

Foundations of Risk Management

FRM一级培训项目-基础班

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- 2. Corporate Risk Management: A Primer
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Topic Weightings in FRM Part I

Session NO.	Content	Weightings
Study Session 1	Foundations of Risk Management	20
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Risk Management: A Helicopter View



Framework

- 1. The Concept of Risk
- 2. The Risk Management Process
- 3. Challenges in Risk Management
- 4. Measuring and Managing Risk
- 5. Expected and Unexpected Loss
- 6. Risk and Reward
- 7. Challenges in Considering Risk and Reward
- 8. Risk Classes





The Concept of Risk

- ➤ Risk is not synonymous with the size of a cost or of a loss. The risk lies in how <u>variable</u> our costs and revenues really are.
- Risk management and risk taking aren't opposites, but two sides of the same coin.
 - Risk management is really about how firms actively select the type and level of risk that it is appropriate for them to assume.
 - The risk-taking framework also helps in assessing how independent the risk management function should be.





The Risk Management Process

- > Identify risk exposures: find instruments and facilities to shift or trade risks.
- Measure and estimate risk exposures
- Assess effects of exposures
- Form a risk mitigation strategy:
 - Avoid
 - Transfer
 - Mitigate
 - Keep
- > Evaluate performance





The Challenge In Risk Management

- Fail to prevent market disruptions or accounting scandals.
- > Derivative markets make it easier to take on large amount of risk and increase market volatility.
- Sophisticated financial engineering lead to the violent implosion of firms as a counterparty.
- Work to the short-term benefit of one group of stakeholders while destroying long-term value for another group.





Measuring and Managing Risk

- ➤ VaR, is a statistical measure that defines a particular level of loss in terms of its chances of occurrence.
- For example, we might say that our options position has a one-day VaR of \$1 million at the 99% confidence level, meaning that our risk analysis shows that there is only a 1 percent probability of a loss that is greater than \$1 million on any given trading day.
- Economic capital is the amount of risk capital, assessed on a realistic basis, which a firm requires to cover the risks that it is running or collecting as a going concern, such as market risk, credit risk, legal risk, and operational risk.





Measuring and Managing Risk

- Scenario analysis: the firm will need to examine how a change in a given macroeconomic factor (e.g. unemployment rate) leads to a change in a given risk factor (e.g. the p robability o f default o f a corporation).
- Worst-case scenario analysis considers the most severe possible outcome that can reasonably be projected to occur in a given situation.
- > Stress testing is a form of deliberately intense or thorough testing used to determine the stability of a given system or entity.





Expected and Unexpected Loss

- **Expected loss** is generally viewed as one of the costs of doing business, and ideally it is <u>priced into</u> the products and services offered to the customer.
- ➤ **Unexpected loss** is the loss that cannot be predicted. So in the risk management, learning to control unexpected loss is more important.





Risk and Reward

- ➤ A **trade-off** is a situation that involves losing one quality, aspect or amount of something in return for gaining another quality, aspect or amount.
- The financial risk that arises from **uncertainty** can be managed. Indeed, much of what distinguishes modern economies from those of the past is the new ability to identify risk, to measure it, to appreciate its consequences, and then to take action accordingly, such as transferring or mitigating the risk.





Challenges in Considering Risk and Reward

> Correlation risk—the tendency for things to go wrong together—is a major factor when evaluating the risk of this kind of portfolio.





Risk Classes

- Market risk
- Credit risk
- Liquidity risk
- > Operational risk
- Legal and regulatory risk
- Business risk
- > Strategic risk
- Reputation risk
- Systemic risk





Market risk

- Market risk is the risk that changes in financial market prices and rates will reduce the value of a security or a portfolio.
 - Equity price risk
 - Interest rate risk
 - ✓ Trading risk
 - ◆General market risk (systematic risk)
 - ◆Specific risk (unsystematic risk)
 - ✓ Gap risk (the risk that arises in the balance sheet of an institution)
 - Foreign exchange risk
 - Commodity price risk





Credit risk

- Credit risk is the risk of an economic loss from the failure of a counterparty to fulfill its contractual obligations, or from the increased risk of default during the term of the transaction.
 - Default risk
 - Bankruptcy risk
 - Downgrade risk
 - Settlement risk





Liquidity risk

- Liquidity risk comprises both "funding liquidity risk" and "trading liquidity risk".
 - Funding liquidity risk relates to a firm's ability to raise the necessary cash to roll over its debt.
 - **Trading liquidity** risk, often simply called liquidity risk, is the risk that an institution will not be able to execute a transaction at the prevailing market price because there is, temporarily, no appetite for the deal on the other side of the market.





Operational risk

- Operational risk refers to potential losses resulting from a range of operational weaknesses including inadequate systems, management failure, faulty controls, fraud, and human errors.
 - Human factor risk
 - ✓ Human factor risk is a special form of operational risk. Such
 as pushing the wrong button on a computer.
 - Technology risk
 - ✓ *Technology risk*, principally computer systems risk, also falls into the operational risk category.





Legal and regulatory risk

- Legal and regulatory risk arises for a whole variety of reasons; it is closely related to operational risk as well as to reputation risk.
 - For example, a counterparty might lack the legal or regulatory authority to engage in a risky transaction
- Another aspect of regulatory risk is the potential impact of a change in tax law on the market value of a position.
 - For example, when the British government changed the tax code to remove a particular tax benefit during the summer of 1997, one major investment bank suffered huge losses.





Business risk

➤ Business risk refers to the classic risks of the world of business, such as <u>uncertainty about the demand for products</u>, or the price that can be charged for those products, or the cost of producing and delivering products.





Strategic risk

- > Strategic risk refers to the risk of significant investments for which there is a high uncertainty about success and profitability.
 - If the venture is not successful, then the firm will usually suffer a major write-off and its reputation among investors will be damaged.





Reputation risk

- From a risk management perspective, reputation risk can be divided into two main classes: the belief that an enterprise can and will fulfill its promises to counterparties and creditors.
 - The importance of the first form of reputation risk is apparent throughout the history of <u>banking</u> and was a dramatic feature of <u>the 2007-2009 crisis</u>.
 - The second main form of reputation risk, for fair dealing, is also vitally important and took on a new dimension around the turn of the millennium following accounting scandals that defrauded the shareholders, bondholders, and employees, of many major corporations during the late 1990s boom in the equity markets.





Systemic risk

Systemic risk, in financial terms, concerns the potential for the failure of one institution to create a chain reaction or domino effect on other institutions and consequently threaten the stability of financial markets and even the global economy.

Flight to quality

✓ Simply the perception of increased risk may lead to panic about the soundness of an institution, or to a more general "flight to quality" away from risky assets and toward assets perceived to be less risky.

Panicked margin call requests

✓ As a consequence, borrowers may have to sell some of their assets at fire-sale prices, pushing prices further down, and creating further rounds of margin calls and forced sales.



Corporate Risk Management: A Primer



Framework

- Disadvantages of Hedging Risk Exposures
- 2. Advantages of Hedging Risk Exposures
- 3. The Role of the Board of Directors
- 4. The Process of Mapping Risks
- Hedging Operational and Financial Risks
- 6. Risk Management Instruments





♠ The M&M theory

- Franco Modigliani and Merton Miller (M&M), laid out in 1958:
 - the value of a firm cannot be changed merely by means of financial transactions.
 - Whatever the firm can accomplish in the financial markets, the individual investor in the firm can also accomplish or unwind on the same terms and conditions.
- > The M&M analysis is based on an important assumption:
 - The capital markets are perfect, in the sense that they are taken to be highly competitive and that participants are not subject to transaction costs, commissions, contracting and information costs, or taxes.





Disadvantages of Hedging Risk Exposures

- Using hedging tools cannot increase the value of the firm. Self-insurance is a more efficient strategy.
- Active hedge may distract management from its core business.
- A careless risk management strategy can drag a firm down even more quickly than the underlying risk.
- Risk management strategy has compliance cost, including disclosure.
- ➤ Hedging could increase the firm's earnings variability due to the gap between accounting earnings and economic cash flows.





Advantages of Hedging Risk Exposures

- > By employing risk management tools, management can better achieve the board's objectives.
- ➤ Hedging reduces the cost of capital and enhances the ability to finance growth.
- ➤ Hedging increases the debt capacity of companies(By increasing interest tax deductions).
- A firm can stabilize its cost through hedging(eg. A competitive advantage.)
- Purchasing insurance is expensive.





Considerations in Risk Management

- A corporation should not engage in risk management before deciding clearly on its objectives in terms of risk and return. Without clear goals, determined and accepted by the board of directors, management is likely to engage in inconsistent, costly activities to hedge an arbitrary set of risks. Some of these goals will be **specific to the firm**, but others represent important general issues.
 - The first step is to determine the "risk appetite" of the firm as the board defines it. Risk appetites can be expressed in a number of ways, including quantitative and qualitative statements.
 - After the objectives have been set and the general nature of the risks to be managed is decided upon, it is essential to map the relevant risks and to estimate their current and future magnitudes.





► The Role of the Board of Directors

- Boards face a key dilemma when setting the risk appetite for a firm, they should
 - Direct management to mitigate or insure against extreme losses.
 - Accept projects with positive risk-adjusted NPV
 - Balance the benefit of both debt-holders and shareholders.
 - Consider which risk to hedge, and which risk to assume.
 - Declare whether the aim is to hedge accounting profits or economic profits, and short-term profits or long-term profits.
 - Decided whether to smooth out the ups and downs of accounting profits.
 - Make clear the time horizon for any of the risk management objectives set for management.
 - Make clear risk limits to allow management to be exposed to the risk within the zone, but to disallow risk exposure beyond those limits.





The Process of Mapping Risks

- Map the specific risks likely to arise from some risk factor(such as exchange rate fluctuation).
- Make a record of all assets and liabilities with values that are sensitive to that risk factor.
- ➤ All expected expenses over the coming year that are concerned with that risk factor should be traced.
- > The timing of cash inflows and outflows for that risk factor can then be matched.
- Prepare a list of risk: each risk on the list should be characterised in terms of its potential damage and the probability of its occurrence.





Hedging Operational and Financial Risks

- Firms should risk-manage their operations.
 - Companies should concentrate on business areas in which they have comparative advantages and avoid areas where they cannot add value.
 - Reducing risk in the production process and in selling activities is advisable.
- Firms may also hedge their assets and liabilities, so long as they disclose their hedging policy.
 - When the market is not perfect, it may have a tax advantage, benefit from economies of scale, or have access to better information about a market than investors.





Risk Management Instruments

- ➤ Identify instruments that can be used to risk-manage the exposure. Some of the instruments can be naturally hedged.
- Compare competing ways to manage the risks: transferable?
 Insurable? Not insurable? Self-insure?
- Many large companies opt to self-insure their property.
- ➤ Hedge with OTC instruments or exchange-trade instruments?



Corporate Governance and Risk Management



Framework

- 1. Corporate Governance
- 2. Risk Governance





Corporate Governance

> The board's responsibility:

- Look after the interests of shareholders.
- Be sensitive to the concerns of other stakeholders.
- Alert for any conflict between the interests of management and the company's long-term stakeholders.
- Separate the role of the CEO and the chairman of the board.

> CRO's responsibility:

- Act as a senior member of the management committee and attend board meetings regularity.
- Have a direct reporting line to the board or its risk committees in addition to reporting to the executive team.





> Risk appetite

- The board characterize a risk appetite for the firm.
- The risk appetite should clearly be connected to its overall business strategy and capital plan.
- Clear communication throughout the firm of the firm's risk appetite and risk position.

Four basic choices in risk management

- Avoid risk
- Transfer risk
- Mitigate risk
- Accept risk





> Risk advisory director

- Specialist risk advisory director is a member of the board who specialized in risk matters.
- Work to improve the overall efficiency and effectiveness of the senior risk committee and the audit committee.
- Provide the independent commentary on executive risk reporting.
- Meet regularly with key members of management.
- Observe the conduct of business.





> Risk management committee

- The risk management committee helps to translate the overall risk appetite of the bank into a set of limits.
- Independently review the identification, and controlling of credit, market, and liquidity risks.
- Report back to the board on a variety of items, such as all loans and credits over a specified dollar limit.
- Senior risk committee oversee risk management practices and detailed reporting.
- Junior risk committees look after specific types of risk and often report to this senior risk committee.





Audit committee of the board

- The audit committee's duties involve checking for infringements, overseeing the quality of the processes that underpin financial reporting, regulatory compliance, internal controls, and risk managements.
- But it only confines to verification function.
- Audit committee members are required to be financially literate.
- The audit committee needs to establish an appropriate interaction with management.







Framework

- 1. ERM Definitions
- 2. ERM Benefits and Costs
- 3. The Chief Risk Officer
- 4. ERM Framework Components



ERM Definitions

- COSO(Committee of Sponsoring Organizations of the Treadway Commission)
 - ERM is a process, effected by an entity's board of directors, management, and other personnel, applied in strategy setting and across the enterprise, designed to identify potential events that may affect the entity, and manage risk to be within its appetite, to provide reasonable assurance regarding the achievement of entity objectives.
- International Organization of Standardization(ISO 31000)
 - Risk is the "effect of uncertainty on objectives" and risk management refers to "coordinated activities to direct and control an organization with regard to risk.





ERM Benefits

ERM is all about integration, in three ways:

- First, enterprise risk management requires an integrated risk organization.
- Second, enterprise risk management requires the integration of risk transfer strategies.
- Third, enterprise risk management requires the integration of risk management into the business processes of a company.

Three benefits to ERM:

- Increased organizational effectiveness
- Better risk reporting
- Improved business performance.





The Chief Risk Officer

> A CRO is responsible for:

- Providing the overall leadership, vision, and direction for enterprise risk management;
- Establishing an integrated risk management framework for all aspects of risks across the organization;
- Developing risk management policies, including the quantification of the firm's risk appetite through specific risk limits;
- Implementing a set of risk indicators and reports, including losses and incidents, key risk exposures, and early warning indicators;





The Chief Risk Officer

- Allocating economic capital to business activities based on risk, and optimizing the company's risk portfolio through business activities and risk transfer strategies;
- Communicating the company's risk profile to key stakeholders such as the board of directors, regulators, stock analysts, rating agencies, and business partners;
- Developing the analytical, systems, and data management capabilities to support the risk management program.





ERM Framework Components

- Corporate governance to ensure that the board of directors and management have established the appropriate organizational processes and corporate controls to measure and manage risk across the company.
- Line management to integrate risk management into the revenuegenerating activities of the company (including business development, product and relationship management, pricing, and so on).
- ➤ **Portfolio management** to aggregate risk exposures, incorporate diversification effects, and monitor risk concentrations against established risk limits.





ERM Framework Components

- ➤ **Risk transfer** to mitigate risk exposures that are deemed too high, or are more cost-effective to transfer out to a third party than to hold in the company's risk portfolio.
- ➤ **Risk analytics** to provide the risk measurement, analysis, and reporting tools to quantify the company's risk exposures as well as track external drivers.
- > Data and technology resources to support the analytics and reporting processes.
- > Stakeholder management to communicate and report the company's risk information to its key stakeholders.



Risk-Taking in

Banks



Framework

- 1. Introduction
- 2. How does Risk Management Add Value?
- 3. Determining a Bank's Risk Appetite
- 4. Governance and Risk Taking
- The Organization of Risk Management
- 6. Using VaR to Target Risk
- 7. The Limits of Risk Measurement
- 8. Incentives, Culture, and Risk Management





Introduction

- > Good risks: banks take risks that have a positive expected payoff or reward.
- Bad risks: can be expected to destroy value.
- For risk-taking to maximize shareholder wealth, a bank has to have the right risk management, but also the right governance, the right incentives, and the right culture.
- Banks cannot succeed without taking risks that are expected to have a profitable outcome.





- ➤ **Merton Miller:** the value of companies would not be affected by corporate efforts to manage financial risks.
- But in the real world:
 - Having taxes and transactions costs;
 - Bad outcomes can lead to financial distress;
 - Companies may lose the ability to carry out their strategies;
 - Difficult to conduct businesses;
 - The value of a company's equity is reduced.
- ➤ **Risk management:** reduce the distress costs, and increase the value of the firm.





- ➤ The goal of risk management for banks is not to eliminate or minimize risk, but rather to determine the optimal level of risk the level that maximizes bank value subject to the constraints imposed by regulators, laws, and regulations.
- A bank should take any project that is expected to earn more than its cost of capital, while taking into account the costs associated with the impact of the project on the bank's total risk.
- Decisions to take on new projects and associated risks cannot be evaluated in isolation; they must be assessed in terms of their impact on the overall risk of the bank.





> Example

- Selling deep-out-of-the-money puts: For the bank's shareholders, such a trading strategy is clearly a negative NPV project as a stand-alone project since the bank is selling an asset for less than it is worth.
- Writing puts that traders believe to be overvalued: the trading strategy would be a positive-NPV project on a standalone basis, and so a "good risk". But whether taking such a risk adds value for the bank as a whole depends on its effect on the overall risk position of the bank.





- In evaluating the case for taking on the good risks, a bank's risk managers must try to ensure that the expected gains outweigh the costs associated with the expected increase in the bank's overall risk.
- Major challenge for risk management in banks: When risk-taking is decentralized, tradeoff between a project's contribution to the bank's risk and its expected return can not be made in real time.
 - Countermeasure: traders and their supervisors focus on individual risks separately while at the same time giving the bank's management the means to manage the bank's overall risk.





- > Two different ways that risk management can destroy value for a bank.
 - It can fail to ensure that the bank has the right amount of risk.
 - Failing to exercise the right amount of flexibility.
 - <u>Too restrictive</u>: traders could not exploit mispricing and create value for their banks.
 - <u>Too inflexible</u>: risk managers come to be viewed within the institution as "policemen" rather than partners in creating value.
- ➤ It is critical to strike the balance between helping the firm take risks efficiently and ensuring that employees don't take risks that destroy value.





- ➤ Banks that operate with too much risk cannot conduct their business even if regulators allow them to do so because they find it hard to fund themselves.
 - The market's perception that a bank has too much risk can reduce its value by limiting its ability to attract such deposits.
 - If the bank is in the derivatives business, counterparties will be reluctant to deal with it if it is too risky.
 - Difficult to hire potential employees.





- For risk to affect the value of a bank to its shareholders, it must affect either the bank's expected future cash flows or the discount rate.
- An unexpected downturn in a bank's cash flow could lead to its financial distress in the future and reduce the value of the bank today.
- ➤ By targeting a certain credit rating, a bank's management is also targeting a specific probability of default and the bank's desired level of risk.
- ➤ Banks with very different strategies, or liability and asset structures, could well end up having very different credit ratings, and different attitudes toward risk.





- The size and importance of financial distress costs and hence a bank's optimal credit rating will depend on a bank's business model and investment opportunities.
 - Most banks that expect to add value mainly through "traditional" activities such as deposit will choose to maintain a low-risk profile.
 - By contrast, banks and other financial institutions with less reliance on deposit-gathering activities are likely to see more value in targeting a less restrictive credit posture.





> Taking Social Costs into Account

- The critical difference between banks and less regulated industrial companies is the potential for bank failures to have system-wide effects.
- The activities of banks that aim to maximize value for their shareholders could end up generating an amount of systemic risk that is excessive from the perspective of society.





- ➤ Because of the role of banks in the economy and the consequences of bank failures, regulators impose restrictions on banks' ability to take risks and require banks to satisfy minimal capital requirements.
- > Therefore, banks choose their level of risk subject to external constraints.
- However, there is still an optimal level of risk for a bank.
- ➤ Because the optimal level of risk differs across banks, the costs to shareholders of constraints imposed by regulators are not equal across banks.





Governance and Risk Taking

- ➤ Bank shareholders expect bank managers to aim to maximize shareholder wealth, and hence a well-governed bank should have mechanisms in place that encourage bank managers to make value-maximizing tradeoffs between risk and reward, all while operating within the constraints imposed by regulation.
- Management could do a poor job of managing the firm's risk that is not in the interest of the shareholders.
- The board has to ensure that the firm has a risk management organization so that the actual level of risk taken is consistent with the firm's stated risk appetite.
- Risk audits could be valuable tools in helping boards reach the proper level of comfort that management is managing a bank's risk properly.





Governance and Risk Taking

- ➤ Because the optimal amount of risk from the perspective of the shareholders need not be the optimal amount for society, better governance does not necessarily mean less risk.
- ➤ Better governance meant taking risks that were expected to be rewarding for shareholders, given that bank managers and their shareholders generally viewed the possibility of a crisis as an exceedingly low-probability event.





The Organization of Risk Management

- Real-world banks cannot control risk for three reasons:
 - Limitations of risk measurement technology
 - ✓ Real-time risk measures do not exist for banks as a whole.
 - ✓ Risk measurement can be highly imprecise.
 - ✓ Risk measurement can be affected by behavioral biases.
 - Limitations of hedging
 - ✓ Some risks cannot be hedged, and hedges may not work out as planned.
 - Limitations of control resulting from incentives
 - ✓ Risk-takers are often rewarded in ways that give them incentives to take risks that are more valuable to themselves than to their organizations.





The Organization of Risk Management

- If a bank's value is relatively insensitive to its overall level of risk, there is little room for risk management to add much value by ensuring that the bank's aggregate risk is at its optimal level.
- ➤ By contrast, in those cases where too much risk-taking results in a sharp drop in a bank's value, a risk management function has the potential to create a lot of value.
- > The risk management function cannot operate completely independently of the businesses.
 - Effective risk managers must continuously monitor risk-taking and be proactive in ensuring that risk limits are enforced.
 - If risk managers come to be viewed as a police, they may not learn of model weaknesses or new risks.





The Organization of Risk Management

- > If the performance of risk managers is partly evaluated by the business lines they monitor,
 - In institutions with weak commitments to manage risk: the business lines may retaliate against uncooperative risk managers
 - In institutions with strong commitments to manage risk: can help in creating incentives for a constructive collaboration between risk managers and business units.





Using VaR to Target Risk

- ➤ To make use of VaR within this risk framework, a bank's management would begin by translating its risk appetite into a targeted probability of experiencing losses that are expected to result in financial distress or in default.
- The bank-wide VaR is a function of the VaRs of these units as well as the correlations among the risks of these units.
- Risk management can target the bank's VaR by setting limits on the VaRs of all the units.





The Limits of Risk Measurement

- There are obvious difficulties in using VaR to measure risk at the firm level:
 - Aggregating VaR measures to obtain a firm-wide risk VaR measure is fraught with problems.
 - VaR does not capture all risks.
 - VaR has substantial model risk.
- For most banks, a firm-wide VaR that is obtained by aggregating market, credit, and operational risks will not reflect all risks. Such an approach often fails to capture some core business risks that are not modeled as part of operational risk.
- Mistakes in correlation estimates could lead a bank to have too little capital.





The Limits of Risk Measurement

Black swans

 The losses corresponding to such a VaR are likely to be caused by such rare events.

Stress testing

 To simulate what the performance of the bank would be if historical crises were to repeat themselves.





Incentives, Culture, and Risk Management

Risk management is not auditing.

- Risk managers must understand the bank's businesses and personnel well enough to know when limit exceedances should be allowed and when a business line should be forced to respect a limit.
- Risk managers also have to determine when limits have to be changed and when it is appropriate for the institution to adjust its risk appetite.
- A risk management organization might make incorrect risk assessment s without having a dialogue with business units.
- If many people in an organization are focused on making sure that the institution takes risks that increase firm value, risk management becomes a resource in making this possible.





Incentives, Culture, and Risk Management

- Risk managers face potential conflicts with managers whose main concern is the profitability of their own units.
- ➤ Hence, for risk management to work well, executives with in the firm must have reasons to care about the firm as a whole.
- It is impossible to set up an incentive plan that is so precisely calibrated that it leads executives to take the right act ions in every situation.
 - Not all risks can be quantified or defined.
 - There is an incentive for employees to take risks that are not quantified and monitored.





Incentives, Culture, and Risk Management

- > Because of the limits of risk management and incentives, the ability of a firm to manage risk properly depends on its corporate culture.
- ➤ Companies in the financial industry differ considerably from nonfinancial firms in the extent to which employees are empowered to make decisions that affect risk.
- Companies where managers are viewed by their employees as trustworthy and ethical are more profitable and have higher valuations.
- Shareholders gain initially from the better governance, but these gains are partly offset over time because of the change in the culture of the firm.



Principles for Effective

Data Aggregation and
Risk Reporting



Framework

- 1. Benefits of Risk Data Aggregation
- 2. Objectives
- Data Architecture and IT Infrastructure
- 4. Risk Data Aggregation Capabilities
- 5. Risk Reporting Practices
- 6. Supervisory Review, Tools and Cooperation
- 7. Implementation Timeline and Transitional Arrangements





Benefits of Risk Data Aggregation

- ➤ Risk data aggregation: defining, gathering and processing risk data according to the bank's risk reporting requirements to enable the bank to measure its performance against its risk tolerance/appetite.
- > Benefits of risk data aggregation
 - Help banks and supervisors anticipate problems ahead.
 - Improve the prospects of finding alternative options to restore financial strength and viability when the firm comes under severe stress.
 - Regulatory authorities should have access to aggregated risk data to resolve issues related to the health and viability of banks.
 - Help bank make strategic decisions, increase efficiency, reduce the chance of loss, and ultimately increase profitability.





Objectives

- The Principles are expected to support a bank's efforts to:
 - Enhance the infrastructure for reporting key information;
 - Improve the decision-making process;
 - Enhance the management of information across legal entities;
 - Reduce the probability and severity of losses resulting from risk management weaknesses;
 - Improve the speed at which information is;
 - Improve the organization's quality of strategic planning and the ability to manage the risk of new products and services.





I. Data Architecture and IT Infrastructure

Principle 1: Governance

 A bank's risk data aggregation capabilities and risk reporting practices should be subject to strong governance arrangements consistent with other principles and guidance established by the <u>Basel Committee</u>.

Principle 2: Data architecture and IT infrastructure

 A bank should design, build and maintain <u>data architecture and IT</u> <u>infrastructure</u> which fully supports its risk data aggregation capabilities and risk reporting practices not only in normal times but also during times of stress or crisis, while still meeting the other Principles.





▶ II. Risk Data Aggregation Capabilities

Principle 3: Accuracy and Integrity

 A bank should be able to generate accurate and reliable risk data to meet normal and stress/crisis reporting accuracy requirements. Data should be <u>aggregated on a largely automated basis</u> so as to minimize the probability of errors.

Principle 4: Completeness

• A bank should be able to capture and aggregate all <u>material risk</u> <u>data</u> across the banking group. Data should be available by business line, legal entity, asset type, industry, region and other groupings, as relevant for the risk in question, that permit identifying and reporting risk exposures, concentrations and emerging risks.





▶ II. Risk Data Aggregation Capabilities

Principle 5: Timeliness

 A bank should be able to generate aggregate and up-to-date risk data in a timely manner. The precise timing will also depend on the bank-specific frequency requirements for risk management reporting, under both normal and stress/crisis situations.

Principle 6: Adaptability

 A bank should be able to generate aggregate risk data to meet a broad range of <u>on-demand</u>, <u>ad hoc risk management reporting</u> <u>requests</u>, including requests during stress/crisis situations, requests due to changing internal needs and requests to meet supervisory queries.





▶ III. Risk Reporting Practices

Principle 7: Accuracy

 Risk management reports should accurately and precisely convey aggregated risk data and reflect risk in an exact manner.
 Reports should be <u>reconciled and validated</u>.

Principle 8: Comprehensiveness

• Risk management reports should cover all material risk areas within the organization. The depth and scope of these reports should be consistent with the size and complexity of the bank's operations and risk profile, as well as the requirements of the recipients.





III. Risk Reporting Practices

Principle 9: Clarity and usefulness

 Risk management reports should communicate information in a clear and concise manner. Reports should be easy to understand yet comprehensive enough to facilitate informed decisionmaking. Reports should include meaningful information tailored to the needs of the recipients.

Principle 10: <u>Frequency</u>

• The board and senior management (or other recipients as appropriate) should set the frequency of risk management report production and distribution. The frequency of reports should be increased during times of stress/crisis.





IV. Supervisory Review, Tools and Cooperation

> Principle 11: Distribution

 Risk management reports should be distributed to the relevant parties while ensuring confidentiality is maintained.

Principle 12: Review

 Supervisors should periodically <u>review and evaluate a bank's compliance</u> with the eleven Principles above.

> Principle 13: Remedial actions and supervisory measures

Supervisors should have and use the appropriate tools and resources to require
effective and timely remedial action by a bank to address deficiencies in its risk data
aggregation capabilities and risk reporting practices.

Principle 14: <u>Home/host cooperation</u>

 Supervisors should cooperate with relevant supervisors in other jurisdictions regarding the supervision and review of the Principles, and the implementation of any remedial action if necessary.





V. Implementation Timeline and Transitional Arrangements

Supervisors expect that a bank's data and IT infrastructures will be enhanced in the coming years to ensure that its risk data aggregation capabilities and risk reporting practices are sufficiently robust and flexible enough to address their potential needs in normal times and particularly during times of stress/crisis.



The Standard Capital Asset Pricing Model



Framework

- Foundation of Quantitative Methods
- 2. Markowitz Portfolio Theory
- 3. Capital Market Line (CML)
- 4. Capital Asset Pricing Model





▶ Foundation of Quantitative Methods

> Expected return / mean

μ

Variance

 σ^2

Standard deviation / volatility / risk

σ

Covariance

Cov

Correlation

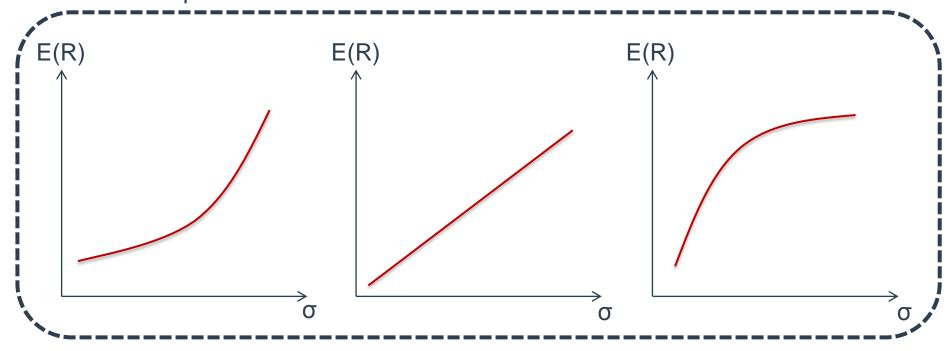
ρ





Markowitz Portfolio Theory

- > A rational person
 - Risk aversion
 - Risk neutral
 - Risk preference







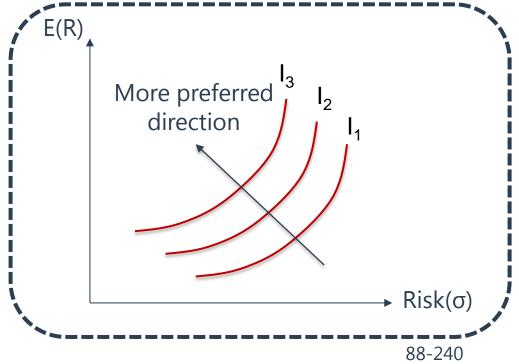
Markowitz Portfolio Theory

Mean Variance Model

• Return: E(R)

• Risk: σ

Risk Aversion





Harry M. Markowitz(1927-) 1990年诺贝尔经济学奖获得者





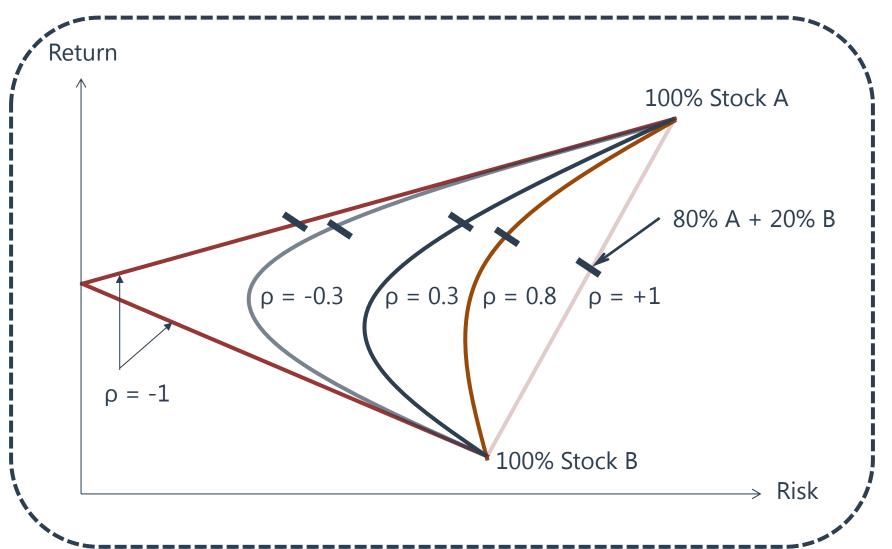
Markowitz Portfolio Theory

- Assumptions about Markowitz Portfolio Theory
 - Regard E(R) as return and σ as risk
 - Risk aversion
 - Utility maximization
 - No transaction cost , no tax.





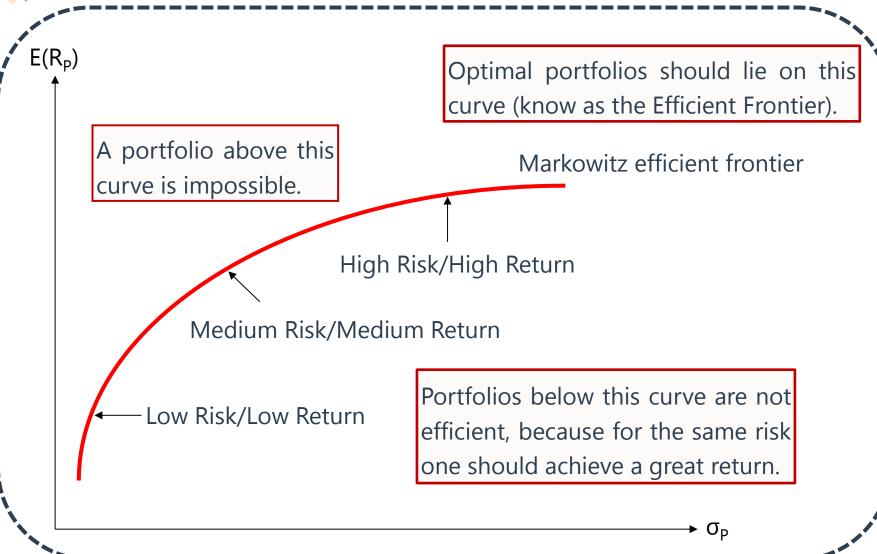
Effects of Correlation on Diversification Benefits







Markowitz Efficient Frontier







Minimum Variance Portfolio

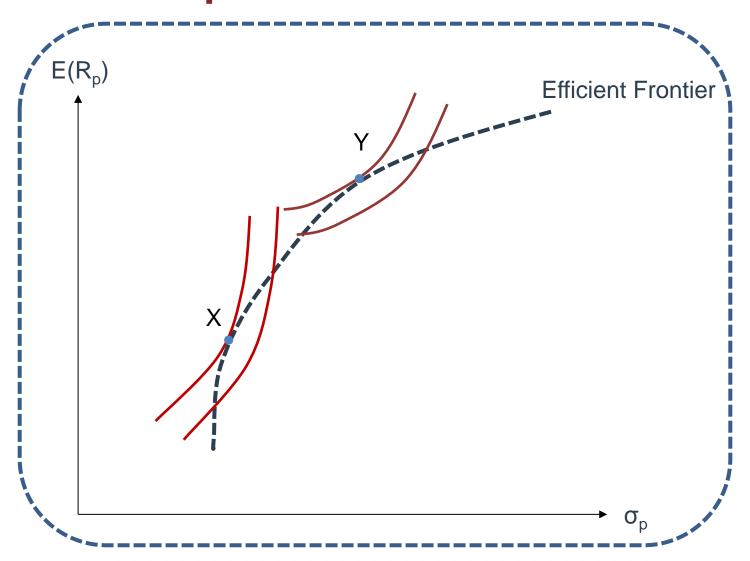
Definition

- The portfolio with the smallest variance among all possible portfolios on a portfolio possibilities curve.
- The shape of the portfolio possibilities curve is best described in two pieces:
 - The portion of the portfolio possibility curve that lies above the minimum variance portfolio is concave.
 - The portion of the portfolio possibility curve that lies below the minimum variance portfolio is convex.





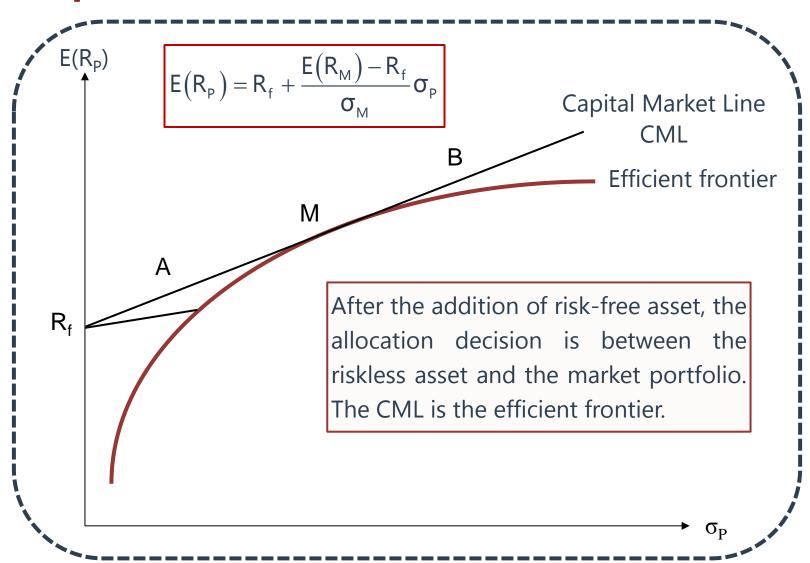
Define an Optimal Portfolio







Capital Market Line (CML)

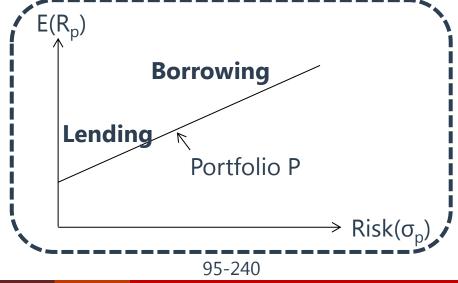






Capital Market Line (CML)

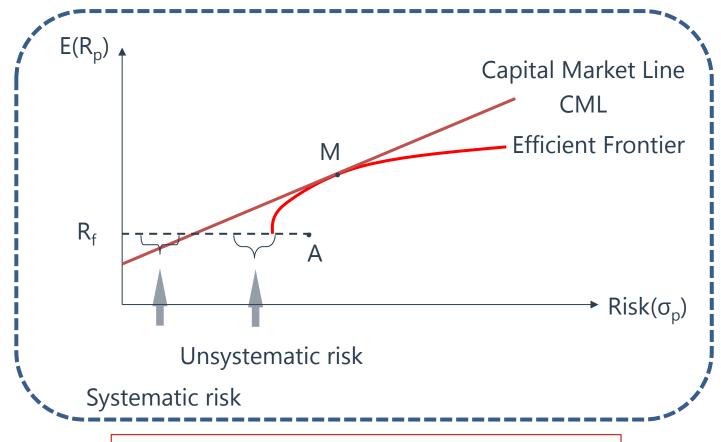
- ➤ The point P, is called the market portfolio. When one can lent or borrow money use riskless rate, investor will hold a combination of the market portfolio and the risk-free asset.
- ➤ Risk-averse investors will sell a portion of market portfolio and deposit the proceed in bank or invest in risk free asset .More risk-tolerant investors will borrow money at risk free rate and invest the proceed in market portfolio.







Systematic and Unsystematic Risk



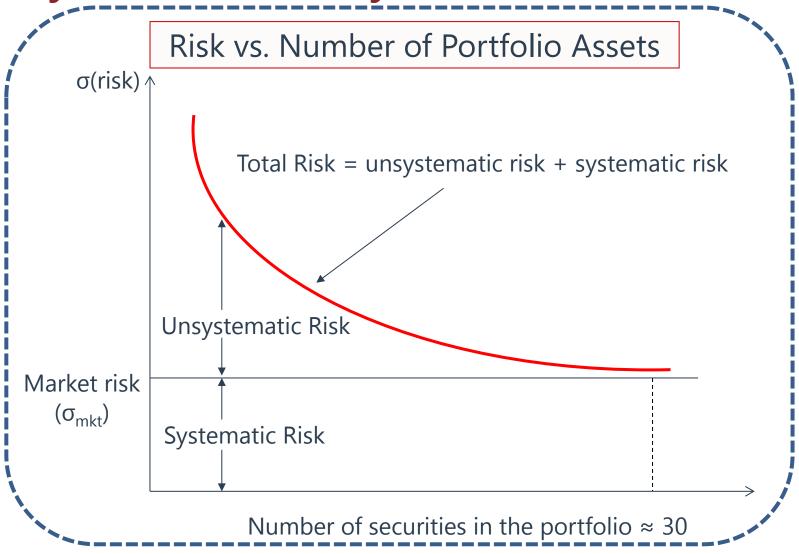
Total risk = systematic risk + unsystematic risk

Systematic risk is the only important ingredient in determining expected returns and that nonsystematic risk plays no role.





Systematic and Unsystematic Risk







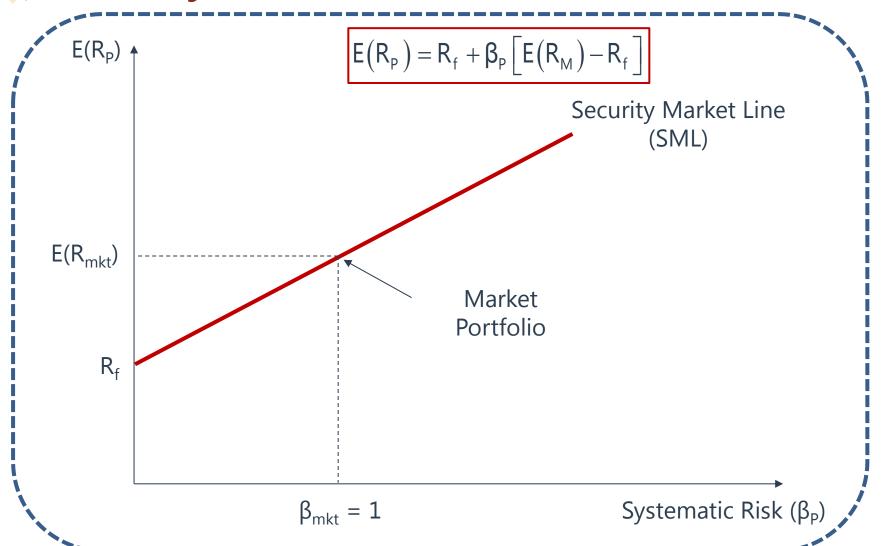
Capital Asset Pricing Model

- > The Assumptions of capital market theory
 - Markowitz investors
 - No transaction costs and taxes
 - Divisible assets
 - perfect competition
 - Unlimited short sales are allowed
 - Unlimited risk-free lending and borrowing
 - Homogeneous expectations
 - All assets are marketable





Security Market Line (SML)







Capital Asset Pricing Model (CAPM)

$$E(R_P) = R_f + \beta_P \left[E(R_M) - R_f \right]$$

$$\beta_{P} = \frac{cov(P,M)}{\sigma_{M}^{2}} = \rho(P,M) \frac{\sigma_{P}}{\sigma_{M}}$$

- E(R_P): expected return on risky asset
- R_f: risk-free rate
- $E(R_M)$ R_f : market portfolio risk premium
- β_P : systematical risk of asset P
- $\beta_P \times [E(R_M) R_f]$: beta-adjusted market risk premium





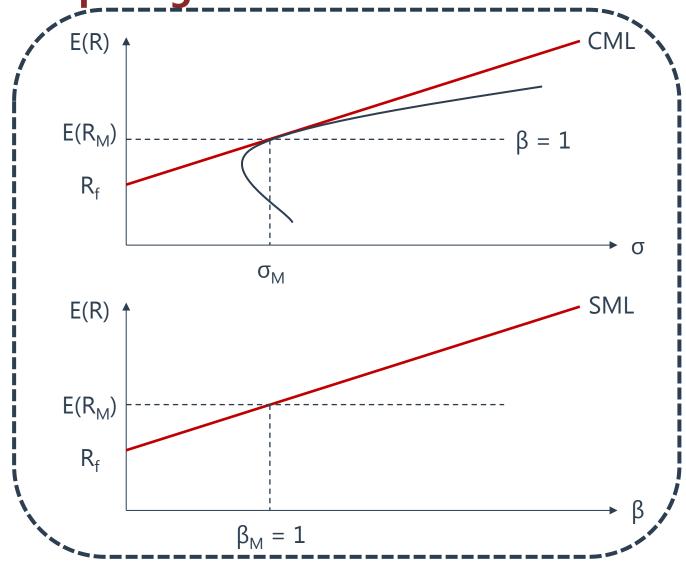
Capital Asset Pricing Model (CAPM)

- The expected return on the market is 15%, the risk-free rate is 8%, and the beta for stock A is 1.2. Compute the rate of return that would be expected (required) on this stock.
 - Answer: $E(R_A) = 0.08 + 1.2 \times (0.15 0.08) = 0.164 = 16.4\%$
 - Note: $\beta_A > 1 \rightarrow E(R_A) > E(R_{mkt})$
- The expected return on the market is 15%, the risk-free rate is 8%, and the beta for stock B is 0.8. Compute the rate of return that would be expected (required) on this stock.
 - Answer: $E(R_B) = 0.08 + 0.8 \times (0.15 0.08) = 0.136 = 13.6\%$
 - Note: $\beta_B < 1 \rightarrow E(R_B) < E(R_{mkt})$





Comparing the CML and the SML









- For a portfolio invested in two risky assets, the higher the correlation of returns between the returns of the risky assets, the:
 - I. Greater the expected return of the portfolio
 - II. Smaller the expected return of the portfolio
 - III. Lower the volatility of portfolio returns.
 - IV. Higher the standard deviation of portfolio returns.
 - A. I and IV
 - B. IV only
 - C. II and III
 - D. III only
- Correct answer : B







- The standard deviation of returns is 0.30 for Stock A and 0.20 for Stock B. The covariance between the returns of A and B is 0.006. The correlation of returns between A and B is:
 - A. 0.10
 - B. 0.20
 - C. 0.30
 - D. 0.40

Correct answer : A







- > Jimmy invests stock A by the CAPM. The information of stock A is as follows:
 - ✓ Expected marker risk premium 9%
 - ✓ Risk-free rate 4%
 - ✓ Historical beta for stock A 1.20

Jimmy holds that historical beta can not reflect appropriate forecasts of future beta, so he uses the following formula to forecast beta:

Forecasted beta = $0.70 + 0.20 \times$ historical beta

After making an examination of market trends and the financial statements, Jimmy forecasts that the return for stock A will be 10%. Jimmy should derive the following required return for stock A along with the following valuation decision (undervalued or overvalued):

	Valuation	CAPM required return
A.	overvalued	8.7%
B.	overvalued	12.46%
C.	undervalued	8.7%
D.	undervalued	12.46%







- Correct answer : B
- > The CAPM equation is: $E(R_P) = R_f + \beta_P [E(R_M) R_f]$

beta forecast =
$$0.70 + 0.20 \times (1.20) = 0.94$$

The CAPM required return is:

Jimmy should decide that the stock is overvalued because she forecasts that the return will equal only 10%. whereas the required return (minimum acceptable return) is 12.46%.







There are two analysts Mike and Bob discussed the use of CML.

Mike thinks that the CML assumes that investors hold two portfolios: 1) the risk-free asset. 2) a risky portfolio ,which is composed of all assets weighted according to their relative market value capitalizations.

Bob holds that the CML is useful in computing the required return for individual portfolio. Are the statements of Mike and Bob correct?

- A. Only Mike's statement is correct.
- B. Only Bob 's statement is correct.
- C. Both statements are correct.
- D. Neither statement is correct.
- Correct answer : A



Applying the CAPM to Performance Measurement



Framework

- 1. Sharpe Ratio
- 2. Treynor Ratio
- 3. Sortino Ratio
- 4. Jensen's Alpha
- 5. Information Ratio
- 6. Risk-Adjusted Performance





Sharpe Ratio

Measures the ratio of the average rate of return $E(R_p)$, in excess of the risk-free rate RF, to the absolute risk $\sigma(R_p)$.

$$SR = \frac{E(R_P) - R_F}{\sigma(R_P)}$$

- Widely used for measuring portfolio performance that are <u>not</u> <u>very diversified</u>.
- A better method for measuring <u>historical performance</u>.
- Suitable for evaluating the performance of a portfolio that represents an individual's total investment.





Treynor Ratio

> Treynor ratio measures the relationship between the return on the portfolio, above the risk-free rate, and its systematic risk.

$$TR = \frac{E(R_P) - R_F}{\beta_P}$$

 More appropriate for comparing <u>well-diversified portfolios</u> and a more <u>forward-looking</u> measure.





Sortino Ratio

- MAR (minimum acceptable return) is the return below which the investor does not wish to drop.
- Sortino ratio measures the ratio of the average rate of return $E(R_p)$, in excess of the risk-free rate R_p , to the semi-standard deviation, which considers only data points that represent a loss.

Sortino Ratio =
$$\frac{E(R_{P}) - MAR}{\sqrt{\frac{1}{T} \sum_{t=0}^{T} (R_{Pt} - MAR)^{2}}} \qquad (R_{Pt} < MAR)$$

- where T is the number of observed losses.
- The Sortino ratio is more relevant than the Sharpe ratio when the return distribution is skewed to the left.





Jensen's Alpha

Jensen's alpha is the asset's <u>excess return</u> over the return predicted by the CAPM.

$$\alpha_{P} = E(R_{P}) - \left\{R_{F} + \beta_{P} \left[E(R_{M}) - R_{F}\right]\right\}$$

 Most appropriate for comparing portfolios that have the <u>same</u> beta and can be used to rank portfolios within peer groups.





Information Ratio

> Tracking error is defined by the standard deviation of the difference in return between the portfolio and the benchmark it is replicating.

$$\mathsf{TE} = \sigma(\mathsf{R}_{\mathsf{P}} - \mathsf{R}_{\mathsf{B}})$$

The information ratio measures the ratio of the <u>residual return</u> of the portfolio compared with its <u>residual risk</u> (tracking error).

$$IR = \frac{E(R_P) - E(R_B)}{\sigma(R_P - R_B)} = \frac{\alpha_P}{\sigma(e_P)}$$

 To check that the risk taken by the manager, in deviating from the benchmark, is sufficiently rewarded.





Risk-Adjusted Performance

$$RAP_{P} = \frac{\sigma_{M}}{\sigma_{P}} (R_{P} - R_{F}) + R_{F}$$

- The relationship is drawn directly from the capital market line.
- To obtain a relative measure, one just calculates the difference between the RAP for the fund and the RAP for the benchmark.
- A fund has an annualized performance of -1.72% and a standard deviation of 17.48%. The market portfolio is represented by the Russell 3000 index, the performance of which for the same period is 16.54% with a standard deviation of 11.52%. The risk-free rate is 5.21%.
 - \bullet RAP_P = 11.52/17.48 × (-1.72% 5.21%) + 5.21% = 0.64%
 - Relative RAP = 0.64% 16.54% = -15.90%





Example 1



- Which performance measure is used to measure not very welldiversified portfolios?
 - A. Beta measure
 - B. Jensen alpha
 - C. Sharpe ratio
 - D. Treynor ratio

Correct answer : C





Example 2



➤ Jerry has invested a portfolio, the expected return is 8% and the standard deviation is 12%. With the beta of the portfolio is 0.6. The expected return of the market is 10%. The risk-free rate is 4%. What is the portfolio's alpha

$$C. +0.4\%$$

D.
$$+1.6\%$$

- Correct answer : C
 - The alpha is $8\% [4\% + 0.6 \times (10\% 4\%)] = 0.4\%$



Arbitrage Pricing
Theory and
Multifactor Models
of Risk and Return



Framework

- 1. Single-Factor Model
- 2. Multifactor Model
- 3. Arbitrage Pricing Theory
- 4. Fama-French Three-Factor Model





Single-Factor Model

- ➤ In a single-factor model, uncertainty in asset returns has two sources: a common or macroeconomic factor, and firm-specific events.
- The factor model states that the actual return on firm i will equal its initially expected return plus a (zero expected value) random amount attributable to unanticipated economy-wide events, plus another (zero expected value) random amount attributable to firm-specific events.

$$R_i = E(R_i) + \beta_i F + e_i$$

- F is the deviation of the common factor from its expected value;
- β_i is the sensitivity of firm i to that factor;
- e_i is the firm-specific disturbance;
- E(R_i) is the expected excess return on stock i;
- The nonsystematic components of returns (e_i), are assumed to be uncorrelated among themselves and uncorrelated with the factor F.

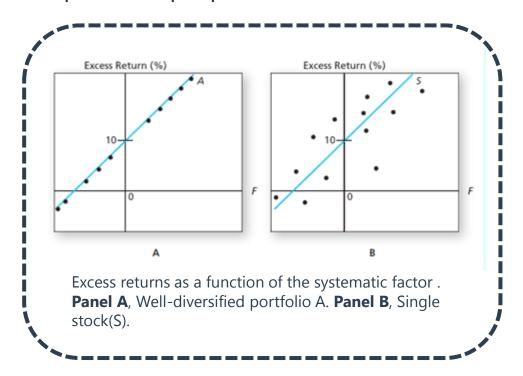




Single-Factor Model

The expected value of ei for any well-diversified portfolio is zero, and its variance also is effectively zero. We conclude that for a well-diversified portfolio, for all practical purposes:

$$R_{i} = E(R_{i}) + \beta_{i}F$$







Multifactor Model

- Models that allow for several factors can provide better descriptions of security returns.
- Multifactor models of security returns can be used to measure and manage exposure to each of many <u>economy-wide factors such as</u> <u>business-cycle risk, interest or inflation rate risk, energy price risk,</u> <u>and so on.</u>
- Factor models are tools that allow us to <u>describe and quantify the</u> <u>different factors that affect the rate of return</u> on a security during any time period.





Multifactor Model

> The equation for multifactor model for stock i

$$R_{i} = E(R_{i}) + \beta_{i,GDP}GDP + \beta_{i,IR}IR + e_{i}$$

- R_i = return on stock i
- $E(R_i)$ = expected excess rate of return for stock i
- $\beta_{i,GDP}$ = GDP factor beta for stock i
- $\beta_{i, IR}$ = interest rate factor beta for stock i
- GDP = deviation of GDP factor from its expected value
- IR = deviation of interest rate factor from its expected value
- \bullet e_i = firm-specific return for stock i





Arbitrage Pricing Theory

Arbitrage pricing theory (APT) is a general theory of asset pricing that holds that the expected return of a financial asset can be modeled as a linear function of various macro-economic factors or theoretical market indices, where sensitivity to changes in each factor is represented by a factor-specific beta coefficient.

Propositions

- Security returns can be described by a factor model.
- There are sufficient securities to diversify away idiosyncratic risk.
- Well-functioning security markets do not allow for the persistence of arbitrage opportunities.





Arbitrage Opportunities

- ➤ The APT assumes there are no market imperfections preventing investors from exploiting arbitrage opportunities.
- Extreme long and short positions are permitted and mispricing will disappear immediately.
- ➤ All arbitrage opportunities would be exploited and eliminated immediately.





Arbitrage, Risk Arbitrage, and Equilibrium

> CAPM's argument

 If a security is mispriced, then investors will tilt their portfolios toward the underpriced and away from the overpriced securities, each by a relatively small dollar amount.

> APT's implication

- A few investors who identify an arbitrage opportunity will mobilize large dollar amounts and quickly restore equilibrium.
- Arbitrageur often refers to a professional searching for mispriced securities in specific areas such as merger-target stocks.





Risk Premiums

- > The risk premiums are derived as follows:
 - Create factor portfolios.
 - ✓ Each factor portfolio is a well-diversified portfolio that has a beta equal to one for a single risk factor, and betas equal to zero on the remaining factors.
 - Derive returns for each factor portfolio.
 - ✓ For instance, define E(Ri) as the expected return on Factor Portfolio i.
 - Calculate risk premiums for each factor portfolio.





Arbitrage Pricing Theory

> Example

- Northeast Airlines has a GDP beta of 1.2 and an interest rate beta of -0.3. Suppose the risk premium for one unit of exposure to GDP risk is 6%, while the risk premium for one unit of exposure to interest rate risk is -7%. If the risk-free rate is 4%, what the total risk premium for Northeast Airlines?
- Explanation

$$E(R) = R_f + GDP \times RP_{GDP} + IR \times RP_{IR}$$
= 4% + 1.2 × 6% + (-0.3) × (-7%)
= 13.3%





Comparison of CAPM and APT

	САРМ	APT
Assumptions	combination of the market portfolio and the risk-free asset. To control risk, less risk averse investors simply hold more of	APT gives no special role to the market portfolio, and is <u>far more</u> <u>flexible</u> than CAPM. Asset returns follow a multifactor process, allowing investors to manage several risk factors, rather than just one.
Conclusions	The risk of the investor's portfolio is determined solely by the resulting portfolio beta.	Investor's unique circumstances may drive the investor to hold portfolios titled away from the market portfolio in order to hedge or speculate on multiple risk factors.





Fama-French Three-Factor Model

> The Fama-French three-factor model incorporates the following systematic factors:

$$R_{i} = \alpha_{i} + \beta_{i,M}R_{Mt} + \beta_{i,SMB}SMB_{t} + \beta_{i,HML}HML_{t} + e_{it}$$

- SMB = Small minus big (the return of a portfolio of small stocks return on a portfolio of large stocks)
- HML = High minus low (the return of a portfolio of stocks with a high book-to-market ratio-return on a portfolio of stocks with a low book-to-market ratio)
- ➤ F&F have observed: firms with high ratios of book-to-market value are more likely to be in financial distress and that small stocks may be more sensitive to changes in business conditions. Thus, these variables may capture sensitivity to risk factors in the macro economy.





Example 1



- ➤ Which of the following assumptions is not the assumptions of the single-factor model?
 - A. Security returns are described by a factor model.
 - B. Idiosyncratic risk is diversified
 - C. Well-diversified portfolio can be formed.
 - D. Arbitrage opportunities exist.

Correct answer : D



Financial Disasters



Framework

- 1. Misleading Reporting Cases
 - Drysdale Securities and Chase Manhattan Bank
 - Kidder Peabody
 - Barings
 - Allied Irish Bank
 - Union Bank of Switzerland
 - Société Générale
- 2. Large Market Movement Cases
 - Metallgesellschaft
 - Long-Term Capital Management
- 3. Customer Conduct Cases
 - Banker's trust
 - JPMorgan, Citigroup, and Enron





Drysdale Securities and Chase Manhattan Bank

Incidence

- During 3 months in 1976, Drysdale Government Securities, obtaining unsecured borrowing of about \$300 million by exploiting a flaw in the market practices for computing the value of U.S. government bond collateral.
- But Drysdale only have \$20 million in capital.
- Drysdale used the borrowed money to take outright positions in bond markets.
- But was <u>unable to repay the borrowed funds</u> because of the decline of the bond value and <u>lost all of the \$300 million</u>, then Drysdale went bankrupt.
- Chase Manhattan absorbed almost all of these losses because they had brokered most of Drysdale's securities borrowings.

Results

• Chase experienced reputational damage and an impact on to their stock price.





Drysdale Securities and Chase Manhattan Bank

Main Reasons

- Chase failed to detect the unauthorized positions: Chase did not believe the firm's capital was a risk.
- The <u>inexperienced managers in Chase</u> were convinced they were simply acting as middlemen.
- They did not correctly interpret borrowing agreements that made Chase take full responsibility for payments due.

Lessons Learned

- Need for more <u>precise methods for computing the value of collateral</u>.
- Need for better process control. The need for a process that forced areas <u>contemplating new product offerings to receive prior approval</u> from representatives of the principal risk control functions within the firm.





Kidder Peabody

> Incidence

- Between 1992 and 1994, Joseph Jett, head of the government bond trading desk, entered into <u>a series of trades that were incorrectly reported in the</u> <u>firm's accounting system, artificially inflating reported profits</u>.
- When this was ultimately corrected in April 1994, \$350 million in previously reported gains had to be reversed.

Results

- The loss of cash was not actual, but the announcement of such a massive misreporting of earnings triggered a <u>substantial loss of confidence in the</u> <u>competence of the firm's management</u> by customers and General Electric, which owned Kidder.
- In October 1994, General Electric, the owner of the Kidder Peabody, sold Kidder to Paine Webber, which dismantled the firm.





Kidder Peabody

Main Reasons

- The computer system used to report government bond trading activity did not account for a forward contract's present value. A trader can get instantly profit by purchasing a bond for cash and delivering the forward contract.
- The system failed to realize that this profit would disappear once financing costs for the cash bond were taken into account.

Lessons to be learned

- Always investigate a stream of large unexpected profits thoroughly and make sure you completely understand the source.
- Periodically review models and systems to see if changes in the way they are being used require changes in simplifying assumptions.





> Incident

- The incident involved the loss of roughly \$1.25 billion due to the unauthorized trading activities during 1993 to 1995 of a single, relatively junior trader named Nick Leeson.
- The size of the losses relative to Baring's capital along with potential additional losses on outstanding trades forced Barings into bankruptcy in February 1995.





Nick Leeson's strategy 1

- Leeson's trading involved two strategies: <u>selling straddles on the</u>
 <u>Nikkei 225</u> and arbitraging price differences on Nikkei 225
 futures contracts that were trading on different exchanges.
- A short straddle involves selling calls and puts.
- A short straddle strategy is profitable when the underlying index remains relatively unchanged over the life of the straddle.
- The calls and puts expire worthless, leaving the option writer with the option premium.





Nick Leeson's strategy 2

- The Nikkei 225 futures arbitrage involves taking a <u>long futures</u> <u>position</u> on one exchange where the price is relatively low and hedging with an offsetting <u>short position</u> on another exchange where the price is relatively higher.
- In order to recover the losses, Leeson abandoned the hedged position in the long-short futures arbitrage strategy and initiated a speculative long-long futures positions on both exchanges in hope of profiting from an increase in the Nikkei 225 which finally led to much more loss.
- The Nikkei 225 plunged because the earthquake in Japan, then the huge losses were created.





> Main Reasons

- Allowing Leeson to function as a head of trading and the back office at an isolated branch.
- Leeson was able to decide the trade strategy as the floor manager.
- Leeson was able to use the back-office influence to hide the losses, and book the profitable trade to the standard trading accounts, while booking the unprofitable trade to the old error account (Account 88888) to escape reporting to senior management.





- > The management failed to inquire how a low-risk trading strategy was supposedly generating such a large profit.
 - The failure can be attributed to the <u>very poor structuring of management information</u> so that different risk control areas could be looking at reports that did not tie together. This made Leeson receive without question \$354 million to meet margin calls from London office.
 - Political power struggles and senior management's lack of understanding about Leeson's role eroded oversight and allowed trading losses to be hidden.
- > Information provided to the credit risk area was not integrated with information provided to funding and showed no such credit extension.





> Lessons to be learned

- Absolute necessity of an independent trading back office.
- The need to make thorough inquiries about unexpected sources of profit (loss) and cash movements.
- The need to establish information, reporting, and control systems.





Allied Irish Bank

> Incident

 John Rusnak, a currency option trader in charge of a very small trading book in AIB's subsidiary, entered into <u>massive</u> <u>unauthorized trades</u> during the period 1997 through 2002, ultimately resulting in \$691 million in losses.

Result

This resulted in a major blow to AIB's reputation and stock price.





Allied Irish Bank

Main Reasons

- Rusnak was able to hide the trading activities from management <u>by</u> <u>creating imaginary trades to offset his real trades, making his trading</u> <u>positions appear small</u>.
- He persuaded back-office personnel not to check these bogus trades.
- He obtained cash to cover his losses by selling deep-in-the-money options, which provided cash up front.
- Rusnak's bullying of operations personnel as part of a general culture of hostility toward control staff.
- AIB's management was so inexperienced that failed to figure out Rusnak's trading activates.
- Rusnak was extremely modest in the amount of false profit he claimed.
- He chose counterparties in the Asian time zone.
- He relied on arguments that costs should be cut be weakening or eliminating key controls.





Allied Irish Bank

Lessons to be learned

- This case is similar to Barings. But Rusnak had no dual role.
- Avoid engaging in small ventures in which the firm lacks any depth of expertise.
- Risk management architecture is crucial.
- Relationship between parent and overseas units needs to be clarified.
- Strong and enforceable back-office controls are essential.





Union Bank of Switzerland

> Incident

- In 1997, UBS lost \$400 \$700 million in equity derivatives.
- In 1998, UBS lost \$700 million due to a large position in Long Term Capital Management (LTCM).
- The 1997 losses force UBS into a merger on unfavorable terms with Swiss Bank Corp, and the 1998 losses occurred after the merger.





Union Bank of Switzerland

Main Reasons

- Less is known about this disaster than the others.
- The equity derivatives business was run without the degree of management oversight that would normally be expected in a firm of the size and sophistication of UBS.
- The senior risk manager authority for the department doubled as the head of quantitative analytics.
- He was contributed to business decisions for which he had review responsibility and his compensation was tied to trading results.





Union Bank of Switzerland

- ➤ The 1997 equity derivatives losses appear to have been due to the following four factors:
 - A change in British tax laws, which impacted the value of some long-dated stock options.
 - A large position in Japanese bank warrants, that was inadequately hedged.
 - An overly aggressive valuation of long-dated options on equity baskets that utilized atypical correlation assumptions.
 - Losses on other long-dated basked options, perhaps due to model risk.





> Incident

 In January 2008, Société Générale reported trading losses of \$7.1 billion that the firm attributed to unauthorized activity by a junior trader, Jerome Kerviel.

> Result

 The large loss severely damaged Société Générale reputation and required it to raise a large amount of new capital.





Jérôme Kerviel's strategy

- Kerviel took very <u>large unauthorized positions</u> in equities and exchange-traded futures. His <u>primary method for concealing these unauthorized positions was to</u> <u>enter fictitious transactions that offset the risk and P&L of his true trades</u>.
- The fictitious nature of these transactions was hidden mostly by creating transactions with forward start dates and then, relying on his knowledge of when control personnel would seek confirmation of a forward-dated trade, canceling the trade prior to the date that confirmation would be sought (Kerviel had previously worked in the middle office of the firm, which may have provided him with particular insight into the actions of control personnel).
- Not surprisingly, given his need to constantly replace canceled fictitious transactions with new ones, there were a large number of these trades, 947 transactions.





Main Reasons

- The incorrect handling of trade cancellations.
- Until his immediate manager was replaced in two and a half month, Kerviel's positions were validated.
- The inaction of Kerviel's trading assistant to report fraudulent activity.
- The violation of the bank's vacation policy.
- There were no limits or other monitoring of Kerviel's gross positions, only his net positions.
- Kerviel's unusually high amount of brokerage commissions, related to his high level of gross positions, could also have provided a warning sign.
- The weak reporting system for collateral and cash accounts.
- Kerviel was reporting trading gains in excess of levels his authorized position taking could have accounted for, but an investigation into unexpected reported trading gains was lacked.





Lessons to be learned

- Trade Cancellation: Institute systems for monitoring patterns of trade cancellation. Flag any trader who appears to be using an unusually high number of such cancellations.
- Supervision: Control personnel should be aware of situations in which traders are being supervised by temporary or new managers. Tightened control procedures should be employed.
- Trading Assistant: Control personnel must remember that even in situations where there is no suspicion of dishonesty, trading assistants are often under intense pressure from the traders with whom they work closely.





Lessons to be learned

- Vacation Policy: Rules for mandatory time away from work should be enforced.
- Cash and Collateral: Cash and collateral requirements should be monitored down to the individual trader level. Better monitoring of cash and credit flows would have also been instrumental in uncovering the Barings and Allied Irish Bank frauds.
- **P&L**: Any patterns of P&L that are unusual relative to expectations need to be identified and investigated by both management and the control functions.





Incidence

• In 1992, an American subsidiary of MG, Metallgesellachaft Refining and Marketing (MGRM), began a program of entering into longterm contracts to supply customers with gas and oil products at fixed costs and hedge these contracts with short-term gas and oil futures.

Results

• In 1993, when a large decrease in gas and oil prices had resulted in funding needs of around \$900 million, the MG parent responded by closing down the futures positions, leaving unhedged exposure to gas and oil price increases through the customer contracts. Faced with this open exposure, MG negotiated unwinds of these contracts at unfavorable terms.





> The Strategy

- MGRM began a program of entering into long-term contracts to supply customers with gas and oil products at fixed costs and to hedge these contracts with short term gas and oil futures.
- The futures being used to hedge were exchange-traded instruments requiring daily cash settlement. The long-term contracts with customers involved no such cash settlement, which can lead to funding liquidity risk.





The Reasons for the Failure of the Strategy

- The market shifted to contango (futures price > spot price) that exploited the basis risk.
 - ✓ Stack-and-roll hedge exposes to basis risk.
 - ✓ Shift to contango created losses on roll return.
 - ✓ Led to cash flow (liquidity) risks.
- German accounting methods required Metallgesellschaft to show futures losses (from futures) but could not recognize unrealized gains from the forward.
 - ✓ German accounting standards <u>increased the MGRM's perceived credit</u> <u>risk</u> and restricted the company's access to credit, which made the problem worse.
 - ✓ These reported losses triggered margin calls and a panic, which led to credit rating downgrades.





Lessons to be learned

- It is often a key component of a market maker's business strategy to extend available liquidity in a market.
- The uncertainty of roll cost is a key risk for strategies involving shorter-term hedges against longer-term risk.
- A firm running short-term hedges against longer-term risk requires the flexibility to choose the shorter-term hedge that offers the best tradeoff between risk and reward.





Introduction of LTCM

- LTCM, a hedge fund, was founded in early 1994, generated stellar returns in its first few years of operation.
- The partners worked together at Salomon Brothers and, given their success, decided to start their own fund and proceeded to seek capital from investors. Funding was provided to LTCM despite the secretive nature of its positions.
- The fund was focused on long-term investment strategies. And in the late years of operations, the partners at LTCM invested a large portion of their net worth in the fund since they believed so strongly in the success of their trading strategies.





> The Strategies

- LTCM's investments strategies: <u>relative value</u>, <u>credit spreads</u>, and <u>equity volatility</u>.
 - ✓ <u>Relative value strategies</u> involved arbitraging price differences, among similar securities and profiting when the prices converged.
 - ✓ LTCM noticed that <u>credit spread</u> were historically high, they entered into mortgage spreads and international high-yield bond spreads intending to profit when the spreads shrank to more typical historical levels.
 - ✓ LTCM's <u>equity volatility strategy</u> assumed that volatility on equity options tended to revert to long-term average levels. When volatility implied by equity options was abnormally high, LTCM "sold volatility" until it regressed to normal levels.





> Two major events

- In August of 1998, Russia unexpectedly defaulted on its debt.
 This economic shock caused the yields on developing nations' debt to increase and a flight to the quality of government bonds in industrialized countries.
 - ✓ The flight to quality <u>increased</u>, rather the decreased, <u>credit</u> <u>spreads</u>, causing huge losses for LTCM.
- Brazil devalued its currency, thereby further increasing interest rates and risk premiums.
 - ✓ The general increase in volatility also generated losses in LTCM's equity volatility strategies.





- The Risks faced by LTCM
- The insufficient of equity and cash flow crisis.
 - The large increase in yield spread caused huge losses and severe cash flow problems caused by realizing marked to market losses and meeting margin calls.
 - LTCM lost 44% of its capital in just one month. And the firm's lack of equity created a cash flow crisis and make it necessary to liquidate positions to meet margin calls.





- Model Risk: valuation or trading models are flawed.
 - LTCM's model assumed that historical relationships were useful predictors of future relationships, which is often true in the absence of economic shocks. However, external shocks often cause correlations that are historically low to increase sharply.
 - The models also assumed that low-frequency/high-severity events were uncorrelated over time.
 - One economic shock triggered another so that extremely low probability events were occurring several times per week, and as a result, traditional VaR models underestimated risk in the tails of the distribution.





Market Risk

 LTCM was diversified across the globe, across different asset classes, and across different trading strategies. However, all of its strategies were based on the notion that <u>risk premiums and market volatility would</u> <u>ultimately decline</u>. And the lack of diversification made LTCM subject to the market risk.

> Trading Liquidity Risk

 LTCM considered the possibility of market impact to some extent in its short risk measures, <u>but underestimated the magnitude of its influence</u> on market prices, particularly in the event of forced liquidation.

Limited Reporting Obligation to Regulators

 Although the size of its positions required financial statement reporting and daily position reporting, these reports were incomplete and lacked disclosure of derivative positions and trading strategies.





The Results

• The Federal Reserve Bank of New York orchestrated a bailout in which 14 leading banks and investment houses invested \$3.65 billion for a 90% stake in LTCM.

Lessons to be Learned

- It is essential to require initial margin for counterparties whose principal business is investing and trading.
- To incorporate potential liquidation costs into prices in the event of adverse market condition.
- A push for greater disclosure by counterparties of their trading strategies and positions.
- Better use of stress tests in assessing credit risk.





Banker's Trust

Incident

- Procter & Gamble (P&G) and Gibson Greetings sought the assistance of Banker's Trust (BT) to help them reduce funding costs.
- BT used derivative trades, which promised the two companies <u>a high-probability</u>, small reduction in funding costs in exchange for a low-probability, large loss.
- The derivative structures developed by BT were <u>intentionally complex</u> and prevented P&G and Gibson from fully understanding the trade values and risks that were involved.
- The structures were <u>not comparable to other derivative trades making it</u> <u>impossible to get a competitive quote</u>.
- In 1994, P&G and Gibson finally realized that they had been misled after discovering that they had suffered huge losses. As a result, the two companies sued BT.





Banker's Trust

Lessons to be Learned

- This case demonstrated the importance of <u>matching trades with</u>
 <u>a client's needs</u> and <u>providing price quotes that are independent</u>
 <u>from the front office</u>.
- It also demonstrated the importance of exercising caution with any form of communication that could eventually be made public, as it could damage a firm's reputation if unethical practices are present.





JP Morgan, Citigroup, and Enron

> Incident

- Citigroup and JP Morgan Chase, the largest and second largest US banks respectively, reached an agreement July 28 2003 with the Securities and Exchange Commission (SEC) to pay a combined \$286 million in fines in connection with their involvement in the fraud perpetrated by Enron.
- The SEC charged that the two banks aided defunct energy trading giant Enron in disguising loans as cash in order to defraud investors.





JP Morgan, Citigroup, and Enron

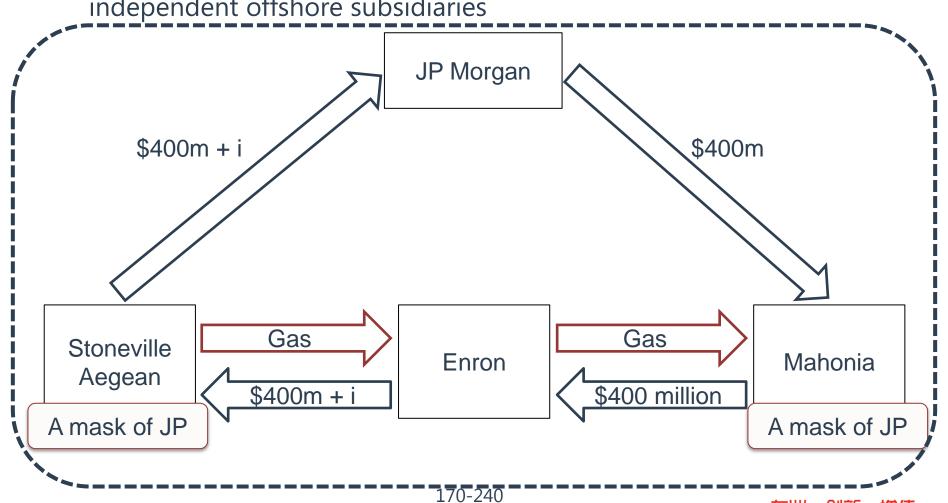
Details, Result and Lesson

- Enron had for years been engaging in <u>dubious accounting practices to hide the</u> size of its borrowings from investors and lenders.
- One of the ploys that Enron had used was to disguise a borrowing as an oil futures contract. Sold oil for future delivery, getting cash, and then agreed to buy back the oil that it delivered for a fixed price. When you canceled out the oil part of the trades, what was left was just an agreement for Enron to pay cash later for cash it had received up front - in practice, a loan.
- When this was finally disclosed, JPMorgan Chase and Citigroup, Enron's principal counterparties on these trades, justified their activities by saying that they hade not harmed Enron and that they had no part in determining how Enron had accounted for the transactions on its books. But both JPMorgan and Citigroup clearly knew what Enron's intent was in entering into the transaction. In the end, they agreed to pay a combined \$286 million for "helping to commit a fraud" on Enron's shareholders.





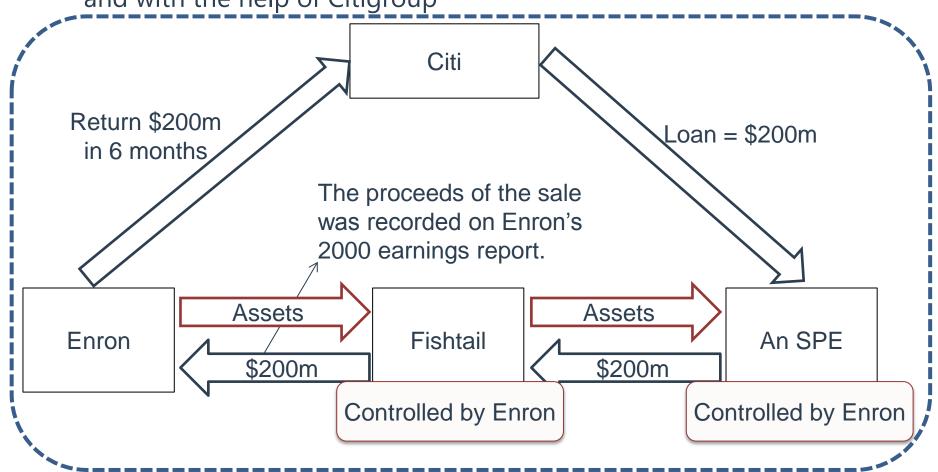
A circular trade between Enron, the banks and their nominally independent offshore subsidiaries







Enron's attempt at manipulating earnings under the structure of SPE and with the help of Citigroup









- A stack-and-roll hedge as described in the Metallgesellschaft case is best described as:
 - A. Buying futures contracts of different expirations and allowing them to expire in sequence.
 - B. Buying futures contracts of different expirations and closing out the position shortly before expiration.
 - C. Using short-term futures to hedge a long-term risk exposure by replacing them with longer-term contracts shortly before they expire.
 - D. Using short-term futures contracts with a larger notional value than the long-term risk they are meant to hedge.
- Correct answer : C







- Past financial disasters have resulted when a firm allows a trader to have dual roles as both the head of trading and the head of the back-office support function. Which of the following case studies did not involve this particular operational risk oversight?
 - I. Drysdale Securities
 - II. Allied Irish Bank
 - III. Barings
 - A. I only
 - B. II and III
 - C. I and II
 - D. I, II, and III
- Correct answer : C







- ➤ Which of the following is a common attribute of the collapse at both Metallgesellschaft and Long-Term Capital Management (LTCM)?
 - A. Cash flow problems caused by large mark to market losses.
 - B. High Leverage.
 - C. Fraud.
 - D. There are no similarities between the causes of the collapse at Metallgesellschaft and LTCM.

Correct answer : A







- ➤ In the case of Barings Bank (Barings), Nick Leeson incurred huge trading losses. Which of the following statements correctly describes one of the factors that led to the bankruptcy of Barings?
 - A. Barings had insufficient liquidity to cover marked to market losses.
 - B. Leeson used a long straddle strategy on the Nikkei 225.
 - C. Leeson held speculative double short positions in the market for Nikkei 225 futures contracts.
 - D. There was ambiguity concerning who was responsible for performing specific oversight functions.
- Correct answer : D



Deciphering the Liquidity and Credit Crunch 2007-2008





The Key Factors The Led To The Housing Bubble

- > The U.S. economy was experiencing a low interest rate environment
 - Large capital inflows from abroad, especially from Asian countries.
 - The Federal Reserve had adopted a lax interest rate policy.

> Decline in lending standards

 The traditional banking model, in which the issuing banks hold loans until they are repaid, was replaced by the "originate and distribute" banking model, in which loans are pooled, tranched, and then resold via securitization.





The Banking Industry Trends Leading

- > The Banking Industry Trends Leading Up To The Liquidity Squeeze
 - Two trends in the banking industry contributed significantly to the lending boom and housing frenzy that laid the foundations for the crisis.
 - ✓ Instead of holding loans on banks' balance sheets, banks moved to an "originate and distribute" model. Banks repackaged loans and passed them on to various other financial investors, thereby offloading risk.
 - ✓ Banks increasingly financed their asset holdings with shorter maturity instruments. This change left banks particularly exposed to a dry-up in funding liquidity.
- > The trigger for the liquidity crisis was an increase in subprime mortgage defaults, which was first noted in February 2007.





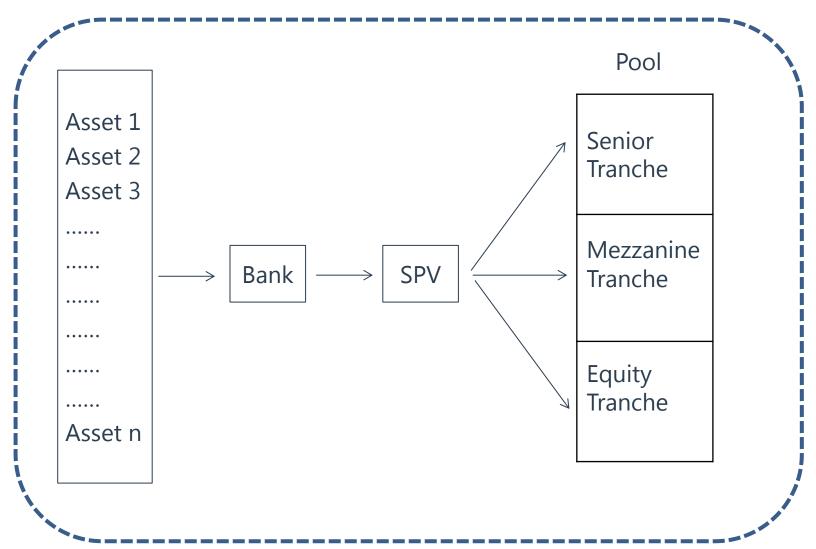
Collateralized Debt Obligations

- > To offload risk, banks typically create "structured" products often referred to as collateralized debt obligations (CDOs).
 - The first step is to form diversified portfolios of mortgages and other types of loans, corporate bonds, and other assets like credit card receivables.
 - The next step is to slice these portfolios into different tranches. These tranches are then sold to investor groups with different appetites for risk.
 - ✓ The safest tranche—known as the "super senior tranche"—offers investors a (relatively) low interest rate, but it is the first to be paid out of the cash flows of the portfolio.
 - ✓ In contrast, the most junior tranche—referred to as the "equity tranche" or "toxic waste"—will be paid only after all other tranches have been paid.
 - ✓ The mezzanine tranches are between these extremes.
 - The final step is to sell the CDOs to the investors.





Collateralized Debt Obligations







Credit Default Swaps

- Buyers of these tranches or regular bonds can also protect themselves by purchasing credit default swaps (CDS), which are contracts insuring against the default of a particular bond or tranche.
 - The buyer of these contracts pays a periodic fixed fee in exchange for a contingent payment in the event of credit default. Estimates of the gross notional amount of outstanding credit default swaps in 2007 range from \$45 trillion to \$62 trillion. One can also directly trade indices that consist of portfolios of credit default swaps, such as the CDX in the United States or iTraxx in Europe.
- Anyone who purchased a AAA-rated tranche of a collateralized debt obligation combined with a credit default swap had reason to believe that the investment had low risk because the probability of the CDS counterparty defaulting was considered to be small.





Securitized and Structured Products

Rise in Popularity of Securitized and Structured Products

- 1 It is clear that one distorting force leading to the popularity of structured investment vehicles was regulatory and **ratings arbitrage**.
- ② Moreover, in retrospect, the statistical models of many professional investors and credit-rating agencies provided **overly optimistic** forecasts.
- ③ Structured products may have received more favorable ratings compared to corporate bonds because rating agencies collected **higher fees** for structured products.
- 4 Originator can offer lower interest because **risks can be transformed to investors.**
- ⑤ Certain institutional investors are attracted because of higher rating securities.





Consequences of Financial Crisis

- > The **trigger for the liquidity crisis** has two reasons:
 - an increase in subprime mortgage defaults, which was first noted in February 2007.
 - Falling housing price, which dues to the burst housing bubbles.
- > The worldwide spread of financial crisis can be explained for three reasons:
 - too much leverage risk which triggers margin calls and fire sales
 - assets and labilities mismatch
 - too interconnected(Bear Stearns)





Funding liquidity and market liquidity

- Funding liquidity describes the ease with which expert investors and arbitrageurs can obtain funding from (possibly less informed) financiers. Funding liquidity is high—and markets are said to be "awash with liquidity"—when it is easy to raise money.
- Funding liquidity risk can take **three forms**:
 - Margin/haircut funding risk, or the risk that margins and haircuts will change;
 - Rollover risk, or the risk that it will be more costly or impossible to roll over short-term borrowing;
 - Redemption risk, or the risk that demand depositors of banks—or even equity holders of hedge funds, for example—withdraw funds. All three incarnations of funding liquidity risk are only detrimental when the assets can be sold only at fire-sale prices—that is, when market liquidity is low.





Funding liquidity and market liquidity

- Market liquidity is low when it is difficult to raise money by selling the assets. In other words, market liquidity is low when selling the asset depresses the sale price and hence it becomes very costly to shrink the balance sheet. Market liquidity is equivalent to the relative ease of finding somebody who takes on the other side of the trade.
- The literature distinguishes between three sub-forms of market liquidity:
 - **The bid–ask spread**, which measures how much traders lose if they sell one unit of an asset and then buy it back right away;
 - Market depth, which shows how many units traders can sell or buy at the current bid or ask price without moving the price;
 - Market resiliency, which tells us how long it will take for prices that have temporarily fallen to bounce back. While a single trader might move the price a bit, large price swings occur when "crowded trades" are unwound—that is, when a number of traders attempt to exit from identical positions in unison.





Loss Spiral and Margin Spiral

- A **loss spiral** arises for leveraged investors because a decline in the value of assets erodes the investors' net worth much faster than their gross worth (because of their leverage) and the amount that they can borrow falls.
- The **margin/haircut spiral** reinforces the loss spiral. As margins or haircuts rise, the investor has to sell even more because the investor needs to reduce its leverage ratio (which was held constant in the loss spiral). Margins and haircuts spike in times of large price drops, leading to a general tightening of lending.





Counterparty credit

Most financial institutions are lenders and borrowers at the same time. Modern financial architecture consists of an interwoven network of financial obligations.





Counterparty credit

> Suppose that **Bear Stearns** had an offsetting swap agreement with a private equity fund, which in turn offset its exposure with Goldman Sachs. In this hypothetical example, all parties are fully hedged and, hence, a multilateral netting arrangement could eliminate all exposures. However, because all parties are aware only of their own contractual agreements, they may not know the full situation and therefore become concerned about **counterparty credit risk**. If the investment banks refuse to let the hedge fund and private equity fund net—that is, cancel out—their offsetting positions, both funds have to either put up additional liquidity, or insure each other against counterparty credit risk by buying credit default swaps.





Counterparty credit

- Network and counterparty credit risk problems are more easily overcome if a clearinghouse or another central authority or regulator knows who owes what to whom.
- > Then, **multilateral netting agreements**, such as the service provided by Swap Clear, can stabilize the system. However, the introduction of structured products that are typically traded over the counter has made the web of obligations in the financial system more opaque, consequently increasing systemic risk.



Getting Up to Speed on the Financial Crisis: A One-Weekend-Reader's Guide





Triggers and Vulnerabilities

- > Triggers and vulnerabilities that led to the financial crisis.
 - Losses on subprime mortgages, after house prices started to decline, were a trigger for the crisis. However, subprime losses were clearly not large enough on their own to account for the magnitude of the crisis.

Shadow banks

✓ Shadow banks are financial entities other than regulated depository institutions (commercial banks, thrifts, and credit unions) that serve as interm ediaries to channel savings into investment.

Bank run

- ✓ The systemic vulnerabilities in large part
- The main vulnerability was short-term debt, mostly **repurchase agreements** and **Asset-backed commercial paper.**





Consequences Of The Lehman Failure

- Most importantly, the failure of Lehman led to a run on money market mutual funds after one large fund "broke the buck".
- The U.S. Treasury then announced a temporary guarantee of money market mutual funds. Confidence in the stability of the financial systems in the U.S. and Europe was lost. The resulting turmoil led to banks hoarding liqui dity, and this will play an important role in transmitting the crisis to the real sector and internationally. In this way, the prospective losses in the subprime market were amplified.
- ➤ Ultimately, the disruptions to a range of financial markets and institutions proved far more damaging than the subprime losses themselves".





Historical Background

- > A banking crisis by the existence of one of two types of events:
 - bank runs that lead to the closure, merging, or takeover by the public se ctor of one or more financial institutions;
 - if there are no runs, the closure, merging, takeover, or large-scale government assistance of an important financial institution or group of institutions, that marks the start of a string of similar outcomes for other institutions.





Historical Background

- Several studies shows that the Financial Crisis in 2008 followed by patterns
 - Increases in public and private lendings
 - Increases in credit supply(Schularick and Taylor)
 - Increases in housing price, leverage and external debt(Reinhart and Rogoff(2008))
 - Large amount of institutional cash pools created so as the demand of MBSs, ABSs and CDOs





Two main panic periods of the financial crisis

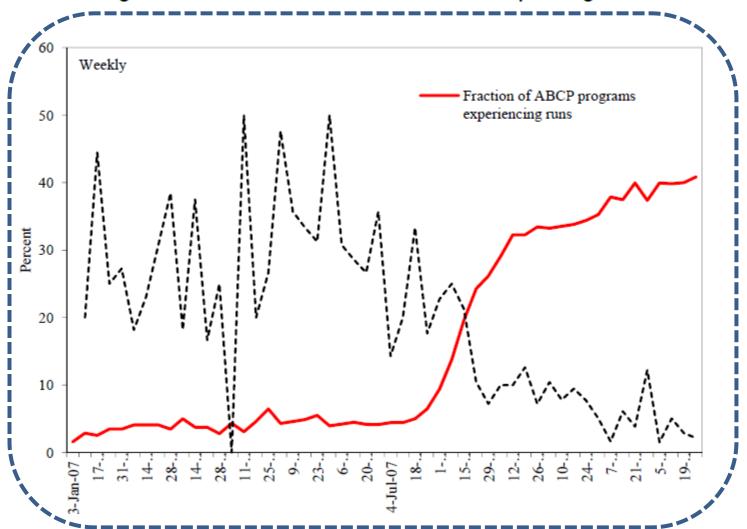
- > Two main panic periods of the financial crisis: August 2007 and September-October 2008.
 - August 2007
 - ✓ Housing price declines in early 2007—homeowners defaults on
 ABCP →ABCP price shrinks →even MMF lose money
 - September-October 2008
 - ✓ Lehman Brothers filed for bankruptcy →run on MMFs →lower haircut





Two main panic periods of the financial crisis

Figure 4: Runs on Asset-Backed Commercial Paper Programs







- > Beginning in August 2007, governments of all advanced nations took a variety of actions to mitigate the financial crisis.
 - The timeline of the crisis shown in the below Table includes some of the major policy actions taken in the United States.





Central Bank - Monetary Policy and Liquidity Support

Interest rate change

Reduction of interest rates

Liquidity support

Reserve Requirements, longer funding terms, more auctions and/or higher credit lines

Government - Financial Sector Stabilization Measures

Recapitalization

Capital injection (common stock / preferred equity)

Capital injection (subordinated debt)

Liability guarantees¹

Enhancement of depositor protection

Debt guarantee (all liabilities)

Debt guarantee (new liabilities)

Government lending to an individual institution

Asset purchases²

Asset purchases (individual assets, bank by bank)

Asset purchases (individual "bad bank")

Provisions of liquidity in context of bad asset purchases/removal

On-balance-sheet "ring-fencing" with toxic assets kept in the bank

Off-balance-sheet "ring-fencing" with toxic assets moved to a "bad bank"

Asset guarantees





- ➤ To evaluate the efficacy of interest rate cuts, the IMF looked at the short-term reaction of both an "economic stress index" (ESI) and a "financial stress index" (FSI).
 - The ESI is a composite of confidence measures (business and consumer),
 credit spreads, and stock prices of nonfinancial companies.
 - The FSI is a composite of several measures of bank credit, spreads, and stock prices.
 - Central banks in all regions cut interest rates in all three crisis periods, but the IMF finds no evidence of short-run impact of interest rate cuts on the ESI, and only limited evidence of a positive effect on the FSI.





- ➤ To measure the short-term impacts of other financial sector policies recapitalizations, liquidity guarantees, and asset purchases the IMF looks to both the FSI and to an index of credit default swaps on domestic banks in the relevant country.
- Of these types of interventions, recapitalizations are found to be particularly effective, with significant improvements in an index of bank CDS spreads in almost all countries during the second and third crisis periods.





Global effects of the financial crisis on firms

- The widespread loss of confidence, concerns about solvency and liquidity of counterparties, **reached the real sector of the economy** when intermediaries began to hoard cash and stop lending. The real effects of the financial crisis were global in nature.
- There are three studies to show the impact on financial crisis
 - Ivashina and Scharfstein: syndicated loans decrease in volume but commercial lendings increase;
 - Puri, Rocholl and Steffen: German banks that have greater exposure of U.S. mortgages reduce their supply of customer loans;
 - Campello, Graham and Harvey: nonfinancial firms were affected with financial crisis and the more effected, the more problems rise from increasing unemployment rate and decreasing credit lines.





Example



- Which of the following statement is not true about the financial crisis?
 - A. Demand for CP is high enough that financial intermediaries have increasingly made use of the market to finance long-term financial assets, in which case the debt is known as "asset-backed commercial paper".
 - B. As a holder of Lehman commercial paper, Reserve Primary was unable to maintain its value after the Lehman bankruptcy.
 - C. The FSI is a composite of confidence measures (business and consumer), credit spreads, and stock prices of nonfinancial companies.
 - D. In later stages, capital injections were the most effective policy.
- Correct Answer: C



Risk Management Failures



Framework

- 1. The Role of Risk Management
- 2. Risk Management Failures
- 3. Was the Collapse of LTCM a Risk Mgmt. Failure?
- 4. A Typology of Risk Management Failures





The Role of Risk Management

- > The role of risk management:
 - Assess the risks faced by the firm;
 - Communicate these risks to those who make risk-taking decisions for the firm;
 - Manage and monitor those risks to make sure that the firm only bears the risks its management and board of directors want it to bear.
- In general, a firm will specify a risk measure that it focuses on together with additional risk metrics.





The Role of Risk Management

- When that risk measure exceeds the firm's tolerance for risk, risk is reduced. Alternatively, when the risk measure is too low for the firm's risk tolerance, the firm increases its risk.
 - With good risk management, large losses can occur when those making the risk-taking decisions conclude that taking large, well-understood risks creates value for their organization. Risk management does not prevent losses.





The Role of Risk Management

- There is not a risk management issue as long as the risks were properly understood.
- Rather, it is an issue of assessing the costs of losses versus the gains from making large profits.
- Deciding whether to take a known risk is not a decision for risk managers. The decision depends on the risk appetite of an institution.
- However, defining the risk appetite is a decision for the board and top management.





Risk Management Failures

> Risk mismeasurement

- Mismeasurement can occur when risk managers <u>do not</u> understand the distribution of returns of a single risky position or the relationships of the distributions among different <u>positions</u>.
- One of the key issues for risk managers is the <u>occurrence of</u> <u>extreme events</u> (those events which occur with low frequency, but high severity).
- Estimate of these rare events <u>require a degree of subjectivity</u>,
 which clearly has the potential for mistreatment.





Risk Management Failures

- > Ignored risks can take three different forms that have different implications for a firm:
 - First, a firm may ignore a risk even though that risk is known.
 - Second, somebody in the firm knows about a risk, but that risk is not captured by the risk models.
 - Third, there is a realization of a truly unknown risk.





Was the Collapse of LTCM a Risk Mgmt. Failure?

Performance:

1994: 20%

1995: 43%

• 1996: 41%

1997: 17%

August and September, 1998: a loss of more than 70%





Was the Collapse of LTCM a Risk Mgmt. Failure?

- LTCM wrote to its investors: it expected that the fund would experience a loss in excess of 20% only in one year out of; one year out of 100 can be expected to have a loss of 70%.
- > Argument: the risk of the fund was poorly managed.
 - Risk management could not have been improved in this case.
- The managers took risks they should not have, but that is not a risk management issue as long as the risks were properly understood.
- Deciding whether to take a known risk is not a decision for risk managers. The decision depends on the risk appetite of an institution. However, defining the risk appetite is a decision for the board and top management.





Was the Collapse of LTCM a Risk Mgmt. Failure?

- ➤ In spite of the cost of losing \$3.5 billion for the investors in LTCM, there were no additional costs beyond the direct monetary loss. For most firms, large losses have deadweight costs.
- Argument: by increasing its leverage, it could boost the return to its shareholders if things went well at the expense of making more losses if things went poorly.
 - The partners of LTCM knew the risks and the rewards from doing so.
- Argument: top management had incentives to take too much risk.
 - The partners of LTCM collectively had almost \$2 billion invested in the fund at the beginning of 1998.





A Typology of Risk Management Failures

- > The process of risk management can fail if one or more of the following events occur.
 - Mismeasurement of known risks
 - Failure to take risks into account
 - Failure in communicating the risks to top management
 - Failure in monitoring risks
 - Failure in managing risks
 - Failure to use appropriate risk metrics





Mismeasurement of Known Risks

- When measuring risk, risk managers attempt to <u>understand the distribution of</u> <u>possible returns</u>. They could make a mistake in using the wrong distribution.
- Correlations may be mismeasured, because the benefit of diversification falls as correlations increase.
- If the correlation between the positions is high, it is more likely that all the firm's activities perform poorly at the same time.
- Historical data is at times of little use, because a known risk has not manifested itself in the past.
- For instance, with the subprime crisis, there was no historical data of a downturn in the real estate market during which a large amount of securitized subprime mortgages was outstanding.
- With such a case, statistical risk measurement reaches its limits and <u>risk</u> management goes from science to art.





Mismeasurement due to Ignored Known Risks

- Russia defaulted on its domestic debt in August 1998
- Argument: Had LTCM taken into account counterparty risk properly, they would have understood that their positions had substantial risk in the event of an adverse shock to the Russian banking system.
 - In fact, LTCM did not behave like these other hedge funds.
 Further, LTCM's Russian exposures were relatively small.





Mistakes in Information Collection

➤ If some risks are not accounted for when risk is measured for a firm, the risks left out are not adequately monitored and they can become large because organizations have a tendency to expand unmonitored risks.





Unknown Risks

- Most unknown risks do not create risk management problems.
- Other unknown risks may not matter simply because they have a <u>trivially low probability</u>. Ignoring that risk has no implications for risk management.
- The unknown risks that represent risk management failures are risks that, had the firm's managers known about them, their actions would have been different.





Communication Failures

➤ Risk monitoring and management reduces to the basis of getting the right information, at the right time, to the right people, such that those people can make the most informed judgments possible.





Failures in Monitoring and Managing Risks

- For the typical non-financial firm, risks often change slowly.
- For a financial firm, the <u>risk properties of portfolios of derivatives</u> can change very rapidly with no trading.
- For such a product, <u>hedges adjusted daily</u> could end up <u>creating</u> <u>large losses</u> because the hedge that is optimal at the start of the day could end up aggravating the risk exposure at the end of the day.
- When <u>liquidity dries up</u> in the markets, many risk-mitigating options that can be used easily outside of crisis periods can no longer be used.





Risk Measures and Risk Management Failures

- From March 1994 to December 1997, LTCM had only eight months with losses and the worst monthly loss was 2.9%. In contrast, it had 37 months with gains.
- VaR does not capture catastrophic losses that have a small probability of occurring.
- Daily VaR measures assume that assets can be sold quickly or hedged, so that a firm can limit its losses essentially within a day.
- ➤ If a firm <u>sits on a portfolio that cannot be traded</u>, a daily VaR measure is not a measure of the risk of the portfolio.





Risk Measures and Risk Management Failures

- ➤ With <u>short horizons</u>, <u>crises are extremely rare events</u>. Yet, when we consider years, crises are not extremely rare events. Months and years are a better horizon to evaluate risk when it comes to crises.
- Positions whose risk was evaluated over one day because the firm thought it could trade out of these positions suddenly became positions that had to be held for weeks or months.
- > During crisis periods, firms will make multiple losses that exceed their daily VaRs.





Risk Measures and Risk Management Failures

- Statistical risk models typically take returns to be exogenous to the firm and ignore risk concentrations across institutions.
- ➤ It is insufficient for institutions that are <u>important in specific markets</u> and whose actions affect security prices.
- > If the institution is large in a market, its losses can lead to more losses.



GARP Code of Conduct





Introductory Statement

- ➤ The GARP Code of Conduct ("Code") sets forth principles of professional conduct for Global Association of Risk Professional ("GARP") Financial Risk Management program (FRM®) certification and other GARP certification and diploma holders and candidates, GARP's Board of Trustees, its Regional Directors, GARP Committee Members and GARP's staff (hereinafter collectively referred to as "GARP Members") in support of the advancement of the financial risk management profession.
- ▶ 为了推动风险管理职业的发展,GARP制定了行为准则以约束FRM持证人、其他 GARP发证的持证人以及相应的候选人、GARP理事会、区域总监、GARP委员会 成员以及协会员工(以下统称为"GARP会员"),该准则旨在推进最高水平 的道德行为和信息披露要求,同时为个人和风险管理职业指明方向。
- These principles promote the highest levels of ethical conduct and disclosure and provide direction and support for both the individual practitioner and the risk management profession.





1. Principles

- > Professional Integrity and Ethical Conduct.
 - GARP Members shall act with honesty, integrity, and competence to fulfill the risk professional's responsibilities and to uphold the reputation of the risk management profession. GARP Members must avoid disguised contrivances in assessments, measurements and processes that are intended to provide business advantage at the expense of honesty and truthfulness.
- ▶ 职业道德和操守。GARP会员应当具备诚实,正直以及履行风险管理职责的能力,并维护风险管理职业的声誉。协会会员不得在评估、计量过程中利用掩饰手段,通过歪曲事实来获取商业利益。





Conflicts of Interest.

- GARP Members have a responsibility to promote the interests of all relevant constituencies and will not knowingly perform risk management services directly or indirectly involving an actual or potential conflict of interest unless full disclosure has been provided to all affected parties of any actual or apparent conflict of interest. Where conflicts are unavoidable GARP Members commit to their full disclosure and management.
- 利益冲突。GARP会员有责任促进有关团体的利益,不能故意直接或间接从事可能导致实际或潜在利益冲突的风险管理服务,除非充分披露所有受影响各方的实际和明显的利益冲突,且这些冲突是无法避免的。

> Confidentiality.

- GARP Members will take all reasonable precautionary measures to prevent intentional and unintentional disclosure of confidential information.
- 保密性。GARP会员应采取所有合理的预防措施来防止有意或无意的泄漏秘密信息。





2. Professional standards

> Fundamental Responsibilities

- GARP Members must endeavor, and encourage others, to operate at the highest level of professional skill.
- GARP会员必须努力学习并鼓励他人以达到最高的专业技能水平.
- GARP Members should always continue to perfect their expertise.
- GARP会员应不断完善各自的专长。
- GARP Members have a personal ethical responsibility and cannot out-source or delegate that responsibility to others.
- GARP会员应履行个人的道德责任,不能推卸责任于他人.





Best Practices

- GARP Members will promote and adhere to applicable 'best practice standards', and will ensure that risk management activities performed under his/her direct supervision or management satisfies these applicable standards.
- GARP会员要促进和遵守可行的'最佳实践标准',并确保他/她所负责的风险管理活动满足这些标准。
- GARP Members recognize that risk management does not exist in a vacuum.
- GARP会员务必考虑自己的评估和活动对同事、社区以及工作环境等所带来的广泛影响。
- GARP Members commit to considering the wider impact of their assessments and actions on their colleagues and the wider community and environment in which they work.
- GARP会员在代表企业进行交流活动时须确保所传达的信息是清晰明确、符合实际情况和目标听众、并满足相应的行为标准。





Communication and Disclosure

- GARP Members issuing any communications on behalf of their firm will ensure that the communications are clear, appropriate to the circumstances and their intended audience, and satisfy applicable standards of conduct.
- GARP会员在代表企业进行交流活动时须确保所传达的信息是清晰明确、符合实际情况和目标听众、并满足相应的行为标准。





3. Rules of conduct

Professional Integrity and Ethical Conduct

- GARP Members Shall act professionally, ethically and with integrity in all dealings with employers, existing or potential clients, the public, and other practitioners in the financial services industry.
- 应本着专业、道德和正直的原则与雇主、现有/潜在客户、公众和金融业的其他从业人员进行交往。
- Shall exercise reasonable judgment in the provision of risk services while maintaining independence of thought and direction. GARP Members must not offer, solicit, or accept any gift, benefit, compensation, or consideration that could be reasonably expected to compromise their own or another's independence and objectivity.
- 在提供风险管理服务过程中除保持客观独立性外还应做出合理判断,GARP会员应禁止提供、索取或接受任何可能损害自己或他人客观独立性的礼物、利益、补偿或其他安排。





- Shall not knowingly misrepresent details relating to analysis, recommendations, actions, or other professional activities.
- 不得故意对有关分析、建议、行为或其他职业活动的细节进行错误表述。
- Shall not engage in any professional conduct involving dishonesty or deception or engage in any act that reflects negatively on their integrity, character, trustworthiness, or professional ability or on the risk management profession.
- 不得从事任何有损于诚实、正直、信任、职业技能或风险管理职业的欺诈活动。
- Shall not engage in any conduct or commit any act that compromises the integrity of the GARP, the (Financial Risk Manager) FRM® designation or the integrity or validity of the examinations leading to the award of the right to use the FRM designation or any other credentials that may be offered by GARP.
- 不得从事任何有损于GARP 、FRM称号、FRM考试或可获得GARP授予其他称号的考试的声誉或公正性等活动。





- endeavor to be mindful of cultural differences regarding ethical behavior and customs, and to avoid any actions that are, or may have the appearance of being unethical according to local customs. If there appears to be a conflict or overlap of standards, the GARP member should always seek to apply the higher standard.
- 应努力注意道德行为和习俗上的文化差异,并避免明显违反当地 习俗的活动。如果同时存在多个冲突或重叠的标准,GARP会员应 始终遵循更严格的标准。





- Conflict of Interest
- GARP Members:
 - Act fairly in all situations and must fully disclose any actual or potential conflict to all affected parties.
 - 在任何情况下均公平处事并且充分披露所有实际的或潜在的受影响各方的利益冲突。
 - Make full and fair disclosure of all matters that could reasonably be expected to impair their independence and objectivity or interfere with their respective duties to their employer, clients, and prospective clients.
 - 充分且公正的披露所有可能损害客观独立性或涉及对雇主、客户和潜在客户职责的事件。





- Confidentiality
- GARP Members:
 - Shall not make use of confidential information for inappropriate purposes and unless having received prior consent shall maintain the confidentiality of their work, their employer or client.
 - 不得将机密用于非正当目的,应该对工作、雇主和客户的信息保密,除非事先得到同意。
 - Must not use confidential information to benefit personally.
 - 不得使用机密为个人谋利。





- Fundamental Responsibilities
- GARP Members:
 - Comply with all applicable laws, rules, and regulations (including this Code) governing the GARP Members' professional activities and shall not knowingly participate or assist in any violation of such laws, rules, or regulations.
 - 遵守所有适用的法律、法规和规章(包括本准则),不得故意从事违反上述法律 法规的活动。
 - Have ethical responsibilities and cannot out-source or delegate those responsibilities to others.
 - 遵守所有适用的法律、法规和规章(包括本准则),不得故意从事违反上述法律 法规的活动。
 - Understand the needs and complexity of their employer or client, and should provide appropriate and suitable risk management services and advice.
 - 理解雇主或客户的需求及其复杂性,并提供恰当、合适的风险管理服务及咨询。





- Be diligent about not overstating the accuracy or certainty of results or conclusions.
- 勤勉尽职,不夸大结论的准确性和确定性。
- Clearly disclose the relevant limits of their specific knowledge and expertise concerning risk assessment, industry practices and applicable laws and regulations.
- 清楚地披露自身在风险评估、行业实践和法规方面的专业知识的不足。





- General Accepted Practices
- GARP Members:
 - Execute all services with diligence and perform all work in a manner that is independent from interested parties. GARP Members should collect, analyze and distribute risk information with the highest level of professional objectivity.
 - 勤勉尽职地对待所有工作并且保持客观独立性,GARP会员应当在收集、分析和发布风险管理信息时保持客观性的最高标准。
 - Shall be familiar with current generally accepted risk management practices and shall clearly indicate any departure from their use.
 - 应当熟悉目前广泛接受的风险管理实践,并明确地辨认出与之背离的任何活动。





- Shall ensure that communications include factual data and do not contain false information.
- 应当确保信息传达过程中使用事实数据且不含错误信息。
- Shall make a distinction between fact and opinion in the presentation of analysis and recommendations.
- 应当在提供分析和推荐报告时对事实还是观点进行区分。





Applicability and enforcement

Violation(s) of this Code may result in, among other things, the temporary suspension or permanent removal of the GARP Member from GARP's Membership roles, and may also include temporarily or permanently removing from the violator the right to use or refer to having earned the FRM designation or any other GARP granted designation, following a formal determination that such a violation has occurred.





It's not the end but just beginning.

Your life can be enhanced, and your happiness enriched, when you choose to change your perspective. Don't leave your future to chance, or wait for things to get better mysteriously on their own. You must go in the direction of your hopes and aspirations. Begin to build your confidence, and work through problems rather than avoid them. Remember that power is not necessarily control over situations, but the ability to deal with whatever comes your way.

一旦变换看问题的角度,你的生活会豁然开朗,幸福快乐会接踵而来。 别交出掌握命运的主动权,也别指望局面会不可思议的好转。你必须与内心 希望与热情步调一致。建立自信,敢于与困难短兵相接,而非绕道而行。记 住,力量不是驾驭局势的法宝,无坚不摧的能力才是最重要的。