

Foundations of Risk Management

FRM一级培训讲义-基础班

讲师: Mikey Chow

101% Contribution Breeds Professionalism



Topic Weightings in FRM Part I

Session NO.	Content	Weightings	
Study Session 1	Foundations of Risk Management	20	CRO
Study Session 2	Quantitative Analysis	20	
Study Session 3	Financial Markets and Products	30	
Study Session 4	Valuation and Risk Models	30	

2-190

专业·创新·增值

Framework 风险管理 Foundations 基本知识 of Risk Management

·风险分散化
(金融学原理)

集团
[失败案例]

- Basic Sense of Risks and Management
- Basic Risk Types
- How Do Firms Manage Financial Risk?
- The Governance of Risk Management
- Credit Risk Transfer Mechanisms

- The Standard Capital Asset Pricing Model
- Arbitrage Pricing Theory
- Risk Aggregation and Reporting
- Enterprise Risk Management
- Learning from financial disasters
- Anatomy of the Great Financial Crisis of 2007-2009
- GARP Code of Conduct

实操

职业操守
专业·创新·增值

3-190

Basic Sense of Risks and Management

4-190

专业·创新·增值

◆◆ What Is Risk? → uncertainty

- Possibility of the bad things that might happen:
 - It exists everywhere and anytime, we will focus on the financial world.
 - But it is not always a bad thing
 - △ ✓ Good risk: Risks that have a positive expected payoff on a stand-alone basis.
回报
 - △ ✓ Bad risk: Risks that can be expected to destroy value on a stand-alone basis.
 - ✓ Banks and other financial institutions cannot succeed without taking risks.

5-190

专业·创新·增值

◆◆ What Is Risk Management?

- Risk management: how firms actively select the types and levels of risks that are appropriate for them to take.
- Risk management and risk taking aren't opposites, but two sides of the same coin.
 - Together they drive all our modern economies.
 - It's all about making forward-looking choices about risk in relation to reward.
• 前瞻清晰
backward-looking

6-190

专业·创新·增值

◆ Is Risk Management Useful?

➤ Challenges for risk management

- Fail to prevent market disruptions or accounting scandals.
 大崩盘 财务造假.
- Derivative markets make it easier to take on large amount of risk.
- Sophisticated financial engineering leads to the violent implosion of firms.
- Only transfer risks to other firms.
 ✓ Risk management is a zero-sum game 零和游戏
- Work to the short-term benefit.

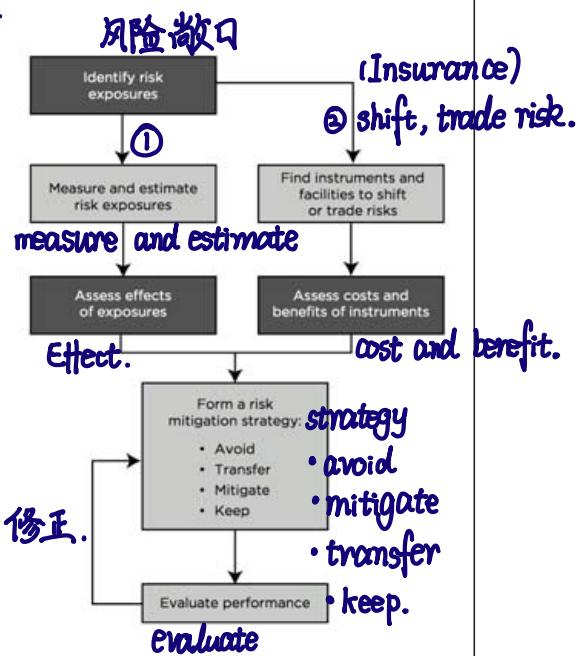
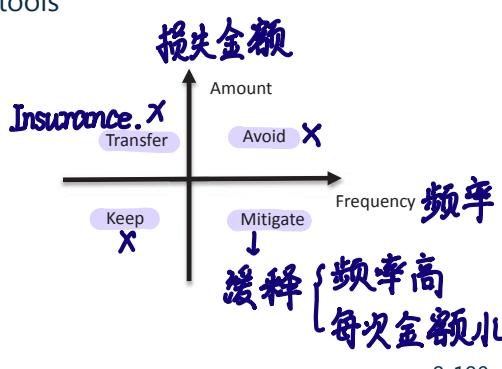
• 金融工程：讲合成方法

7-190

专业·创新·增值

◆ Risk Management Process

1. Identify the risk
2. Analyze and measure risk
3. Assess the effects of all risk, and balance between risk and reward
4. Manage the risk using different kind of tools

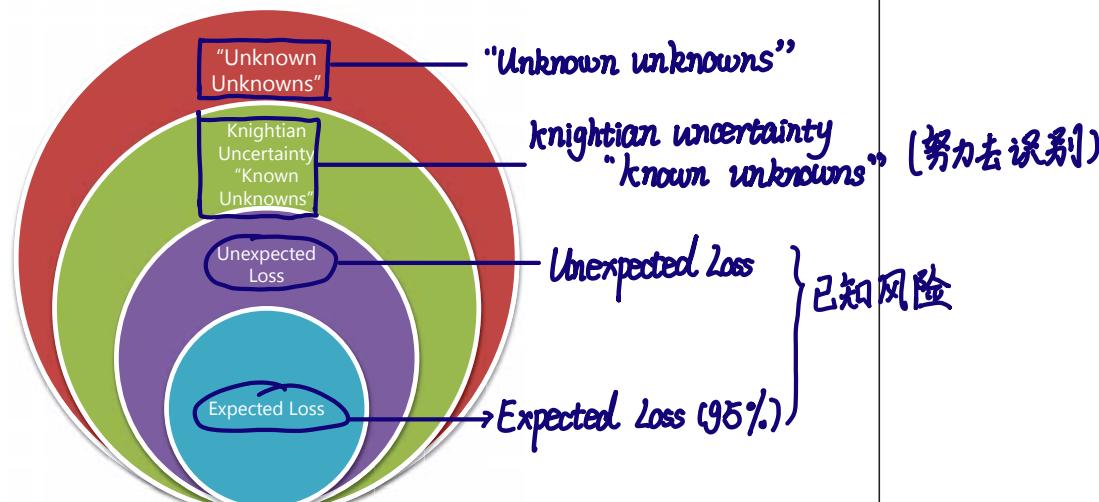


8-190

专业·创新·增值

◆ Identify the risk

- There are things we know that we know.
- There are known unknowns... But there are also unknown unknowns.



9-190

专业·创新·增值

2. ◆ Analyze and measure risk

➤ Quantitative Risk Measures

- VaR (Value at risk)

- ✓ Developed by Dennis Weatherstone, CEO of J.P. Morgan
- ✓ VaR uses the **loss distribution** associated with a position or portfolio to estimate losses at a given level of likelihood (or confidence).

◆ E.g. a ① one day ② 99% confidence level VaR of USD 1 million

➤ Qualitative Risk Measures

- Scenario analysis

• 一天内有99%概率，至少产生1m损失

- Stress testing

• 一天内有1%概率，至少损失1m

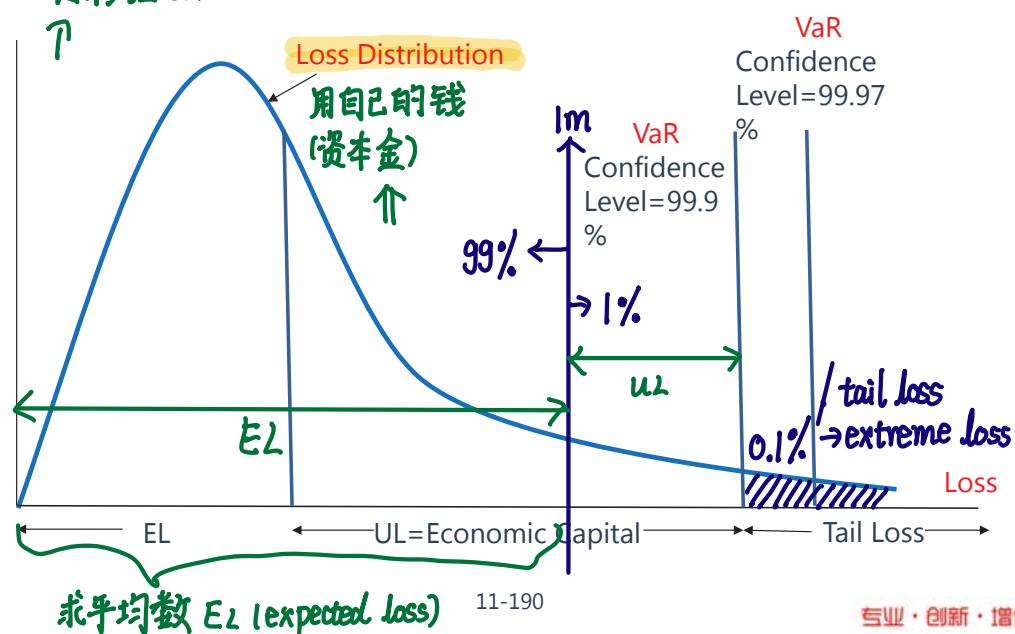
{ 银行 99.9%, 99%
保险 : 99.5%

10-190

专业·创新·增值

◆ Analyze and measure risk

• 转移给 consumer.



11-190

专业·创新·增值

◆ Expected Loss (EL)

- EL is the **average loss** expected to incur from a position or a portfolio.
It can be estimated by historical data of a period of time.

- It can be treated as a **predictable expense** rather than a risk or uncertainty

- In the case of the credit risk of a loan:

- $EL = EAD \times LGD \times PD$

- ✓ PD: Probability of default **违约概率**

- ✓ EAD: Exposure amount at default **金额**

- ✓ LGD: Loss given default **损失比率**

- EL is often priced into the product directly.

12-190

专业·创新·增值

◆◆ Unexpected Loss(UL)

- On a bad day, losses can range above the expected level. **Unexpected loss** is the **surprising loss** that above the EL in bad days.
 - Value at risk (VaR) uses the loss distribution to estimate losses at a given level of likelihood(confidence).
 - $UL = VaR - EL$ 超过平均的损失
 - **Economic capital**(usually called risk capital) is the amount of liquid capital used to cover unexpected loss. **未料意外损失.**
- **Correlation risk**, where unfavorable events happen together, will drive potential losses to unexpected levels. **祸不单行**
- In practice, **concentration** makes the probability of multiple losses high for a portfolio. As a result, we need more capital to cover the UL.
降低集中度.

13-190

专业·创新·增值

◆◆ Tail Risk

- Some credit portfolios, however, exhibit a much more extreme variance in their losses over longer intervals of time (e.g., a decade). **长期**
- **From the crisis lesson, we focus on the tail risk beyond confidence level which cannot be explained by VaR.** **不能被var解释.**
 - **Extreme value theory(EVT)** focuses on tail distribution to understand the black swans
 - **Expected shortfall** is the EL of tail distribution
**尾部损失的E值.
平均数)**

14-190

专业·创新·增值

◆◆ Balance Between Risk and Reward

- There is a natural **trade-off** between risk and reward: the more risk takes, the more potential reward is earned.
- However, there are challenges.

 1. Conflicts between **EL** and **UL**, can be solved by **RAROC** **操作风险, 解决EL, UL**
 - ✓ Risk adjusted return on capital (RAROC)=after-tax risk-adjusted expected return(**EL is subtracted**)/economic capital
 2. Correlation between risk factors is changing
 3. Conflicts of interests among different units, can be solved by **three lines of defense** **三道防线:**
 - ① ✓ business line that generates, owns, and manages risk;
 - ② ✓ risk managers implement day-to-day oversight;
 - ③ ✓ periodic independent oversight and assurance, such as **internal audit** **内部审计** → **external audit.**

15-190

专业·创新·增值

◆ Example 1



- Tail risk techniques are dealt by
 - A. Extreme Value Theory, *Expected shortfall.*
 - B. VaR Theory.
 - C. Probably of Default Theory.
 - D. Standard deviation.

- Correct answer : A

16-190

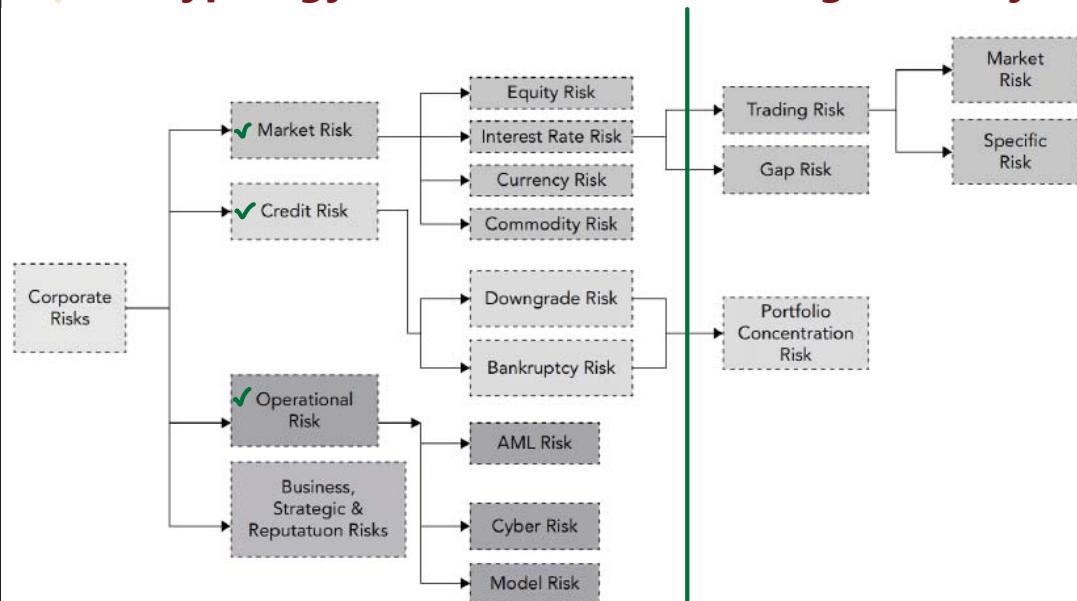
专业·创新·增值

Basic Risk Types

17-190

专业·创新·增值

◆ A typology of risks for the banking industry



18-190

专业·创新·增值

◆◆ Typology of Risk Exposures

价格变动的风险

- Market risk is the risk that changes in financial market prices and rates will reduce the value of a security or a portfolio. 利率变动.
 - 1.● Equity price risk
 - 2.● Interest rate risk 债券.
 - 3.● Currency (Foreign exchange) risk
 - 4.● Commodity price risk
- Market risk is driven by:
 - General market risk (systematic risk)
 - Specific risk (idiosyncratic risk) 只对一家公司产生影响.
unsystematic risk.

19-190

专业·创新·增值

◆◆ Typology of Risk Exposures

- **Credit risk:** It arises from the failure of one party to fulfill its financial obligations to another party. Some examples of credit risk include
 - A debtor fails to pay interest or principal on a loan (**bankruptcy risk**); (**default**) 利息、本金
 - An obligor or counterparty is downgraded (**downgrade risk**), indicating an increase in risk that may lead to an immediate loss in value of a credit-linked security; and (下调评级)
 - A counterparty to a market trade fails to perform (**counterparty risk**), including settlement or Herstatt risk.
交易
没有钱一手交钱

20-190

专业·创新·增值

◆◆ Typology of Risk Exposures

- **Liquidity Risk** 账户上没钱还;
 - **Funding Liquidity Risk:** a firm's ability to raise the necessary cash to roll over its debt; to meet the cash requirements, the margin requirements, and the collateral requirements; and to satisfy the need of capital withdrawals. 交易时产生的:打折出售.
 - **Market (Trading) Liquidity Risk:** 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.

21-190

专业·创新·增值

◆ Typology of Risk Exposures

运营风险：人为问题

- Operational Risk refers to potential losses resulting from inadequate or failed internal processes, people, and systems or from external events.

- It includes legal risk, but excludes business, strategic and reputational risk.

✓ Legal risk: the potential for litigation to create uncertainty for a firm.

compliance risk. ← Regulatory risk: the uncertainty actions by governmental entity.

- Under broad definition, it includes everything from AML Risk
 - ✓ anti-money laundering risk, 反洗钱
 - ✓ cyber risk to risks of terrorist attacks, 网络风险
 - ✓ rogue trading, 流动交易
 - ✓ model risk: The risk of potential indirect costs of relying on models.

22-190

专业·创新·增值

◆ Typology of Risk Exposures

错误的估计了客户的需要 (hard to estimate)

- Business Risk: lies at the heart of any business and includes all the usual worries of firms, such as customer demands, pricing decisions, supplier negotiations, and product innovation management. 只能从事后风险.
- Strategic Risk: involves making critical, long-term decisions about the firm's direction, often accompanied by major investments of capital, human resources, etc. 名誉风险.
- Reputation Risk: the danger that a firm will suffer a sudden fall in its market standing or brand with economic consequences.

23-190

专业·创新·增值

◆ Risk Aggregation 风险整合

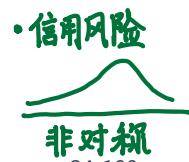
- Given the many different types of risk and risk metrics, a key problem in risk management is the challenge of seeing the bigger picture, also called risk aggregation.

- One challenge occurs when one single risk factor could ultimately spill over many kinds of risks, which will increase correlations.

✓ This is dangerous with UL.

- Another challenge occurs when aggregating different risks at enterprise level.

✓ Different risks have different characteristics, such as loss distributions.



24-190

专业·创新·增值

◆◆ Example 1



B Operational risk includes

- A. counterparty risk.
- B. cyber risk.
- C. reputation risk.
- D. business risk.

➤ Correct answer : B

25-190

专业·创新·增值

How Do Firms Manage Financial Risk?

26-190

专业·创新·增值

◆◆ Risk Management Strategies

➤ Make four basic choices in risk management 策略)

1. Avoid or undertake risk
2. Whether transfer risk to third parties
3. Mitigate risk or not
4. Assume or not assume risk. (keep)

➤ Before making the choice, a risk appetite must be determined.

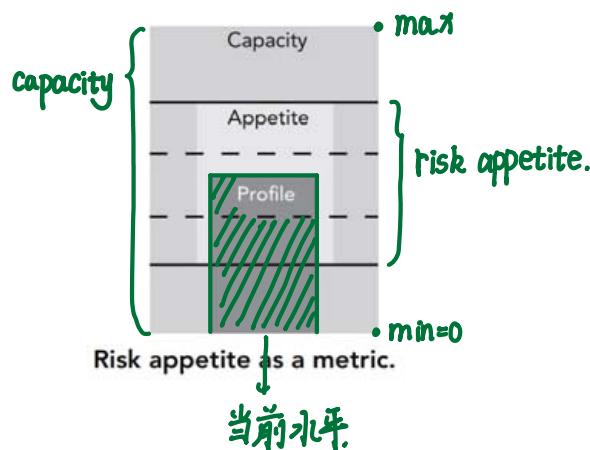
风险口味

27-190

专业·创新·增值

◆ Risk Appetite

- **Risk appetite** describes the amount and types of risk a firm is willing to accept. This is in contrast to risk capacity, which describes the maximum amount of risk a firm can absorb.



28-190

专业·创新·增值

◆ Risk Appetite

➤ Issues related with risk appetite

- The board must characterize an appropriate "risk appetite" for the firm.
- Be connected to a firm's overall business strategy and capital plan.
- Clear communication throughout the firm of the firm's risk appetite and risk position.
- Effective risk management program should be consistent with fundamental strategic and risk appetite choices.
- Risk appetites can be expressed in a number of ways, including quantitative and qualitative statements.
- Banks have to choose their level of risk subject to external constraints

信负审批额度 < 1亿

外部限制

29-190

专业·创新·增值

◆ Risk Management Tools

➤ Risk Limits

- Limits vary by the nature of the risk, the competitive positioning of the firm, and the span of its activities.
- Practically speaking, these limits should be designed such that the probability of exceeding them during the normal situation of business is low.

➤ Derivatives

- In many cases, the risk manager will decide to transfer a portion of a financial risk to the risk management markets. transfer to 交易对手
- The use of these instruments requires firms to make key decisions based on their specific needs.

30-190

专业·创新·增值

◆ Risk Limits

Limit	Nature	Example Weakness
Stop Loss Limits (止损限额)	Loss threshold and associated action (e.g., close out, escalation)	Will not prevent future exposure, only limit realized losses.
Notional Limits (本金限制)	Notional size of exposure	Notional amount may not be strongly related to economic risk of derivative instruments, especially options.
Risk Specific Limits	Limits referencing some special feature of risk in question (e.g., liquidity ratios for liquidity risk)	These limits are difficult to aggregate; may require specialized knowledge to interpret.

+10亿
—
31-190

专业·创新·增值

(流入-流出)
缺口

◆ Risk Limits

Limit	Nature	Example Weakness
≤5年 Maturity/Gap Limits gap limits. (时间相关)	Limit amount of transactions that mature or reset/ reprice in each time period	These limits reduce the risk that a large volume of transactions will need to be dealt with in a given time frame, with all the operational and liquidity risks this can bring. But they do not speak directly to price risk.
Concentration Limits 集中度风险	Limits of concentrations of various kinds (e.g., to individual counterparties, or product type)	These limits must be set with the understanding of correlation risks. They may not capture correlation risks in stressed markets.
Greek Limits 衍生产品	Option positions need to be limited in terms of their unique risk characteristics (e.g., delta, gamma, vega risk)	These limits suffer from all the classic model risks and calculation may be compromised at trading desk level without the right controls and independence.

32-190

专业·创新·增值

◆ Risk Limits

Limit	Nature	Example Weakness
Value-at-Risk (VaR)	Aggregate statistical number	VaR suffers from all the classic model risks and may be misinterpreted by senior management. Specifically, VaR does not indicate how bad a loss might get in an unusually stressed market.
单一风险 敏感度 ↑ Stress, Sensitivity, and Scenario Analysis	These limits are based on exploring how bad things could get in a plausible worst-case scenario. Stress tests look at specific stresses. Sensitivity tests look at the sensitivity of a position or portfolio to changes in key variables. Scenario modeling looks at given real-world scenarios (hypothetical or historical).	Varies in sophistication. Dependent on deep knowledge of the firm's exposures and market behavior. Difficult to be sure that all the bases are covered (e.g., there are endless possible scenarios).

33-190

专业·创新·增值

◆ Derivatives 未来以约定的价格买卖资产 (default risk)

Instrument Type	Defining Features
Forward	It is a tailored agreement to exchange an agreed upon quantity of an asset at a pre-agreed price at some future settlement date. The asset may be delivered physically, or the contract may stipulate a cash settlement (i.e., the difference between the agreed upon price and some specified spot or current price).
Futures 期货	It is an <u>exchange-listed</u> forward with <u>standardized</u> terms, subject to margining. 交易所
Swap 互换 -类似forward.	It is an over-the-counter (OTC) agreement to swap the cash flows (or value) associated with two different economic positions until (or at) the maturity of the contract. For example, one side to an interest rate swap might agree to pay a fixed interest rate on an agreed upon notional amount for an agreed upon period, while the other agrees to pay the variable rate. Swaps take different forms depending on the underlying market.

34-190

专业·创新·增值

◆ Derivatives

Instrument Type	Defining Features
Call Option 权利	The purchaser of a call option has the right, but not the obligation, to buy the underlying asset at an agreed upon strike price, either at the maturity date (European option) or at any point during an agreed upon period (American option).
Put Option	The purchaser of a put option has the right, but not the obligation, to sell the underlying asset at the agreed upon strike price at the maturity date (European option) or at any point during an agreed upon period (American option).
Exotic Option 奇异期权	There are many different options beyond the standard or plain vanilla puts and calls. These include Asian (or average price) options and basket options (based on a basket of prices).
Swaption [Swap + option]	It is the right, but not the obligation, to enter a swap at some future date at pre-agreed terms.

35-190

专业·创新·增值

◆ Hedging Philosophy :套期保值.

- Just because a risk can be hedged does not mean that it should be hedged. Hedging is simply a tool and, like any tool, it has limitations.
 - Hedging has advantages.
 - Hedging has disadvantages.
 - How to hedge?

36-190

专业·创新·增值

◆ Advantages of Hedging Risk Exposures

1. By employing risk management tools, management can better achieve the board's objectives.
2. Hedging reduces the cost of capital and enhances the ability to finance growth.
3. Hedging increases the debt capacity of companies
 - increasing interest tax deductions 税收抵减
4. A firm can stabilize its cost through hedging
 - A competitive advantage
5. Purchasing insurance is expensive.

37-190

专业·创新·增值

金融风险管理只能转移风险，不能增加公司价值。

◆ Disadvantages of Hedging Risk Exposures

1. Using hedging tools cannot increase the value of the firm.
 - 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.
2. Active hedge may distract management from its core business.
3. Hedging requires specific skills.
 - A careless risk management strategy can drag a firm down even more quickly than the underlying risk.
4. Risk management strategy has compliance cost, including disclosure.
5. Hedging could increase the firm's earnings variability due to the gap between accounting earnings and economic cash flows. 对冲真实。
6. The problem will be amplified by poor communication.



38-190

专业·创新·增值

◆ How to hedge?

- Static and Dynamic hedging strategies
 - The latter is more complex, time consuming and expensive
- Hedge operational risk and financial risk
 - Hedging operational risk means stabilizing expenses and revenues 对冲 economic cashflow
 - Hedging financial risk means stabilizing assets and liabilities 稳定B/S.
 - E.g. Price risk, interest rate risk and foreign exchange risk
- A firm may misunderstand the type of risk that it faces. It may map or measure the risk incorrectly, fail to notice changes in the market structure, or suffer from a rogue traders on its team.
 - ↓
accounting earnings

运营风险

39-190

专业·创新·增值

◆ Example 1



- Which of the following statements regarding the amount of risk taken by a bank and the impact on the value of a bank is most likely correct?
- A. Banks need to take on a small amount risk in order to maximize shareholder value while satisfying the constraints imposed by bank regulators. *Suitable 合适*
 - B. Banks that are conservative in practice and take on less risk will always end up generating more value because they avoid incurring losses that would be associated with taking on more risk.
 - C. Banks that are valued for their ability to provide liquid investments to their customers should take on less risk in order to maximize value.
 - D. Banks that are conservative in practice typically assume an optimal amount of risk of zero.

➤ Correct answer : C

40-190

专业·创新·增值



41-190

专业·创新·增值

◆ Introduction

➤ Corporate governance

- The way in which companies are run.
- Describes the roles and responsibilities of a firm's shareholders, board of directors, and senior management, etc.
- Three main regulatory acts making standards of corporate governance

▲ 三个法案

- { ✓ Sarbanes-Oxley Act :安然事件.
- ✓ The Basel Committee on Banking Supervision (BCBS) 2007 (欧洲)
- ✓ Dodd-Frank Act 美国

42-190

专业·创新·增值

◆ Sarbanes-Oxley Act (SOX)

- Came into effect on July 30, 2003, creating stricter legal requirements for boards, senior management, and external/internal auditors.
- CEO and CFO must: **the C-suits** 美国证监会
 - Ensure that reports filed with SEC are accurate for publicly traded firms.
 - Affirm that disclosures provide a complete and accurate presentation of their company's financial conditions and operations. 夸张
 - Be responsible for internal controls, including their design and maintenance.
 - Review annually the effectiveness of a firm's reporting procedures and controls.
 - Disclose the names of individuals who serve on the board audit committee.

43-190

专业·创新·增值

Basel:规范银行的风险管理

◆ Key Post Crisis Corporate Governance Concerns

1. Stakeholder Priority 股东 & 债权人

- Depositors, debt holders, and taxpayers have a much stronger interest in minimizing the risk of bank failure than do most shareholders, who often seem to press for short-term results. 增加权利
- Shareholder empowerment, the usual remedy to corporate governance ills, may therefore be an inadequate solution for the banking industry's woes. 语言

2. Board Composition

[银行业要帮助有资金需求的人]

- The crisis reignited a longstanding debate as to how to ensure bank boards can achieve the appropriate balance of independence, engagement, and financial industry expertise.
- Analyses of failed banks do not show any clear correlation between success and a 失败 predominance of either insiders or outsiders. One can note, however, that failed bank Northern Rock had several banking experts on its board.

44-190

专业·创新·增值

◆ Key Post Crisis Corporate Governance Concerns

3. Board Risk Oversight

- The importance of boards being proactive in risk oversight became increasingly recognized following the crisis.

4. Risk Appetite

- Regulators have pushed banks to articulate a formal, board-approved risk appetite that defines a firm's willingness to undertake risk and tolerate threats to solvency. This can be translated into an enterprise-wide setting of risk limits.

5. Compensation 长期风险 → 股权激励

- One of a board's key levers in determining risk behavior is its control over compensation schemes. Boards have a duty to examine how pay structures might affect risk-taking and whether risk-adjustment mechanisms capture all key long-term risks.

45-190

专业·创新·增值

◆ The Evolution of BCBS

- The Basel Committee on Banking Supervision (BCBS), an organization comprised of the central banks and bank supervisors from 27 jurisdictions, focuses on formalizing international standards for prudential banking regulation.



46-190

专业·创新·增值

◆ Revised Principles on Corporate Governance

- **13 principals (Corporate governance)** 风险管理的责任由董事会承担。
- **Board's Overall Responsibilities:** The board has overall responsibility for the bank, including approving and overseeing management's implementation of the bank's strategic objectives, governance framework and corporate culture.
 - **Board Qualifications and Composition:** Board members should be and remain qualified, individually and collectively, for their positions. They should understand their oversight and corporate governance role and be able to exercise sound, objective judgment about the affairs of the bank.
 -

47-190

专业·创新·增值

◆ The Evolution of Dodd-Frank Act

目的: 增强投资者信心。

- In July 2010, the Dodd-Frank Act was signed into law.
- The Dodd-Frank Act is a federal law with 2300 pages in USA that gives regulation of the financial industry.



48-190

专业·创新·增值

◆◆ Dodd-Frank Act

- The Dodd-Frank Act aims to prevent another significant financial crisis by creating new financial regulatory processes that enforce transparency and accountability while implementing rules for consumer protection.
 - Strengthening the Federal Reserve's regulatory reach for systemic risk. **联邦政府**.
 - Ending too-big-to-fail by creating an orderly liquidation authority. **大而不倒**
 - Resolution plan called "living will". **生前遗嘱**
 - Helping derivatives markets participants with counterparty risk.
- ▲ ● The Volcker Rule **〈禁止自营(银行不能涉及股市, 房地产)〉**
- Protecting consumers
- Stress testing

49-190

专业·创新·增值

◆◆ Infrastructure of Risk Governance

- Three critical questions on infrastructure of risk governance
 1. Are corporate governance best practices related to best practice in risk management, and if so, how?
 2. How is risk management delegated through the organization? **What roles do the executive staff and board committees undertake** in the execution and oversight of risk management?
 3. How does risk management policy **filter down** to business managers and how is it reflected in the way regular business is conducted?
过滤

50-190

专业·创新·增值

◆◆ 1.Best Practice of Corporate Governance

- The board should
 - Look after the interests of shareholders (gatekeeper).
 - Be responsible for the concerns of other stakeholders (debtholders and employees). **监督CEO**.
 - Oversee executive management and alert for any conflict of interests between the management and stakeholders (agency problems).
 - ✓ Clawback provisions **(年终奖追回来)**
 - ✓ Separate the role of the CEO and the chairman of the board
 - Comprise a majority of independent members
 - Consider introducing a CRO

51-190

专业·创新·增值

◆ 1.Best Practice with Risk Management

- The board plays a central role in risk management, especially in shaping and overseeing risk.
 - Decide appropriate risk appetite
 - Assess firm's risk management systems and procedures
 - Strive for economic performance not accounting performance
 - Ensure major transactions are consistent with the risk authorized
 - Keep the disclosure adequate and transparent
 - Balance the risk and rewards
 - Take the ultimate responsibility
 - Be trained on risk issues
 - Establish and maintain CRO
 - Maintain the independence of audit committee

52-190

专业·创新·增值

◆ 2.Corporate Governance at Board Level

- The board often delegates its power to some professional committees to implement risk appetite and break it down into a set of practical restrictions and limitations.
 - **Risk Management Committee**
 - ✓ Set risk appetite on annual basis.
 - ✓ Translate the overall risk appetite into a set of limits.
 - ✓ Approve and independently review risk levels.
 - ✓ Report back to the board on a variety of items, such as all loans and credits over a specified dollar limit.
 - **Risk Advisory Director:** is a member of the board who specialises in risk matters.

53-190

专业·创新·增值

◆ 2.Corporate Governance at Board Level

- **Compensation Committee** (CEO, CFO, CRO)
 - Determine the compensation of top executives.
 - Be aligned with the long-term interests of stakeholders, and with risk-adjusted return on capital.
 - Removal of guaranteed bonuses.
 - Stock-based compensation can encourage risk-taking.

54-190

专业·创新·增值

◆ 2. Corporate Governance at Board Level

➤ Audit Committee of The Board 3rd defense

- Independently verify whether the firm is doing what it claims to be doing.
- Check for discrepancies and infringements in regulatory, legal, compliance, and risk management activities.
- Assess the quality of reporting, compliance, internal control, and risk management processes.
- Audit committee members are required to be knowledgeable, capable of independent judgement, financially literate, and have the utmost integrity. (海人都有家)

55-190

专业·创新·增值

◆ 2. Corporate Governance at Management Level

➤ The Role of the CRO

- The CRO is usually a member of the risk committee and is responsible for the design of the firm's risk management program
- The CRO is also responsible for risk policies, analysis approaches, and methodologies, as well as the risk management infrastructure and governance inside the organization.
- The bank's senior risk committee delegates the power to make day-to-day decisions to the CRO <1亿
- △ ● CRO should also report directly to the CEO, maintain a seat on the board risk committee, and have a voice in approving new financial instruments and lines of business.
 - ✓ At many banks, CROs act as a liaison between the board and management. 纽带.

56-190

专业·创新·增值

◆ 3. Risk Appetite filters down 如何自上而下传递

➤ Risk appetite and business strategy

- There needs to be an iterative relationship between setting risk appetite and implementing business strategy.
 - ✓ Iteration starts with a concept of risk appetite → implementing business strategy → aggregation → checking back with the risk appetite framework → adjusting as necessary.
- There are always challenges to strike balance between business opportunity and risk limits
 - ✓ Fail to exercise the right amount of flexibility.
 - ◆ Too restrictive: 太苛刻 policemen.
 - ◆ Too flexible: potential of large loss

57-190

专业·创新·增值

◆ 3.Risk Appetite filters down

- It is now widely recognized that compensation is part of a sound risk culture.
The compensation committee needs to ensure that managerial remuneration reinforces the firm's risk appetite.

实力强大的
集团。

G-20 recommendations include:

- Deferral of certain compensation
- The elimination of multi-annual guaranteed bonuses
- share-based remuneration to incentivize long-term value creation 股权激励
- Limitations on the amount of variable compensation granted to employees relative to total net revenues (不鼓励业绩与激励挂钩)
- Disclosure requirements to enhance transparency satisfactory 满意度
- Affirming the independence of the committees responsible for executive compensation oversight to ensure their alignment with performance and risk.

58-190

专业·创新·增值

◆ The Independence of Functional Units

Risk Management Committee

↓
Supervise

Senior Management CRO

- Sets business level risk tolerances
- Designs and manages policy
- Evaluates performance

Business Line VaR < 1m

- Takes on and manages exposure to approved risks
- Implement risk policy

Risk Management

- Monitors limits
- Gives senior management independent risk assessments

中后台

Finance & Operations

- executes risk mitigation/transfer strategies
- Manages and supports analyses required for business planning

59-190

专业·创新·增值

◆ Example 1



- Which of the following statements about best practices in corporate governance and risk management is most accurate?
- A. The board should keep the risk committee separate from the audit committee.
- B. The board should ensure that it has the firm's chief risk officer as a member of the board. 小公司不用CRO (introducing)
- C. The board should focus on management's actions and their impact on the interests of the firm's shareholders.
- D. The board should focus on accounting performance instead of economic performance because of the importance of maintaining or enhancing the firm's stock price.

- Correct answer : A

60-190

专业·创新·增值

◆◆ Example 2



B Which of the following statements regarding the firm's risk appetite and/or its business strategy is most accurate?

- A. The firm's risk appetite does not consider its willingness to accept risk. =
- B. The board needs to work with management to develop the firm's overall strategic plan.
- C. Management ~~X~~ will set the firm's risk appetite and the board will provide its approval of the strategic plan.
- D. Management should obtain the risk management team's approval once the business planning process is finalized. 先新后老

➤ Correct answer : B

61-190

专业·创新·增值

◆◆ Example 3



B The major roles of the audit committee do not include

- A. reviewing the risk management process.
- B. preparing the annual financial report. X audit
- C. analyzing the integrity of risk governance.
- D. affirming the reliability of vetting processes.

➤ Correct answer : B

62-190

专业·创新·增值

Credit Risk Transfer Mechanisms

银行如何做风险管理：

63-190

专业·创新·增值

◆ Traditional Credit Risk Mitigation Approaches

➤ Traditional transfer of credit risk

- Requiring collaterals
- Purchasing insurance from third-party counterparties
- Netting of exposures to counterparties **逐日盯市** **净额结算**. A  B
- Marking to market / Margining **保证金**.
- Termination by a set of trigger events **(触发事件)**.
- Reassignment of a credit exposure to another party
- Syndication **辛迪加 (银团) - 对多个银行贷款**

64-190

专业·创新·增值

◆ Credit Derivatives C (保险产品)

➤ Credit derivatives enables institutions to effectively tailor pools of credit-risk exposures by repackaging of risk.

- Risk transfer
 - ✓ credit default swaps (CDS)
- Securitization
 - ✓ collateralized debt obligations (CDOs)
 - ✓ collateralized loan obligations (CLOs).

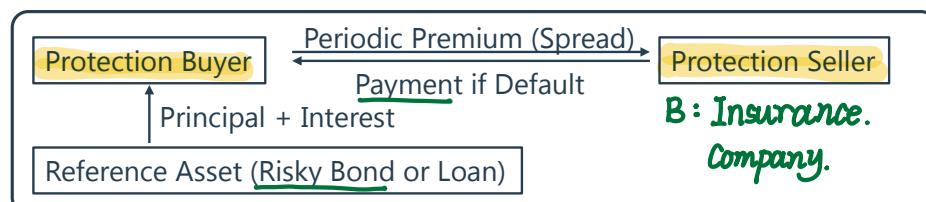
65-190

专业·创新·增值

◆ Credit Default Swaps

➤ CDS

- In a Credit Default Swaps contract, a protection buyer (say A) pays a premium to the protection seller (say B), in exchange for payment if a credit event occurs.

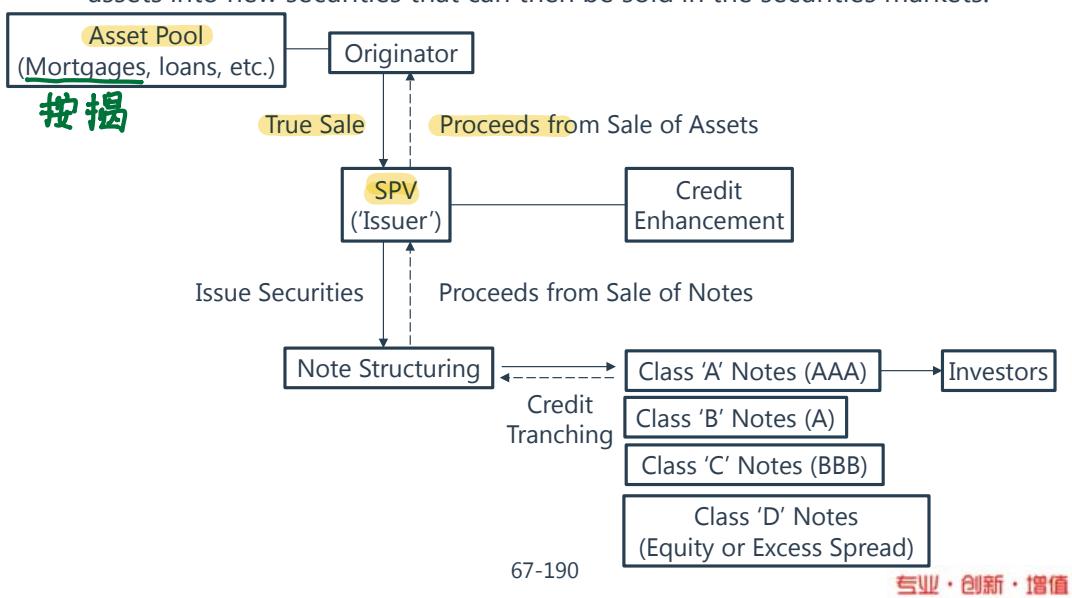


66-190

专业·创新·增值

◆ Securitization 资产证券化.

- **Securitization:** Securitization involves the repackaging of loans and other assets into new securities that can then be sold in the securities markets.



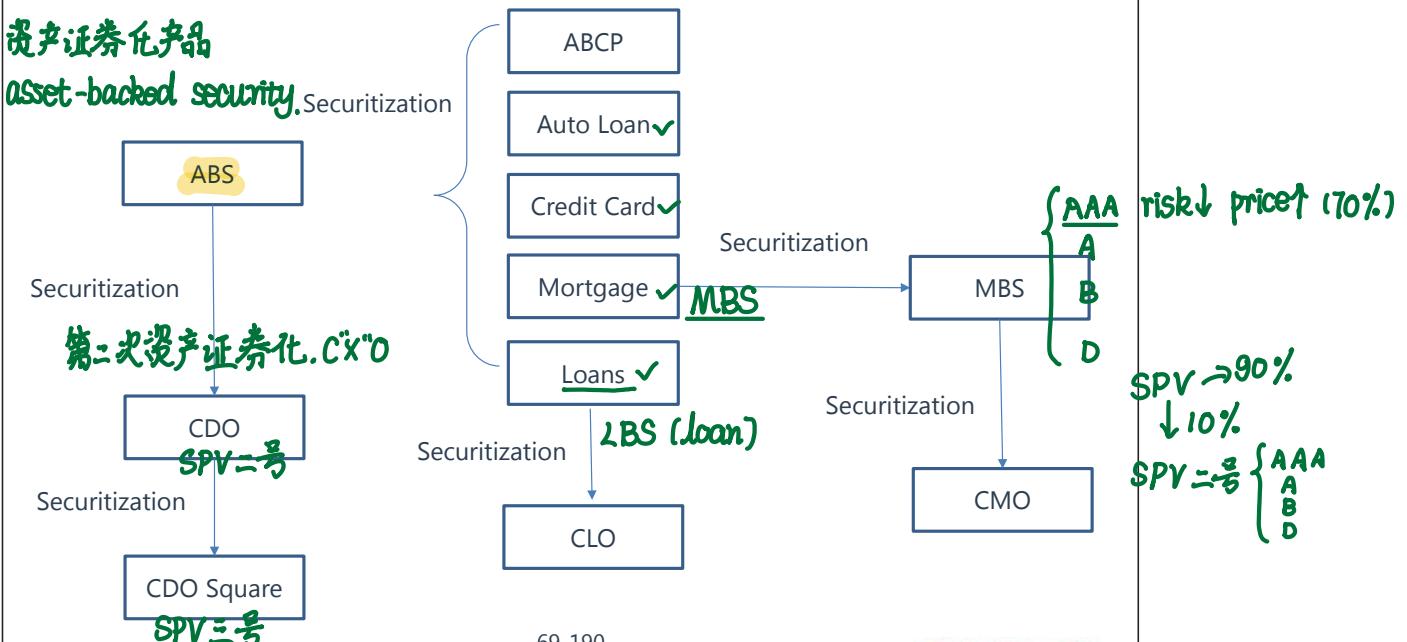
◆ From Buy-and-hold to Originate-to-distribute

- The shift toward the OTO business model seemed to offer the financial services industry many benefits [盘活资金]
 - **Originators benefited** from greater capital efficiency (by Basel capital adequacy requirements) and enhanced funding opportunities, as well as lower earnings volatility 间接进入xx市场
 - **Investors benefited** from a wider array of investments, allowing them to diversify their portfolios and better sync their risk/return profiles
 - **Borrowers benefited** from the expansion of available credit and product options, as well as from the lower borrowing costs. low interest

68-190

专业·创新·增值

◆ The Securitization Products



69-190

专业·创新·增值

◆ Issues Addressed in Securitization

- Securitization amplified systemic risk during the crisis by allowing massive leverage and risk concentration in the financial sector
 - **Loan origination:** compensation was tied to high loan volumes
 - **Securitization:** the risk embedded was not transparent for investors
 - **Credit rating:** overreliance on the accuracy and transparency of credit ratings
“评级” 过度依赖
 - **Risk management:** poor risk management in many segments (e.g., assessment, stress test)
 - **Risk concentration potential**
 - **High complexity**

70-190

专业·创新·增值

◆ Example 1



- Which of the following cannot be used to transfer credit risk from a bank's balance sheet?
 - A. Credit derivatives
 - B. Credit default swaps [CDS 相当于保险]
 - C. Securitization
 - D. US government bond futures market risk
- Correct answer : D :D

71-190

专业·创新·增值

◆ Example 2



- B Which technique below does not contribute to credit risk mitigation?
- A. Bond insurance ✓
 - B. Buy-and-hold 买入并持有
 - C. Netting ✓
 - D. Collateralization ✓

- Correct answer : B

72-190

专业·创新·增值

◆ Example 3



B

- Over-the-counter CDSs helped transfer credit risk in the loan book, but also generated new ___ of a systemic nature
- A. credit spread risk
 - B. counterparty credit risk 交易对手风险.
 - C. interest rate risk
 - D. None of the above

➤ Correct answer : B

73-190

专业·创新·增值

The Standard Capital Asset Pricing Model

为什么要分散化. (Markowitz ; Sharp)

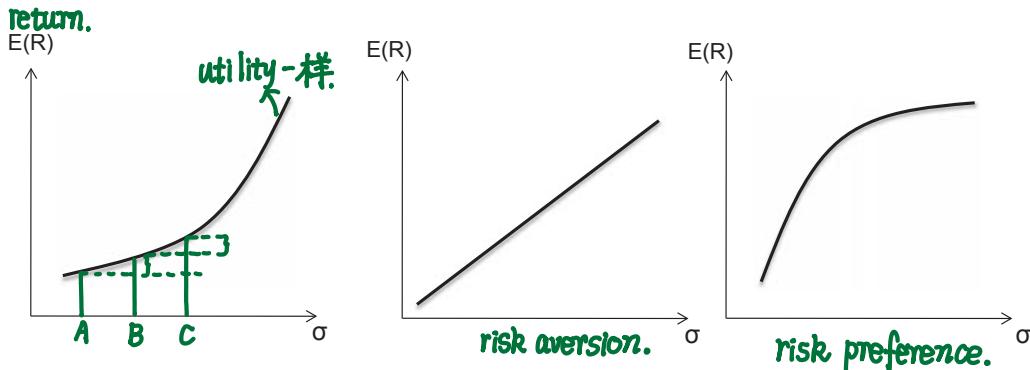
74-190

专业·创新·增值

◆ Markowitz Portfolio Theory

➤ A rational person 有统一的想法

- Risk aversion
- Risk neutral
- Risk preference



75-190

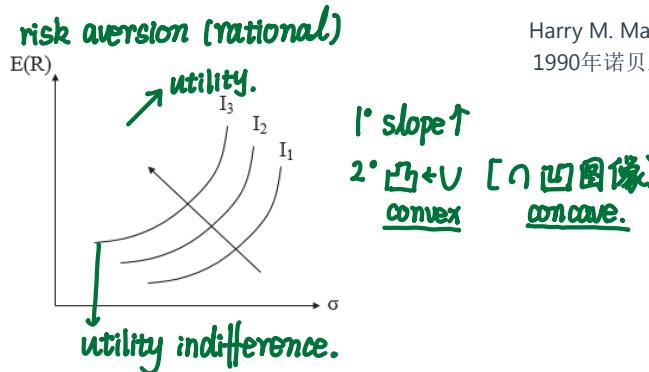
专业·创新·增值

◆ Markowitz Portfolio Theory

➤ Mean Variance Model

- Return: $E(R)$
- Risk: $\sigma \rightarrow$ standard deviation.

➤ Indifferent curve



76-190

专业·创新·增值

◆ Markowitz Portfolio Theory

➤ Assumptions about a Markowitz investor

- No transaction costs
- Assets are infinitely divisible 无限可分
- The absence of personal income tax
- An individual cannot affect the price of a stock by his trading
- Investors make decisions solely in terms of returns and standard deviation of the returns
- Unlimited short sales are allowed
- Unlimited lending and borrowing at the riskless rate
- All investors have identical expectations: $\mu, \sigma, \rho \rightarrow$ 相关系数.
- All assets are marketable 可交易的.

$E(R)$
risk

77-190

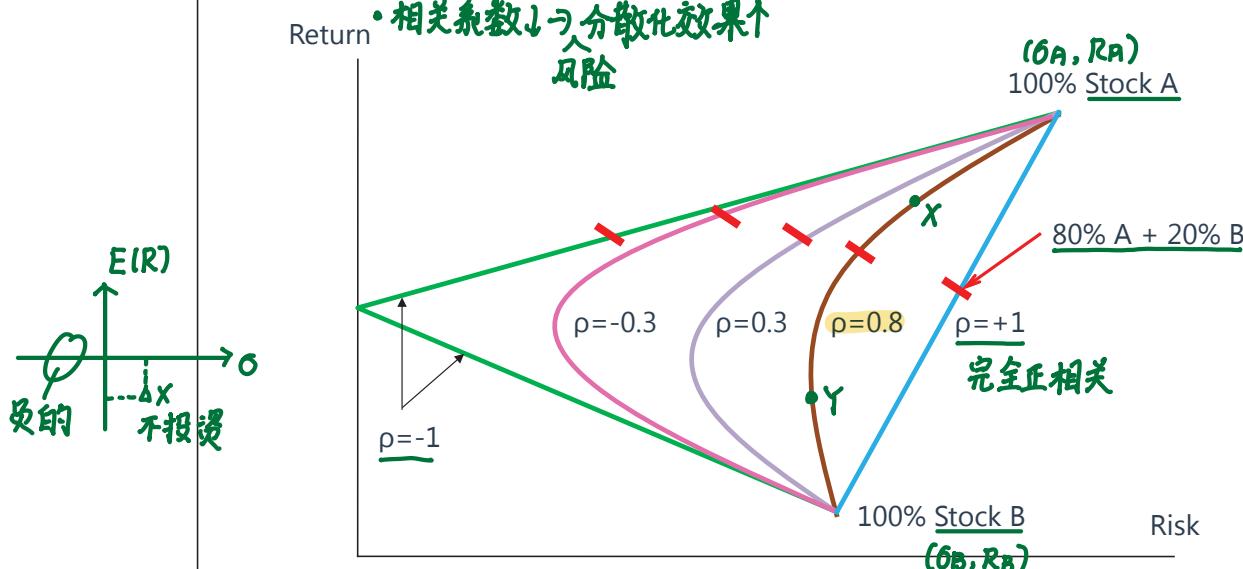
专业·创新·增值

◆ Effects of Correlation on Diversification Benefits

$$\cdot W_1^2\sigma_A^2 + W_2^2\sigma_B^2 + 2W_1 \cdot W_2 \cdot \rho_{A,B} \cdot \sigma_A \cdot \sigma_B$$

• 相关系数 $\rho \rightarrow$ 分散化效果 \downarrow

风险

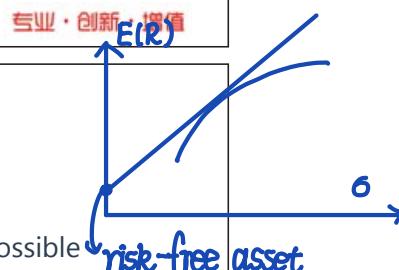
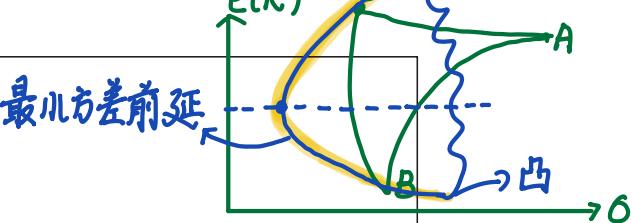


78-190

专业·创新·增值

$E(R)$ 凸

◆◆◆ Markowitz Efficient Frontier



◆◆◆ Minimum Variance Portfolio

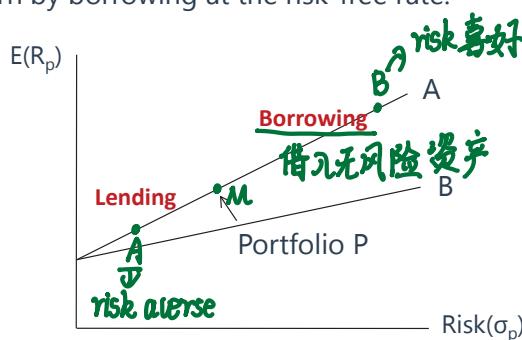
- **Definition:** the portfolio with the smallest variance among all possible portfolios on a portfolio possibilities curve.
- **The shape of the portfolio possibilities curve is best described in two pieces:**
 - The portion of the portfolio possibility curve that lies above the minimum variance portfolio is concave. $\text{凹} \rightarrow \text{Efficient frontier}$
 - The portion of the portfolio possibility curve that lies below the minimum variance portfolio is convex. 凸

80-190

专业·创新·增值

◆◆◆ Capital Market Line (CML)

- The point of tangency – Portfolio P, is known as the market portfolio. When one can lend or borrow money use riskless rate, investor will hold a combination of the market portfolio and the risk-free asset.
- Risk-averse investors will create lower risk portfolios by lending (i.e., investing in the risk-free asset). More risk-tolerant investors will increase portfolio return by borrowing at the risk-free rate.

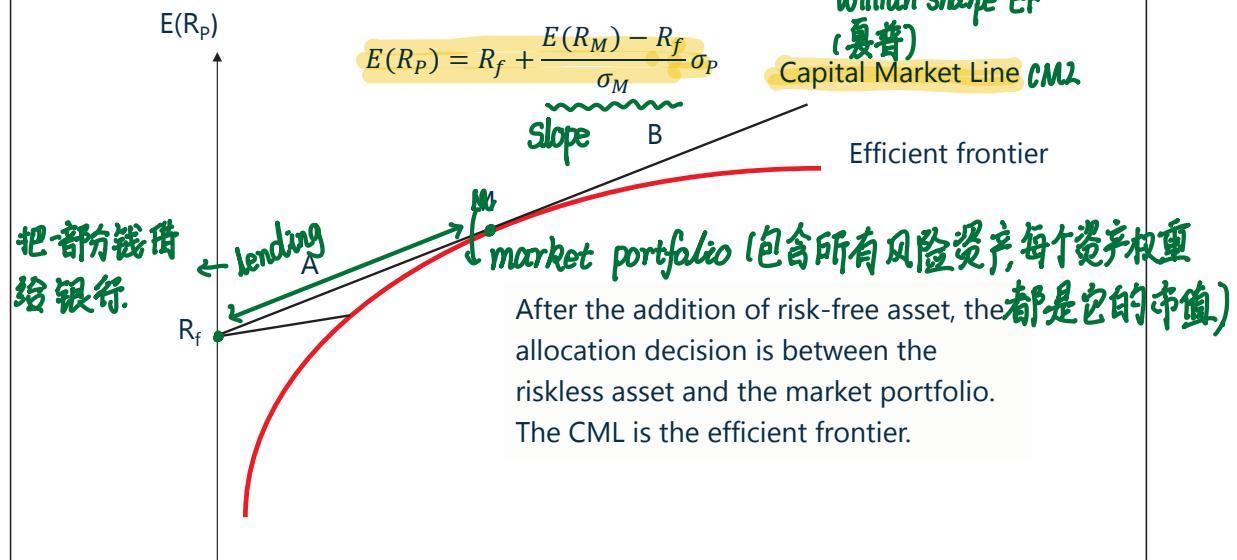


81-190

专业·创新·增值

◆ Capital Market Line (CML)

$$\text{Sharpe ratio} = \frac{E(R_p) - R_f}{\sigma_p}$$

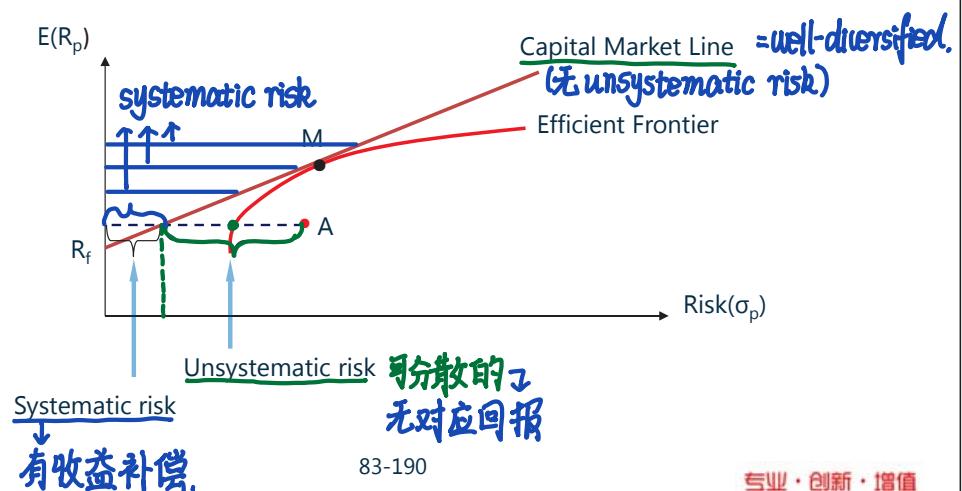


82-190 专业·创新·增值

◆ Systematic and Unsystematic Risk

$$\text{Total risk} = \text{systematic risk} + \text{unsystematic risk}$$

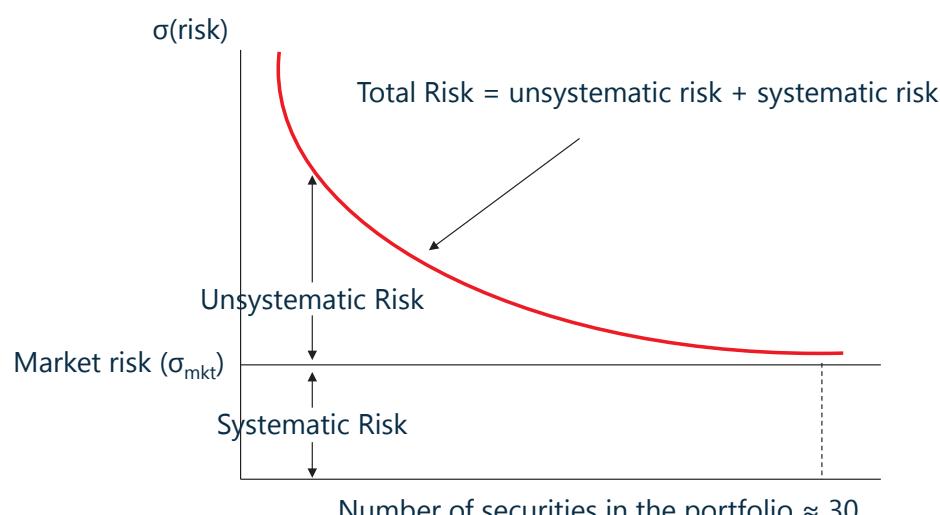
Systematic risk is the only important ingredient in determining expected returns and that nonsystematic risk plays no role



83-190 专业·创新·增值

◆ Systematic and Unsystematic Risk

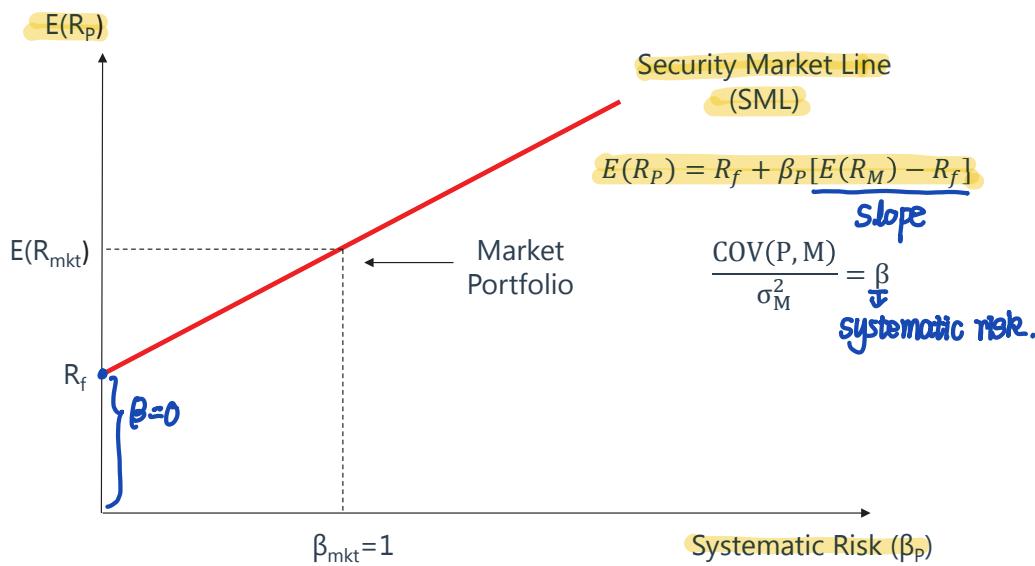
Risk vs. Number of Portfolio Assets



84-190

专业·创新·增值

★(计算题)◆ Security Market Line (SML) 系统性风险与补偿关系.



专业·创新·增值

◆ Capital Asset Pricing Model (CAPM)

- Assumptions about CAPM
 - Access to information for all market participants, meaning that all information is freely available and instantly absorbed.
 - No transaction costs, taxes, or other frictions.
 - Allocations can be made in an investment of any partial amount (i.e., perfect divisibility).
 - All participants can borrow and lend at a common risk-free rate.
 - Any individual investor's allocation decision cannot change the market prices.



专业·创新·增值

◆ Capital Asset Pricing Model (CAPM)

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

$$\beta_P = \frac{\text{Cov}(P, M)}{\sigma_M^2} = \rho_{P,M} \frac{\sigma_P}{\sigma_M}$$

- $E(R_P)$: 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

William sharp: SML / CAPM

• Assumption:

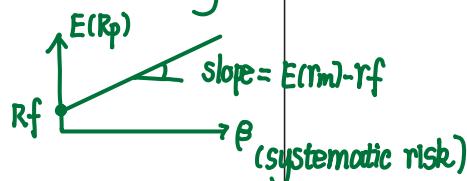
Markovoz: + 存在 risk-free asset

• 目的: asset allocation.

• { lending
borrowing }

$E(R_p) = r_f + (E(R_m) - r_f) \beta$

• SML: security market line



• Required rate of return < Expected return

→ 投资 (低估)

$\beta_{\text{market portfolio}} = 1$

◆ Capital Asset Pricing Model (CAPM)

$$E(R_m) = 15$$

$$R_f = 8\%$$

➤ 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: $E(R_A) = 0.08 + 1.2 \times (0.15 - 0.08) = 0.164$

- Note: $\beta_A > 1 \Rightarrow E(R_A) > E(R_m)$

➤ 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: $E(R_B) = 0.08 + 0.8 \times (0.15 - 0.08) = 0.136$

- Note: $\beta_B < 1 \Rightarrow E(R_B) < E(R_m)$

88-190

专业·创新·增值

CML 与 SML 对比:

1. CML:



➤ Jimmy invests stock A by the CAPM. The information of stock A is as follows:

- ✓ Expected market 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%
	overvalued	12.46%
C.	undervalued	8.7%
D.	undervalued	12.46%

2. CML:

目的: asset allocation.

SML:

目的: valuation. (估值)

3. CML:

→ 在 CML 线上的组合: well-diversified.

在 SML 线上的组合:

→ all portfolio (well-diver + not well diversified)

(只知道系统性风险)

89-190

专业·创新·增值

◆ Example 1



➤ Correct answer : B

➤ The CAPM equation is: $E(R_p) = R_f + \beta_p [E(R_M) - R_f]$

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

The CAPM required return is:

$$4\% + 0.94 \times 9\% = 12.46\%$$

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%.

90-190

专业·创新·增值

◆ Example 2



- 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 SMZ / CAPM individual portfolio. Are the statements of Mike and Bob correct?
- Only Mike's statement is correct.
 - Only Bob's statement is correct.
 - Both statements are correct.
 - Neither statement is correct.

- Correct answer : A

91-190

专业·创新·增值

◆ Performance Measures

- In a world where the market is in equilibrium and is expected to remain in equilibrium, no investor can achieve an abnormal return. Of course, this is not the case in the real world.
- Portfolio managers rely on indices to measure the performance of a given stock or portfolio relative to the CAPM equilibrium risk-return relationship.
- The focus is on the three traditional measures of portfolio performance based on CAPM: **三个业绩评价指标:**
- ① ● the Sharpe reward-to-volatility ratio,
 - ② ● the Treynor reward-to-volatility ratio,
 - ③ ● the Jensen performance index.

92-190

专业·创新·增值

▲ CML 的 slope : $slope = \frac{E(R_p) - R_f}{6m}$

• slope = $\frac{E(R_m) - R_f}{6m}$

◆ Sharpe Performance Index

- Measures the ratio of the average rate of return $E(R_p)$, in excess of the risk-free rate R_f , to the absolute risk $\sigma(R_p)$. 是 CML 的 slope.

$$\text{Sharpe ratio: } SR = \frac{E(R_p) - R_f}{\sigma(R_p)}$$

- Widely used for measuring portfolio performance that are not very diversified.
- A better method for measuring historical performance. (推测未来效果差)
- Suitable for evaluating the performance of a portfolio that represents an individual's total investment. 基金, (股票用的少)

93-190

专业·创新·增值

◆ Treynor Performance Index

- Treynor ratio is equal to the risk premium divided by beta (systematic risk)

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

▼ non-systematic risk=0

- More appropriate for comparing well-diversified portfolios and a more forward-looking measure.
(未来)
backward-looking (评价过去业绩)

94-190

专业·创新·增值

◆ Jensen's Performance Index

超额回报率

- Jensen's Performance Index (also called Jensen's alpha) is the asset's excess return over the return predicted by the CAPM.

$$E(R_P) - R_F = \alpha_P + \beta_P [E(R_M) - R_F]$$

$\alpha_P = E(R_P) - [\gamma_f + \beta [E(R_M) - \gamma_f]] \rightarrow CAPM / required rate of return.$

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

$\alpha \begin{cases} >0 & \text{报} \rightarrow undervalued \\ =0 & \\ <0 & \end{cases}$

95-190

专业·创新·增值

◆ Performance Measures

- An alternative approach, adopted by many professionals and investors, is to measure performance relative to a target portfolio or benchmark.
- There are three different measures of performance relative to a benchmark are discussed:
 - tracking error
 - information ratio
 - sortino ratio.

} 主动型基金

96-190

专业·创新·增值

◆◆◆ Tracking Error : 主动型基金

- The tracking error (TE) measures the difference between a portfolio's returns and those of a benchmark. The first way to calculate TE is:

$$R_P - R_B \rightarrow \text{benchmark.}$$

- Another way to measure TE is to calculate the standard deviation of the differences in the portfolio and the benchmark returns over time (N is the number of return periods measured):

$$\sigma_{(R_P - R_B)} = \sqrt{\frac{\sum(R_P - R_B - \bar{R}_P - \bar{R}_B)^2}{N - 1}}$$

↓
TEV

(tracking error volatility) 稳定性.

• 又叫 tracking error.

97-190

专业·创新·增值

◆◆◆ Information Ratio

- The information ratio measures the ratio of the residual return of the portfolio compared with its residual risk (tracking error).

$$IR = \frac{E(R_P) - E(R_B)}{\sigma(R_P - R_B)} = \frac{\alpha_P}{\sigma(\alpha_P)} = \frac{\text{超额回报}}{\text{active return}}$$

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

$$IR = \frac{TE}{TEV} = \frac{\text{tracking error}}{\text{tracking error volatility}} = \frac{R_P - R_B}{\sigma(R_P - R_B)}$$

→ 可比性差.

98-190

专业·创新·增值

◆◆◆ Sortino Ratio

保底收益率

- 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_f , to the semi-standard deviation, which considers only data points that represent a loss.

$$\text{Sharpe ratio} = \frac{E(r_p) - r_f}{\sigma_p}$$

$$\text{Sortino Ratio} = \frac{E(R_P) - MAR}{\sqrt{\frac{1}{N-1} \sum_{t=1}^N (R_{Pt} - MAR)^2}} \quad (R_{Pt} < MAR) \quad (\text{找到低的})$$

- Where N 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.

左偏时 (极小值更多) 

99-190

专业·创新·增值

◆ Example 1



- An analyst has compiled the following data on Stock P:

$$\text{Covariance}_{P,\text{market}} \quad 0.0315 \quad \beta = \frac{\text{Cov}(m, \hat{r})}{\sigma_m \sigma_r}$$

$$\sigma_{\text{Stock } P} \quad 16.50\%$$

$$\sigma_{\text{market}} \quad 15.00\%$$

$$\text{Expected market return} \quad 11.80\% \quad (\text{圈出})$$

$$\text{Risk-free rate} \quad 4.50\% \quad (\text{圈出})$$

$$\text{Stock P actual return} \quad 13.25\%$$

Calculate and interpret Jensen's Alpha for Stock P.

$$A. +1.47\%; \text{ overperformed. } E(r_p) - [r_f + \beta(E(r_m) - r_f)]$$

$$B. -1.47\%; \text{ underperformed. }$$

$$C. +1.45\%; \text{ overperformed. }$$

$$D. -1.45\%; \text{ underperformed. }$$

- Correct answer : B

100-190

专业·创新·增值

• CAPM:

$$E(r_p) = r_f + \frac{(E(r_m) - r_f) \cdot \beta}{\downarrow \text{单.} \quad \downarrow \text{量.}}$$

• Single factor model:

$$r_p = \frac{E(r_p)}{\downarrow \text{expected}} + \frac{\beta \cdot F}{\downarrow \text{surprise.}}$$

Arbitrage
Pricing Theory

101-190

专业·创新·增值

◆ 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.

➤ $R_i = E(R_i) + \beta_i F + e_i$ = expected + unexpected.

● F is the deviation of the common factor from its expected value;

● β_i is the sensitivity of firm i to that factor; 每单位的偏差带来的收益率补偿)

● e_i is the firm-specific disturbance; 以消除系统风险应该有收益率补偿)

● $E(R_i)$ is the expected return on stock i;

● The nonsystematic components of returns (e_i), are assumed to be uncorrelated among themselves and uncorrelated with the factor F.

102-190

专业·创新·增值

◆ Single-Factor Model

- The expected value of e_i 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
- $R_i = E(R_i) + \beta_i F$

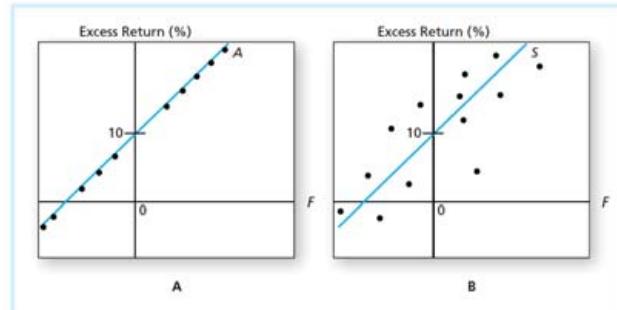


Figure 10.1 Excess returns as a function of the systematic factor. **Panel A.** Well-diversified portfolio A. **Panel B.** Single stock (S).

103-190

专业·创新·增值

$$R_p = E_{Rp} + \beta_1 F_1 + \beta_2 F_2 + \dots + \epsilon$$

surprise. 非系统性风险

◆ Multifactor Models

➤ 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 economy-wide factors such as business-cycle risk, interest or inflation rate risk, energy price risk**, and so on. *GDP growth risk*.
- Factor models are tools that allow us to **describe and quantify the different factors that affect the rate of return** on a security during any time period.

104-190

专业·创新·增值

◆ Multifactor Models

➤ The equation for multifactor model for stock i

- $R_i = E(R_i) + \beta_{i,GDP} \downarrow_{F_{GDP}} + \beta_{i,IR} \downarrow_{F_{IR}} + e_i$
 - 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 |Expected - Factual|
 - IR = deviation of interest rate factor from its expected value
 - e_i = firm-specific return for stock i (非系统性风险)

105-190

专业·创新·增值

$$APT: E(\eta_p) = r_f + \lambda_1 \beta_1 + \lambda_2 \beta_2 + \lambda_3 \beta_3 + \dots$$

- 系列认为 risk premium.

◆ 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.

➤ Assumptions:

- Asset returns can be explained by **systemic factors**.
- By using diversification, investors can eliminate specific risk from their portfolios.
- There are **no arbitrage opportunities** among well-diversified portfolios.
If any arbitrage opportunities were to exist, investors would exploit them away.

106-190

专业·创新·增值

◆ 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

CAPM {
1°计算 required return
2°比较； 3°投资}

APT {
1°寻找2个相同的资产 系统性 risk相同)
2°判断有无套利机会 3°投资.}

107-190

专业·创新·增值

在 multi-factor model 里 \Rightarrow deviation

◆ Risk Premiums

$\Rightarrow APT$ model

➤ 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 $E(R_i)$ as the expected return on Factor Portfolio i.
- Calculate risk premiums for each factor portfolio

108-190

专业·创新·增值

◆ Example



- Northeast Airlines has a GDP beta of $\beta_{GDP} = 1.2$ and an interest rate beta of $\beta_{interest} = 0.3$. 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 expected return for Northeast Airlines?
- Explanation $\beta_{GDP} \times \lambda_{GDP} + \beta_{IR} \times \lambda_{IR}$
- $E(R) = R_f + GDP \times RP_{GDP} + IR \times RP_{IR}$
 - $E(R) = 4\% + 1.2 \times 6\% + (-0.3)(-7\%) = 13.3\%$

• 判断用什么模型

APT 有 R_f , 而不是 R_p (expected)
有 risk premium, 而不是 deviation
无 firm-specific.

109-190

专业·创新·增值

◆ Empirical Work Preference 实证:

- APT approach is more popular than CAPM in empirical works for the following reasons:
- CAPM is a special case of APT. CAPM is a one-factor model while APT is a multi-factor model.
 - APT better helps facilitate risk analyses than CAPM. Consider the case of APT 计算量少 a portfolio with $n = 50$ different equities:

✓ CAPM requires a full volatility and correlation matrix, which means (相关系数) C_{50}^2
there will be a total of $50 + \frac{50^2 - 50}{2} = 1275$ calculations.
 $\{R_1, \dots, R_n\}$

✓ With a multi-factor model, for example, if the 50 equities are categorized into 3 factors, the number of calculations will be
3个因子的相关系数
 $3 \times 50 + \frac{(3^2 - 3)}{2} = 153$.

每个 R_i 有 3 个 β

110-190

专业·创新·增值

考点: 哪3个 factor?

◆ Fama-French Three-Factor Model

- The Fama-French three-factor model incorporates the following systematic factors:
- ① market factor
- $R_{it} - r_f = \alpha_i + \beta_{i,M}(R_{Mt} - r_f) + \beta_{i,SMB}SMB_t + \beta_{i,HML}HML_t + e_{it}$
- SMB = Small minus big (the return of a portfolio of small stocks – return on a portfolio of large stocks) [小盘股, 放空大盘股] (小盘股 return 高)
 - 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) 成长股
从长期来看, 价值股收益 > 成长股
- 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.

$\frac{\text{Book value}}{\text{Market value}} \downarrow$

111-190

专业·创新·增值

◆ Factor Analysis in Hedging Exposure

- Idiosyncratic (specific) risk can theoretically be eliminated through diversification, but this is not true for systematic risk.
- Challenges to the hedge:
 - The selection of appropriate systematic factors
 - The frequency of adjusting a hedge { dynamic
statistic
 - Model risk (模型产生的risk)

112-190

专业·创新·增值

◆ Example 1



- Which of the following statements is least likely a requirement for an arbitrage opportunity? The arbitrage situation leads to a:
 - A. risk-free opportunity. ✓ 无任何风险
 - B. zero net investment opportunity. (无任何资金支出) → (净投资为0)
 - C. profitable opportunity. 赚钱
 - D. return in excess of the risk-free rate opportunity.
- Correct answer : D

113-190

专业·创新·增值

◆ Example 2



- The APT model is derived from
 - A. a theoretical model of optimal portfolio selection.
 - B. an extension of the concept of CAPM.
 - C. arbitraging a few known risk factors in the market.
 - D. investors holding efficient portfolios.
- Correct answer : B

114-190

专业·创新·增值

◆ Example 3



- If a portfolio has 80 securities, the number of covariance that should be estimated is

$$\left[\frac{80^2 - 80}{2} \right] \frac{80(80-1)}{2} = \frac{80 \times 79}{2}$$
 - 6,320.
 - 6,400.
 - 3,160.
 - 80.
- Correct answer : C

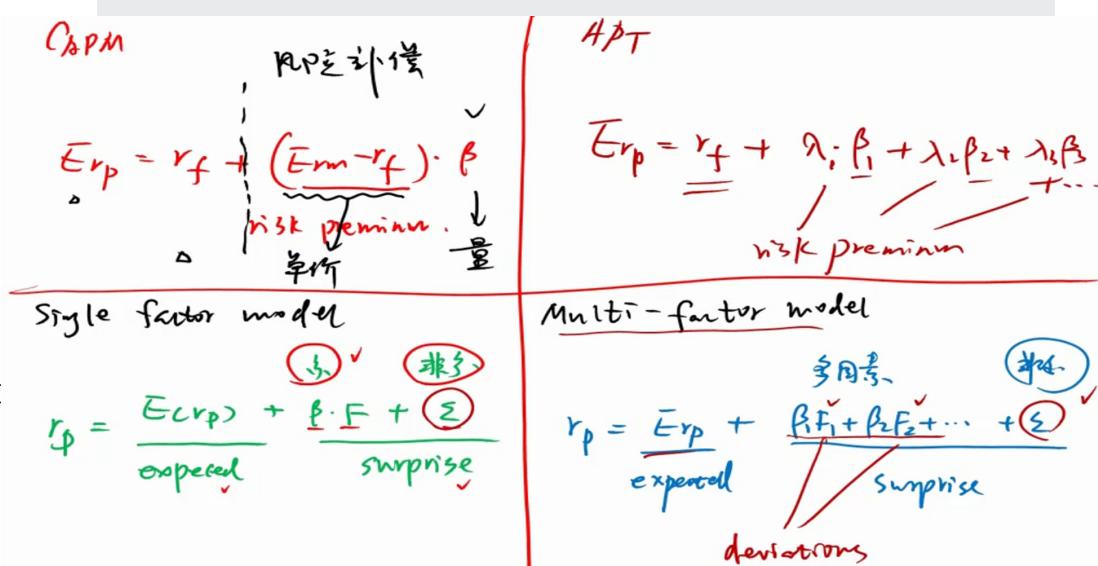
115-190

专业·创新·增值

◆ Example 4



- If the return process for 100 firms is a four-factor market model, then the number of parameters to be estimated is 多因子模型
 - $r_p = E(r_p) + \beta_1 F_1 + \beta_2 F_2 + \beta_3 F_3 + \beta_4 F_4$
 100. $\{F_1, F_2, \dots, F_{100}\}$ - deviation
 386. $\frac{4 \times 100}{2} + \frac{4 \times 3}{2} = 406$
 - 406.



Risk Aggregation and Reporting

风险数据的整合并领导汇报

◆ Introduction of Data Aggregation

➤ A lesson learned from the global financial crisis

- Banks' IT and data architectures were inadequate to support the broad management of financial risks because of weak risk data aggregation capabilities and risk reporting practices.

➤ 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 regarding its risk tolerance/appetite.

➤ Improving risk data aggregation will:

- Help banks and supervisors anticipate problems and make correct decisions.
- Gain in efficiency of risk analysis and management.
- Reduce probability of losses.

118-190

专业·创新·增值

◆ I. Data Architecture and IT Infrastructure

14条准则

➤ Principle 1 风险治理要求 董事会/CRO重视

- 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 Basel Committee.

➤ Principle 2

- Data architecture and IT infrastructure - A bank should design, build and maintain data architecture and IT infrastructure 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 other Principles.

119-190

专业·创新·增值

◆ II. Risk Data Aggregation Capabilities

➤ Principle 3 正确且完整

- 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 aggregated on a largely automated basis to minimize the probability of errors.

➤ Principle 4 完整

- Completeness – A bank should be able to capture and aggregate all material risk data 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.

120-190

专业·创新·增值

◆◆ II. Risk Data Aggregation Capabilities

➤ Principle 5

- Timeliness – A bank should be able to generate aggregate and up-to-date risk data 一周一次 **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 **临时需求**

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

121-190

专业·创新·增值

◆◆ 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 reconciled and validated.

➤ Principle 8 **检查 校正**

- 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.

与公司规模相匹配

122-190

专业·创新·增值

◆◆ 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 decision-making. Reports should include meaningful information tailored to the needs of the recipients.

适合,定制

➤ Principle 10 **频率**

- Frequency – 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.

➤ Principle 11

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

123-190 保护客户机密

专业·创新·增值

◆ IV. Supervisory Review, Tools and Cooperation

➤ Principle 12

- Review - Supervisors should periodically **review and evaluate a bank's compliance** with the eleven Principles above.

➤ Principle 13 应急预案, plan B

- **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 反洗钱, 跨国合作

- **Home/host cooperation** - 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.

124-190

专业·创新·增值

Enterprise Risk Management and Future Trends

全面风险管理

125-190

专业·创新·增值

◆ ERM Definitions

综合

集团

- ERM is a **comprehensive** and **integrated** framework at the **top of enterprise** for managing the entire portfolio of risks in order to achieve business objectives, to minimize unexpected earning volatility, and to maximize firm value.
- Focus on the threats to a firm.

126-190

专业·创新·增值

◆ ERM Definitions

独立的看待风险

Traditional Risk Management	ERM View <i>integrated</i>
Risk viewed in business line, risk-type, and functional silos <i>各个单独管理</i>	Risk viewed across business lines, functions, and risk types, looking at <u>diversification</u> and <u>concentration</u>
Risk managers work in <u>isolation</u>	Risk team <u>integrated</u> using global risk management committee and chief risk officer
Many different risk <u>metrics</u> that <u>cannot be compared</u> (apples to oranges) 指标	Development of rational risk management frameworks and <u>cross-risk universal metrics</u> (e.g., VaR and scenario analysis) to integrate risk view (i.e., apples to apples)
Risk aggregated, if at all, within business lines and risk types. Difficulty seeing the aggregate <u>risk picture</u>	Tools and integrated frameworks make it possible to more accurately measure and track enterprise risk. Potentially, <u>risk is aggregated across multiple risk types.</u>

127-190

专业·创新·增值

◆ ERM Definitions

Traditional Risk Management	ERM View
Each risk type managed using <u>risk-specific</u> transfer instruments	Possibility of cutting risk transfer costs firm-wide and <u>integrated</u> (e.g., multi-trigger) instruments
Each risk management approach (e.g., avoid/retain/mitigate/transfer) often <u>treated separately</u> , with strategy rarely being optimized.	Each risk management approach is viewed as <u>one component of a total cost of risk</u> , ideally measured in a single currency. Component choice is optimized as far as possible in risk/reward and cost/benefit terms expressed in that currency.
<u>Impossible to integrate</u> the management and transfer of risk with balance sheet management and financing strategies	Risk management is increasingly <u>integrated</u> with balance sheet management, capital management, and financing strategies.

128-190

专业·创新·增值

◆ The Benefits of ERM

1. Helping firms define and adhere to enterprise risk appetites
2. Focusing on most threatening risks
3. Identifying enterprise-scale risks generated from business lines **声誉** *reputation.*
4. Managing risk concentrations across the enterprise
5. Managing emerging enterprise risks (e.g., cyber risk, AML (anti-money laundering) risk, reputation risk) **网络安全** *网络安全风险*
6. Supporting regulatory compliance and stakeholder reassurance
7. Helping firms understand risk-type correlations and cross-over risks
8. Optimizing risk transfer expenses in line with risk scale and total cost
9. Incorporating stress scenario capital costs into pricing and business decisions
10. Incorporating risks into business model selection and strategic decisions

129-190

专业·创新·增值

◆ Implementation of ERM

ERM Dimension	Examples
Targets	集团目标 Enterprise goals: Enterprise risk appetite, enterprise limit frameworks, risk-sensitive business goals and strategy formulation
Structure	How we organize ERM: Board risk oversight, global risk committee Risk Officer; ERM subcommittee; reporting lines for ERM; reporting structures
Metrics 指标 universal	How we measure enterprise risk: Enterprise-level risk metrics, enterprise stress testing, aggregate risk measures (Value-at-Risk, Cash-Flow-at-Risk, Earnings-at-Risk, etc.), "total cost of risk" approaches, enterprise level risk mapping and flagging, choice of enterprise-level risk limit metrics
ERM Strategies ① avoid/keep/transfer/ mitigate	How we manage ERM: Enterprise level risk transfer strategies, enterprise risk transfer instruments, enterprise monitoring of business line management of enterprise-scale risks
Culture 风险文化	How we do things: "tone at the top", accountability for key enterprise risks, openness and effective challenge, risk-aligned compensation, staff risk literacy, whistle-blowing mechanisms

130-190

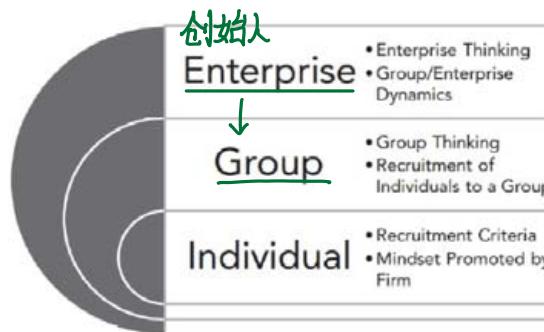
专业·创新·增值

上层发出声音,建立威望.

◆ Risk Culture

指引员工.

- Can be defined as the norms and traditions of behavior of individuals and of groups within an organization that determines the way in which they identify, understand, discuss, and act on the risks the organization confronts and the risks it takes.
- Risk culture is a difficult to address because it is multilayered.



131-190

专业·创新·增值

◆ Risk Culture

- Key risk culture indicators 关键风险指标.

- Leadership tone, 问责制度
- Accountability and risk monitoring,
- Openness and effective challenge,
- Risk-aligned compensation, 薪水
- Risk appetite knowledge,
- Risk literacy, 专业知识
- Risk information flows, 快速流通
- Risk/reward decisions,
- Risk stature, 高度

- 预警.
- Escalation and whistle blowing, 告密
 - Board risk priorities, 优先级
 - Action against risk offenders, 触犯风险的人
 - Risk incident and near miss responses

应对/回应.

132-190

专业·创新·增值

◆ Risk Culture

- There are several **problems** standing in the way of a robust risk culture.
 - Risk indicator or risk lever? 杠杆
 - ✓ It's a lot easier to manage (or manipulate) an indicator than it is to manage risk culture.
 - Education for everyone? 对每个人培训不一样
 - Time and space
 - ✓ Empirical evidence suggests risk culture is mainly formed in the local business lines.
 - Culture cycle (周期)
 - ✓ Arguably, it is only during times of stress that the enterprise's real risk culture becomes visible
 - Curse of data (数据量大)
 - ✓ massive amounts of data

133-190

专业·创新·增值

◆ Scenario Analysis

- Scenario analysis must be unfolded over several quarters.
- Scenario analysis drives a series of interlinked factors covering a variety of risks.
- The risk variables are not static.
- Banks can adjust their capital planning with the scenario's results.
- Imposing a standard set of scenarios on the biggest banks allows regulators to see systemic effects and to compare bank risk exposures.

134-190

专业·创新·增值

◆ Scenario Analysis

Advantages	Disadvantages
No need to consider risk frequency beyond "plausibility"	Difficult to gauge <u>probability of events</u> ; does not lead to the quantification of risk
Scenarios can take the form of transparent and intuitive narratives.	Unfolding scenarios can become <u>complex</u> with many choices.
Challenges firms to imagine the worst and gauge the effects	Firms may not stretch their <u>imaginings</u> (e.g., scenarios might underestimate the impact of an extreme loss event or omit important risk exposures).
Can allow firms to focus on their key exposures, key risk types, and the ways in which risk develops over time	Only a <u>limited</u> number of scenarios can be fully developed—are they the right ones?

135-190

专业·创新·增值

◆ Scenario Analysis

Advantages	Disadvantages
Allows firms to identify warning signals and build contingency plans	Are they the <u>right warnings</u> and plans, given the scenario selection challenge?
Does not depend on historical data; can be based around either historical events or forward-looking hypothetical events	The scenarios chosen are often prompted by the <u>last major crisis</u> ; imaginative future scenarios may be dismissed as improbable. 锚定效应
Firms can make scenario analysis as sophisticated or straightforward as they like, outside regulator defined programs.	Scenario analyses vary in terms of quality and <u>sophistication</u> . Their credibility and assumptions can be difficult to assess.
Stress test results can influence risk appetite, risk limits, and capital adequacy.	<u>Usefulness</u> depends on <u>accuracy</u> , <u>comprehensiveness</u> , and the <u>forward-looking</u> qualities of the firm's stress test program.

136-190

专业·创新·增值

Learning from financial disasters

137-190

专业·创新·增值

◆ 1. Interest Rate Risk

➤ 1980s Savings and Loan Crisis in the US 存贷款行业

- Rising inflation led to a restrictive monetary policy.
- The increase in short-term rates pushed up funding costs for S&Ls.

➤ Result

- A long-running crisis in the United States was sparked 爆发
- The industry lost more money through poorly controlled credit and business risks.
- The world's most expensive banking system bailouts: USD 160 billion.

➤ Lessons

$$\text{Term (asset)} = \text{Term (liability)}$$

- Firms should manage their balance sheet to ensure that effect of interest rate movement on assets remains correlated with the effect on liabilities.
- The use of classical duration matching tools and more sophisticated methods (e.g., caps, floors, and swaps).

138-190

专业·创新·增值

◆◆ 2. Funding Liquidity Risk

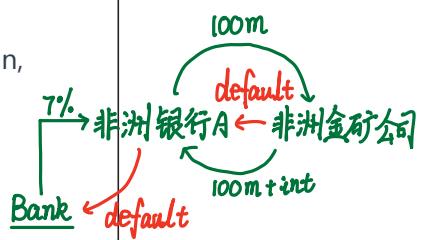
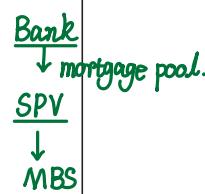
{ funding liquidity risk (缺流动性) }
欠钱但无力还钱)

➤ Liquidity Crisis at Lehman Brothers 雷曼兄弟

- The institution sold mortgages to residential customers and MBS to investors.
- Lehman's growth strategy was aggressive and it made outsized bets on real estate.
- It borrowed short-term money to finance long-term investment.
- After the collapse of Bear Stearns, investors lost confidence in Lehman, which led Lehman to lose its funding source, and to bankruptcy.

➤ Liquidity Crisis at Continental Illinois 大陆银行 (美国救的最后一个)

- Aggressive growth strategy: commercial and industrial lending from USD 5 billion to over USD 14 billion.
- Main funding source: federal funds and large issues of CDs.



139-190

专业·创新·增值

◆◆ 2. Funding Liquidity Risk

- The failure of Penn Square caused Continental to suffer heavy losses.
- It was unable to fund its operations from the U.S. markets and borrowed at much higher rates in foreign money market.
- Rumors led to run on the bank, and regulatory authorities stepped in.

➤ Northern Rock-Liquidity and Business Models 北岩

- An excessive use of short-term financing for long-term assets and a sudden loss of market confidence triggered a funding liquidity crisis.
- Northern Rock accepted emergency government support and then public ownership.

英国 → mortgage (流动性)

140-190

专业·创新·增值

◆◆ 2. Funding Liquidity Risk

➤ Lessons

- Liquidity stress testing programs are important.
- Banks may also mitigate funding liquidity risk by reducing the maturity of their assets. (loans)
- Firms need emergency liquidity cushions to ensure they can meet their commitments. (应急备用金)
- Asset/liability management (ALM) decisions need to be considered by trade-offs: trade-off between funding liquidity and interest rate risk, and trade-off between cost and risk mitigation. Term(saving) = Term(loan)
- All the components of an ALM policy are linked and must be part of a holistic and integrated approach to balance-sheet management.

141-190

专业·创新·增值

未来10年后以固定价格卖石油

tool

◆ 3. Implementing Hedging Strategies (对冲策略)

- 0
- 10 yr买入期货 (oil) P↓ 强制平仓 → 交违约金
- 没有做好现金流对冲
(会计制度用错了)
期货有逐日盯市

10 > Metallgesellschaft Case 德国金属公司

- MGRM: 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, which is known as a **rolling hedge**. 滚动对冲
- In 1993, a large decrease in gas and oil prices had resulted in funding needs of around \$900 million.
- MG negotiated unwinds of these contracts at unfavorable terms. (不利条款)

> Lessons

- When we use shorter-term hedges against longer-term contracts, the strategy can be successfully carried out only if proper risk controls are applied. 凡有评估好 risk.
- It's important to select appropriate models to use for both **pricing** and **hedging**.
- Accounting issues and potential **tax implications** need to be considered when devising a hedging strategy.

142-190

专业·创新·增值

N 卖保险
若明天SP500涨幅=10%
给我100万

→ Investor

◆ 4. Model Risk 模型风险 (IQ高)

> Niederhoffer Case (投机 → 哈佛进课)

- The strategy was writing large quantities of uncovered deep out-of-the-money put options on the S&P 500 Index and collected the option premiums. It failed when the stock market fell by over 7% in one day, which caused the fund's equity to be wiped out by brokers.
- Financial markets rarely offer a "free lunch". 有一定机率产生巨额亏损.

> Long-Term Capital Management 著名经济学家奖得主.

● LTCM's Presumed Positions 套利(加杠杆)

- Long U.S. interest rate swaps and short U.S. government bonds at a time when these spreads were at historically high levels.
- Over the life of the trade, this position will make money as long as the average spread narrows.
- LTCM sold equity options at historically high implied volatilities.

143-190

专业·创新·增值

◆ 4. Model Risk

- LTCM's Funding Sources
 - Deal in over-the-counter markets as well as on futures exchanges.
 - LTCM always negotiated terms that avoided posting the initial margin.
- The Crisis
 - The triggers: Russian debt default in 1998. (俄罗斯国债违约)
 - The LTCM fund's equity began to decline, and it was reluctant to cut positions in a turbulent market.
 - As competitors learned more about the actual positions, their pressure on market prices in the direction unfavorable to LTCM intensified.

144-190

专业·创新·增值

◆◆◆ 4. Model Risk

- The Fall of LTCM
 - ✓ 1994: 20%, 1995: 43%, 1996: 41%, 1997: 17%
 - ✓ In August and September of 1998: a loss of capital more than 70%
 - ✓ 14 of the largest creditors contributed a fresh \$3.65 billion in equity investment into the LTCM fund to allow for a substantial time period in which to close out positions.
 - ✓ By 2000, LTCM had been wound down.
- Lessons of LTCM
 - LTCM failed to supplement VaR measures with a full set of stress test scenarios.
 - LTCM failed to account for the illiquidity of its largest positions.

145-190

专业·创新·增值

◆◆◆ 4. Model Risk

➤ The London Whale 外号

- In 2012, the Chief Investment Office (CIO) of JP Morgan Chase placed a massive bet on a complex set of synthetic credit derivatives that lost at least USD 6.2 billion.

- The CIO took a trading strategy that called for purchasing additional long credit derivatives, which ended up increasing the portfolio's size, risk, and Risk Weighted Assets (RWA) and taking the portfolio into a net long position.
- As the CIO changed valuation methodology and mismarked its books, operation risk was included in the case.
- Poor risk culture of corporate governance was a big problem.
- VaR model was manipulated in favor of CIO.

146-190

专业·创新·增值

◆◆◆ 5. Rogue Trading and Misleading Reporting

➤ Barings Bank 流氓

Account A (对外展示)
Account B (自己看)

- A loss of \$1.25 billion due to the unauthorized trading of a trader Nick Leeson forced Barings into bankruptcy.
- Leeson disguised his speculative position and manufactured substantial reported profits for his own accounts.
- The loss was not detected as Leeson was allowed to function as head of trading and the back office => depriving the firm of an independent check on his activities. (同时是前台与后台的head)

➤ Lessons

- The absolute necessity of an independent trading back office. 分开.
- Oversized profits need to be independently investigated and rigorously monitored. 要调查大额利润

147-190

专业·创新·增值

◆ 5. Rogue Trading and Misleading Reporting

➤ Leeson's trading involved two strategies

- First, selling straddles on the Nikkei 225 and arbitraging price differences on Nikkei 225 futures contracts that were trading on different exchanges. 
- Second, in order to recover the losses, Leeson abandoned the hedged posture 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 Nikkei225 which finally led to much more loss.

148-190

专业·创新·增值

◆ 6. Financial Engineering and Complex Derivatives

➤ Bankers Trust 信孚银行

复杂衍生产品

P&G 告上法庭, BT
吐槽 对论
电子录音

- BT offered P&G and Gibson a probable but small reduction in funding expenses (in exchange) for a potentially large loss under some less probable circumstances. 非常低的概率下会遇到一个极大损失
- Both P&G and Gibson claimed that they had suffered large losses in derivatives trades they had entered into with BT due to being misled by BT as to the nature of the positions.
- BT was forced into an acquisition by Deutsche Bank.

➤ Lessons of Banker Trust

- Banks should match the degree of complexity of trades to the degree of financial sophistication of customers.
- Be cautious about how to use any form of communication.

149-190

专业·创新·增值

◆ 6. Financial Engineering and Complex Derivatives

➤ Orange County 橙县

县投资

- Orange County treasurer Robert Citron borrow USD 12.9 billion through the repo market and used the borrowed funds to purchase complex inverse floating-rate notes. 反向浮动且可追加杠杆
- Before 1994 in the favorable upward-sloping environment, Citron was able to increase the return of the fund by 2% with yield curve play. But after a 250-basis point interest rate increase, he lost USD 1.5 million by December 1994.
- Orange County bankrupted as some of the fund's lenders stopped rolling over their repo agreements.

➤ Lessons of Orange County

- Leverage need to be used carefully and properly.
- Firms need to understand the risks that are inherent in their business models.

150-190

专业·创新·增值

◆◆◆ 6. Financial Engineering and Complex Derivatives

➤ Sachsen Landesbank

冰岛,爱尔兰的MBS + US.MBS.

- Sachsen opened a unit in Dublin to set up vehicles for holding large volumes of highly rated U.S. MBS.
- While the vehicles were off the parent bank's balance sheet, they benefited from Sachsen's guarantee.
- The operation was too large compared to the size of Sachsen's balance sheet. When the subprime crisis struck in 2007, Sachsen's capital was wiped out and it was sold to another German state bank.

➤ Lessons of Sachsen Landesbank

- Funding liquidity commitment should be considered as a credit or liquidity risk rather than only an operation risk.

151-190

专业·创新·增值

◆◆◆ 7. Reputational Risk 名誉风险

大众 排放作弊

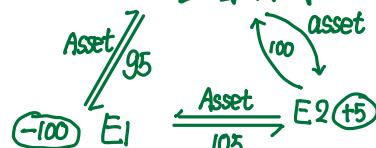
➤ Volkswagen Emission Cheating Scandal

- Volkswagen programmed certain emissions controls. Its diesel engines would be activated only during regulatory testing, which made the nitrogen oxide levels appear to meet U.S. standards.
- From 2009 through 2015, Volkswagen put this programming in place in over ten million cars worldwide.
- In September 2015, the United States Environmental Protection Agency (EPA) announced the scandal. The share price of the company fell by over a third and it faced potential billions of dollars of fines and penalties.

152-190

(+5) 专业·创新·增值

Enron (虚增利润) → 创建许多子公司



◆◆◆ 8. Corporate Governance

➤ Enron 安然: 财务造假 SOX法案

- Enron, which had been named "America's Most Innovative Company", with 20,000 employees and revenues of nearly USD 101 billion in 2000, declared bankruptcy in December 2001.
- It turned out to be a poster child of corporate governance failure and poor risk management.

➤ Reasons for Enron's bankruptcy

- Senior management acted in their own self interest and against the interests of shareholders
- The board failed to fulfill its fiduciary duties to the shareholders.
- Enron also used fraudulent accounting practices to hide flaws in its actual financial performance.

153-190

专业·创新·增值

◆◆ 9. Cyber Risk

支付系統

➤ The SWIFT Case

- SWIFT is the world's leading system for transferring funds electronically among banks.
- In April 2016, an article published in the New York Times revealed that **hackers used the SWIFT network to steal USD 81 million from the account of Bangladesh Bank** (the central bank of Bangladesh) at the New York Fed.
- The malware sent unauthorized SWIFT messages to move the funds to the hackers' account and the database record was deleted.

154-190

专业·创新·增值

◆◆ Example 1



interest risk

- The S&L crisis of the 80s was mainly due to
 - A. S&Ls failing to manage their interest rate risk.
 - B. increased competition among S&Ls.
 - C. increased competition from commercial banks.
 - D. economic recession.
- Correct answer : A

155-190

专业·创新·增值

◆◆ Example 2



- Liquidity risk, which brought the demise of Lehman Brothers and Continental Illinois, was not caused by
 - A. expanding the business too fast.
 - B. reliance on short-term financing. **借短投长**
 - C. changes in regulation that required more liquidity reserves.
 - D. worsening macroeconomic conditions.
- Correct answer : C

156-190

专业·创新·增值

◆◆ Example 3



- In the Northern Rock case one of the lessons is that there is a tradeoff between funding liquidity and interest rate risk: When funding liabilities have shorter duration than loan assets, the bank is exposed to ____ interest rate risk and ____ funding liquidity risk.
 - A. lower, higher 借短投长
 - B. lower, lower
 - C. higher, higher
 - D. higher, lower
- Correct answer : A

157-190

专业·创新·增值

◆◆ Example 4



- In which of the following cases did the firm default due to fraud?
 - A. Metallgesellschaft Refining and Marketing 对冲
 - B. Northern Rock Bank liquidity
 - C. Victor Niederhoffer
 - D. None of the above
- Correct answer : D

158-190

专业·创新·增值

◆◆ Example 5



- Which of the financial disasters was not affected by increased correlations in the markets?
 - ✓ LTCM 大盘下跌
 - B. Metallgesellschaft 石油P↓
 - C. The subprime crisis
 - D. The London Whale 先亏钱
(因为大盘下跌)
- Correct answer : B

159-190

专业·创新·增值

◆ Example 6



- The Enron failure was due to
- A. liquidity risk.
 - B. foreign currency risk
 - C. commodity risk
 - D. governance risk.

➤ Correct answer : D

160-190

专业·创新·增值

Anatomy of the Great Financial Crisis of 2007-2009

次贷危机 GFS

161-190

专业·创新·增值

1.为什么房地产市场出现泡沫

◆ How It All Started

① Growth in housing demand and concomitant mortgage financing was fueled by the low interest rate. *demand↑ with low interest
伴随*

② Cheap Credit and Low Lending Standards

- Teaser rates. *(刚开始利率几乎为0, 0% → 上涨)*
- No-documentation mortgages.
- NINJA (no income, no job or assets) loans.
- Refinance another loan using the increased value of a house. *再抵押*

➤ And housing boom came true!

162-190

专业·创新·增值

◆◆ How It All Started

➤ The Subprime Mortgage Crisis

- House prices and sales continued to drop.
- An increase in subprime mortgage defaults: February 2007
次级违约
- Rating downgrades.
评级下调

➤ Asset-Backed Commercial Paper

- Money market participants had become reluctant to lend to each other.

➤ LIBOR: surged upward in times of crises.

A银行 ← → B银行
借贷

163-190

专业·创新·增值

◆◆ Overview and Timeline of the Crisis

➤ Bernanke's Testimony 美国财长

触发点

- Losses on subprime mortgages were a trigger for the crisis.
- But subprime losses were not large enough for the magnitude of the crisis. “非法集资” bank reserve. 银行借过量钱
- Shadow banking was also the source of key vulnerabilities.

➤ Vulnerabilities in Shadow Banks

①

②

- Short-term debt: repurchase agreements, and commercial paper.
- These markets are large, but unregulated.

164-190

专业·创新·增值

◆◆ Overview and Timeline of the Crisis

➤ The Progress of the Crisis

- Disruptions in the U.S. short-term debt markets created a shortage of U.S. dollars in global markets.
- The failure of Lehman ⇒ run on money market mutual funds.
- Reduction in policy rates. 下调利率
- Banks hoarding liquidity ⇒ transmitting the crisis to the real sector.
囤积

165-190

专业·创新·增值

◆ The Crisis Build-Up

➤ Shadow Banks

① repo

- Raise funds by lending short-term asset-backed commercial paper. ②
- The short-term assets are backed by a pool of mortgages.
- In the case of default, owners of the asset-backed commercial paper have the power to sell the underlying collateral assets.
- But exposes the banks to funding liquidity risk (borrow short and invest in long).

➤ Why were Shadow Banks Growing?

替代物

- The traditional banking model became less profitable.
- Institutional cash pools have a demand for insured deposit alternatives.
- And the shadow banking system rose to fill this gap.

166-190

专业·创新·增值

◆ The Crisis Build-Up

➤ Credit Boom (Foreign Factors)

- In the US: national saving < U.S. capital investment.
- Large and persistent capital inflows from foreigners seeking U.S. assets.
- Institutional cash pools had to find substitutes such as repo.

➤ Credit Boom (Domestic Factors)

- The increase in the production of asset-backed securities appears to be a credit boom.
- House prices were rising.

167-190

专业·创新·增值

◆ The Panics ≈ 270 day

• 商业票据 (抵押券)

1. Asset-backed Commercial Paper ABCP ⇒ asset-backed = mortgage

➤ What is ABCP?

1> 收益率↑

➤ Why ABCP Becoming Prevalent?

2> rolling risk.

- More transparent ⇒ lowering funding costs.
- Save on regulatory capital.

➤ ABCP Run

(rolling risk)

- Lenders are unwilling to refinance CP when it comes due.
- Programs were more likely to experience a run if they had high credit risk or high liquidity risk.

挤兑 {·自动转投

168-190

专业·创新·增值

◆◆ The Panics

2. Money Market Mutual Funds 货币基金(余额宝) { CD大额存单 国债

➤ A Chain Effect

- MMFs saw the values of their stakes decline when ABCP yields rose ⇒ were forced to sell their underlying assets ⇒ further downward pressure on asset classes held by many MMFs.

➤ The Lehman bankruptcy was a major shock to MMFs.

- It led to run on many MMFs. 挤兑
- Investors moved to government-only MMFs.

169-190

专业·创新·增值

◆◆ The Panics



3. Repo 回购

- Repo: A firm borrows funds by selling a collateral asset today and promising to repurchase it at a later date.
- Overnight repos: banks have to roll over their funding on a daily basis.
- Repo is the shadow-banking equivalent of a deposit market.
- Haircuts continued a steady rise throughout 2007-2008.
- Following the Lehman failure, the haircut rose by an additional 20% to 100%.
collateral 的折损率 100% → 50%

- Leading up to the crisis, any reduction in funding liquidity could thus lead to significant stress for the financial system.
- Subprime crisis turned into the collapse of global financial institutions.

170-190

专业·创新·增值

◆◆ The Liquidity Crunch Hits

Liquidity Risk

➤ Funding Liquidity Risk 融资流动性

- Describes the ease with which expert investors and arbitrageurs can obtain funding from financiers.
- Funding liquidity is high when it is easy to raise money.

➤ Market Liquidity Risk 市场

- Market liquidity is low when it is difficult to raise money by selling the asset.

171-190

专业·创新·增值

◆ The Liquidity Crunch Hits

Loss Spiral And Margin Spiral

➤ Loss Spiral 融资螺旋

- Decline in the value of assets \downarrow \Rightarrow eroding the investors' net worth \Rightarrow selling for money \Rightarrow these sales depressing the price further \downarrow \Rightarrow inducing more selling.

➤ Margin/haircut Spiral 变现率 $\downarrow \rightarrow$ haircut spiral \uparrow

- As margins or haircuts rise \Rightarrow the investor has to sell more assets \Rightarrow a lower price \Rightarrow increasing margins further and forcing more sales.

172-190

专业·创新·增值

◆ Systematic Risk in Action

- The confidence that lenders used to had in collateral in the ABCP and repo markets disappeared. (丧失信心)
- Money market funds, typically large purchasers of ABCP and active participants in the repo markets, began to flee to quality.
- The collapse of ABCP and repo markets caused a big problem in the whole financial system, including hedge funds, banks, etc.

173-190

专业·创新·增值

◆ The Role of Financial Intermediaries

1. Banks

- "Originate and distribute" model: banks repackaged loans and passed them on to various other financial investors.
- Collateralized Debt Obligations (CDOs).
- Tranches: senior, equity, mezzanine tranches.
- Credit Default Swaps (CDS): buyers of these tranches can protect themselves by purchasing CDS contracts insuring against the default.

174-190

专业·创新·增值

◆ The Role of Financial Intermediaries

2. Rating Agencies

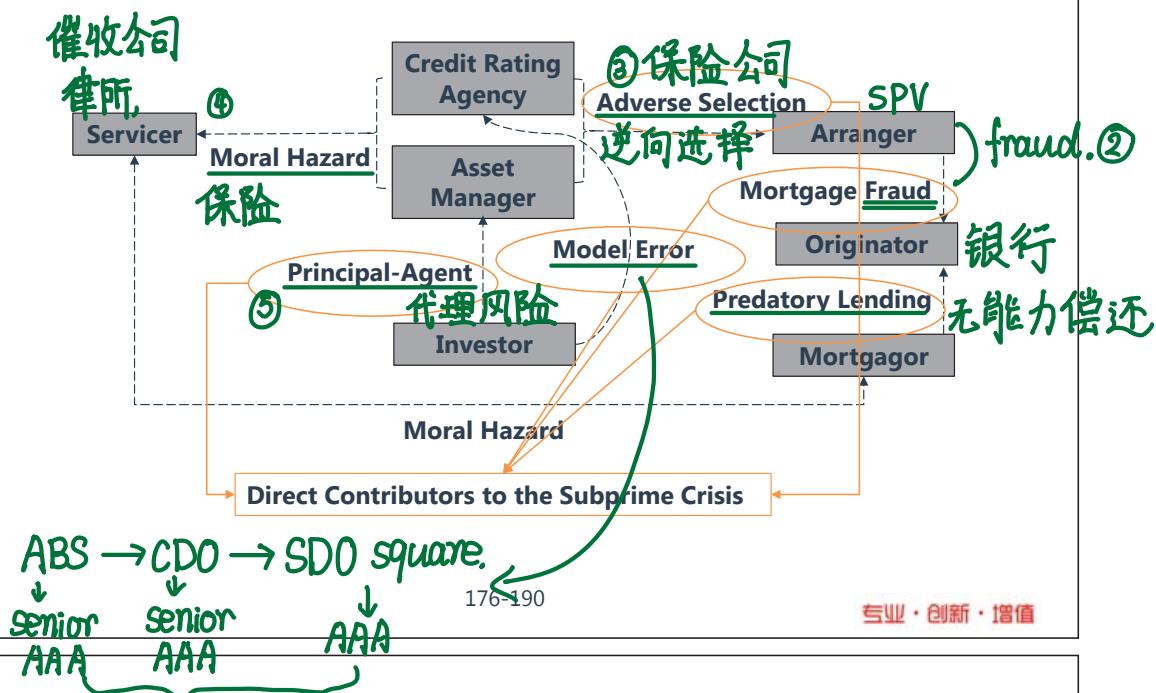
- CDO trust partners would pay credit rating agencies to rate CDOs.
- They could structure the payment waterfalls and associated liabilities to obtain a high percentage of AAA-rated bonds.
- The data problem for rating agencies.
- More favorable ratings: higher rating fees, high return.
- Rating agencies collected higher fees for structured products than corporate bond.

175-190

专业·创新·增值

◆ The Role of Financial Intermediaries

3. Other participants



专业·创新·增值

◆ Central Banks to The Rescue

- Creating long-term lending facilities against high quality collateral
- Opening the discount window²⁴ to investment banks and securities firms
- Providing funds to be lent against high-quality illiquid asset-backed securities,
- Providing funds to finance the purchase of unsecured CP and ABCP
- Providing liquidity to money market funds
- Purchasing assets from Fannie Mae and Freddie Mac

177-190

专业·创新·增值

◆◆ Example 1



- Which of the following most accurately describe the main trigger and main vulnerability of the most recent financial crisis?

Trigger

- A. Run on ABCP
- B. Lehman Brothers bankruptcy
- C. Losses on subprime mortgages
- D. Mortgage defaults by homeowners

Vulnerability

- Shadow banks
- Money market mutual funds
- ABCP and repo agreements
- Holders of MBSs

- Correct answer : C

178-190

专业·创新·增值

◆◆ Example 2



- The Great Financial Crisis (GFC) started
- A. with the failure of Lehman Brothers.
 - B. in the high-tech sector.
 - C. in the subprime mortgage market.
 - D. with the housing price bubble burst

- Correct answer : C

179-190

专业·创新·增值

◆◆ Example 3



- The Lehman Brothers collapse
- A. could have been easily predicted from the ratings of Lehman's debt instruments.
 - B. could have been predicted from the financial reports of the company.
 - C. all of the above.
 - ✓ D. none of the above.

- Correct answer : D

180-190

专业·创新·增值

GARP Code of Conduct

风险管理职业操守

{①案例
②}

181-190

专业·创新·增值

◆ 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.
- 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.

GAAP hold;
candidate.
committee member.

182-190

专业·创新·增值

◆ Code of Conduct

1. Principles

- Professional Integrity and Ethical Conduct
- Conflicts of Interest 利益冲突
 - GARP Members will not knowingly perform risk management services involving a conflict of interest unless full disclosure has been provided to all affected parties.
- Confidentiality 保密
 - GARP Members will prevent intentional and unintentional disclosure of confidential information.

183-190

专业·创新·增值

◆◆ Code of Conduct

2. Professional Standards

➤ Fundamental Responsibilities

- GARP members must encourage others to operate at the highest level of professional skills.

➤ Best Practices

- GARP Members ... will ensure that risk management activities performed under his direct supervision.

➤ Communication and Disclosure

- Clear, appropriate to the circumstances.

184-190

专业·创新·增值

◆◆ Rules of Conduct

1. Professional Integrity And Ethical Conduct

- Maintain independence, and must not solicit any gift that could compromise their independence. **solicit** 乞求, 恳求

...

- Be mindful of cultural differences regarding ethical customs.
- If there is a conflict of standards, the member should seek to apply the higher standard. **遵守更严格法律**

185-190

专业·创新·增值

◆◆ Rules of Conduct

2. Conflict of Interest

- Fully disclose any conflict to all affected parties.

3. Confidentiality

- Maintain the confidentiality of their work, employer or client.

4. Fundamental Responsibilities

5. General Accepted Practices

- Independent from interested parties; objectivity; distinction between fact and opinion.

186-190

专业·创新·增值

◆◆ 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.

① for member.

② holder (持证人)

③ candidate → 不让考试

187-190

专业·创新·增值

◆◆ Example 1



- Jack Schleifer, FRM, is an analyst for Brown Investment Managers(BIM). Schleifer has recently accepted an invitation to visit the facilities of ChemCo, a producer of chemical compounds used in a variety of industries. ChemCo offers to pay for Schleifer's accommodations in a penthouse suite at a luxury hotel and allow Schleifer to use the firm's private jet to travel to its three facilities located in New York, Hong Kong, and London. In addition, ChemCo offers two tickets to a formal high-society dinner in New York. Schleifer declines to use ChemCo's corporate jet or to allow the firm to pay for his accommodations but accepts the tickets to the dinner (which he discloses to his employer) since he will be able to market his firm's mutual funds to other guests at the dinner. Has Schleifer violated the GARP Code of Conduct? (丧失独立客观性)
- A. Yes.
B. No, since he is using the gifts accepted to benefit his employer's interests.
C. No, since the gifts he accepted were fully disclosed in writing to his employer.
D. No, since the gift he accepted is of nominal value and he declined to accept the hotel accommodations and the use of ChemCo's jet.
- Correct answer : A

188-190

专业·创新·增值

◆◆ Loneliness, by Rilke/里尔克

Being apart and lonely is like rain.

隔绝与孤独，如同雨

It climbs toward evening from the ocean plains;

从海面升起，迎向黑夜

from flat places, rolling and remote,
it climbs

从荒野升起

to heaven, which is its old abode.

升向天空，它的故所

And only when leaving heaven
drops upon the city.

而后才从天空洒向城市

189-190

专业·创新·增值

问题反馈

- 如果您认为金程课程讲义/题库/视频或其他资料中存在错误，欢迎您告诉我们，所有提交的内容我们会在最快时间内核查并给与答复。
- 如何告诉我们?
 - 将您发现的问题通过电子邮件告知我们，具体的内容包含:
 - ✓ 您的姓名或网校账号
 - ✓ 所在班级（eg.2011FRM一级长线无忧班）
 - ✓ 问题所在科目（若未知科目，请提供章节、知识点）和页码
 - ✓ 您对问题的详细描述和您的见解
 - 请发送电子邮件至：academic.support@gfedu.net
- 非常感谢您对金程教育的支持，您的每一次反馈都是我们成长的动力。后续我们也将开通其他问题反馈渠道（如微信等）。

190-190

专业·创新·增值

Typology of risk exposures:

1. Market risk

(risk that changes in financial market prices (风险的分类))

- Equity price risk.
- Interest rate risk. (trading risk / gap risk)
- Currency risk. (交易风险)
(foreign exchange)  arises in the balance sheet. [缺4.]
- Commodity price risk.
- option risk.

2. Market risk is driven by:

{ general market risk (systematic risk)
specific risk. (idiosyncratic risk)

3. Credit risk. (信用风险)

→ credit risk is driven

{ probability of default. (PD)
exposure amount at default. (EAD)
Loss given default. (LGD)

→ credit risk type:

{

- Default risk
- Bankruptcy risk. (宣布破产) 并不是全部都到期
- Downgrade risk.
- Settlement risk

4. Operational Risk:

(inadequate, failed internal processes,
people, and systems or from external events)
自然灾害

• Includes legal risk, but excludes business strategic and reputational risk.

• 远离, 战略, 声誉

• Includes :

① human factor risk.
② technology risk. (computer systems)

③ AML Risk:

(anti-money laundry and financing for terrorism.)

2. The Importance of Risk Management:

1. Risk management, risk taking are's opposites.

2. Blames for risk management:

- short-term benefit
- transfer risks to other firm.
- sophisticated financial engineering
(复杂的金融工具)
- derivative markets
- market disruptions / accounting scandals.

3. goal of risk management:

• 增加 shareholder value.

→ determine optimal level of risk

→ 合规

→ tradeoff between return and risk.

• two ways that risk management can destroy value:

▷ fail to ensure the right amount of risk.

▷ fail to exercise the right amount of flexibility

4. Risk Appetite:

Capacity \rightarrow tolerance.



- risk appetite is set ① below the firm's total risk bearing capacity.
② above the amount of risk that firm is exposed to currently.

The Governance of Risk Management (risk governance)