decisions are drawn from decision theory and operations research. The types of problems addressed by the decision theory approach to decision making are those for which there is no obvious solution, a situation that characterizes many risk management decisions. The decision theory approach aims at identifying the best decision or solution to the problem.

#### ***Cost-Benefit Analysis***

In theory only cost effective techniques of risk management should be used, that is only to the point at which each dollar spent on the measure will produce a dollar in saving through reduction in losses.

#### ***Expected Value***

Decision theory literature suggests three classes of decision-making situations, based on the knowledge the decision-maker has about the possible outcomes or results (called states of nature). The first is the decision made under certainty, which defines the situation where outcome from each choice is known (and therefore, when cost-benefit analysis is appropriate). The second is the decision made under condition of risk, in which the outcomes are uncertain but where probability estimates are available for the various possible outcomes. Finally, decision making under uncertainty means that the probability of occurrence of each outcome is not known.

	<i>State 1</i>	<i>State 2</i>	
	<i>No Loss</i>	<i>Loss Occurs</i>	<i>Expected Value</i>
<i>Insure</i>	$-\$1,500 \times .99$	$-\$1,500 \times .01$	$-\$1,500$
<i>Retain</i>	$\$0 \times .99$	$-\$100,000 \times .01$	$-\$1,000$

Applying the expected value criterion, the decision is to retain is the most attractive alternative or alternative that minimize costs of maximize returns.

There are two problems with the expected value model for risk management decisions. The first is that it requires that the decision-maker have accurate information on the probabilities. Second, even when accurate probability estimates are available, actual value will deviate from the expected value. Although the long-run expected value of the retention strategy is  $-\$1,000$ , a loss of  $\$100,000$  could occur. If a  $\$100,000$  loss is unacceptable to management, the long-run expected value is irrelevant. There is little consolation following the bankruptcy that results from the uninsured  $\$100,000$  loss in the fact that the retention strategy would have been the cost-effective strategy in the long run if the firm had survived.

### ***Pascal's Wager***

"Pascal's wager" introduces two significant principles for decision-making. The first is that there are some situations in which the consequence (magnitude of the potential loss) rather than the possibility should be the first consideration. In other words, there are some situations in which the outcome is so undesirable that it is unacceptable even though the probability of occurring is low. The second is that even when dependable estimates of the probability are not available, decisions made under conditions of uncertainty can be made on a rational basis.

[According to Pascal, there is no way to estimate the probability or likelihood that God exists. One believes in God or one does not. The decision, therefore, is not whether to believe in God, but rather whether to act as if God exists or does not exist. The choice, in Pascal's view, is, in effect, a bet on whether or not God exists. According to Pascal's wager, if one bets that God exists, he or she will lead a good life. A person who chooses to lead an evil life is wagering that God does not exist. If God does not exist, whether you lead a good life or bad is immaterial. But suppose, says Pascal, that God does exist. If you bet against the existence of God (by refusing to lead a good life) you run the risk of eternal damnation, while the winner of the bet that God exists has the possibility of salvation. Because salvation is preferable to damnation, for Pascal the correct decision is to act as if God exists.

"Pascal's wager introduces two significant principles for decision-making. The first is that there are some situations in which the consequence (magnitude of the potential loss) rather than the probability should be the first consideration. Put somewhat differently, there are some situations in which one of the outcomes is so undesirable that its possibility is unacceptable. The second is that even when dependable estimates of the probability are not available, decisions made under conditions of uncertainty can be made on a rational basis.

### ***Minimax Regret Strategy***

In the minimax regret strategy, the decision-maker attempts to minimize the maximum loss or maximum regret. For problems those in the area of risk management, in which payoffs

such as costs are to be minimized, the maximum cost of each decision for each of the possible outcomes is listed and the minimum of the maximums is selected as the appropriate choice, which gives rise to the term minimax.

In risk management, the premise on which the minimax cost or minimax regret strategies are based on Pascal's contention that when the probability of loss cannot be determined, one should choose the option in which the potential for regret is the lowest. The minimax cost or minimax regret strategies are appropriate when the maximum cost associated with one of the possible states of nature is unacceptable to management. This would be the case, for example, when the potential loss that might arise is beyond the firm's ability to bear; the situation in which one of the states of nature would result in bankruptcy and would result in failure to achieve the risk management objective.

### ***Risk Characteristics as Determinants of the Tool***

It is the characteristic of the risk itself that determines the choice of relevant risk management tool in a given situation.

It is possible at this point to summarize a few general guidelines with respect to the relationship of the various tools and particular risks. The matrix below categorizes risks into four classes, based on the combination of frequency (probability) and severity of each risks. Although real-world risks are not dividable so conveniently, most exposures can be classified according to their frequency and potential severity.



	<i>High Frequency</i>	<i>Low Frequency</i>
<i>High Severity</i>	<i>Avoidance &amp; Reduction</i>	<i>Avoidance &amp; Reduction</i>
<i>Low Severity</i>	<i>Retention &amp; Reduction</i>	<i>Retention</i>

When the possible severity of loss is high, retention is not realistic and some other technique is necessary. However, it must be noted that when the probability of loss is high, insurance becomes too costly. Through a process of elimination, therefore the appropriate tools for dealing with risks characterized by high severity and high frequency are avoidance and reduction. Reduction may be used when it is possible to reduce either the severity or the frequency to manageable level. Otherwise, the risk should be avoided.

Risk characterized by high severity and low frequency are best dealt with through insurance. The high severity implies a catastrophic impact if the loss should occur, and low expected value and a low cost of transfer.

Risks characterized by low severity and high frequency are most appropriately dealt with through retention and reduction. Retention because the high frequency implies that transfer will be costly, and reduction is to reduce the aggregate amount of losses that might occur.

Finally, those risks characterized by low severity and low frequency are best handled through retention. They seldom occur, and when they do happen, the financial impact is not significant.



### **1.3.5 Implementing the Decision**

If the decision is made to retain a risk, this might be accomplished with or without a fund. If the decision is made to include the accumulation of a fund, the administrative procedure must be inaugurated to implement the decision. If the decision is made to use prevent loss associated with a particular risk, the proper loss prevention program must be designed and implemented. The decision to transfer the risk through insurance must be followed by the selection of a cost-effective insurer.

### **1.3.6 Evaluation and Review**

Evaluation and review must be included in the program for two reasons. First, the risk management process does take place in a context of a dynamic environment. Things change: risks arise and old risks disappear. Second, mistakes do happen. Evaluation and review of the risk management program permits the risk manager to review his or her decisions and minimise costs from mistakes.

How does one review a risk management program? Basically, it is by repeating each of the steps in the risk management process to determine whether past decisions were relevant in the light of existing conditions and whether they were properly executed. The risk manager need to re-evaluates the program's objectives, revise the risk identification process to assure its effectiveness. Finally, the implementation of the decisions must be verified to ensure they were cost-effective and help achieved the desired objectives.

#### 1.4 Risk Management Application

Companies facing large exposure to interest rates, exchange rates, or commodity prices can increase their market values by using derivative securities to reduce their exposures. The primary emphasis of the theory is on the role of derivatives in reducing the variability of corporate cash flows and in doing so, reducing the various cost associated with financial distress.

Focus must be initiated on actively managing risks that must be taken in the pursuit of opportunity and ultimate profits. This contrasts with the common notion of "risk management", which involves protecting the company from losses through compliance procedures and hedging techniques. Such "risk management" tactics only seek to avoid the downside of financial loss. This is done by taking a closer look at both assessments – understanding the potential upside and downside of actions – and the management of risk to raise the probability of success, reduce the probability failure and decrease the uncertainty of overall financial performance. "Risk management" in a broader sense involves seeking the upside potential while managing the downside risk.

The first step towards clarity is to recognize that "risk" can be recognized as an opportunity or a hazard. "Risk as opportunity" is implicit in the concept that a relationship exists between risk and return. The greater the risk, the greater the potential return and necessarily the greater the potential loss. In this context, "managing risk" means using techniques to maximize the upside or minimize the downside within the constraints of the firm's operating environment.

"Risk as hazard" is what managers most often mean as potential negative events such as financial loss, fraud, injury or death in plant or a lawsuit. "Managing risk" means installing management techniques to reduce the probability of the negative event without incurring excessive costs or paralyzing the organization financially.

The next view embraces risk of uncertainty. "Risk as uncertainty" refers to the distribution of all possible outcomes, both positive and negative. In this context, risk management seeks to reduce the variance between anticipated outcomes and actual results. Opportunity hazard, and uncertainty – successful long-term risk management involves all three.

Managing risk on the upside is an "offensive" function; it concerns actions taken by management to achieve positive gains. Analysis of the upside creates insights used by management to increase the probability of success and decrease the probability of failure.

Managing risk on the downside is a "defensive" function; it concerns preventing or mitigating the actions of employees and others that can generate losses, and increasing the effectiveness of the firm's responsiveness to adverse developments.

Managing uncertainty is critically important for achieving the best overall financial performance. Drawing upon hedging techniques, budgets, and other tools, it seeks to ensure that a company's actual performance falls within a defined range.

Hedging techniques seek to limit the negative impact on a company's financial performance of uncontrollable external events, such as fluctuations in interest rates, currency exchange rates, and commodity prices. Hedging programs that use inverse linkage also dampen the impact of moves in rates and prices that are favourable to the company. Hedging instruments have a cost, and this expense must be factored into the overall cost/benefit analysis of using them. Finally, there is the additional, crucial expense of implementing compliance activities to ensure that companies use derivatives for hedging, not speculating.

The literature suggests the selective hedging as opposed to "full-cover" hedging. That is, while few companies regularly use derivatives to take a "naked" speculative position on forex rates or commodity prices, most corporate derivatives users appear to allow their views of future interest rates, exchange rates, and commodity prices to influence their hedge ratios.

Most corporations do not systemically hedge their exposure, the extent to which they hedge depends on their views of future price movements, the focus of hedging is primarily on near-term transactions, and the use of derivatives is greater for large firms than small firms.

### **1.4.1 Managing Credit Risk**

A major part of the business of financial institutions such as banks, insurance companies, pension funds, and finance companies is making loans. To earn high profits, these institutions must make successful loan credit risk. The concept of adverse selection and moral hazard provide a framework for understanding the principles that managers of financial institutions must take the necessary steps to minimize credit risk and make successful loans.

To be profitable, financial institutions must overcome the adverse selection and moral hazard problems that increase the probability of loan defaults. The attempts by financial institutions to solve these problems, help explain a number of principles for managing credit risk: screening and monitoring, establishment of long-term customer relationships, loan commitment, collateral, compensating balance requirements and credit rationing.

#### **1.4.1.1 Managing Interest-Rate Risk**

As the volatility of interest rates increased in the 1980s, financial institutions managers became more concerned about their exposure to interest-rate risk, the riskiness of earnings and returns that is associated with changes in interest rates.

### *Income Gap Analysis*

The sensitivity of bank income to changes in interest rates can be measured more directly using gap analysis (also called income gap analysis), in which the amount of rate-sensitive liabilities is subtracted from the amount of rate-sensitive assets. This calculation, called gap can be written as:

$$GAP = RSA - RSL$$

where

*RSA* = rate-sensitive assets

*RSL* = rate-sensitive liabilities

Multiplying *GAP* with the change in the interest rate immediately reveals the effect on bank income:

$$\Delta I = GAP \times \Delta i$$

where

$\Delta I$  = change in bank income

$\Delta i$  = change in interest rates

The analysis conducted is known as basic gap analysis, and it suffers from the problem that many of the assets and liabilities that are not classified as rate-sensitive have different maturities. One refinement to deal with this problem is the maturity bucket approach, that is to measure the gap for several maturity sub-intervals, called maturity buckets, so that effects of interest-rate changes over a multiyear period can be calculated.

### *Duration Gap Analysis*

The gap analysis so far focuses only on the effect of interest-rate changes on income. An alternative method for measuring interest-rate risk, called duration gap analysis, examines the sensitivity of the market value of the financial institution's net worth to changes in interest rates.

Duration analysis is based on Macaulay's concept of duration, which measures the average lifetime of a security's stream of payments. This concept is a useful concept because it provides a good approximation of the sensitivity of a security's market value to a change in its interest rates using the following formula:

$$\% \Delta P \approx - \text{DUR} \times \Delta i / (1 + i)$$

where  $\% \Delta P = (P_{t+1} - P_t) / P_t$  = percent change in market value of the security

*DUR* = duration

*i* = interest rate

After having determined the duration of all assets and liabilities on the bank's balance sheet, the bank manager could use this formula to calculate how the market value of each asset and liability changes when there is a change the interest rates and then calculate the effect on net worth. An easier approach is to figure out the effect that interest-rate changes for assets and for liabilities and then use those figures to estimate the effects of interest-rate changes. Duration is additive, that is, the duration of a portfolio of securities is the weighted average of the duration of the individual securities, with the weights reflecting the proportion of the portfolio invested in each.

$$DUR_{GAP} = DUR_A - (L/A \times DUR_L)$$

where  $DUR_A$  = average duration of assets

$DUR_L$  = average duration of liabilities

L = market value of liabilities

A = average value of assets

### 1.4.2 Hedging With The Financial Derivatives

Starting in the 1970s and the increasing volatility in the 1980s and 1990s had made the world become a riskier place for financial institutions. Swings in interest rates widened, and the bond and stock markets went through some episodes of increased volatility. As a result of these developments, managers of financial institutions became more concerned with reducing the risk on instruments. Given the greater demand for risk reduction, the process of financial innovation came to the rescue by producing new financial instruments that help financial institution managers manage risk better. These financial instruments, called financial derivatives, have payoffs that are linked to previously issued securities and are extremely useful risk reduction tools.

Two of the most important financial derivatives that managers of financial institutions use to reduce risk are forward and futures contracts.



### 1.4.2.1 Forward Markets

Forward contracts are agreements by two parties to engage in a financial transaction at a future (forward) point in time. The focus on forward contracts are linked to debt instruments, called interest-rate forward contracts.

#### *Interest-Rate Forward Contracts*

Interest-rate forward contracts involve the future sale of debt instrument and have several dimensions:

- 1). specification of the actual debt instrument that will be delivered at a future date,
- 2). amount of the debt instrument to be delivered
- 3). price (interest rate) on the debt instrument when it is delivered, and
- 4). date on which the delivery will take place.

#### *Pros and Cons of Forward Contracts*

The advantage of forward contracts is that they can be as flexible as the parties involved want them to be. This means an institutions may be able to hedge completely the interest-rate risk for the exact security it is holding in its portfolio.

However, forward contracts suffer from two problems that severely limit their usefulness. The first is that it may be very hard for an institutions to find another party (called a counterparty) to the contracts. There are brokers to facilitate the matching up of parties but there may be few institutions that want to engage in forward contract specifically. This means that it

may prove impossible to find a counterparty when a financial institution wants to make a specific type of forward contract. Furthermore, even if the financial institution finds a counterparty, it may have to sell for a price lower than it thinks it should (say bonds in the contract) it wants to sell because there may not be anyone else to make the deal with. A serious problem for the market in interest-rate forward contracts, then, is that it may be difficult to make the financial transaction or that it will have to be made at an unfair price; in the parlance of the financial world, this market suffers from a lack of liquidity.

The second problem with forward contracts is that they are subject to default risk. The presence of default risk in forward contracts must check each other out to be sure that the counterparty is both financially sound and likely to be honest and live up to its contractual obligations. Because this is a costly process and because all the adverse selection and moral hazard problems apply, default risk is a major barrier to use the interest-rate forward contracts. When the default risk problem is combined with a lack of liquidity, we see that these contracts may be of limited usefulness to financial institutions. Although there is a market for interest-rate forward contracts, particularly in Treasury and mortgage-backed securities, it is not nearly as large as the financial futures market.

#### **1.4.2.2 Financial Futures Markets**

Given the default risk and liquidity problems in the interest-rate forward market, another solution to hedging interest-rate risk is the future market. This solution was provided by the development of financial futures contracts by the Chicago Board of Trade starting in 1975.

### ***Financial Futures Contracts***

A financial futures contract is similar to an interest-rate forward contract in that it specifies that a debt instrument must be delivered by one party to another on a stated future date. However, it differs from an interest-rate forward contract in several ways that overcome some of the liquidity and default problems of forward markets.

### ***Organization of Trading in Financial Futures Markets***

Financial futures contracts are traded in the United States on organized exchanges such as the Chicago Board of Trade, the Chicago Mercantile Exchange, the New York Futures, the MidAmerica Commodity Exchange, and the Kansas City Board of Trade. These exchanges are highly competitive with one another, and each organization tries to design contracts and set rules that will increase the amount of futures trading on its exchange.

The futures exchanges and all trades in financial futures in the United States are regulated by the Commodity Futures Trading Commission (CFTC), which was created in 1974 to take over the regulatory responsibilities for futures trading and the futures exchanges to ensure that prices in the market are not being manipulated, and it also registers and audits the brokers, traders, and exchanges to prevent fraud and to ensure the financial soundness of the exchanges.

### *Using Short-Term Interest Rate Futures & Options*

Banks, security dealers and other financial firms were the early users of financial futures and options for managing their interest rate exposure. Interest rate contracts are an obvious and effective risk management tool where uncertain interest income and expense are integral parts of a business.

Interest expense, in fact, an important expense component in nearly any type of business because interest rate volatility can have a major impact on earnings and cash flows. Any firm with a substantial temporary or permanent interest rate exposure should investigate the risk-minimizing benefits that financial futures and options can provide. The money market comprises the markets for short-term, heavily-traded credit instruments with maturities of less than one year. Money market instruments include Treasury bills, commercial paper, bankers' acceptances, negotiable certificates of deposit (CDS), Federal funds and short-term loans collateralized by such securities. The markets for these instruments are distinct, but interdependent. Their respective interest rates reflect general credit conditions with adjustments for differences in credit risk and liquidity.

The money market has expanded rapidly in recent years because of changing economic conditions. Volatile interest years have advanced the rate of financial innovations. With the development of money market funds, small investors no longer were locked out of the money market by large minimum transaction barriers.

As both corporate and individual funds sought higher money market returns, negotiable CDs and Eurodollar time deposits (both developed in the 1960s) became key funding sources for banks. Floating rate deposits, a response to the growth of money market funds, further reduced a bank's core of stable-rate funds. As the banks found it necessary to pay money market rates for lendable funds, they became reluctant to make fixed-rate loans of longer maturities. So, through bank loans based on floating rates, even companies too small to participate in the commercial paper or Eurodollar market became indirect money market borrowers.

Corporations today are making more aggressive use of cash management technique. No longer willing to leave balances as unproductive, non-interest-earning demand deposits, the corporate cash manager places funds in short-term or overnight securities that have little or no credit risk. As these markets have become more liquid, corporate debt managers borrow in the commercial paper or Eurodollar markets when they offer a price advantage.

### ***What Are Interest Rates Futures?***

The 91-day US treasury bill futures contract is an agreement to buy or sell, at a given time in the future, a US Treasury bill with 91 days to maturity and a face value of \$1,000,000. The three-month Eurodollar Times Deposit futures contract is an agreement to place a deposit (lend) or take a deposit (borrow) at a given time in the future of \$1,000,000 for three months in the London Interbank Market. The contracts are traded using a price index, which is derived by subtracting the interest rate from 100.00. for instance, an interest rate of 10.0 percent translates to an index price of 90.00. If interest rates move higher, the price of the contract falls; if rates move lower, the contract price rises.

Discount Rate = Discount/Face Value x 360/Days to Maturity

Add-on Yield Equivalent = Discount/Purchase Price x 360/Days to Maturity

### ***What Are Options on Interest Rate Futures?***

A futures option contract confers the right from seller to buyer to take a futures position at a stated price. Two types of options are traded on the Chicago Mercantile Exchange's Index and Option Market: calls and puts. Calls are the right to buy the futures at a below market price. Puts are right to sell at that fixed price. If the futures price falls below the fixed exercise price, the puts give the holder the opportunity to sell the futures at an above-market price.

### **1.4.3 Introduction to Interest Rate Swap**

An interest rate swap is a contractual agreement between two parties to exchange a series of payments for a stated period of time. The nomenclature arises from the fact that typically the payments in a swap are similar to interest payments on a borrowing. When combined with an asset or a liability, a swap can change its nature eg. Risk characteristics, by changing the net cash flow. For example, a fixed rate liability can be swapped fro variable rate liability using an interest rate swap.

### ***Swap Pricing***

The maturity of the dollar interest rate swap market is indicated by the widely available bid and offer quotations in maturities from 2 to 10 years. Rates are quoted as a spread over the bond yield of the on-the-run. Treasury of appropriate maturity. For maturities of up to 3 years,

the rates are commonly quoted using the money market practice, eg. As an absolute level on an annual, actual/360 day basis.

Usually, simultaneous execution of offsetting swaps by a swap dealer is uncommon. Therefore, it is likely that one or both parties to a swap will execute a Treasury trade to hedge the swap position. Swaps up to 3 years maturity can also be hedged in the Eurodollar futures market.

Several practical considerations enter into the pricing of a swap by a swap dealer. Among them are:

1. prevailing market conditions, eg. The term structure of the interest rates.
2. structure of the swap, eg. Maturity, floating index, size.
3. the current position of the firm.
4. ready availability of offsetting swaps
5. credit quality of the counterparty
6. regulatory constraints, eg. Capital requirements.

### ***Interest Rate Risk Characteristics***

The risk characteristics of a swap are quite interesting. The popular risk measure, duration, can be roughly defined as the change in value for a unit change in interest rates. Floating rate bonds usually have very small interest rate sensitivity, eg. Low duration. It is therefore tempting to look at the duration of the swap as equal to the duration of the fixed side only, ignoring the floating side as having zero or low duration.



However, it turns out that floating side of a swap does not have a small duration. In fact, it has a (large) negative duration. This fact can be easily demonstrated. A little reflection reveals that the floating side resembles the coupon stream from a floating rate bond. In other words, we can synthesize a floating rate bond by combining the floating side with a zero coupon bond representing the principal payment. Viewing this another way, the floating side is equivalent to a portfolio of a long position in a floating rate bond and a short position in the zero coupon bond representing the principal payment.

Floating Rate Bond = Floating Side of Swap + Zero Coupon Bond

Floating Side of Swap = Floating Rate Bond – Zero Coupon Bond

### ***Currency Swaps***

In the same way an interest rate swap can effectively change the nature of a cash flow from fixed to floating, it is also possible to change the underlying currency itself via the swap mechanism. Such a transaction is called a currency swap. Normally, currency swaps are used to convert a liability (or an asset) from one currency to another. The cash flows at maturity corresponding to the principals amounts in the two liabilities (or assets) may not be equal in value. Therefore, unlike an interest rate swap, the currency swap includes the exchange, at maturity, of the principal amounts as well. In this sense, the currency swap closely resembles a back-to-back loan. It is also possible to have coupon-only currency swaps with no exchange of principal. Such swaps are useful in hedging dual-currency liabilities where the interest is paid in one currency and the principal in another. Depending upon whether the two sides of a currency



swap pay a fixed or floating rate of interest, the transaction is classified as a fixed, fixed/floating, or floating/floating currency swap. As can be expected, the final exchange of principal imparts additional complexity to non-standard structures and to termination.

### ***Swap Derivatives***

Whenever a product gains popularity, it is only natural that other derivative products also emerge to claim their rightful share of the market. The interest rate swap is no exception, and a luster of its own derivatives with option-like characteristics has developed.

In a callable swap, the fixed payer has the right, at his option, to terminate the swap on or before a scheduled maturity date. The floating payer is compensated for his option either by an upfront premium or by an increase in the fixed payer who expects the interest rates to fall. By terminating the swap at an opportune time, he can enter into another one at a lower fixed rate.

A puttable swap mirrors the callable swap. Here, the floating payer has the termination right. The payment for this privilege is made either by reducing the fixed rate received or by making an up-front fee. A corporation that has issued a fixed rate callable bond and that wishes to have floating rate funding can use the puttable swap. At the time the corporation calls the bond, it will also simultaneously exercise its right to terminate the swap.

Extendible Swaps are similar to callable and puttable swaps. Here, one of the counterparties has the right to extend the swap beyond its stated maturity date as per an agreed upon schedule.

A capped swap is one in which a ceiling rate is set on the floating side. If the index rises above this ceiling rate, the floating rate payer simply pays the ceiling rate. The floating rate payer either pays an upfront premium or receives a fixed rate lower than the market in return for protection provided by the ceiling or cap. Typical users of capped swaps are borrowers wishing to limit exposure to high short term interest rate levels. Another example is an asset swap where the cash flow from a portfolio of capped adjustable-rate mortgages is converted to fixed.

### ***Using Currency Futures and Options***

Trading in currency futures at the International Monetary Market (IMM) division of the Chicago Mercantile Exchange (CME) began on May 16, 1972. The opening bell at the IMM signaled the beginning of a new era in futures trading—currency futures represented the first step in the developments of financial futures.

The rapid growth in the use of currency futures is indicative of the utility that these markets, foreign brokers, institutional traders and domestic banks, foreign exchange brokers, institutional traders, corporate treasurers and public investors. These contracts provide mechanism for price "discovery" and "hedging", which are the most important economic benefits of an organized futures exchange.

#### ***Currency Futures Contracts***

A currency futures contracts' total dollar value is determined by multiplying the contract amount (eg. DM) by the price of the contract. The buyer of a currency futures contract (a "long" position) agrees to pay a dollar price to receive a fixed amount of the other currency on the contract delivery date (if the contract position has not been "offset" by resale). The buyer profits, if the dollar price of the currency rises after the position is established.

Futures prices are related closely to "spot" (or cash) exchange rates, but there is a difference which is due to different delivery times. This difference—the futures price minus the spot price – is called the "basis". The basis tends toward zero as the delivery day for the futures contract approaches; as a result, the futures delivery ultimately becomes a spot delivery. They become perfect substitutes for each other, hence they should have equal value. This principle is very important in a futures market because it is the essence of the use of the futures for "forward pricing" or fixing of costs in advance.

In foreign exchange, the basis reflects the interest-rate differential between countries. If there are no restrictions for trade and capital flow, forward rates vary inversely with the interest-rate differential between two countries. For example, if interest rates are two percent higher in Canada than in the United States, the forward price for Canadian dollars should be at two percent discount on an annual basis in terms of US dollars.

### ***Options On Currency Futures***

Taking a position on a currency by buying a call or a put option requires no margin. The price (also called the premium) paid for the option is the absolute limit of the buyer's risk. As an option buyer, there is the right, but no obligation, to take a position in the underlying futures contract. A futures position can be taken by "exercising" the option, re-selling it in the market, or simply letting the option expire if it has no value.

Buying a call option gives the right to buy the underlying futures at a specific price, even if the current price is higher. Calls gain value when the futures price rises quickly. Buying a put option gives the right to sell the futures at a specific price, even if the current price is lower. Puts gain value when the futures price falls quickly.

Calls and puts are distinct contracts, and there is a seller for every buyer of either. The option "writer", who sells the option to open position, assumes the obligation of taking a futures position opposite to the option holder, if the option is exercised. The call writer stands ready to take a short futures position. The put writer stands ready to take a long futures position.

The option writer sells the right to exercise in order to earn the premium income. Such a position carries unlimited risk, but can be liquidated at any time before expiration by buying the same option. Many option writers limit their risk by writing the option against an opposite futures, cash or option position. This enables any loss on the written option to be offset by profit from the other position.

### ***Hedging Currency Risk With Futures and Options***

The difference between hedging and speculating involves risk. The speculator starts with no risk, and buys or sells options or futures contracts, assuming risk in order to make profits. The hedger starts with a pre-existing currency risk generated from the normal course of business; options or futures are used to reduce or eliminate that pre-existing risk.

For example, the US exporter who contracts to accept payment in Deutsche marks bears the risk that the value of the Deutsche mark may fall before payment. In this case, any strategy that provides profits from a declining Deutsche mark (up to the total amount of the pre-existing exchange rate risk) is a hedge.

Futures contracts may be used to hedge some or all pre-existing risk by essentially locking in a rate in a forthcoming foreign exchange transaction. Once hedged with futures, the position is insulated from the effects of subsequent changes in the spot exchange rate—either beneficial or adverse. Options contracts provide alternative hedging approaches with different characteristics.

For a given risk (either the risk of a declining exchange rate or a rising exchange rate) options can be used to offset risk or generate income in one or two ways. For example, to hedge against declining exchange rates (rising value of the dollar), buy an appropriate number of put contracts or sell an appropriate number of call contracts. Similarly, during a period of rising exchange rates (a declining dollar) hedge by buying calls or by selling puts.

In general, the option-buying hedge can be viewed as purchasing insurance with a deductible clause. The options protect against losses after they reach a certain point. The precise threshold point is determined by the option chosen. An option-selling hedge, on the other hand, offers protection with maximum coverage equal to the value of the options sold. If losses from the pre-existing risk exceeded the receipts of the option sale, those "excess" losses are not protected by the hedge.

#### 1.4.4 The Choice of Hedge Ratio

Profit opportunities with the cash-and-carry trade vary with the objectives and strategies of each arbitrageur. The previous description implicitly assumes that the arbitrageur prices the cash and futures transactions with the futures expiration day (designated the anticipated trade date). If a position is financed on an overnight basis, the trade offers a yield opportunity to the arbitrageur. If financed to term, no such opportunity exists. Similarly, the correct hedge ratio is determined by the remaining maturity of the delivery bill at delivery. So even if the current maturity of the bill is 174 days when the arbitrageur is initiated, the appropriate hedge ratio is one futures contract for each \$1 million par amount.

This hedge ratio is determined by comparing the value of a basis point associated with the deliverable Treasury bill upon the delivery date to the value of a basis point (\$25) on a Treasury bill futures contract. In general for nondelivery date circumstances, the value of a bias point ( $V$ ) can be determined from:

$$V = \text{Par}(.001)(d / 360)$$

when  $d$  equals the number of days until maturity. The one-to-one hedge ratio assumed earlier was obtained by dividing a basis point value of \$25.28 for the cash Treasury bill by \$25; but this ration clearly exceeds unity for Treasury bills with maturity beyond three months. Suppose, for example, that the objective is to hedge the overnight exposure of the same deliverable Treasury bill rather than the exposure until the futures expiration. Implicitly, the goal is to equate changes

in cash and futures values on a daily basis. To achieve this end, the hedge ratio should reflect the next day's maturity. Hedging interest rate risk in the previous example now requires calculating the revised value of a basis point as the original Treasury bill changes from a 174-day to a 173-day instrument. In this case, the value of a basis point for the cash bill equals \$48.06 and the appropriate hedge ratio becomes 1.92 futures contracts per \$1 million of par value bills.

As structured, the hedge ratio necessarily decreases as time passes until it reaches unity delivery. So a trader who wants to hedge changes in value on daily basis must rebalance the hedge continuously. Toevs and Jacob (1986) essentially make this point by distinguishing between "strong form" and "weak form" other than delivery day uses a different hedge ratio determined by the targeted value date.



## **1.5 Statement of Problem**

Many companies listed on the KLSE lack of the risk management practice, thus exposing these companies vulnerable to various risk namely interest rates risks, currency risks, liquidity risks, business risks, commodity risks, market risks, credit risks and operational risks.

The onset of the Asian Financial Crisis in 1997-1998 spared no mercy to these companies that lack of appropriate risk management practice. Stock prices on the KLSE slumped to all time low to 262 points on September 1<sup>st</sup> 1998. Many companies even resorted to allow them to rehabilitate their debt and restructure their organization. It is imperative that management of these companies look into shareholders' interest by protecting their wealth.

Could Malaysian companies could actually weathered through this storm should they have been more careful in their approach? Should complacency be blamed or lack of risk management experience was the culprit? Or could it be the combination of both? Whatever it is, what's matter most is how to salvage the whole situation and measures to be taken in immediately and near future to prevent such occurrence. In the next section, we'll discuss about the objective of this study to provide insights of risk management.

## **1.6 Objective of Study**

Generally, there two major objectives of this study. As the Asian Financial Crisis has resulted many companies running into huge losses or mountains of debts, the first objective of

the study is to identify risks and examine the vulnerability and the impact of companies exposed to these risks. To determine the vulnerability and the impact of companies exposed to various risks, we look into their book and bottomlines as compared to previous years or to their peers within the same sector in the country or against foreign countries.

Secondly, the study identify necessary measures to be taken to manage risk effectively. Various forms of risk management to be taken include risk transfer, risk control, risk avoidance, risk reduction, risk financing, risk retention and risk sharing.

### **1.7 Significant of Study**

The 1997-1998 Asian Financial Crisis was actually a tsunami that swept away many weak companies, bringing them down to knees. Perhaps, without this crisis, would these companies currently in trouble able to continue to grow and expand?

This seems unlikely. Companies that are lack of risk management practice are actually a "time-bomb" waiting to be detonated. Excessive borrowings, huge foreign currency exposure, aggressive expansion and commodity fluctuations yet lack of risk management technique such as hedging and diversification actually almost buried these companies. It is therefore hopefully this study will provide a clearer picture and better understanding of the importance of risk management. With this understandings, more comprehensive risk management techniques could be employed to safeguard the profitability of companies and their shareholders' wealth.

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