

- D. Funding liquidity risk can be managed by setting limits on certain asset markets or products and by means of diversification.

Answer: C

The yield spread between on-the-run and off-the-run reflects a liquidity premium.

Because the bonds are otherwise nearly identical. In answers a. and d., asset and funding risk should be interchanged. Finally, for b., a flight to quality increases the yield spread.

1.2 Prior to Jon Corzine's arrival, MF Global incurred a large loss due to unauthorized trading. This loss was an operational risk event, but quickly exposed the firm to other risks as well. Which of the following correctly describes a risk that MF Global was exposed to resulting from the unauthorized trading? (Important)

- A. Counterparty credit risk as a result of the low credit quality of many of the trading counterparties.
- B. Asset liquidity risk as most of the trades involved illiquid assets that were difficult to unwind.
- C. Funding liquidity risk as the firm's debt was downgraded by rating agencies.
- D. Market risk related to the long positions in European sovereign debt.

Answer: C

2 Transaction Liquidity Risk Measurement

Measurement
★★★

Transaction Liquidity Risk Measurement

Factors that Influence Liquidity	Characteristics used to measure market liquidity 概念对比
<ul style="list-style-type: none"> Number of traders in the market Frequency and size of trades Time it takes to carry out a trade Cost of transacting Exchange-traded positions (e.g., FX) have more liquid markets than OTC. 	<ul style="list-style-type: none"> Tightness refers to the cost of a round-trip transaction, and is typically measured by the bid-ask spread and brokers' commissions. Depth describes how large an order it takes to move the market adversely. Resiliency is the length of time for which a lumpy order moves the market away from the equilibrium price. Lack of liquidity manifests itself in these observable: Bid-ask spread; Adverse price impact; Slippage (the deterioration in the market price induced by the amount of time it takes to get a trade done)

Liquidity – Adjusted VaR = VaR + Liquidity Cost (LC) 计算

Exogenous Price

Constant Spread Approach: $LC = 0.5 \times V \times \text{spread}$

$$\text{spread} = \frac{(\text{ask price} - \text{bid price})}{(\text{ask price} + \text{bid price})/2}$$

• **Normal** VaR: $\text{LVAR} = (V \times z_\alpha \times \sigma) + [0.5 \times V \times \text{spread}]$

• **Lognormal** VaR: $\text{LVAR} = [1 - \exp(\mu - \sigma \times z_\alpha)] \times V + 0.5 \times \text{spread} \times V$

$$\text{Liquidity adjustment: } \frac{\text{LVAR}}{\text{VAR}} = 1 + \frac{\text{spread}}{2 \times [1 - \exp(-\sigma \times z_\alpha)]}$$

- the liquidity adjustment will **increase (decrease)** when there is an **increase (decrease) in the spread**, a **decrease (increase) in the confidence level**, and a **decrease (increase) in the holding period**

Random Spread Approach

• **Normal** VaR: $\text{LVAR} = (V \times z_\alpha \times \sigma) + 0.5 \times [(\mu_s + z'_\alpha \times \sigma_s)] \times V$

$$\frac{\text{LVAR}}{\text{VAR}} = 1 + \frac{\text{LC}}{\text{VAR}} = 1 + \frac{(\mu_s + z'_\alpha \times \sigma_s)}{2 \times [1 - \exp(-\sigma \times z_\alpha)]}$$

Endogenous Price

$$\text{Elasticity (E)} = \frac{\Delta P/P}{\Delta N/N} \leftarrow \Delta N/N = \text{size of the trade relative to the entire market}$$

$$\text{LVaR} = \text{VaR} \times \left(1 - \frac{\Delta P}{P}\right) = \text{VaR} \times \left(1 - E \times \frac{\Delta N}{N}\right) \Rightarrow \frac{\text{LVaR}}{\text{VaR}} = 1 - E \times \frac{\Delta N}{N}$$

$$\text{Multiplying the effects} \rightarrow \frac{\text{LVAR}}{\text{VAR}} \Big|_{\text{combined}} = \frac{\text{LVAR}}{\text{VAR}} \Big|_{\text{exogenous}} \times \frac{\text{LVAR}}{\text{VAR}} \Big|_{\text{endogenous}}$$

Adjusting VaR for Position Liquidity 计算

- To adjust for the fact that the position could be liquidated over a period of days: $\text{VaR}_t \times \sqrt{\frac{(1+T)(1+2T)}{6T}}$

2.1 Gilbert has been analyzing bid-ask spreads on over-the-counter equities for the last several years in his job as an equity analyst. He notes that with the exception of the 2007–2008 financial crisis, spreads have generally narrowed over his period of study. If Gilbert is correct, this is an indication that

- Liquidity has improved over the period.
- The market has become more resilient over the period.
- The depth of the market has improved over the period.
- Credit risk has fallen over the period.

Answer: A

Factors such as tightness, depth, and resiliency are characteristics used to measure market liquidity. Tightness (Or width) refers to the cost of a round-trip transaction, measured by the bid-ask spread and brokers' commissions. The narrower the spread, the tighter it is. The tighter it is, the greater the liquidity. Depth describes how large an order must be to move the price adversely. In other words, can the market absorb the sale? Resiliency refers to the length of time it takes "lumpy orders" to move the market away from the equilibrium price. In other words, what is the ability of the market to "bounce back" from temporary incorrect prices? In this case, narrowing spreads is indicative of a more liquid market.

2.2 The owner of USD 200 million portfolio wants to estimate the 1-day 99% liquidity-adjusted VaR using the random spread approach. The portfolio daily mean return is zero with daily volatility of 1.4%. The bid-ask spread on the portfolio has a daily mean of 0.1% and standard deviation of 0.2%. If the confidence parameter of the spread is equal to 3, what is the daily

liquidity cost adjustment that should be added to VaR?

- A. USD 0.30 million
- B. USD 0.60 million
- C. USD 0.70 million
- D. USD 1.50 million

Answer: C

2.3 You are a manager of a renowned hedge fund and are analyzing a 1,000 share position in an undervalued but illiquid stock BNA, which has a current stock price of USD 80 (expressed as the midpoint of the current bid-ask spread). Daily return for BNA has an estimated volatility of 1.54%. The average bid-ask spread is USD 0.10. Assuming returns of BNA are normally distributed, what is the estimated liquidity-adjusted daily 95% VaR, using the constant spread approach?

- A. USD 1,389
- B. USD 2,076
- C. USD 3,324
- D. USD 4,351

Answer: B

The constant spread approach adds half of the bid-ask spread (as a percent) to the VaR calculation:

$$\text{Daily 95\% VaR} = 80,000 (1.645 \times 0.0154) = \text{USD } 2026.64$$

$$\text{Liquidity cost (LC)} = 80,000 \times (0.5 \times 0.10/80) = 50$$

$$\text{LVaR} = \text{VaR} + \text{LC} = 2076.64$$

2.4 Suppose that portfolio XYZ has a \$1,000,000 portfolio invested in a stock that has a daily standard deviation of 2%. The current bid-ask spread of that stock is 1%. Assuming a constant spread, what is the liquidity-adjusted VaR (LVaR) at the 95% confidence level?

- A. \$5,000
- B. \$38,000
- C. \$44,200
- D. \$43,000

Answer: B

2.5 You are holding 100 SkyTrek Company shares with a current price of \$30. The daily mean and volatility of the stock return are 2% and 3%, respectively. VaR should be measured relative to initial wealth. The bid-ask spread of the stock varies over time, and the daily mean and

volatility of this spread are 0.5% and 1%, reactively. The return is normally distributed. What is the daily liquidity-adjusted VaR (LVaR) at a 99% confidence level assuming the confidence parameter of the spread is equal to 2.58?

- A. \$193.15
- B. \$172.62
- C. \$103.50
- D. \$195.90

Answer: D

2.6 Assuming the following parameters: $\mu = 0$, $\sigma = 0.006$, spread = 0.01, and a 95% confidence level, the ratio of LVaR to VaR (lognormal VaR) is closest to:

- A. 1.08
- B. 1.51
- C. 1.66
- D. 2.04

Answer: B

2.7 Major Investments is an asset management firm with USD 25 billion under management. It owns 20% of the stock of a company. Major Investments' risk manager is concerned that, in the event the entire position needs to be sold, its size would affect the market price. His estimate of the price elasticity of demand is -0.5. What is the increase in Major Investments' Value-at-Risk estimate for this position if a liquidity adjustment is made?

- A. 4%
- B. 10%
- C. 15%
- D. 20%

Answer: B

What is needed is a liquidity adjustment that reflects the response of the market to a possible trade. The formula to use is the ratio of LVaR to VaR

$$\frac{LVaR}{VaR} = 1 - \frac{\Delta P}{P} = 1 - E \frac{\Delta N}{N}$$

The ratio of LVaR to VaR depends on the elasticity of demand E and the size of the trade, relative to the size of the market ($\Delta N/N$). We are given: $\Delta N/N = -0.5$. Thus $\Delta P/P = \text{elasticity} \times \Delta N/N = -0.1$. Therefore $LVaR/VaR = 1 - \Delta P/P = 1 + 0.1 = 1.1$

The liquidity adjustment increases the VaR by 10%.

2.8 Dowd defines a ratio of LVaR/VaR. Which of the following should be true about this ratio?

- A. It should fall in proportion with the assumed spread increases
- B. It should fall as the confidence level increases
- C. It should rise as the holding period increases
- D. It should be invariant to assumed spread, confidence level and holding period

Answer: B

Dowd: "It is easy to show that the liquidity adjustment (a) rises in proportion with the assumed spread, (b) falls as the confidence level increases, and (c) falls as the holding period increases. The first and third of these are obviously 'correct', but the second implication is one that may or may not be compatible with one's prior expectations."

2.9 A risk manager who has been using a lognormal VaR as the risk measure is considering the inclusion of liquidity into the measure. He decides to use the constant spread approach. Which combination of confidence level and holding period will result in the highest ratio of LVaR to VaR?

Confidence Level Holding Period

- | | |
|--------|--------|
| A. 95% | 1-day |
| B. 99% | 1-day |
| C. 95% | 10-day |
| D. 99% | 10-day |



Answer: A

2.10 Which of the following factors might be (or are likely to be) incorporated into a liquidity-adjusted value at risk (LVaR) model where the liquidity risk is specifically endogenous, not exogenous?

- I. Bid-ask spread
 - II. Size of the trade/size of market
 - III. Price elasticity of demand
- A. I only
 - B. II Only
 - C. I and II.
 - D. II and III.

Answer: D

Dowd's basic approach uses (i) size of the trade/size of market and (ii) price elasticity of demand.

The bid-ask spread can be used (is used in the basic approach) to incorporate exogenous liquidity.

2.11 A trader observes a quote for Stock DUY, and the midpoint of its current best bid and best ask prices is CAD 45. DUY has an estimated daily return volatility of 0.38% and average bid-ask spread of CAD 0.14. Using the constant spread approach on a 20,000 share position and assuming the returns of DUY are normally distributed, what is closest to the estimated liquidity-adjusted, 1-day 95% VaR? (Practice Exam)

- A. CAD 1,600
- B. CAD 5,625.90
- C. CAD 6,600
- D. CAD 7,025.90

Answer: D

Explanation: The daily 95% VaR = $45 * 20,000 * (1.645 * 0.0038) = \text{CAD } 5,625.90$

The constant spread approach adds half of the bid-ask spread (as a percent) to the VaR calculation, using the following formula: Liquidity Cost (LC) = $\frac{1}{2} * (\text{Spread} * P)$, where Spread is equal to the actual spread divided by the midpoint and P is the value of the position. Therefore the liquidity cost (LC) = $0.5 * (0.14/45) * 900,000 = \text{CAD } 1,400$; and Liquidity-adjusted VaR (LVaR) = $\text{VaR} + \text{LC} = 5,625.90 + 1,400 = \text{CAD } 7,025.90$.

2.12 Consider a 1,200 share position in an undervalued but illiquid stock TQR that has a current stock price of EUR 76 (expressed as the midpoint of the current bid-ask spread). The daily return for TQR has an estimated volatility of 0.28%. The average bid-ask spread is EUR 0.18. Using the constant spread approach and assuming the returns of TQR are normally distributed, what is the estimated liquidity adjusted, 1-day 95% VaR? (Practice Exam)

- A. EUR 108
- B. EUR 210
- C. EUR 420
- D. EUR 528

Answer: D

Explanation: The liquidity adjusted VaR (LVaR) derived using the constant spread approach adds half of the bid-ask spread (as a percent) to the VaR calculation, using the following formula:

$\text{LVaR} = \text{VaR} + \text{Liquidity Cost (LC)} = \text{VaR} + \frac{1}{2} * (\text{Spread} * P)$, where Spread is equal to the actual spread divided by the midpoint and P is the value of the position. Therefore, Daily 95% VaR = $76 * 1,200 * (1.645 * 0.0028) = \text{EUR } 420.07$

Liquidity cost = $76 * 1,200 * (0.5 * 0.18 / 76) = 108$

And so, LVaR = $\text{VaR} + \text{LC} = 528.07$

2.13 A mutual fund manager is stress testing a portfolio to simulate large outflows from the fund. In the simulation, the manager assumes a liquidation of 50,000 shares of a company with a share price of USD20. The daily return of this position is lognormally distributed with an estimated mean of 0.0% and volatility of 1.0%, and the average bid-ask spread of this position is USD 0.80. Using the constant spread approach, what is the best estimate of the 1-day 95% liquidity-adjusted VaR of this position? (Important)

- A. USD26,500
- B. USD36,300
- C. USD43,100
- D. USD56,500

Answer: B

3 Funding Liquidity Risk Measurement

Funding Liquidity Risk Measurement	结论
Indicators of Liquidity Risk <ul style="list-style-type: none"> • The <i>difference between LIBOR and fed funds is a term spread.</i> • The credit spread between <i>Eurodollar LIBOR and Treasuries</i> is known as the <i>TED spread</i>. Liquidity at Risk (LaR) <ul style="list-style-type: none"> • Definition: <i>Liquidity at Risk (LaR)</i> (also known as <i>cash flow at risk</i>) is the cash-flow version of VaR. That is, where VaR is concerned with a loss in value, LaR is concerned with a <i>cash flow shortfall</i>. <ul style="list-style-type: none"> • For example, a <i>bond hedged with a futures</i> contract has <i>low VAR but high LAR</i> • Factors that influence cash flow and LAR: <i>Borrowing</i> or lending, <i>Margin requirements</i>, <i>Collateral</i> obligations, <i>Unexpected cash flows</i>, and <i>Changes in risk management policy</i> 	

3.1 Jeremy Park and Brian Larksen are both portfolio managers who hold identical long positions worth GBP 100 million in the FTSE 1000 index. To hedge their respective portfolios, Park shorts TSE 1000 futures contracts while Larksen buys put options on the FTSE 1000. Who has a higher Liquidity-at-Risk (LaR) measure?

- A. Larksen
- B. Park
- C. Both have the same LaR
- D. Insufficient information to determine

Answer: B

The futures positions are exposed to margin calls in the event that the FTSE 1000 increases. Park, with the short futures position, is thus exposed more to liquidity risk (cash flow risk). The Park portfolio, hedged with the short futures contract, will thus have the higher LaR.

3.2 The CEO of a regional bank understands that failing to anticipate cash flow needs is one of the most serious errors that a firm can make and demands that a good liquidity-at-risk (LaR) measurement system be an essential part of the bank's risk management framework. Which of the following statements concerning LaR is correct? (Practice Exam)

- A. Reducing the basis risk through hedging decreases LaR.
- B. Hedging using futures has the same impact on LaR as hedging using long option positions.
- C. For a hedged portfolio, the LaR can differ significantly from the VaR.
- D. A firm's LaR tends to decrease as its credit quality declines.

Answer: C

The LaR can differ substantially from the VaR in a hedged portfolio, and in different situations can be larger or smaller than the VaR. For example, consider a portfolio where futures contracts are used to hedge. While the hedge can reduce the VaR of the portfolio, the LaR can be larger than the VaR as the futures contracts create an exposure to margin calls and the potential for cash outflows. Alternatively, in situations where the hedging instruments do not result in potential cash outflows over the measurement period (e.g., a portfolio of European options which do not expire during the period), the LaR can be smaller than the VaR.

3.3 The Basel Committee recommends that banks use a set of early warning indicators in order to identify emerging risks and potential vulnerabilities in their liquidity position. Which of the following is an early warning indicator of a potential liquidity problem?

- A. Rapid asset growth.
- B. Positive publicity.
- C. Credit rating upgrade.
- D. Increased asset diversification.

Answer: A

Rapid asset growth is an early warning of a potential liquidity problem. Positive publicity, credit rating upgrade, and increased asset diversification are all not early warnings of a potential liquidity problem.

4 Repurchase Agreements and Financing

Repurchase Agreements and Financing ★★

概念对比、结论

Mechanics of Repurchase Agreements	
Definition and Features	<ul style="list-style-type: none"> • short-term loan secured by collateral. The difference between the sell and buy prices of the security is the implied interest • Repo: from the borrower's side; reverse repo: from the lender's side • Repo price at termination: $P_t = P_0 \times \left(1 + \frac{i_r \times t}{360}\right)$
Motivations for entering into repos	<p>Borrowers in Repos</p> <ul style="list-style-type: none"> • Bond Financing: Repos offer relatively cheap sources of obtaining shortterm funds. • Liquidity Management: Repos offer secured short-term financing; Repo financing is cheaper but less stable. <p>Lenders in Repos</p> <ul style="list-style-type: none"> • Cash Management (Repos as Investment Vehicles): Repos offer a low risk, collateral-secured investment opportunity • Short Position Financing (Repos as Financing Vehicles): Lenders may also use repos (as the reverse repo side) to finance short positions in bonds.

The Collateral Market and Leverage

概念对比

General Collateral	Special Collateral
<p>定义: Most repo investors are not usually picky about which particular bond they accept</p> <p>性质:</p> <ul style="list-style-type: none"> • Investors can obtain the highest repo rate • fed funds-GC spread: widens when Treasuries become scarcer (the GC rate falls) or during times of financial stress 	<p>定义: When lenders are concerned with receiving a particular security as collateral</p> <p>性质:</p> <ul style="list-style-type: none"> • The lender: in order to finance the purchase of a bond (for shorting) • Every special rate is typically less than the general collateral rate
<p>Special Spreads</p> <ul style="list-style-type: none"> • The difference between the GC rate and the special rate. • The popularity of OTR issues as special collateral resulted in lower repo rates and wider special spreads. 	
<p>Special Spreads and the Auction Cycle</p> <ul style="list-style-type: none"> • OTR special spreads can be volatile each day depending on the special collateral. • spreads fluctuate over time. • OTR special spreads are generally narrower (smaller) immediately after an auction but wider before auctions. 	
<p>Special Spreads and Rate Levels</p> <ul style="list-style-type: none"> • Special spreads move within a band that is capped at the GC rate (implying a floor of 0% for the special rate). • The special spread can also be tied to the penalty for failed trades. 	
<p>Financing value of a bond: $FV = P_0 \times \left(\frac{i_s \times t}{360}\right)$</p>	

4.1 Pasquini Investments (Pasquini) is a private brokerage looking for 30-day financing of \$25 million of its accounts payable but is unsure whether the appropriate investment is a term repurchase agreement (repo) or a term reverse repo agreement. Pasquini is willing to post AAA-rated government bonds as collateral. The bonds have a face value of \$27 million and a market value of \$25 million. The firm is quoted a rate of 0.5% for the transaction. Which of the following choices most accurately reflects the contract type and the contract price needed by Pasquini?

- | Contract type | Contract price |
|-----------------|----------------|
| A. Repo | \$27,011,250 |
| B. Reverse Repo | \$25,010,417 |
| C. Repo | \$25,010,417 |
| D. Reverse Repo | \$27,011,250 |

Answer: C

Given that Pasquini is a borrower in the repo market, the transaction is a repo from the perspective of the firm (but a reverse repo from the perspective of the lender). The contract price is calculated as follows: $\$25,000,000 \times (1 + 0.5\% \times 30/360) = \$25,010,417$

4.2 At initiation of a repurchase agreement (repo), counterparty A sells a security to counterparty B for settlement on June 1st, 2015 at an invoice price of USD 180 million. At the same time, counterparty A agrees to repurchase the security three months later, for settlement on September 1st, 2015, at a purchase price equal to the original invoice price plus interest at a repo rate of 0.90%. Using the actual/360 convention of most money market instruments, which is nearest to the repurchase price?

- A. \$414,000
- B. \$180,000,000
- C. \$180,414,000
- D. \$181,620,000

Answer: C

$$180,000,000 \times (1 + 0.0090 \times 92/360) = \$180,414,000$$

4.3 In a presentation to management, a bond trader makes the following statements about repo collateral:

Statement 1: The difference between the federal funds rate and the general collateral rate is the special spread.

Statement 2: During times of financial crises, the spread between the federal funds rate and the general collateral rate widens.

Which of the trader's statements are accurate?

- A. Both statements are incorrect.
- B. Only statement 1 is correct.
- C. Only statement 2 is correct.
- D. Both statements are correct.

Answer: C

The trader's first statement is incorrect. The difference between the federal funds rate and the general collateral (GC) rate is known as the fed funds-GC spread. The special spread is the difference between the GC rate and the special rate for a particular security.

The trader's second comment is correct. During times of financial crises, the spread between the federal funds rate and the general collateral rate widens as the willingness to lend Treasury securities declines, lowering the GC rate (thereby increasing the spread).

Section 4 Principles for the Sound Management of Operational Risk

1 Principles for the Sound Management of Operational Risk

Principles for the Sound Management of Operational Risk

Three Lines of Defense

- **Business line management:** identify and manage the risks in the products, activities, processes and systems
- **Functionally independent corporate operational risk function (CORF):** This function may include the operational risk measurement and reporting processes, risk committees and responsibility for board reporting.
- **Independent review:** This review may be done by **audit** or by staff independent of the process or system

The Role of the Board and Senior Management ★

Role of the board should:

- Establish a code of conduct or an **ethics policy**
- Establish a mgt **culture**, and supporting **processes**, to understand the nature and scope of the operational risk , and develop comprehensive, dynamic oversight and control environments
- Provide senior mgt with clear **guidance** and **direction**
- Regularly review the Framework
- Ensure the **Framework** is subject to effective independent review
- Ensure that as **best practice** evolves mgt
- Establish clear lines of mgt **responsibility** and **accountability**
- In approving and reviewing the **risk appetite** and **tolerance**, the board should consider all relevant risks

Role of the board should:

- Establish and maintain robust challenges mechanisms and effective issue-resolution processes
- Translate the operational risk mgt Framework established by the board into specific policies and procedures
- Clearly assign authority, responsibility and reporting relationships
- Ensure the mgt **oversight process** is appropriate
- Ensure staff for managing operational risk coordinate and communicate effectively
- Ensure that the bank **activities** are conducted by staff with the necessary experience
- The **managers** of CORF should be of sufficient stature

1.1 The Basel Committee suggests that banks should maintain three strong lines of defense to help ensure an effective process of operational risk governance. According to the Basel Committee, the first line of defense should be the responsibility of: (Important)

- A functionally independent corporate operational risk function.
- Management staff of individual business lines.
- An independent committee review of key processes and controls.
- Knowledgeable third parties responsible for outsourced risk management functions.

Answer: B

1.2 What can be said about the impact of operational risk on both market risk and credit risk?

- Operational risk has no impact on market risk and credit risk.
- Operational risk has no impact on market risk but has impact on credit risk.
- Operational risk has impact on market risk but no impact on credit risk.
- Operational risk has impact on market risk and credit risk.

Answer: D

Operational risk can lead to market or credit risk. Operational errors in the settlement process

may result in credit risk and market risk since the settlement amount may be dependent on market movements.

Section 5 Risk Capital Attribution and Risk-Adjusted Performance

Measurement

1 RAROC and Adjusted RAROC

RAROC and Adjusted RAROC ★★

计算、结论

$$\text{RAROC} = \frac{\text{After-tax expected risk-adjusted net income}}{\text{Economic capital}}$$

**expected revenues – costs
– expected losses – taxes
+ return on economic capital ± transfers**

Economic capital:

- Risk capital
 - Credit risk
 - Market risk
 - Operational risk
 - Etc
- Strategic risk capital
 - Goodwill
 - Burned-out capital

Hurdle Rate and Capital Budgeting Decision Rule

- The hurdle rate, h_{AT} : $h_{AT} = [(CE * R_{CE}) + (PE * R_{PE})] / (CE + PE)$
- Capital Budgeting Decision Rule**
 - If RAROC > hurdle rate → value creation from the project and accepted.
 - If RAROC < hurdle rate → value destruction and rejected/ discontinued.

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RAROC and other common measures of risk/return 概念对比

RAROC and ROE (or ROA): RAROC has two specific adjustments	结论、了解
<ul style="list-style-type: none"> In the numerator, it deducts expected loss (the risk factor) from the return. In the denominator, it replaces accounting capital with economic capital. 	结论、了解
RAROC and other common measures of risk/return	概念对比
<ul style="list-style-type: none"> The discount rate for the NPV is a risk-adjusted expected return that uses beta (captures systematic risk only) from the capital asset pricing model (CAPM). In contrast to NPV, RAROC takes into account both systematic and unsystematic risk in its earnings figure. 	概念对比

RAROC Assumptions

RAROC Horizon	<ul style="list-style-type: none"> Practitioners usually adopt a one-year time horizon. For market risk, short time horizons require adjustments <ul style="list-style-type: none"> factor to lower the current risk level to the core risk level (i.e., "time to reduce") There is a lot of subjectivity in selecting the time horizon: A longer time horizon could be selected to account for the full business cycle
Default Probabilities	<ul style="list-style-type: none"> A point-in-time (PIT) probability of default could be used to compute short-term expected losses and to price financial instruments with credit risk exposure. A through-the-cycle (TTC) probability of default is more commonly used for computations involving economic capital, profitability, and strategic decisions. the TTC approach results in a lower volatility of economic capital
Confidence Level	<ul style="list-style-type: none"> the confidence level chosen must correspond with the firm's desired credit rating. A high rating such as AA or would require a confidence level in excess of 99.95%, for example.

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Risk Capital and Diversification

Aggregating a firm's risk capital

- The *overall risk capital for a firm should be less than the total of the individual risk capitals*
- Risk reduction due to diversification effects is *very difficult to measure*

Allocating economic capital to different business lines

- A business unit that are *highly correlated* to the overall firm need to be *allocated more risk capital*

Adjusted RAROC ★★

- Adjusted RAROC = RAROC - \beta_E (R_M - R_F)*
- The revised business decision rules**
 - If adjusted RAROC > R_F then accept the project
 - If adjusted RAROC < R_F, then reject the project

计算、结论

RAROC Best Practices

Recommendations for implementing a RAROC approach are as follows:

- Senior Management
- Communication and Education
- Ongoing Consultation
- Data Quality Control
- Complement RAROC with Qualitative Factors

Quality of Earnings: Strategic Importance/Long-Term Growth Potential

1.1 Suppose that a business line of a bank has a loan book of USD 100 million. The average interest rate is 10%. The book is funded at a cost of USD 5.5 million. The economic capital against these loans is USD 7.5 million (7.5% of the loan value) and is invested in low risk securities earning 5.5% per annum. Operating costs are USD 1.5 million per annum and the expected loss on this portfolio is assumed to be 1% per annum (i.e., USD 1 million). The firm's cost of capital is 15%. The RAROC for this business line is:

- A. 26.7%
- B. 37.1%
- C. 21.2%
- D. 32.2%

Answer: D

The RAROC for this business line is:

$$\text{Risk-adjusted return / Risk-adjusted capital} = (100 \times 0.1 - 5.5 - 1.5 - 1 + 7.5 \times 0.055) / 7.5 = 2.4125 / 7.5 = 32.2\%$$

1.2 Given the following data for a project, which of the following statements is most accurate regarding the use of the RAROC?

Equity beta	1.20
Market return	13%
Variance of returns	5%
RAROC	16%
Risk-free rate	4%

- I. Using the adjusted RAROC, the project should be accepted because its adjusted RAROC is higher than the risk-free rate.

II. Using the second-generation RAROC, the project should be accepted because its adjusted RAROC is higher than the market risk premium.

- A. I only.
- B. II only.
- C. Both I and II.
- D. Neither I nor II.

Answer: A

1.3 Widget, Inc. is considering an investment in a new business line. The company calculates the RAROC for the new business line to be 12%. Suppose the risk-free rate is 5%. The expected rate of return on the market is 11 .0%. And the systematic risk of the company is 1.5. If the company only invests in new businesses for which the ARAROC (adjusted RAROC) exceeds the risk-free rate. What return will this new business earn for Widget, Inc.?

- A. 0.0%
- B. 12.0%
- C. 4.7%
- D. 6.0%

Answer: A

1.4 In calculating its risk-adjusted return on capital, your bank uses a capital charge of 2.50% for revolving credit facilities with a loan equivalent factor of 0.35 assigned to the undrawn portion. Recently, you have become concerned that the protective covenants embedded in these loans are weak and may not prevent customers from drawing on the facilities during times of stress. As such, you have recommended doubling the loan equivalent factor to 0.70. This recommendation has met with resistance from the loan origination team, and senior management has asked you to quantify the impact of your recommendation. For a typical facility that has an original principal of USD 1 billion and is 30% drawn, how much additional economic capital would have to be allocated if you increase the loan equivalent factor from 0.35 to 0.70?

- A. USD 3.50 million
- B. USD 6.13 million
- C. USD 8.75 million
- D. USD 13.63 million

Answer: B

The required economic capital to support a loan in the RAROC model can be calculated using the following formula:

$$\text{Required Capital} = [B_{\text{DRAWN}} + (B_{\text{UNDRAWN}} \times \text{LEF})] \times \text{CF}$$

Where LEF represents the loan equivalent factor and CF represents the capital factor.

Therefore the initial required economic capital is calculated as follows:

$$[(1 \text{ billion} \times 0.3) + (1 \text{ billion} \times 0.7 \times 0.35)] \times 2.5\% = \text{USD } 13.625 \text{ million},$$

And the required capital if the change is implemented would be:

$$[(1 \text{ billion} \times 0.3) + (1 \text{ billion} \times 0.7 \times 0.70)] \times 2.5\% = \text{USD } 19.75 \text{ million.}$$

Hence the additional required economic capital would be $19.75 - 13.625$ or 6.13 million.

1.5 Suppose a bank loan has the following characteristics:

Gross revenues are \$1.3 million.

Interest expense is \$0.3 million.

The return on the \$5 million economic capital invested in T-bills is \$100,000.

The firm's beta is 1.5.

The unexpected loss for the loan is estimated at \$500,000.

The adjusted RAROC is equal to 8%.

What is the worst-case loss for this loan?

- A. \$1.6 million.
- B. \$2.3 million.
- C. \$0.9 million.
- D. \$0.75 million.

Answer: C

First, determine RAROC as follows:

$$\text{RAROC} = \beta_E \times \text{RAROC} + R_F$$

The R_F is calculated as the return from economic capital, which is $\$100,000/\$5,000,000 = 2\%$.

$$\text{RAROC} = 1.5 \times 0.08 + 0.02$$

$$\text{RAROC} = 14\%$$

Second, determine the expected loss for the loan as follows:

$$\text{EL} = -(\text{RAROC} \times \text{EC} - \text{revenues} + \text{expenses} - \text{return on EC})$$

$$\text{EL} = -(0.14 \times \$5 - \$1.3M + \$0.3M - \$0.1M) = \$400,000$$

Finally, compute the worst-case loss as the sum of expected and unexpected loss:

$$\text{Worst-case loss} = \text{expected loss} + \text{unexpected loss}$$

$$\text{Worst-case loss} = \$400,000 + \$500,000$$

$$\text{Worst-case loss} = \$0.9M$$

1.6 Which of the following statements regarding the risk-adjusted return on capital (RAROC) methodology is correct?

- A. In the context of performance measurement, RAROC uses accounting profits.
- B. In the numerator of the RAROC equation, expected loss is added to the return.
- C. If a business unit's cost of equity is greater than its RAROC, then the business unit is not adding value to shareholders.
- D. RAROC is useful for determining incentive compensation but it lacks the flexibility to consider deferred or contingent compensation.

Answer: C

The cost of equity represents the minimum rate of return on equity required by shareholders. Therefore, if RAROC is below the cost of equity, then there is no value being added.

1.7 Which of the following statements regarding the choice of default probability approaches in computing economic capital is correct?

- A. A through-the-cycle (TTC) approach should be used to price financial instruments with credit risk exposure.
- B. A point-in-time (PIT) approach is more commonly used for computations involving profitability and strategic decisions.
- C. A TTC approach is more likely to result in a lower volatility of capital compared to the PIT approach.
- D. A firm's rating will not change when analyzed under the PIT approach versus the TTC approach.

Answer: C

A firm's rating is more likely to change when analyzed under the point-in-time (PIT) approach compared to the through-the-cycle (TTC) approach. As a result, the TTC approach results in a lower volatility of economic capital compared to the PIT approach.

A PIT approach should be used to price financial instruments with credit risk exposure and to compute short-term expected losses. A TTC approach is more commonly used for computations involving profitability, strategic decisions, and economic capital.

1.8 A bank uses a capital charge of 3.0% for revolving credit facilities with a loan equivalent factor of 0.4 assigned to the undrawn portion in calculating its risk-adjusted return on capital. A risk manager of the bank has become concerned that the protective covenants embedded in these loans are weak and may not prevent customers from drawing on the facilities during times of stress. As such, the manager has recommended increasing the loan equivalent factor to 0.85. This recommendation has been met with resistance from the loan origination team, and senior management has asked the risk manager to quantify the impact of the recommendation. For a typical facility that has an original principal of USD 1 billion and is 35% drawn, how much

additional economic capital would have to be allocated if the loan equivalent factor is increased from 0.4 to 0.85? (Practice Exam)

- A. USD 3.500 million
- B. USD 6.195 million
- C. USD 8.775 million
- D. USD 18.300 million

Answer: C

Explanation: The required economic capital to support a loan in the RAROC model can be calculated using the following formula:

Required Capital = [DRAWN + (UNDRAWN * LEF)] * CF Where: Credit commitment = COM = USD 1 billion

Drawn amount = Drawn = 35% * COM = 0.35 * USD 1 billion = USD 350 million

Undrawn amount = UnDrawn = COM – Drawn = 65% * COM = USD 650 million

Loan equivalent factor = LEF = 0.4

Capital factor (capital charge) = CF = 3.0%

Therefore the initial required economic capital is calculated as follows: Required Capital = [350 + (650 * 0.4)] * 0.03 = USD 18.3 million, and the required capital if the change is implemented would be: [350 + (650 * 0.85)] * 0.03 = USD 27.075 million.

Hence the additional required economic capital would be 27.075 – 18.3 = USD 8.775 million.

1.9 A chemical company is considering a project that has an estimated risk-adjusted return on capital (RAROC) of 17%. Suppose that the risk-free rate is 4% per year, the expected market rate of return is 12% per year, and the company's equity beta is 1.5. Using the criterion of adjusted risk-adjusted return on capital (ARAROC), the company should: (Practice Exam)

- A. Reject the project because the ARAROC is higher than the market expected excess return.
- B. Accept the project because the ARAROC is higher than the market expected excess return.
- C. Reject the project because the ARAROC is lower than the market expected excess return.
- D. Accept the project because the ARAROC is lower than the market expected excess return.

Answer: B

$$\text{ARAROC} = (\text{RAROC} - R_f)/\beta = (0.17 - 0.04)/1.5 = 8.67\%.$$

$$\text{Market excess return} = R_m - R_f = 0.12 - 0.04 = 8\%.$$

Where: R_f = risk-free rate of return β = beta of company equity R_m = market rate of return

As ARAROC is higher than the market excess return, the project should be accepted.

1.10 Bank BHC is considering a loan to be fully funded by deposits, with the following parameters:

- Loan amount: GBP 5 billion
- Average annual interest rate paid on deposits: 1.2%
- Annual interest rate on loan: 6.0%
- Expected loss: 2.0% of face value of loan
- Annual operating costs: 1.0% of face value of loan
- Economic capital: 8.0%
- Average return on economic capital: 4.0%

What is the risk-adjusted return on capital for this loan? (Practice Exam)

- A. 9.5%
- B. 10.5%
- C. 26.5%
- D. 35.5%

Answer: C

The risk-adjusted return on capital (RAROC) is computed by:

$$RAROC = \frac{\text{Revenue} + \text{Income} - \text{Interest} - \text{Operating Cost} - \text{Loss}}{\text{Economic Capital}}$$

Where:

Economic Capital = GBP 5 billion \times 0.08 = GBP 400,000,000

Revenue = expected revenue = GBP 5 billion \times 0.06 = GBP 300,000,000

Income = return on invested economic capital = GBP 400,000,000 \times 0.04 = GBP 16,000,000

Interest = interest expense = GBP 5 billion \times 0.012 = GBP 60,000,000

Operating Cost = GBP 5 billion \times 0.01 = GBP 50,000,000

Loss = expected loss = GBP 5 billion \times 0.02 = GBP 100,000,000

$$RAROC = \frac{300 + 16 - 60 - 50 - 100}{400} = 0.2650 = 26.5\%$$

1.11 Your bank is considering making a USD 500million loan that will be fully funded by deposits paying an average annual interest rate of 2%.The loan has an interest rate of 7%per year. The expected loss on this loan is assumed to be 1.5% and the operating costs associated with it are assumed to be equal to 1% of the face value of the loan .Assuming that economic capital is set at 10% of the loan book and that it earns 6% per year, what is the risk-adjusted return on capital for this loan? (Important)

- A. 19%
- B. 25%
- C. 29%
- D. 31%

Answer: D

Section 7 Enterprise Risk Management: Theory and Practice

1 Enterprise Risk Management (ERM) and Firm-wide VaR

1.1 In its efforts to enhance its enterprise risk management function, Countryside Bank introduced a new decision-making process based on economic capital that involves assessing sources of risk across different business units and organizational levels. Which of the following statements regarding the correlations between these risks is correct? (Practice Exam)

- A. Correlations between the risks in the asset and liability sides of the balance sheet can be changed by management decisions.
- B. Generally, correlations between broad risk types such as credit, market, and operational risk are well understood and are easy to estimate at the individual firm level.
- C. Correlations between business units are only relevant in deciding total firm-wide economic capital levels and are not relevant for decisions at the individual business unit or project level.
- D. The introduction of correlations into firm-wide risk evaluation will result in a total VaR that, in general, is greater than or equal to the sum of individual business unit VaRs.

Answer: A

Management has the ability to influence the correlations between these risks by changing the asset/Liability mix, so management decision-making is indeed quite relevant.

1.2 While building the bank's enterprise risk management system, a risk analyst takes an inventory of firm risks and categorizes these risks as market, credit, or operational. Which of the following observations of the bank's data should be considered unexpected if compared to similar industry data? (Practice Exam)

- A. The operational risk loss distribution has a large number of small losses and therefore, a relatively low mode.
- B. The operational risk loss distribution is symmetric and fat-tailed.
- C. The credit risk distribution is asymmetric and fat-tailed.
- D. The market risk distribution is similar to the distribution of the return on a portfolio of securities.

Answer: B

Statements (A), (C), and (D) are consistent with industry data. However, with operational risk, there tends to be large numbers of small losses and a small number of large losses, so the distribution is asymmetric (and fat-tailed).

1.3 Nordlandia is a country with a developed economy maintaining its own currency, the Nordlandian crown (NLC), and whose most important export is domestically produced oil and natural gas. In a recent stress test of Nordlandia's banking system, several scenarios were considered. Which of the following is most consistent with being part of a coherent scenario?

- A. An increase in domestic inflation and appreciation of the NLC.
- B. A significant increase in crude oil prices and a decrease in the Nordlandian housing price index.
- C. A drop in crude oil prices and appreciation of the NLC.
- D. A sustained decrease in natural gas prices and a decrease in the Nordlandian stock index.

Answer: D

A scenario is coherent when a change in one factor influences other factors in a logical manner. In this case, choice d is a coherent scenario since the Nordlandian economy depends heavily on exports of oil and natural gas, so therefore a sustained decrease in natural gas prices should lead to a decrease in stock prices as the domestic economy weakens. In stress testing banks, it is often challenging to develop scenarios where all factors behave coherently.

1.4 ABC Company is implementing the enterprise risk management framework to quantify and manage the risk-return tradeoff for the entire firm. Which of the following statements about the ERM framework is/are correct?

- I. The performance of each business unit should be evaluated on a stand-alone basis and the unit should be allocated more capital if its net income is positive.
 - II. The ERM framework tries to minimize the aggregate risk taken by the firm.
- A. Statement I only
 - B. Statement II only
 - C. Both statements are correct.
 - D. Both statements are incorrect.

Answer: D

1.5 A bank holds a portfolio of loans denominated in a foreign currency. The bank separately measures the credit risk and market risk of the portfolio, then determines the portfolio's economic capital by adding (aggregating) the two risk components. Specifically, the bank determines the portfolio's economic capital is \$30 million because the market risk component is \$10 million per a value at risk method and the credit risk component is \$20 million per a CVaR method. Consider four statements about this aggregation:

- I. As VaR is not subadditive, it is technically possible for the portfolio's VaR to exceed \$10 plus \$20 million.

- II. As this summation implicitly assumes zero correlation (and zero covariance) between market and credit risk, if their correlation is actually positive, \$30 million understates economic capital.
- III. There may be “wrong way” risk between the credit and market risk components, in which case the portfolio’s economic capital may be higher than \$30 million.
- IV. VaR is a quantile, not a tail risk measure. Expected shortfall (ES) should be used, in which case, by definition the portfolio’s economic capital (EC) must be higher than \$30 million.

Which of the above are true?

- A. I only
- B. I and III
- C. II and IV
- D. All four

Answer: B

The most important point is the wrong-way risk: “A more important reason why aggregate risk may be larger than the sum of its components is independent of the choice of metric (i.e. it applies to metrics other than VaR) and relates to the economic underpinnings of the portfolios that are pooled. The logic outlined above assumes that covariance (a linear measure of dependence) fully captures and summarizes the dependencies across risks. While this may be a reasonable approximation in many cases, there are instances where the risk interactions are such that the resulting combination may represent higher, not lower, risk. For example, measuring separately the market and credit risk components in a portfolio of foreign currency denominated loans can underestimate risk, since probabilities of obligor default will also be affected by fluctuation in the exchange rate, giving rise to a compounding effect. Similar types of “wrong-way” interactions could occur in the context of portfolio positions that may be simultaneously affected by directional market moves and the failure of counterparties to a hedging position. From a more “macro” perspective, asset price volatility often interacts with the risk appetite of market participants and feeds back to market liquidity leading to a magnification of risk rather than diversification.”

In regard to (II), this is false: summation assumes perfect correlation (1.0) not independence. Summation confers no diversification benefit.

In regard to (IV), VaR is a quantile but that neither disqualifies it, per se, as a tail risk measure nor as a EC metric; e.g., a 99.9% VaR is likely higher than a 95% ES.

1.6 A large investment bank has just acquired a smaller regional competitor and is extending its best practices in the field of operational risk to the newly acquired company. As part of this process, management of the new subsidiary is reviewing which responsibilities should be assumed by the board of directors and which should be assumed by senior management. For which of the following should the board of directors be responsible? (Important)

- A. Implementing operational risk management systems across the organization

- B. Develop a clear, effective and robust governance structure
- C. Assigning responsibilities to, and reporting relationships between, the bank's risk managers
- D. Periodically reviewing and approving the operational risk management framework

Answer: D

1.7 Based on guidance from the Basel Committee. Which of the following best describes a key principle for effective data aggregation and risk reporting? (Important)

- A. The main goal of aggregating risk data should be to meet recurring and standard risk management reporting requests.
- B. A bank should use the same metrics and systems to report risk factors and aggregate risk data across the organization to ensure consistent reporting results
- C. Data and information technology infrastructure should fully support risk reporting practices under all market conditions
- D. Data should be aggregated on a largely manual basis but must be subject to automated validation to reduce the potential for human error

Answer: C

Section 9 The Failure Mechanics of Dealer Banks

1 The Failure Mechanics of Dealer Banks

1.1 In recent years, large dealer banks financed significant fractions of their assets using short-term, often overnight repurchase (repo) agreements in which creditors held bank securities as collateral against default losses. The table below shows the quarter-end financing of four broker-dealer banks. All values are in USD billions:

	Bank A	Bank B	Bank C	Bank D
Financial instruments owned	823	629	723	382
Pledged as collateral	272	289	380	155

In the event that repo creditors become nervous about a bank's solvency, which bank is least vulnerable to a liquidity crisis?

- A. Bank A
- B. Bank B
- C. Bank C
- D. Bank D

Answer: A

A liquidity crisis could materialize if repo creditors become nervous about a bank's solvency and choose not to renew their positions. If enough creditors choose not to renew, the bank could likely be unable to raise sufficient cash by other means on such short notice, thereby precipitating a crisis. However, this vulnerability is directly related to the proportion of assets a bank has pledged as collateral.

Bank A is least vulnerable since it has the least dependence on short-term repo financing (i.e. the lowest percentage of its assets out of the four banks is pledged as collateral: 272/823, or 33%).

1.2 Which of the following statements is most likely correct?

- A. The internal controls policy of BHCs requires that senior management should furnish the board of directors with sufficient information to comprehend the BHC risk exposures.
- B. A governance policy offers fundamental guidelines and principles to BHCs for the capital issuance, use, distribution, and planning purposes.
- C. Suspension or reduction in dividends or repurchase programs do not fall under the capital policy of BHCs.
- D. Designing and testing a scenario-related default of a major counterparty is an example of BHC stress testing and a stress scenario design policy.

Answer: D

The first statement is the requirement of the governance policy and not the internal control policy. The second statement falls under capital policy and not the governance policy. Regarding the third statement, capital contingency plans (e.g., suspension or reduction in dividends or repurchase programs) are a key part of capital policies of BHCs detailing the actions intended to be taken under deficiencies in capital position. The fourth statement is correct. Many different scenarios, including counterparty default, fall under the BHCs stress testing and scenario design policy.

1.3 At times, large dealer banks have financed significant fractions of their assets using short-term (often, overnight) repurchase agreements in which creditors held bank securities as collateral against default losses. The table below shows the quarter-end financing of four broker-dealer financial instruments. All values are in USD billions.

	Bank W	Bank X	Bank Y	Bank Z
Financial instruments owned	2,669	2,850	3,100	3,450
Pledged as collateral	1,200	1,550	1,870	825

In the event that repo creditors become equally nervous about each bank's solvency, which bank is most vulnerable to a liquidity crisis? (Practice Exam)

- A. Bank W
- B. Bank X

- C. Bank Y
D. Bank Z

Answer: C

	Bank w	Bank x	Bank y	Bank z
Financial instruments owned	2,669	2,850	3,100	3,450
Pledged as collateral	1,200	1,550	1,870	825
Not pledged	1,469	1,300	1,230	2,625
Fraction Pledged	45%	54%	60%	24%

A liquidity crisis could materialize if repo creditors become nervous about a bank's solvency and choose not to renew their positions. If enough creditors choose not to renew, the bank could likely be unable to raise sufficient cash by other means on such short notice, thereby precipitating a crisis. However, this vulnerability is directly related to the proportion of assets a bank has pledged as collateral.

Bank Y is most vulnerable since it has the largest dependence on short-term repo financing (i.e. the highest percentage of its assets out of the four banks is pledged as collateral).

Section 10 Stress Testing Banks

1 Stress Testing Banks

1.1 A country with a developed economy maintains its own currency, NLC, and has domestically produced oil and natural gas as its most important exports. In a recent stress test of the country's banking system, several scenarios were considered. Which of the following is most consistent with being part of a coherent scenario? (Practice Exam)

- A. An increase in domestic inflation and appreciation of the NLC
- B. A significant increase in crude oil prices and a decrease in the country housing price index
- C. A drop in crude oil prices and appreciation of the NLC
- D. A sustained decrease in natural gas prices and a decrease in the country's stock index

Answer: D

Explanation: A scenario is coherent when a change in one factor influences other factors in a logical manner. In this case, choice d is a coherent scenario since the country's economy depends heavily on exports of oil and natural gas, so therefore a sustained decrease in natural gas prices should lead to a decrease in stock prices as the domestic economy weakens. In stress testing banks, it is often challenging to develop scenarios where all factors behave coherently.

Section 11 Capital Planning at Large Bank Holding Companies

1 Capital Planning at Large Bank Holding Companies

1.1 QUESTIONS 31 AND 32 REFER TO THE FOLLOWING INFORMATION

A risk management consultant is involved in evaluating the capital planning at a US-based bank holding company (BHC) with over USD 100 billion in total consolidated assets. The evaluation includes looking at the stress testing program that is integral to the capital planning process.

(1) In evaluating the BHC's design of stress scenarios, which of the following statements is correct?

- A. Although the BHC may feel it is losing some of its independence, limiting the scenarios to those developed by the Federal Reserve will ensure regulatory compliance.
- B. To avoid introducing bias, if the BHC uses private sector third-party-defined scenarios, they should be implemented without alteration.
- C. In order to properly assess both right-way and wrong-way risk in stress environments, assumptions should be included that specifically benefit the BHC.
- D. When developing scenarios internally, it is acceptable to combine expert judgment with quantitative models rather than relying only on the models.

Answer: D

(2) In evaluating the modeling program of the BHC, which of the following statements is correct?

- A. To reflect a range of economic conditions, the BHC should use long-run historical averages when estimating expected losses during periods of stress
- B. To compensate for the limited number of realized outcomes under stressful scenarios, when back-testing loss models, the BHC should compare results to those derived from different estimation approaches.
- C. To avoid the imprecision that occurs when estimating loss models at a granular level, the BHC should strive to use aggregate high-level data for model estimation purposes
- D. To ensure consistency across business segments and portfolios, the BHC should use the fewest number of models possible to estimate losses across its business lines

Answer: B

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Basel Accord

1 Basel I – Credit Risk

On-Balance-Sheet Risk Charge		Off-Balance-Sheet Risk Charge
Risk Capital Weights By Asset Class		
Weights	Asset type	
0%	Cash, gold, claims on Organization of Economic Co-operation and Development (OECD) countries such as U.S. Treasury bonds and insured residential mortgages	<ul style="list-style-type: none"> To account for off-balance-sheet items, such as guarantees, letter of credit, credit lines, the Basel Accord computes a credit exposure that is equivalent to the notional for a loan, through credit conversion factors.
20%	Claims on OECD banks and government agencies like U.S. agency securities or municipal bonds	<ul style="list-style-type: none"> Other derivatives are given special treatment due to the complexity of their exposures. (Add-On): Credit equivalent amount = $\max(V, 0) + \alpha \times L$
50%	Uninsured residential mortgages	Risk weights are similar with the exception of corporate counterparties. If the counterparty is a corporation, the risk weight is 50%.
100%	Loans to corporations, corporate bonds, claims on non-OECD banks	

1.1 Michigan One Bank and Trust has entered a \$200 million interest rate swap with a corporation. The remaining maturity of the swap is six years. The current value of the swap is \$3.5 million. Using the table below to find the add-on factor for the interest rate swap, the equivalent risk-weighted assets (RWA) under Basel I is closest to:

Add-on Factors as a Percentage of Principal for Derivatives		
Remaining Maturity in Years	Interest Rate	Equity
<1 year	0.0	6.0
1 to 5 years	0.5	8.0
>5 years	1.5	10.0

- A. \$3,000,000
- B. \$3,250,000
- C. \$3,500,000
- D. \$6,500,000

Answer: B

The add-on factor is 1.5% of the interest rate swap principal for swaps with a maturity greater than five years.

Credit equivalent amount = $\max(V, 0) + a \times L$

Where:

V = current value of the derivative to the bank

a = add-on factor

L = principal amount

Credit equivalent amount = $\$3.5 + (0.015 \times \$200) = \$6,500,000$

The risk-weight factor for a corporate counterparty under Basel I is 50% for derivatives and 100% for corporate loans. This means the risk-weighted assets (RWA) are:

$$\text{RWA} = 0.50 \times \$6,500,000 = \$3,250,000$$

2 Basel II: Pillar 1 – Capital Requirements

Basel II: Pillar 1 – Capital Requirements

Definition of Capital

Item	Item of Capital base
1	Tier 1 Capital, or "Core" Capital
1.1	Equity capital: <i>common stock and nonredeemable, noncumulative preference shares</i>
1.2	Disclosed reserves: <i>share premiums, retained profits, and general reserves</i>
1.3	Goodwill (<i>deducted</i>)
2	Tier 2 Capital, or "Supplementary" Capital
2.1	Undisclosed reserves: Reserves that passed through the earnings statement but remain unpublished
2.2	Asset Revaluation reserves
2.3	General loan-loss provision: held against future unidentified losses.
2.4	Hybrid debt capital instruments: combine some characteristics of equity and of debt
2.5	Subordinated term debt: minimum original maturity of <i>five years</i>
3	Tier 3 Capital (Short-term subordinated debt covering <i>market risk</i>): with a maturity of <i>at least two years</i> .

Capital Requirements

$$\frac{\text{Total Capital}}{\text{RWA}_{\text{Credit}} + (\text{MRC}_{\text{Market}} \times 12.5) + (\text{ORC}_{\text{Opri}} \times 12.5)} \geq 8\%$$

- *At least 50% of capital must be Tier 1.* This means there is a 4% Tier 1 capital to risk-weighted assets requirement (i.e., $8\% \times 0.5$). *Half of the Tier 1 requirement has to be met with common equity.*

2.1 Banks are required to maintain 8 percent of their assets as "Tier 1 Capital". Which of the following count towards this capital requirement?

- I. Shareholders equity.
- II. Sovereign debt held in the trading book.
- III. Common stock of other banks.
- IV. Subordinated debt issued by the bank in question (subject to certain qualifying rules).
 - A. I, II, and IV
 - B. II and III
 - C. I and IV
 - D. I only

Answer: D

Only equity capital and disclosed reserves (primarily after the retained earnings) qualify as Tier 1 capital.

2.2 According to the Basel II Accord. "At the discretion of their national authority, banks may

also use a third tier of capital (Tier 3). Consisting of short-term subordinated debt for the sole purpose of meeting a proportion of the capital requirements" for which of the following?

- A. Market risk charges only
- B. Credit risk charges only
- C. Market risk and credit risk charges
- D. All types of risk charges

Answer: A

Tier 3 capital can only be used to satisfy capital requirements resulting from market risk charges and cannot be applied to credit risk charges. Other choices are incorrect except choice A.

3 Basel II: Pillar 1 – Credit Risk Measurement

Pillar 1 – Credit Risk Measurement

Standardized Approach

- The Standardized Approach incorporates risk weights based on *external credit rating assessments*.

Risk weight by asset class (On-balance sheet items)						
Claim	Credit rating					
	AAA/ AA-	A+/A-	BBB+/BBB-	BB+/B-	Below B-	Unrated
Sovereign	0%	20%	50%	100%	150%	100%
Banks-option 1	20%	50%	100%	100%	150%	100%
Banks-option 2	20%	50%	50%	100%	150%	100%
Short-term	20%	20%	20%	50%	150%	20%
Claim	AAA/ AA-	A+/A-	BBB+/BB-		Below BB-	Unrated
Corporates	20%	50%	100%		150%	100%

Collateral Adjustment

- *The simple approach:* the *risk weight of the collateral replaces the risk weight of the counterparty*.
- *The comprehensive approach:* *adjust the size of the exposure upward and the value of the collateral downward*

$$E^* = \max \{0, [E \times (1 + H_c) - C \times (1 - H_c - H_{fx})]\}$$

Internal Rating-Based (IRB) Approaches

预期损失 (EL)	=	违约概率 (PD)	X	违约损失率 (LGD)	X	违约暴露额 (EAD)	X	Effective maturity (M)
FIRB		银行自行估计		监管当局给出		监管当局给出		监管当局给出
AIRB		银行自行估计		银行自行估计		银行自行估计		银行自行估计

Required capital = EAD x LGD x (WCDR - PD) x MA

$$WCDR_i = N \left[\frac{N^{-1}(PDi) + \sqrt{\rho} N^{-1}(0.999)}{\sqrt{1-\rho}} \right]$$

$$\rho = 0.12 \times \frac{1 - \exp(-50 \times PD)}{1 - \exp(-50)} + 0.24 \times \left(1 - \frac{1 - \exp(-50 \times PD)}{1 - \exp(-50)} \right)$$

$$MA = (1 + (M - 2.5) \times b) / (1 - 1.5 \times b)$$

$$b = [0.11852 - 0.05478 \times \ln(PD)]^2$$

Asymptotic Single Risk Factor (ASRF) Model

- The capital requirement is based on a *VaR* calculated over a *one-year time horizon* and a *99.9% confidence level*.
- *All systematic risks* are modeled by *a single risk factor*; *all idiosyncratic (unsystematic) risks* tend to *cancel out*.
- *R: Asset correlations increase with firm size. Asset correlations decrease with higher PDs* as higher PDs suggest more idiosyncratic risk.
- *Maturity Adjustment:* Under the *foundation* approach, the effective maturity is assumed to be *2.5 years*, while the effective maturity is *calculated individually based on PD* under the *advanced* IRB approach.
- *LGD of FIRB: LGD at 45% for senior claims and 75% for subordinated claims*. If there is *collateral*, the *LGD is reduced using the comprehensive approach* described earlier.

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Asset Securitization

- A bank can remove these assets from its balance sheet only after a *true sale*

The Standardized Approach

	AAA/AA-	A+/A-	BBB+/BBB-	BB+/BB-	B+ and below or unrated
Tranche	20%	50%	100%	350%	1250% (deduction)

The IRB approach

- External Ratings-Based Approach (RBA)
- Supervisory Formula (SF)
- Internal Assessment Approach (IAA)

3.1 Each of the following is true about the internal ratings-based (IRB) approaches to credit risk under Basel III, except which is false?

- In both approaches (FIRB and AIRB) each debt issuer is assigned a probability of default (PD) according to the bank's internal rating system
- In both approaches (FIRB and AIRB) the goal is to compute a credit risk charge that supports unexpected credit losses at a 99.9% confidence level over a one-year horizon
- In both approaches (FIRB and AIRB) the credit risk function is a multi-factor(APT) model which does not assume the credit portfolio is diversified
- In Foundation IRB approach, only default probability (PD) is assigned by the bank's internal model; but exposure at default (EAD) is based on credit conversion factors (CCF), LGD is set to either 45% or 75%, and residual maturity is generally fixed at 2.5 years

Answer: C

P Z A C A D E M Y . C O M

Perhaps the critical assumption of the internal ratings-based models is so-called portfolio invariance: individual exposure charges do not depend on the rest of the credit portfolio, but rather depend on their presumed correlation to a single factor. This is achieved with the dubious assumption of a well-diversified ("infinitely granular") portfolio and exposure to a single common risk factor (the asymptotic risk factor, ASRF).

In regard to (A), (B) and (D), each is true.

3.2 Each of the following is true about the foundation/advanced internal ratings-based (IRB) approach to credit risk in Basel II and Basel III, except:

- The risk weight function estimates a 99.9% confident one-year horizon credit value-at-risk (CVaR)
- The capital charge intends to cover unexpected losses (UL) and not expected losses (EL) with $UL = CVaR - EL$
- The risk weight function includes PD, EL, EAD, LGD and asset correlations but does not include a maturity (M) adjustment
- Asset (default) correlations are included in the risk weight function but cannot be specified by the bank's own internal estimates (in either FIRB or AIRB)

Answer: C

The risk-weight function does indeed include an effective maturity adjustment (M) that is equal to a generic 2.5 years in FIRB and which is defined for each facility in AIRB. In general, longer maturities imply higher charges.

In regard to (A), (B), and (D), all are TRUE.

4 Basel II: Pillar 1 – Market Risk Measurement

Pillar 1 – Market Risk Measurement

Standardized Measurement Method

$$MRC_t^{STD} = \sum_{j=1}^5 MRC_t^j = MRC_t^{IR} + MRC_t^{EQ} + MRC_t^{FX} + MRC_t^{CO} + MRC_t^{OP}$$

- It *ignores correlations between the instruments*. Banks with *less sophisticated risk management processes* are more likely to use this approach.

Internal Models Approach

$$\text{market RWA} = 12.5 \left[\max(VaR_{t-1}, m_c \times VaR_{avg}) + SRC \right]$$

- This method calculates a **value at risk (VaR)** measure. **Capital charges are generally lower** using this method because it better reflects the **benefits of diversification**.
- VaR_{t-1} = previous day's VaR, VaR_{avg} = the average VaR over the past 60 trading days m_c , m = multiplicative factor
- Quantitative Parameters
 - A horizon of **10 trading days**; banks can scale their **daily VaR** by the square root of time.
 - A **99%** confidence interval
 - An observation period based on **at least a year of historical data**. **The 2009 revisions require a minimum monthly update**.
- The specific risk charge (SRC):** The VaR model does not incorporate company-specific risks such as changes in a firm's credit spread or changes in a company's stock price.

The multiplicative factor (Plus Factor): The Basel Penalty Zones		
Zone	Number of exceptions	Potential increase in k
Green	0 to 4	0.00
Yellow	5	0.40
Yellow	6	0.50
Yellow	7	0.65
Yellow	8	0.75
Yellow	9	0.85
Red	≥ 10	1.00

4.1 As a risk manager for Bank ABC is asked to calculate the market risk capital charge of the bank's trading portfolio under the internal models approach using the information given in the table below. Assuming the return of the bank's trading portfolio is normally distributed, what is the market risk capital charge of the trading portfolio?

VaR (95%, 1-day) of last trading day USD 30,000

Average VaR (95%, 1-day) for last 60 trading days USD 20,000

Multiplication Factor 3

A. USD 84,582

B. USD 134,594

C. USD 189,737

D. USD 267,471

Answer: D**Market Risk Capital Charge**

$$\text{MAX}(30,000 \times \text{SQRT}(10)/1.65 \times 2.326, 3 \times 20,000 \times \text{SQRT}(10)/1.65 \times 2.326) = 267,471$$

Candidate is required to convert the VaR (95%, 1-day) to a 95% 10-day VaR.

4.2 As a result of the credit crisis, the Basel Committee revised the market risk framework and introduced a stressed VaR requirement. A bank uses the internal models approach for market risk and has generated the following risk measures (in USD million) for the current trading book positions:

Confidence Level	Latest Available 10-day VaR	Latest Available 10-day Stressed VaR	Average 10-day VaR of Previous 60 Days	Average 10-day Stressed VaR of Previous 60 Days
95.0%	305	664	340	743
99.0%	588	1,345	555	1,489
99.9%	757	1,726	708	1,844

The supervisory authority has set the multiplication factors for both the VaR and stressed VaR values to 3. What is the capital requirement for general market risk? (Practice Exam)

- A. USD 1,665 million
- B. USD 3,977 million
- C. USD 6,132 million
- D. USD 8,502 million

Answer: C

The revised market risk capital requirement is:

$$\begin{aligned} \text{Market Risk Capital} &= \max(\text{VaR}_{t-1}, m_c * \text{VaR}_{60\text{-day Avg}}) + \max(\text{SVaR}_{t-1}, m_s * \text{SVaR}_{60\text{-day Avg}}) \\ &= \max(588, 3 * 555) + \max(1345, 3 * 1489) = \text{USD } 6,132 \text{ million} \end{aligned}$$

4.3 The Basel II accord requires a supervisory backtesting framework with all of the following components except:

- A. Seven zones with different plus factors.
- B. Verifies daily deviations from estimated VaR.
- C. Extends over a 1-year period (i.e., 250 trading days).
- D. A multiplier that is subject to a floor of three

Answer: A

The backtesting framework only includes three zones: green, yellow, and red. The plus factor determined from these zones is added to the multiplier floor of three.

4.4 Saugatuck National Bank uses the internal model-based approach to set market risk capital as prescribed by the 1996 Amendment to the 1988 Basel Accord. The bank has backtested its 99%, one-day VaRs against the actual losses over the last 250 trading days. Based on the results of the backtesting, the bank recorded 11 exceptions. Based on these results, the multiplicative factor (m_c) in the model should be set:

- A. Less than 3
- B. Equal to 3
- C. Between 3.1 and 3.9
- D. Equal to 4

Answer: D

Saugatuck National Bank must compare the VaR calculated using its current method for each of the 250 trading days to the actual loss over the same period to determine the multiplicative factor. If the actual loss is greater than the estimated loss, an exception is recorded. If, over the previous 250 days, the number of exceptions is:

- Less than 5, m_c is usually set equal to three.
- 5, 6, 7, 8, or 9, m_c is set equal to 3.4, 3.5, 3.65, 3.75, and 3.85, respectively.
- Greater than 10, m_c is set equal to four.

Therefore, with 11 exceptions recorded, m_c should be set equal to four.

4.5 Which of the following is true about the standardized measurement method for the calculation of market risk under Basel III?

- A. Tier 3 capital is eligible to support market risks calculated by the standardized approach in Basel III
- B. The capital charge is an arithmetic sum of charges across categories, including interest rate risk, equity position risk, foreign exchange risk, commodities risk, and options risk
- C. For trading portfolios, according to the Third Pillar disclosure requirements, the high, mean and low value at risk (VaR) values over the reporting period must be disclosed
- D. If an equities portfolio is both liquid and well-diversified, the capital charge for general market risk and specific risk is 4.0%

Answer: B

The capital charge is an arithmetic sum of charges across categories including interest rate risk, equity position risk, foreign exchange risk, commodities risk, and options risk. This is why a key criticism of the standardized approach is that it overcharges by ignoring the benefits of any diversification.

In regard to (A), this is false: Basel III abolished Tier 3 capital

In regard to (C), this is false: Third Pillar does require VaR disclosure, but for the internal

models approach (IMA) as they would not be necessary under the standardized approach

In regard to (D), this is false: Basel III eliminated this provision.

4.6 Under Basel III, each of the following is true about the internal models approach (IMA) to market risk except which is false?

- A. Value at risk (VaR) must be computed on a daily basis with a one-tailed confidence level of 99.0% and a minimum holding period of ten (10) days
- B. Banks must update their data sets at least once a year which corresponds to the maximum historical observation (sample) period
- C. A bank must support their VaR model with all three of the following: a stress testing program, a back-testing program, and on-going validation
- D. Market risk factors that are deemed relevant for pricing should be included as risk factors in the value-at-risk (VaR) model

Answer: B

The sample period is a minimum of one year and the data set must be updated at least monthly: "The choice of historical observation period (sample period) for calculating value-at-risk will be constrained to a minimum length of one year...Banks must update their data sets no less frequently than once every month and reassess them whenever market prices are subject to material changes. This updating process must be flexible enough to allow for more frequent updates."

In regard to (A), (C) and (D), each is true.

5 Basel II: Pillar 1 – Operational Risk Measurement

Pillar 1 – Operational Risk Measurement		
	The Basel Operational Risk Charge	Business Line
Basic Indicator Approach	$K_{BIA} = \alpha * GI$, $\alpha = 15\%$ NOTE: If negative gross revenues are experienced in a previous year, that year is not counted	corporate finance trading and sales settlement and payment activities
Standardized Approach	Bank's activities are divided into 8 business lines $K_{TSA} = \sum_1^8 \beta_i \times GI_i$	commercial banking agency and custody services retail banking asset management retail brokerage
The advanced measurement approach (AMA)	<ul style="list-style-type: none"> • The operational risk capital requirement is equal to the unexpected loss in a total loss distribution that corresponds to a confidence level of 99.9% over a 1-year time horizon. • Firms are encouraged to use the loss distribution approach (LDA). 	18% 18% 18% 15% 15% 12% 12% 12%

5.1 Your bank is implementing the advanced Internal Rating Based Approach of Basel II for credit risk, and the Advanced Measurement Approach for operational risk. The bank uses the internal model approach for market risk. The Chief Risk Officer (CRO) wants to estimate the bank's total risk by adding up the regulatory capital for market risk, credit risk, and operational risk. The CRO asks you to identify the problems with using this approach to estimate the bank's

total risk. Which of the following statements about this approach is incorrect?

- A. It assumes market, credit, and operational risks have zero correlation.
- B. It uses a 10-day horizon for market risk.
- C. It ignores strategic risks.
- D. It ignores the interest risk associated with the bank's loans.

Answer: A

It is the perfect correlation.

5.2 A bank uses the basic indicator approach (BIA) to determine their capital charge for operational risk under Basel II (or Basel III). The bank's annual gross income (GI) over the previous three years was +\$130 million (T-3), -\$60 million loss (T-2), and +\$230 million (T-1). What is the bank's operational risk capital charge?

- A. \$15.0 million
- B. \$18.0 million
- C. \$27.0 million
- D. \$34.5 million

Answer: C

The loss year is excluded, so the charge is $\text{AVERAGE}(130, 230) \times 15\% \alpha = \27 million

5.3 A bank uses the standardized approach (SA) to determine their capital charge for operational risk under Basel II (or Basel III). The bank has three (3) business lines and each business line contributes one-third toward the total gross income. For a given total gross income, which business mix will produce the largest capital charge?

- A. Corporate finance; trading and sales; payment and settlement
- B. Retail banking; retail brokerage; and asset management
- C. Commercial banking; agency services; asset management
- D. Retail banking; Commercial banking; and Payment and settlement

Answer: A

Trading and sales: 18%

Corporate finance: 18%

Payment, settlement: 18%

Commercial banking: 15%

Agency services: 15%

Retail banking: 12%

Retail brokerage: 12%

Asset management: 12%

5.4 Assume a bank determines credit risk-weighted assets (credit RWA) of \$10 million, a market risk charge (MRC) of \$300,000 and an operational risk charge (ORC) of \$500,000. To meet Basel III requirements, the bank has determined it holds \$2.0 million in eligible total (Tier 1 plus Tier 2) regulatory capital. What is the bank's total capital ratio?

- A. 5.0 %
- B. 6.25%
- C. 8.0%
- D. 10.0%

Answer: D

$$10.0\% \text{ RWA} = \$10,000,000 + \$300,000 \times 12.5 + \$500,000 \times 12.5 = \$20,000,000 \text{ RWA}; \$2 \text{ MM} / \$20 \text{ MM} = 10.0\%$$

5.5 Pillar 1 of the Basel II framework allows banks to use various approaches to calculate the capital requirements for credit risk, operational risk and market risk. Which of the following Basel II approaches allows a bank to explicitly recognize diversification benefits? (Practice Exam)

- A. The internal models approach for market risk
- B. The internal ratings based approach for credit risk
- C. The basic indicator approach for operational risk
- D. The standardized approach for operational risk

Answer: A

The internal models approach allows banks to use risk measures derived from their own internal risk management models, subject to a set of qualitative conditions and quantitative standards. In terms of risk aggregation within market risk, banks are explicitly allowed to recognize empirical correlations across broad market risk categories, and, thus, diversification benefits.

5.6 Each of the following is true about the Basic Indictor Approach (BIA) to operational risk under Basel III except which is false?

- A. Operational risk is the risk of loss resulting from inadequate or failed internal processes, people and systems or from external events
- B. The definition of operational risk includes strategic and reputational risk, but excludes legal risk
- C. Bank's using the Basic Indictor Approach (BIA) must hold capital for operational risk equal to the average over the previous three years of a fixed percentage (denoted alpha) of positive annual gross income
- D. Under the Basic Indicator Approach (BIA), Gross Income is defined as net interest income plus net non-interest income

Answer: B

As stated, the TRUE statement is: "This definition [of operational risk includes legal risk, but excludes strategic and reputational risk."

In regard to (A), (C) and (D) each is true.

In regard to (C), please note that under BIA, "Fingers for any year in which annual gross income is negative or zero should be excluded from both the numerator and denominator when calculating the average."

5.7 Each of the following is true about the Standardized Approach (SA) to operational risk under Basel III except which is false?

- A. Whereas the Basic Indicator Approach (BIA) uses Gross Income for the whole institution as a proxy for the scale of business operations, the standardized approach (SA) calculates the capital charge for each business line by multiplying its gross income by a factor (denoted beta) assigned to that business line
- B. The beta factor in the Standardized Approach (SA) serves as a proxy for the industry-wide relationship between the operational risk loss experience for a given business line and the aggregate level of gross income for that business line
- C. Under the standardized approach (SA), business units that fail to provision expected operational losses must calibrate their risk charge based on the unexpected loss at 99.99% confidence level (i.e., rather than 99.9%) over a one-year horizon
- D. A national supervisor can allow a bank to use the Alternative Standardized Approach (ASA) which replaces gross income with loans and advances for retail and commercial banking business lines

Answer: C

Both non-advanced approaches, including the standardized approach, multiply factors (alpha or beta) by gross income. Instead, the advanced measurement approaches (AMA) instead obtain a risk charge by internally estimating the unexpected loss (UL) at 99.9% confidence over one year; i.e., an OpRisk VaR approach.

5.8 Each of the following is true about Advanced Measurement Approach (AMA) to operational risk under Basel III except which is false?

- A. Under the AMA, a bank must develop specific policies and have documented criteria for mapping gross income for current business lines and activities into the AMA framework
- B. Under the AMA, a bank can use its own internal model(s) but the quantitative standards include a charge for unexpected losses at 99.9% confidence over one-year horizon
- C. To qualify for the AMA, the bank must have an independent operational risk management function that is responsible for the design and implementation of the bank's operational risk management framework

- D. To qualify for the AMA, the bank must : use internal loss data; use scenario analysis; and take into account key business environment and internal control factors

Answer: A

The standardized approach maps gross Income for business lines; the AMA allows banks to estimate unexpected operational losses with their own, presumably more accurate, internal models conditional on supervisor approval and meeting the associated quantitative and qualitative criteria.

5.9 Which of the following is not a type of operational risk as defined by Basel II and Basel III?

- A. Human error and internal fraud
- B. Destruction by fire or other external catastrophes
- C. Damaged reputation due to a failed merger
- D. Failure or breakdown in internal control processes

Answer: C

Explanation: Basel II and Basel III define operational risk (inclusive of technological risk) as “the risk of direct or indirect loss resulting from inadequate or failed internal processes, people and systems or from external events.” Although a number of financial institutions add reputation risk and strategic risk (e.g., due to a failed merger) as part of a broadened definition of operational risk, they are not within the scope of definition by Basel II/III.

6 Basel II: Pillar 2 & Pillar 3

6.1 John Smith is a bank supervisor responsible for the oversight of Everbright Group, a large banking conglomerate. Everbright Group now determines its credit risk profile according to the foundation IRB approach and assesses operational risk according to the standardized approach as described in the Basel II Capital Accord. Which of the following are specific issues that should be addressed as part of Smith’s supervisory review process of Everbright Group?

- I. Review the bank’s internal control systems.
 - II. Check compliance with transparency requirements as described in Pillar 3 of Basel II Accord.
 - III. Make sure that the bank estimates for LGD and EAD for its corporate loans are in compliance with supervisory estimates.
 - IV. Evaluate the impact of interest rate risk by assessing the impact of a 200 basis point interest rate shock to the bank’s capital position.
- A. I and III only
 - B. II and IV only
 - C. I, II, and IV only
 - D. I, II, III, and IV

Answer: C

The supervisor's duties as part of the supervisory review process include:

Check compliance with Pillars I and III of Basel II Accord. Which would include credit risk mitigation and transparency requirements. Review internal control systems. Assess internal capital management methods employed by the bank. So I and II are correct. Note that the foundation IRB approach. The bank provides its estimates for PD but uses supervisory estimates for LGD and EAD for corporate loans. So III is incorrect. Also, the impact of interest rate risk on the bank's capital position must be assessed by determining the impact of a 200 basis Point shock or its equivalent. So IV is also correct. Therefore, the correct answer for this question is choice C.

6.2 In regard to Basel II minimum capital requirements, which of the following is false?

- A. Banks can reduce their capital charge, subject to a limit, if they can demonstrate diversification benefit due to imperfect correlation between the major risk buckets: credit, operational and market risk.
- B. Pillar Two explicitly encourages national authorities (supervisors) to supplement Pillar One with additional capital requirements at their discretion if they deem appropriate
- C. Under the advanced/internal approaches, all three risk categories (credit, market, and operational risk) employ value at risk (VaR) concepts
- D. Basel II had no explicit charge for liquidity risk

Answer: A

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False: The capital charges are added (CRC + MRC + ORC); Basel II gives no recognition for potential diversification benefits at this level of analysis.

In regard to (b), (c) and (d), each are true. In regard to (b), please note the "mutually reinforcing" aspect of the framework; and that Pillar One implies only minimum capital requirements

6.3 The Supervisory Review Process does not include which of the following elements?

- A. Verifying compliance with Pillar 2.
- B. Reviewing internal control systems.
- C. Assessing operational risks.
- D. Assessing credit concentration risk.

Answer: A

The Supervisory Review Process is Pillar 2 and should include verifying compliance with Pillars 1 and 3.

6.4 Each of the following is a required disclosure element (i.e., must be disclosed by the bank) of the Third Pillar (Pillar 3) except for:

- A. The bank's capital structure including a break-down of Tier 1 capital, deductions, and total eligible capital
- B. Details of the bank's compensation (renumeration) program including performance metrics, risk metrics, and variable pay plan elements
- C. The bank must disclose securitization special purpose entities (SPEs) even if the bank is only a sponsor (i.e., only "manages or advises" on the placement of securities)
- D. The bank's long-term strategy and a mapping of new product development initiatives to planned target markets and customers

Answer: D

The bank's long-term strategy and a mapping of new product development initiatives to planned target markets and customers.

The Third Pillar does not ask the bank to reveal such strategic insights (the nearest to this is likely indirect by way of renumeration-related disclosures)

From Basel II: 819. Proprietary information encompasses information (for example on products or systems), that if shared with competitors would render a bank's investment position. Information about customers is often confidential, in that it is provided under the terms of a legal agreement or counterparty relationship. This has an impact on what banks should reveal in terms of information about their customer base, as well as details on their internal arrangements, for instance methodologies used, parameter estimates, data etc...

7 Basel II.5 and Fundamental Review of The Trading Book

Basel II.5

Stressed Value-at-Risk (SVaR) & Incremental Risk Capital Charge

$$MRC_t^{IMA} = \text{Max}\left(k \frac{1}{60} \sum_{i=1}^{60} \text{VAR}_{t-i}, \text{VAR}_{t-1}\right) + \text{Max}\left(k_s \frac{1}{60} \sum_{i=1}^{60} \text{SVAR}_{t-i}, \text{SVAR}_{t-1}\right) + \text{SRC}_t + \text{IRC}_t$$

Stressed Value-at-Risk (SVaR)

- SVaR is the loss on the current portfolio that corresponds to a 99% confidence level over a 10-day period
- using a **250-day period of stressed market conditions**.
- The multiplier k_s , as with k , is subject to a floor of 3, in addition to a plus factor that depends on the results of backtesting the regular VAR, and not SVAR.

Incremental Risk Capital Charge

- The incremental risk charge (**IRC**) covers (1) default risk and (2) credit migration risk for debt instruments.
- **99.9% confidence level over one year**, computed on **at least a weekly basis**.

$$\text{IRC}_t = \text{Max}\left(\frac{1}{12} \sum_{i=1}^{12} \text{IRM}_{t-i}, \text{IRM}_{t-1}\right)$$

Comprehensive Risk Measure

- The comprehensive risk measure (CRM) is a single capital charge for **correlation-dependent instruments** that replaces the specific risk charge (SRC) and the IRC.

Fundamental Review of The Trading Book

Market Risk Capital Calculation: The FRTB has proposed an alternate measure using *expected shortfall (ES)*

Liquidity Horizons

- is "*the time required to execute transactions that extinguish an exposure to a risk factor, without moving the price of the hedging instruments, in stressed market conditions.*"
- Under FRTB proposals, *every risk factor is assigned a liquidity horizon for capital calculations.*

$$\text{Internal Models-based Approach (IMA): } ES = \sqrt{ES_1^2 + \sum_{j=2}^5 \left[ES_j \sqrt{\frac{LH_j - LH_{j-1}}{10}} \right]^2}$$

Proposed Modifications to Basel Regulations

- The FRTB makes a specific distinction between assets held in the trading book and those held in the banking book.
- To be allocated to the trading book, the *bank must prove more than an intent to trade.*

7.1 Which of the following statements regarding the differences between Basel I, Basel II.5, and the Fundamental Review of the Trading Book (FRTB) for market risk capital calculations is incorrect?

- Both Basel I and Basel II.5 require calculation of VaR with a 99% confidence interval.
- FRTB requires the calculation of expected shortfall with a 97.5% confidence interval.
- FRTB requires adding a stressed VaR measure to complement the expected shortfall calculation.
- The 10-day time horizon for market risk capital proposed under Basel I incorporates a recent period of time, which typically ranges from one to four years

Answer: C

Basel I and Basel II.5 use VaR with a 99% confidence interval and the FRTB uses the expected shortfall with a 97.5% confidence interval. Basel I market risk capital requirements produced a very current result because the 10-day horizon incorporated a recent period of time. The FRTB does not require adding a stressed VaR to the expected shortfall calculation. It was Basel 11.5 that required the addition of a stressed VaR.

8 Basel III

Capital Definition

Tier 1 Capital	1. Common equity including retained earnings (Tier 1 common capital) 2. Non-cumulative perpetual preferred stock (additional Tier 1 capital) Tier 1 capital is adjusted downward to reflect defined benefit pension plan deficits
Tier 2 Capital	1. Debt subordinated to depositors with an original maturity of five years or more 2. Some preferred stock, such as cumulative perpetual preferred Basel III eliminated Tier 3 capital.

	普通股 (扣减调整项后)	一级资本	总资本
最低资本要求	4.5%	6.0%	8.0%
资本留存超额资本	2.5%		
最低资本要求+资本留存超额资本	7.0%	8.5%	10.5%
反周期超额资本*	0%-2.5%		

Capital Conservation Buffer (CCB)

- Bank will draw on this buffer **during periods of stress**. The **2.5% buffer** is established above the minimum capital standards.
- Dividend payments are constrained when the buffer is wholly or partially used up.**

Countercyclical Buffer

- Countercyclical buffers are intended to dampen the effect of procyclical amplification**
- A countercyclical buffer: **0% to 2.5%**.
- Banks that **do not meet** the capital conservation buffer or countercyclical buffers will be **subject to constraints on capital distributions of dividends, stock repurchases, and discretionary bonuses to staff**.

Market Risk Capital

$$MRC_t^{IMA} = \text{Max}\left(k \frac{1}{60} \sum_{i=1}^{60} VaR_{t-i}, VaR_{t-1}\right) + \text{Max}\left(k_s \frac{1}{60} \sum_{i=1}^{60} SVaR_{t-i}, SVaR_{t-1}\right) + SRC_t + IRC_t$$

Operational Risk

- The Basel Committee defines **gross loss** at the loss before any recoveries are made. A **net loss** is the loss after recoveries are accounted for.
- Selecting Internal Loss Reference Dates: including the date of the event's occurrence, the date of discovery, the date of contingent liability, the date of the first financial impact, and the date of the settlement.
- operational risk management framework (ORMF) & operational risk measurement system (ORMS)**
 - Validation: Provides **assurance of the integrity of the inputs** in AMA operational risk capital models
 - Verification: Is **conducted by internal and/or external audits**

Leverage Ratios

- The Committee will test a **Tier 1 leverage ratio of 3%**

Systematic Risk Management

- The Committee is considering several options for dealing with **systemically important institutions**

Liquidity Requirements

- Liquidity coverage ratio (LCR): Promote **short-term resilience** of a bank's liquidity profile
- Net stable funding ratio (NSFR): Promote **resilience over a longer time frame**, creating incentives for banks to fund activities with more stable sources of funds.
- The Committee has developed a set of **common metrics to monitor global liquidity risks**.

Liquidity Coverage Ratio

$$LCR = \frac{\text{Stock of high-quality liquid assets}}{\text{Total net cash outflows over the next 30 calendar days}} \geq 100\%$$

High-Quality Liquid Assets (HQLA): There are two categories of liquid assets

- Level 1 assets:** Cash, Central bank reserves, Marketable securities, Non-0% risk-weighted sovereign or central bank securities.
- Level 2 assets:**
 - Level 2A assets:** A minimum 15% haircut is applied to the current market value of each Level 2A asset
 - Level 2B assets:** Residential mortgage-backed securities, Corporate debt securities, Common equity. A greater haircut than Level 2A assets is applied to the current market value of each Level 2B asset.

Net Cash Outflows

net cash outflows = outflows over the next 30 calendar days - min(inflows, 75% of outflows)

Net Stable Funding Ratio (NSFR)		$\text{NSFR} = \frac{\text{available amount of stable funding}}{\text{required amount of stable funding}} > 100\%$	
ASF(available stable funding) Factors in NSFR		RSF(required stable funding) Factors in NSFR	
ASF Factor	Category	RSF Factor	Category
100%	Tier 1 and Tier 2 capital, preferred stock, debt with remaining maturity greater than one year.	0%	Cash and short-term instruments, securities, and loans.
90%	"Stable" demand and term deposits with maturities less than one year.	5%	Marketable securities
80%	"Less stable" demand and term deposits with maturities less than one year.	20%	Corporate bonds with rating of AA- or higher. Claims on sovereigns or similar bodies
50%	Wholesale funding.	50%	Gold, equities, bonds rated A+ to A-.
0%	All other liability and equity categories.	65%	Residential mortgages.
		85%	Loans to small businesses or retail customers
		100%	All other assets.

Liquidity Monitoring Tools

- Contractual maturity mismatch, Concentration of funding, Available unencumbered assets, Liquidity coverage ratio by significant currency, Market-related monitoring tools

Risk Coverage

- Reforms are intended to address CCR (*counterparty credit risk*), *credit value adjustments (CVA)* (i.e., mark-to-market losses on the expected counterparty risk) and *wrong-way risk*.

8.1 Given the following information, what is Bank A's liquidity coverage ratio?

High-quality liquid assets	\$100
Required amount of stable funding	\$200
Cash outflows over the next 30 days	\$130
Net cash outflows over the next 30 days	\$90
Available amount of stable funding	\$210
High-quality liquid assets in each major currency	\$75

- A. 83%
- B. 90%
- C. 111%
- D. 130%

Answer: C

8.2 Given the following information, what is Bank A's net stable funding ratio?

High-quality liquid assets	\$100
Required amount of stable funding	\$200
Cash outflows over the next 30 days	\$130
Net cash outflows over the next 30 days	\$90
Available amount of stable funding	\$210
High-quality liquid assets in each major currency	\$75

- A. 65%
- B. 89%

- C. 105%
- D. 125%

Answer: C

The longer-term funding ratio is equal to the available amount of stable funding divided by the required amount of stable funding. Under Basel III, this ratio must exceed 100%. Bank A's net stable funding ratio = \$210 / \$200 = 105%

8.3 In the latest guidelines for computing capital for incremental risk in the trading book, the incremental risk charge (IRC) addresses a number of perceived shortcomings in the 99 %/10-day VaR framework. Which of the following statements about the IRC are correct?

- I. For all IRC-covered positions, the IRC model must measure losses due to default and migration over a one-year horizon at a 99% confidence level.
 - II. A bank can incorporate into its IRC model any securitization positions that hedge underlying credit instruments held in the trading account.
 - III. A bank must calculate the IRC measure at least weekly, or more frequently as directed by its supervisor.
 - IV. The incremental risk capital charge is the maximum of (1) the average of the IRC measures over 12 weeks and (2) the most recent IRC measure.
- A. I and II
 - B. III and IV
 - C. I, II, and III
 - D. II, III, and IV

Answer: B

Confidence level is 99.9%. Securitizations are subject to the banking book capital requirements.

8.4 The capital conservation buffer:

- A. Will provide an extra 2.5% Common Equity Tier 1 capital buffer in times of stress.
- B. Will be used exclusively to protect banks from the losses garnered from OTC derivatives trading.
- C. Is required only for banks with inadequate liquidity coverage and net stable funding source ratios.
- D. Is covered in the increased Common Equity Tier 1 capital to risk-weighted assets ratio that will increase to 4.5% from the current 2% over the next few years.

Answer: A

The capital conservation buffer is intended to provide an extra cushion against loss in times of

stress. It is 2.5% Common Equity Tier 1 capital to risk-weighted assets, which in effect increases the total Common Equity Tier 1 capital ratio to 7%.

8.5 The capital conservation buffer:

- A. Is intended to protect banks from the countercyclical nature of bank earnings.
- B. Can be set between 0.0% and 2.5% of risk-weighted assets, and is at the discretion of the regulators in individual countries.
- C. Causes the Tier 1 equity capital ratio requirement to increase to 7% of risk-weighted assets in normal economic periods.
- D. Requires that total capital to risk-weighted assets must be 10.5% at all times.

Answer: C

The capital conservation buffer is meant to protect banks in times of financial distress. Banks are required to build up a buffer of Tier 1 equity capital equal to 2.5% of risk-weighted assets in normal times, which will then be used to cover losses in stress periods. This means that in normal times, a bank should have a minimum 7% Tier 1 equity capital to risk-weighted assets ratio, an 8.5% total Tier 1 capital to risk-weighted assets ratio, and a 10.5% Tier 1 plus Tier 2 capital to risk-weighted assets ratio. The capital conservation buffer is a requirement and is not left to the discretion of individual country regulators. It is not a requirement at all times but is built up to that level in normal economic periods and declines in stress periods.

8.6 A measure intended to protect the banking sector by taking macro-environment factors into consideration is the:

- A. Leverage ratio.
- B. Procyclical deleveraging ratio.
- C. Countercyclical buffer.
- D. Counterparty credit risk adjustor.

Answer: C

The countercyclical buffer requires that banking authorities monitor credit growth and other system-wide factors. If system-wide risks increase, authorities can require banks to hold additional capital, called the countercyclical buffer.

8.7 Which statement is true regarding Common Equity Tier 1 capital?

- A. Common Equity Tier 1 capital to risk-weighted assets must be 6% beginning January 1, 2015.
- B. Preferred stock will make up the bulk of Common Equity Tier 1 capital because shareholders cannot force the bank into bankruptcy.
- C. Common Equity Tier 1 capital has the least-stringent requirements for what constitutes

capital.

- D. To qualify as common shares that may be used for Common Equity Tier 1 capital, investors of the shares must have a residual claim to the assets.

Answer: D

Common Equity Tier 1 capital to risk-weighted assets must be 4.5% beginning January 1, 2015. Common stock plus retained earnings, not preferred stock, must make up the bulk of Common Equity Tier 1 capital. The requirements for Common Equity Tier 1 capital are the most-stringent, not the least-stringent. Investors of the common shares must have a residual claim to the assets.

8.8 Each of the following was both (i) a deficiency or omission of Basel II but is, at the same time, (ii) explicitly addressed by new requirement in Basel III except for

- A. Basel II did not formally include liquidity risk, but Basel III explicitly covers liquidity risk
- B. Basel II could arguably create a procyclical effect, but Basel III explicitly adds a buffer to address this
- C. Basel II did not require external credit ratings, but Basel III seeks to increase the reliance on external ratings
- D. Basel II allowed many banks to show strong risk-based regulatory capital ratios despite high on- and off-balance sheet leverage; Basel III adds a simple leverage ratio to act as a backstop to the risk-based capital ratio

Answer: C

This is extremely false: Basel II relies heavily on external credit ratings and the Committee has a focus to REDUCE reliance on external ratings.

In regard to (A), Basel III will add the Liquidity Coverage Ratio (LCR) and the Net Stable Funding Ratio (NSFR). In regard to (B), Basel III will phase-in the countercyclical buffer requirement. In regard to (D), this is TRUE. The new leverage ratio (Tier 1/Total Exposure) will begin in 2013 as an additional measure.

8.9 With respect to Basel II, Basel III immediately (i.e., effective in 2011 regardless of phase-in arrangements) changes or adds each of the following except for:

- A. Eliminated Tier 3 capital
- B. Restricted the definition of Tier 1 capital
- C. Increased the (Pillar One) Minimum Total Capital (Tier 1 + Tier 2) requirement
- D. Adds a capital conservation buffer (CCB) where none existed in Basel II

Answer: C

Minimum total Tier 1 + Tier 2 capital REMAINS at 8.0% through January 2019. Additional capital requirements are achieved by other means; e.g., Minimum Tier 1 phases up to 6.0%, capital

conservation buffer (CCB), minimum common equity capital ratio. In regard to (A), (B), and (D), these are TRUE about Basel III.

8.10 Highlands Bank has estimated stable funding in the bank to be \$100 million. The bank estimates that net cash outflows over the coming 30 days will be \$137 million. The bank has capital of \$5 million and a total exposure of \$140 million. The bank estimates that it has high-quality liquid assets of \$125 million. What is the bank's liquidity coverage ratio (LCR)?

- A. 89.3%
- B. 91.2%
- C. 73.0%
- D. 3.6%

Answer: B

Basel III requires a minimum liquidity coverage ratio of 100%. The LCR focuses on the bank's ability to weather a 30-day period of reduced/disrupted liquidity. The formula is computed as follows:

High-quality liquid assets / net cash outflows in a 30-day period

$$\text{LCR} = \$125 \text{ million} / \$137 \text{ million} = 0.912 \text{ or } 91.2\%$$

In this case, Highlands Bank does not meet the minimum 100% requirement and is in violation of the rule.

8.11 The liquidity requirement designed to improve bank resiliency to liquidity shocks over a one-year horizon is called the:

- A. Liquidity coverage ratio.
- B. Net stable funding ratio.
- C. Contractual maturity mismatch ratio.
- D. Available unencumbered assets ratio.

Answer: B

The net stable funding ratio is intended to promote medium-and long-term funding of the bank's activities. It is defined as the available amount of stable funding divided by the required amount of stable funding, and it must be greater than 100%.

8.12 Which of the following characteristics outlined describe the measurement of stressed value at risk?

- A. The stressed VaR is calculated on a monthly basis.
- B. Historical bank data from the same portfolio is used in measuring SVaR.

- C. The stressed confidence interval is a 95% one-tailed test.
- D. The multiplication factor used in calculating SVaR is the same as that for VaR.

Answer: B

The stressed value at risk should be calculated on a daily basis. This measure is calculated by combining current portfolio performance data based on the 10-day, 99% confidence interval with firm's historical data from a significantly financially stressed period of the same portfolio.

8.13 In calculating the market risk capital requirement, the following statements are all true except:

- A. Both VaR and stressed VaR are considered in calculating capital charge of market risk.
- B. The average value of VaR in the preceding 60 business days is taken into account.
- C. The equation for calculating the market risk capital requirement uses a 99% two-tail confidence interval.
- D. Only VaR is used when generating backtest results.

Answer: C

The equation for calculating market risk capital requirement uses a 99% one-tail confidence interval.

8.14 Which of the following statements is false regarding the leverage ratio? The leverage ratio:

- A. Acts as a supplementary measure to risk-based capital standards
- B. Is defined as Tier 1 capital to on-and-off-balance sheet items and exposures.
- C. Allows banks to lend approximately 33 times their capital.
- D. Is risk-based.

Answer: D

The leverage ratio is simple and non-risk based and meant to act as a "backstop" measure of leverage.

8.15 The CFO at a bank is preparing a report to the board of directors on its compliance with Basel requirements. The bank's average capital and total exposure for the most recent quarter is as follows:

REGULATORY CAPITAL	USD MILLION
Total Common Equity Tier 1 Capital	108
Additional Tier 1 Capital	28
Prior to regulatory adjustments	34
Regulatory adjustments	6

Total Tier 1 Capital	136
Tier 2 Capital	36
Prior to regulatory adjustments	45
Regulatory adjustments	9
Total Capital	172
Total Average Exposure	3678

Using the Basel III framework, which of the following is the best estimate of the bank's current leverage ratio? (Practice Exam)

- A. 2.94%
- B. 3.70%
- C. 4.68%
- D. 5.08%

Answer: B

For Basel III purposes, the leverage ratio is Tier 1 Capital/Total Exposure = 136/3,678 = 3.70%

8.16 The following formula defines the capital requirement (c) under the internal models approach to the calculation of market risk under Basel III:

$$C = \max \{VaR_{t-1}, m_c \times VaR_{avg}\} + \max \{sVaR_{t-1}, m_s \times sVaR_{avg}\}$$

About this calculation, each of the following is true EXCEPT which is false?

- A. The first term is the higher of (i) the previous day's VaR and (ii) an average of the daily VaR measures on each of the preceding sixty business days, multiplied by a multiplication factor
- B. The second term is the higher of (i) the latest available stressed VaR and (ii) an average of the stressed VaR numbers over the preceding sixty business days, multiplied by a multiplication factor
- C. The multiplication factors $m(c)$ and $m(s)$ will be set by individual supervisory authorities but subject to an absolute minimum of three (3)
- D. The bank can choose to conduct an ex-post backtest on the stressed VaR only; if the test is successful, both multiplicative factors can be reduced to one

Answer: D

The ex-post backtest applies only to the VaR, not the stressed VaR. Further, the backtest increases (via a "plus") the $m(c)$ factor by a factor of zero to 1.0; it does not reduce the minimum of 3.0. Essentially, a yellow-zone backtest result can imply a minimum factor, $m(c)$, of at least four ($4.0=3.0+1.0$), or more if the supervisor requires.

To review, the capital requirement (c) is given by the following formula:

$$C = \max \{VaR_{t-1}, m_c \times VaR_{avg}\} + \max \{sVaR_{t-1}, m_s \times sVaR_{avg}\}$$

i.e., the sum of:

The higher of (1) its previous day's value-at-risk number, $VaR(t-1)$; and (2)an average of the daily value-at-risk measures on each of the preceding sixty business days, $VaR(\text{avg})$, multiplied by a multiplication factor, $m(c)$, plus

The higher of (1) its latest available stressed-value-at-risk $sVaR(t-1)$; and (2)an average of the stressed value-at-risk over the preceding sixty business days, $sVaR(\text{avg})$, multiplied by a multiplication factor, $m(s)$

In regard to (A), (B) and (C), each is true.

8.17 In updating the Basel II regulatory framework, the Committee asserted that Basel III introduced “a number of fundamental reforms to the international regulatory framework.” Each of the following was a brand new introduction by Basel III (with respect to Basel II) except which was not?

- A. Liquidity ratios were newly introduced in Basel III
- B. A leverage ratio was newly introduced in Basel III
- C. A concentration in operational risk charge (CORC) was newly introduced in Basel III
- D. A credit value adjustment (CVA) charge was newly introduced in Basel III

Answer: C

Operational risk was unaffected by Basel III; CORC does not exist (Basel 2.5 updated concentration risk)

In regard to (A), (B) and (D), each is true.

The primary, new elements in Basel III include: liquidity ratios (LCR and NSFR), the leverage ratio, CVA and wrong-way (counterparty) risk.

8.18 Thrift Bank carries risk-weighted assets (RWA) of \$40.0 billion. In regard to its eligible regulatory capital, the bank holds:

- \$2.8 billion of Common Equity Tier 1 Capital (“Core Tier 1”)
- \$0.2 billion of Additional Tier 1 Capital
- \$1.4 billion of Tier 2 Capital (“Gone concern”)

Does Thrift Bank meet the Basel III capital requirements?

- A. No, because Tier 1 Capital is not at least 8.5%
- B. No, because Total Capital is not at least 10.5%
- C. Yes, because Tier 1 is at least 4.0%
- D. Yes, because Tier 2 is at least 2.5%

Answer: A

No, because Tier 1 Capital is not at least 8.5%

Basel III requires Core Tier 1 (Common Equity) of 7.0%, Tier 1 of 8.5%, and Total Capital of 10.5%:

Core Tier 1 (Common Equity) ratio of at least 7.0% = 4.5% + 2.5% Conservation Buffer. Thrift Bank holds exactly sufficient Common Equity: $2.8/40.0 = 7.0\%$.

Tier 1 (Common Equity + Additional Tier 1) ratio of at least 8.5% = 6.0% Tier 1 + 2.5% Conservation buffer. Thrift Bank only holds Tier 1: $3.0/40.0 = 7.5\%$

Total Capital ratio of 10.5% = 8.0% total capital + 2.5% Conversation Buffer. Thrift Bank holds Total Capital: $4.4/40.0 = 11.0\%$

8.19 Thrift Bank carries risk-weighted assets (RWA) of \$100.0 billion. In regard to its eligible regulatory capital, the bank holds:

- \$5.0billion of Common Equity Tier 1 Capital ("Core Toer 1")
- \$2.0billion of Additional Tier1 Capital
- \$3.5billion of Tier 2 Capital ("Gone concern")

Does Thrift Bank meet the Basel III capital requirements?

- A. Yes, because its Total Capital Ratio of 10.5% is sufficient
- B. No, because it does not hold enough Common Equity Capital
- C. No, because its Tier 1 Capital Ratio is insufficient
- D. No, because the bank has no buffer-quality capital to contribute to its Capital Conservation Buffer

Answer: B

No, because it does not hold enough Common Equity Capital

The minimum Common Equity Capital Ratio is 4.5% but the Capital Conservation Buffer (which requires Common Equity) is 2.5%, such that the "Minimum common equity plus capital conservation buffer" is 7.0%.

In regard to (C), the Minimum Tier 1 Capital Ratio is 6.0%

In regard to (D), the Tier 1 Capital Requirement is 6.0%, and the bank has 7.0%, which implies that 1.0% is available toward the Conservation buffer (but it needs 2.5%).

Please note: The Capital Conservation Buffer must be Common Equity Tier 1 and "Common Equity Tier 1 must first be used to meet the minimum capital requirements (including the 6% Tier 1 and 8% Total capital requirements if necessary), before the remainder can contribute to the capital conservation buffer."

8.20 According to the Basel Committee, "During the early liquidity phase of the financial crisis, many banks--despite adequate capital levels--still experienced difficulties because they did not

manage their liquidity in a prudent manner. The crisis again drove home the importance of liquidity to the proper functioning of financial markets and the banking sector. Prior to the crisis, asset markets were buoyant and funding was readily available at low cost. The rapid reversal in market conditions illustrated how quickly liquidity can evaporate and that illiquidity can last for an extended period of time...the Committee has further strengthened its liquidity framework by developing two minimum standards for funding liquidity." Consider the following statements:

- I. The two mentioned standards - which aim to strengthen the liquidity framework - are the liquidity coverage ratio (LCR) and the net stable funding ratio (NSFR)
- II. The LCR tries to ensure short-term liquidity resilience (one month) while the NSFR promotes longer-term liquidity resilience (one year)
- III. The LCR anticipates an acute stress scenario by defining total net cash outflows under a stress scenario, while the NSFR does not explicitly simulate a stress scenario

Which of the above is (are) true?

- A. None are true
- B. I only
- C. II only
- D. All are true

Answer: D

All are true

"These standards have been developed to achieve two separate but complementary objectives. The first objective is to promote short-term resilience of a bank's liquidity risk profile by ensuring that it has sufficient high quality liquid resources to survive an acute stress scenario lasting for one month. The Committee developed the Liquidity Coverage Ratio (LCR) to achieve this objective. The second objective is to promote resilience over a longer time horizon by creating additional incentives for a bank to fund its activities with more stable sources of one year and has been developed to provide a sustainable maturity structure of assets and liabilities."

8.21 Among these two buffers, which does Basel 3 implement to reduce procyclicality and "promote the conservation of capital and the build-up of adequate buffers above the minimum that can be drawn down in periods of stress?"

- I. Basel 3 will phase-in a capital conservation buffer of 2.5% (of RWA) comprised of common equity Tier 1
 - II. Basel 3 will phase-in a countercyclical buffer of between 0% and 2.5% (of RWA) to be determined by supervisors (national authorities)
- A. Neither I nor II.
 - B. Only I but not II.

- C. Only II but not I.
- D. Both I and II.

Answer: D

Both I and II.

8.22 Which is true about the capital conservation buffer?

- A. When a bank's capital levels fall within this range, the bank can continue to conduct (operate) business
- B. When a bank's capital levels fall within this range, the bank is constrained (restricted) with respect to dividends, share buybacks, and discretionary bonus payments to staff
- C. When a bank's capital levels fall within this range, the bank is "severely restricted" with respect to conducting business (operations)
- D. The bank can elect to draw down the buffer in normal times if competitive demands warrant, including the need to maintain market share

Answer: B

When a bank's capital levels fall within this range, the bank is constrained (restricted) with respect to dividends, share buybacks, and discretionary bonus payments to staff

In regard to (A), (C) and (D), each are false.

8.23 Which is true about the countercyclical conservation buffer?

- A. The countercyclical buffer is primarily a micro-prudential measure
- B. The countercyclical buffer can only be zero (0%) during the phase-in period, as eventually it achieves a constant of 2.5% regardless of environment
- C. Its primary goal is to avoid destabilizing losses subsequent to a period of excess credit growth
- D. A bank will be required to maintain this buffer if the bank falls under a jurisdiction identified and designated by the Basel Committee

Answer: C

Its primary goal is to avoid destabilizing losses subsequent to a period of excess credit growth

"136. Losses incurred in the banking sector can be extremely large when a downturn is preceded by a period of excess credit growth. These losses can destabilize the banking sector and spark a vicious circle, whereby problems in the financial system can contribute to a downturn in the real economy that then feeds back on to the banking sector. These interactions highlight the particular importance of the banking sector building up additional capital defenses in periods where the risks of system-wide stress are growing markedly."

In regard to (A), this buffer is quintessentially MACRO-prudential; e.g., “137. The countercyclical buffer aims to ensure that banking sector capital requirements take account of the macro-financial environment in which banks operate.”

In regard to (B), this is false as the countercyclical buffer is only meant to apply during excess credit regimes. “This requirement will be released when system-wide risk crystallizes or dissipates.”

In regard to (D), the requirement for this buffer (from 0 to 2.5%) is delegated to the respective national authorities, not Basel.

“139. Each Basel Committee member jurisdiction will identify an authority with the responsibility to make decisions on the size of the countercyclical capital buffer. If the relevant national authority judges a period of excess credit growth to be leading to the buildup of system-wide risk, they will consider, together with any other macroprudential tools at their disposal, putting in place a countercyclical buffer requirement. This will vary between zero and 2.5% of risk weighted assets, depending on their judgment as to the extent of the build-up of system-wide risk.”

8.24 Canzone International Bank carries \$3.0 billion in Level 1 assets plus \$2.0 billion in Level 2A assets. With respect to expected cash outflows over the next 30 days, the bank carries “less stable” deposits (liabilities) of \$80.0 billion with an average run-off rate (factor) of 10%; expected cash inflows are \$10.0 billion. Please note per Basel III:

- Level 1 assets can comprise an unlimited share of the pool and are not subject to a haircut under the LCR
- A 15% haircut is applied to the current market value of each Level 2A asset held in the stock of HQLA
- Level 2 assets (comprising Level 2A assets and any Level 2B assets permitted by the supervisor) can be included in the stock of HQLA, subject to the requirement that they comprise no more than 40% of the overall stock after haircuts have been applied
- Definition: Total net cash outflows over the next 30 calendar days = Total expected cash outflow - Min{total expected cash inflows; 75% of total expected cash outflows}

Which is nearest to Canzone’s liquidity coverage ratio (LCR)?

- A. 87.5%
- B. 136.5%
- C. 235.0%
- D. 360.0%

Answer: C

High quality liquid assets (HQLA) = L1 + L2 × (1 – haircut) = 3.0 + 2.0 × (100% - 15%) = \$4.7 billion. As $2/(3+2) = 40\%$, the 40% cap on L2 assets implies a post-haircut L2 max of \$2.0 billion, but post-haircut L2 assets are only valued at \$1.7 such that cap does not apply.

$$\text{Total net cash outflows} = (\$80.0 \times 10.0\%) - \text{Min}\{10.75\% \times 8.0\} = 8 - 6 = \$2.0 \text{ billion}$$

Therefore, $LCR = \$4.7 / 2.0 = 235.0\%$. Note this is greater than the LCR ratio requirement of 100%.

In summary, the liquidity coverage ratio (LCR) = (Stock of HQLA)/(Total net cash outflows over the next 30 calendar day) and LCR must be equal to or greater than 100%.

- Stock of HQLA refers to unencumbered high-quality liquid assets (HQLA) that can be converted easily and immediately in private markets into cash to meet their liquidity needs for a 30 calendar day liquidity stress scenario.
- Total net cash outflows is defined as the total expected cash outflows minus total expected cash inflows in the specified stress scenario for the subsequent 30 calendar days.
- Total expected cash outflows are calculated by multiplying the outstanding balances of various categories or types of liabilities and off-balance sheet commitments by the rates at which they are expected to run off or be drawn down.

Total expected cash inflows are calculated by multiplying the outstanding balances of various categories of contractual receivables by the rates at which they are expected to flow in under the scenario up to an aggregate cap of 75% of total expected cash outflows.

8.25 Each of the following is a characteristic of a high-quality asset except for:

- A. Active and sizeable market with evidence of market breadth (price impact per unit of liquidity) and market depth (units of the asset that can be traded for a given price impact)
- B. High market concentration among a limited set group of buyers and sellers
- C. Low correlation with risky assets; i.e., not subject to wrong-way risk
- D. Asset class has shown historical tendency to be a “flight to quality” destination

Answer: B

NOT HIGH, but rather: Low market concentration among a limited set group of buyers and sellers

“Characteristics of high-quality liquid assets

(a) Fundamental characteristics

- Low credit and market risk: assets that are less risky tend to have higher liquidity. High credit standing of the issuer and a low degree of subordination increases an asset's liquidity. Low duration, low volatility, low inflation risk and denomination in a convertible currency with low foreign exchange risk all enhance an asset's liquidity.
- Ease and certainty of valuation: an asset's liquidity increases if market participants are more likely to agree on its valuation. The pricing formula of high-quality liquid asset must be easy to calculate and not depend on strong assumptions. The inputs into the pricing formula must also be publicly available. In practice, this should rule out the inclusion of most structured or exotic products.

- Low correlation with risky assets: the stock of high-quality liquid assets should not be subject to wrong-way (highly correlated) risk. For example, assets issued by financial institutions are more likely to be illiquid in times of liquidity stress in the banking sector.
- Listed on a developed and recognized exchange market: being listed increases an asset's transparency.

(b) Market-related characteristics

- Active and sizable market: the asset should have active outright sale or repurchase agreement (repo) markets at all times (which means having a large number of market participants and a high trading volume). There should be historical evidence of market breadth (price impact per unit of liquidity) and market depth (units of the asset that can be traded for a given price impact).
- Presence of committed market makers: quotes will most likely be available for buying and /or selling a high-quality liquid asset.
- Low market concentration: a diverse group of buyers and sellers in an asset's market increases the reliability of its liquidity
- Flight to quality: historically, the market has shown tendencies to move into these types of assets in a systemic crisis.”

8.26 Which of the following risks is specifically recognized by the incremental risk charge (IRC)?

- Expected shortfall risk, because it is important to understand the amount of loss potential in the tail.
- Jump-to-default risk, as measured by 99.9% VaR, because a default could cause a significant loss for the bank.
- Equity price risk, because a change in market prices could materially impact mark-to-market accounting for risk.
- Interest rate risk, as measured by 97.5% expected shortfall, because an increase in interest rates could cause a significant loss for the bank

Answer: B

The two types of risk recognized by the incremental risk charge are: (1) credit spread risk, and (2) jump-to-default risk. Jump-to-default risk is measured by 99.9% VaR and not 97.5% expected shortfall.

8.27 The risk management department at a bank is trying to assess the impact of the capital conservation and countercyclical buffers defined in the Basel III framework. They consider a scenario in which the bank's capital and risk-weighted assets are as shown in the table below (all values are in EUR millions): (Practice Exam)

Item	Value
Risk-weighted assets	3,480

Common equity Tier 1 (CET1) capital	145
Additional Tier 1 capital	50
Total Tier 1 capital	195
Tier 2 capital	98
Tier 3 capital	0
Total capital	293

Assuming that all Basel III phase-ins have occurred and that the bank's required countercyclical buffer is 0.95%, which of the capital ratios does the bank satisfy? (Practice Exam)

- A. The CET1 capital ratio only.
- B. The CET1 capital ratio plus the capital conservation buffer only.
- C. The CET1 capital ratio plus the capital conservation buffer and the countercyclical buffer.
- D. None of the above.

Answer: D

Rationale: The bank has CET1 capital ratio of $(195/3,480) = 4.2\%$. This ratio does not meet the 4.5% minimum CET1 capital requirement; does not meet the additional 2.5% capital conservation buffer; and does not meet the additional countercyclical buffer of 0.95% ($= 4.5\% + 2.5\% + 0.95 = 7.95\%$).

8.28 A bank uses the internal models approach for market risk and has generated the following risk measures(in US million) for the current trading book positions:

Confidence Level	Latest Available 10-day VaR	Average 10-day VaR of Previous 60 Days	Latest Available 10-day Stressed VaR	Average 10-day Stressed VaR of Previous 60 days
99.0%	110	45	275	80
99.9%	280	85	888	350

The supervisory authority has set the multiplication factors to three for both VaR and stressed VaR. What is the capital requirement for general market risk? (Important)

- A. USD 385 million
- B. USD 410 million
- C. USD 1,168 million
- D. USD 1,330 million

Answer: B

8.29 Capital conservation buffers have been established by the Basel Committee as part of measures designed to ensure that banks have enough capital to handle stress situations. Assuming no regulatory add-ons have been imposed, which of the following is correct?

(Important)

- A. If the bank has 8%Common Equity Tier 1(CET1) capital with no Additional Tier 1or Tier 2 capital.it would have zero conservation buffer and therefore be subject to a 100% constraint on capital distributions.
- B. If the bank has 8%CET1with no Additional Tier1 or Tier 2 capital, it would satisfy the zero conservation buffer and therefore not be subjected to a constraint on capital distributions.
- C. If the bank has 7%CET1 with no Additional Tier1 or Tier 2 capital; it would have a 2.5% conservation buffer and therefore not be subjected to a constraint on capital distributions.
- D. If the bank has 9.5%CET1 with no Additional Tier 1orTier 2 capital, it would have a 2.5% conservation buffer and therefore not be subjected to a constraint on capital distributions.

Answer: A

8.30 During a market crash in a certain country, some chief risk officers conclude that the mandated use of VaR according to national banking regulations could be amplifying the market crash. To justify this conclusion, which of the following statements is correct? (Important)

- A. When the market fails, VaR-driven bank capital requirements tighten, and banks have to sell off their assets, which puts pressures on the prices of these assets and leads to further losses.
- B. VaR-driven bank capital requirements are not responsive to market movements, and banks cannot create extra capacity to enter the market and buy distressed assets.
- C. The use of stressed VaR makes the capital requirements of the banks unstable.
- D. The use of stressed VaR increases the capital charges for the banks especially during crises.

Answer: A

8.31 A bank operates in a country that has mandated full compliance with the Basel III Accord. The bank's capital is provided in the table below.

Risk-Weighted Assets	Amount (USD millions)
Total risk-weighted assets for credit risk	1,355
RWA for credit risk – Basel III IRB Approach	1,137
CVA capital charge	218
Total capital charge for market risk	36
Total capital charge for operational risk	48
Other Pillar 1 capital requirements	0

What level of Risk-Weighted Assets should the bank report according to Basel requirements?

(Important)

- A. USD 1,137 million
- B. USD 1,439 million
- C. USD 1,853 million
- D. USD 2,405 million

Answer: D

8.32 Consider a bank with a liquidity coverage ratio (LCR) of 120% which has USD 12 billion of high-quality liquid assets, all of which are level 1 assets. The bank estimates its total expected outflows over the next 30 days to be USD 40 billion and its expected inflows to be USD 30 billion over the same period. A day later, the bank receives an incremental, unexpected USD 2 billion in deposits from unrelated but AA-rated banks and invests the proceeds in Level 1 assets. What is the bank's new LCR after this unexpected inflow? (Important)

- A. 100%
- B. 117%
- C. 133%
- D. 140%

Answer: D

9 Compare Basel II/III with Solvency II



Compare Basel II/III with Solvency II

<ul style="list-style-type: none"> • Basel II/III: regulatory rules for banking; Solvency II: regulate insurance companies in Europe 	
Framework ➔	<ul style="list-style-type: none"> Both Basel II/III and Solvency II are modeled on a three pillar structure: <ul style="list-style-type: none"> • Pillar 1: Quantitative requirements regarding required capital and risk measurement. • Pillar 2: Qualitative conditions of risk management, terms of supervisory review process, and institution's assessment of risk and solvency. • Pillar 3: Requirements regarding disclosure. • In Basel II/III there is a stronger emphasis on the stability of the financial system (systemic risk) • Solvency II focuses on individual policyholders.
VaR Parameters ➔	<ul style="list-style-type: none"> Basel II/III: <ul style="list-style-type: none"> • For market risk VaR, a one-tailed confidence level of 99% is required. • It is increased to 99.9% for credit risk as well as the operational risk AMA. Solvency II <ul style="list-style-type: none"> • a confidence level of 99.5% for the insurance company as a whole.
Risk Classes ➔	<ul style="list-style-type: none"> • Basel II/III considers three risk classes: market, credit, and operational risk. In addition, Basel III emphasizes liquidity risk. • Solvency II comprehensively assesses all quantitatively measurable risk types, all related to underwriting risk.

Minimum Capital Requirements

- With **Basel II/III**, there is only **one minimum equity capital ratio requirement**
- Solvency II** capital requirements use a two-level approach
 - Solvency capital requirements (SCR)**
 - Minimum capital requirement (MCR)**: capital requirement is between 25-45% of the SCR.

Diversification (在什么层次做diversification)

Diversification benefits are related to the interrelationship among risk factors, which can lead to large reductions in capital requirements.

Level 1	Within specific class of risk. Within a specific line of business.	
Level 2a	Within specific class of risk. Across specific lines of business.	Level 2b: Across specific classes of risk. Within a definite legal entity.
Level 3:	Across definite classes of risk. Across legal entities.	

- Basel II/III** only considers **Level 1 diversification**
- Solvency II** considers **Level 1, Level 2 and Level 3 diversification**

9.1 Which of the following statements would be considered a drawback of Basel II/III?

- Procyclicality is a concern, and no countercyclical buffer is provided.
- It does not consider diversification effects among risk classes.
- Level 1 diversification benefits are not acknowledged.
- There are no detailed disclosure requirements for risk management policies concerning credit risk.

Answer: B

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Basel II/III only considers Level 1 diversification benefits. It considers the sum of the risks but not the interrelationships among risk factors.

9.2 Which of the following statements is correct regarding capital requirements for insurance companies?

- Basel II includes the regulation of banks and insurance companies in the three pillars.
- The minimum capital requirement is likely to be higher than the solvency capital requirement for insurance companies.
- The repercussion for violating the solvency capital requirement is likely liquidation and the transfer of company insurance policies to another firm.
- The internal models approach to calculating the solvency capital requirement is similar to internal ratings based approach under Basel II in that the firm must calculate a VaR with a one-year time horizon.

Answer: D

Solvency II, not Basel II, establishes capital requirements for insurance companies. The minimum capital requirement (MCR) is just that, a true floor and is thus likely to be lower than the solvency

capital requirement (SCR). The repercussion for violating the MCR is likely the prohibition of taking new business and possible liquidation. The repercussion for violating the SCR is the requirement of a plan to remedy the situation and bring the capital back to the required level. The internal models approach is similar to the internal ratings based approach under Basel II in that the insurance company must calculate a one-year VaR with a 99.5% confidence level (versus 99.9% confidence for banks under Basel II).

9.3 The Basel II/III standard approach and the Solvency II basic approach to capital requirements take very different approaches to the benefits of diversification across risk classes and legal entities when calculating required capital. Under their respective Pillar I rules, which of the following statements is correct?

- A. Solvency II sums the risk factor capital requirements without including any diversification benefit.
- B. Basel II/III specifies a correlation matrix to use when calculating diversification benefits;
- C. Solvency II incorporates diversification at the group level.
- D. Basel II/III penalizes concentration risk

Answer: C



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Current Issues in Financial Markets

1 Bitcoin:Economics,Technology and Governance

1.1 Which of the following statements is incorrect regarding the incentives to use a virtual currency?

- A. Bitcoin is a virtual currency that transacts using blockchain technology.
- B. The Bitcoin verification process utilizes a key system similar to HTTPS protocols.
- C. The incentive for honesty in Bitcoin transactions is a structured regulatory system.
- D. Fees paid to Bitcoin miners are the primary incentive for honesty in the blockchain infrastructure.

Correct answer: C

Bitcoin is a virtual currency that transacts utilizing blockchain technology. It deploys a system of private and public keys just like the HTTPS protocol. The fees paid to Bitcoin miners are the only formal incentive to encourage honesty in the verification process because there is not a centralized regulatory structure supervising Bitcoin transactions.

1.2 Which of the following items is not a limitation of the current Bitcoin structure?

- A. Bitcoin transactions are irreversible.
- B. The potential for Bitcoins to be stolen from currency exchanges or from digital wallet services.
- C. The time it takes to validate a Bitcoin transaction.
- D. User identity verification is transparent.

Correct answer: D

The decentralized structure makes coordination and user identity verification difficult. The transactions are irreversible, and there is the potential for Bitcoin to be stolen either from currency exchanges or from digital wallet services. The fact that it takes roughly 10 minutes to validate a Bitcoin transaction is a limitation to broad use of Bitcoin by consumers for everyday purchases.

1.3 Which of the following statements about Bitcoin centralization structures is not correct?

- A. Mining pools were created to solve the problem of miners conducting work with a low probability of payoff.
- B. Digital wallet services are a safe way to transact in Bitcoins.

- C. Mixers are designed to protect anonymity in Bitcoin transfers.
- D. Mixers blur transaction audit trails.

Correct answer: B

Mining pools were designed to allow syndicates of miners to jointly profit if one of the miners in the group successfully validates a transaction. This helps alleviate the problem of miners using tremendous effort to find the public key to validate a transaction and then miss the payment because another miner conducted the hunt faster. Digital wallets are a step forward in organization, but they may present risk to the Bitcoin owner. If the digital wallet is hacked, then Bitcoins can be stolen unless the owner retains the private key, in which case it is still subject to data security risks. Mixers do blur the audit trail, and for this reason, they help to protect anonymity in the blockchain transaction storage system.

1.4 Which of the following items is not a risk borne by the Bitcoin structure?

- A. The irreversibility of transactions subtracts a layer of protection afforded to traditional payment methods.
- B. Low trading volume in the Bitcoin currency adds another layer of market risk to those who want to own the currency.
- C. Blockchain transactions may not be anonymous if the user makes certain types of transactions.
- D. Bitcoins do not face counterparty risk because all transactions are anonymous.

Correct answer: D

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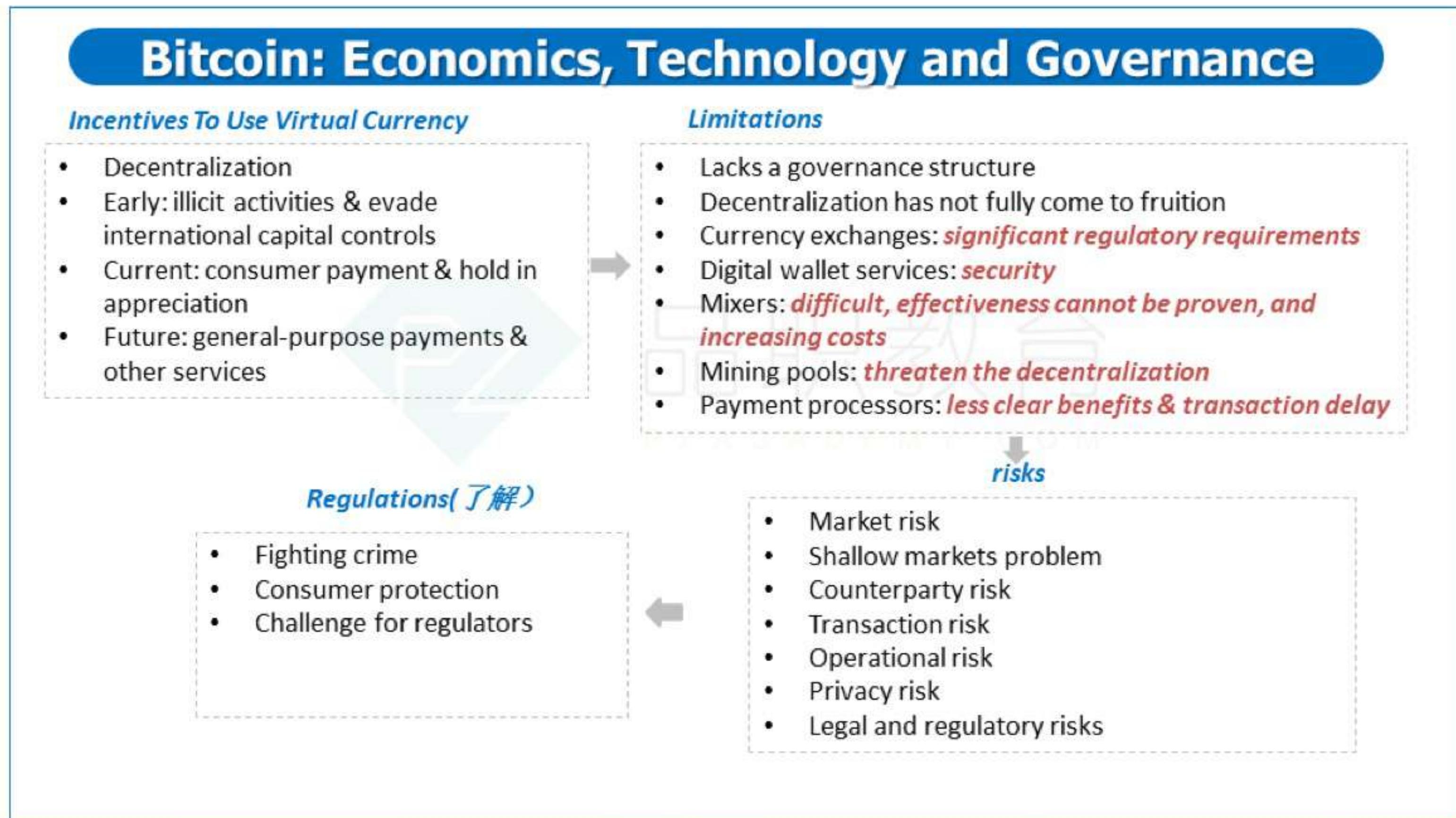
Bitcoins do face counterparty risk because some wallet services are hacked and some currency exchanges shut down. The irreversibility of Bitcoin transactions is a key risk for patrons. It makes accidental transactions an issue. The shallow market for Bitcoins does compound currency volatility. Blockchain transactions may sacrifice their anonymous features if the user ships products to a physical address or transacts on a monitored currency exchange.

1.5 Which of the following items are correct with respect to the regulation of Bitcoin?

- I. Theft of Bitcoin can be easily tracked to the specifically identifiable party that stole the Bitcoin.
 - II. Bitcoins need to be regulated because of money laundering and several categories of illegal transactions.
- A. I only.
 - B. II only.
 - C. Both I and II.
 - D. Neither I nor II.

Correct answer: B

Bitcoins have been shown to be used for money laundering and various other illegal activities. However, regulation of Bitcoins is challenging due to the semi-anonymous nature of the accounts and the global reach of this virtual currency. All global jurisdictions will need to come to a common regulatory understanding, or users will be able to exploit regulatory arbitrage. Theft of Bitcoins is easily tracked to the account that stole them. This is accomplished using the blockchain structure, but this structure also makes it very difficult to find out who owns a given account unless they make a mistake that reveals their identity.



P Z A C A D E M Y . C O M

2 market and funding liquidity-overview

2.1 Which of the following reasons would least likely suggest that market liquidity has decreased in recent years?

- A. Falling average trade sizes.
- B. Increasing bifurcation in corporate bond markets.
- C. Larger trades occurring with larger price changes.
- D. Falling realized bid-ask spreads for corporate bonds.

Correct answer: D

Evidence to suggest that market liquidity has not decreased includes: (1) stable quoted bid-ask spreads (U.S. Treasuries), (2) order book depth that is not unusually low (U.S. Treasuries), and (3) falling realized bid-ask spreads for corporate bonds.

Evidence to suggest that market liquidity has decreased includes: (1) larger trades now tend to result in large securities price changes, (2) average trade sizes have fallen, and (3) increased bifurcation in corporate bond markets (i.e., liquidity is biased in favor of larger and more recent bond issuances by larger issuers).

2.2 Which of the following factors has had the greatest impact on the liquidity of U.S. Treasuries?

- A. The Volcker Rule.
- B. Basel risk-weighted capital ratio.
- C. Supplementary leverage ratio (SLR).
- D. Comprehensive Capital and Analysis Review (CCAR) stress tests.

Correct answer: C

For U.S. Treasuries, the key change is the supplementary leverage ratio (SLR) that caps the amount of leverage permitted by dealers. In computing the SLR, the same amount of regulatory capital is required on all assets, regardless of their risk levels. Accordingly, there is now much less financing of low-risk assets, such as repos.

For corporate bonds, there have been three key changes: (1) the increase in the Basel risk-weighted capital ratio, (2) the Comprehensive Capital and Analysis Review (CCAR) stress tests, and (3) the Volcker Rule.

2.3 Which of the following factors is not considered a regulatory factor impacting liquidity?

- A. Basel risk-weighted capital ratio.
- B. Comprehensive Capital and Analysis Review (CCAR) stress tests.
- C. Monetary policy.
- D. The Volcker Rule.

Correct answer: C

Changes in monetary policy would be an example of a non-regulatory factor impacting liquidity.

There are three regulatory factors that have impacted liquidity: (1) the increase in the Basel risk-weighted capital ratio, (2) the Comprehensive Capital and Analysis Review (CCAR) stress tests, and (3) the Volcker Rule.

2.4 Which of the following statements regarding the link between market and funding liquidity is correct?

- A. A lack of market liquidity results in fewer arbitrage opportunities available.
- B. The correlation between the levels of funding liquidity and market liquidity tends to fall during times of market crisis.
- C. The fixed-rate on an interest rate swap should always be higher than the yield on a Treasury note of the same term.
- D. A narrower dispersion of Treasury yields compared to a fitted Treasury yield curve is indicative of lower funding liquidity.

Correct answer: C

The fixed rate on an interest rate swap of a given term should be higher than the yield on a Treasury note of the same term due to the greater risk of the swap.

A lack of market liquidity will result in lower price efficiency with a greater number of arbitrage opportunities. A higher level of correlation between funding liquidity (e.g., the fall in the amount of dealer-funded repos backed by U.S. Treasuries and wider dispersion of Treasury yields compared to a fitted Treasury yield curve) and market liquidity (e.g., rise in Treasury bid-ask spreads) exists during times of market crisis. A narrower (wider) dispersion of Treasury yields compared to a fitted Treasury yield curve is indicative of higher (lower) funding liquidity.

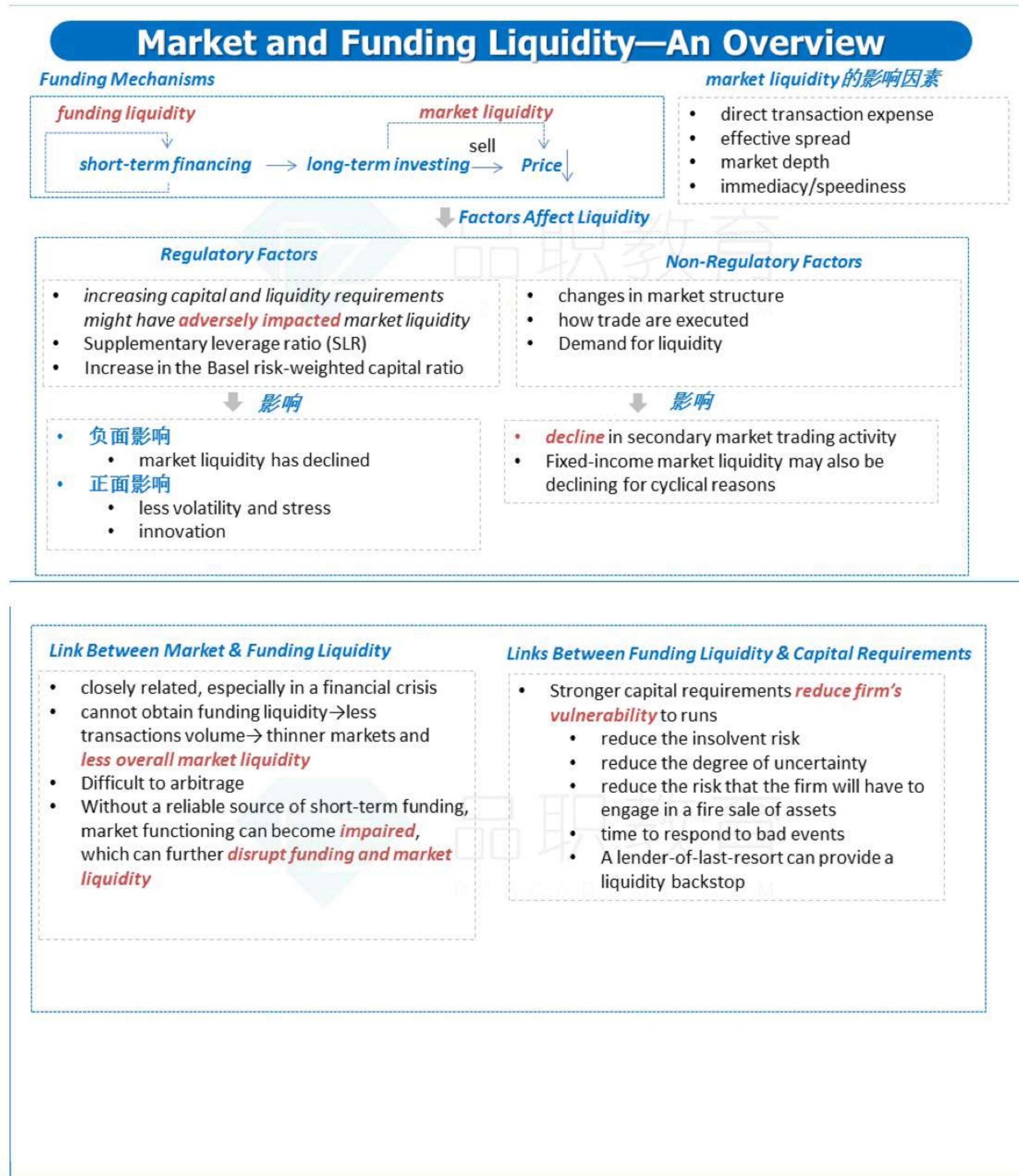
2.5 Which of the following methods is the most appropriate way to reduce funding liquidity risk?

- A. Performing more scenario analyses.
- B. Imposing lower liquidity requirements.
- C. Maintaining stable capital requirements.
- D. Using a central bank as the lender-of-last-resort.

Correct answer: D

Funding liquidity risk can be reduced by having a lender-of-last resort to provide a source of liquidity to strengthen funding liquidity. In practice, a central bank (e.g. Federal Reserve) may be able to function as the lender-of-last-resort to improve the confidence that counterparties have with each other and, thereby, increase market and funding liquidity.

Stress tests (not scenario analysis) should be performed to allow for a more accurate assessment of a firms solvency. Higher liquidity requirements, such as the liquidity coverage ratio, should be imposed to reduce funding liquidity risk. It is not sufficient to just maintain stable capital requirements; stronger capital requirements are needed to minimize the risk of insolvency during tougher economic times.



3 Market liquidity-resilient or fleeting?

- 3.1 Which of the following statements is most accurate in regard to liquidity drivers during the 2013 taper tantrum?
- Smaller and riskier bonds were more liquid than larger-scale, lower-risk bonds.
 - Bonds with greater pretrade transparency exhibited greater liquidity resilience.
 - Greater concentrations of investment company holdings help to maintain liquidity.
 - There is an inverse relationship between the number of market makers and overall liquidity.

Correct answer: B

Based on the number of quotes, bonds that had greater pretrade transparency outperformed bonds with less transparency from a liquidity standpoint. Smaller and riskier bonds were less liquid than larger-scale, lower-risk bonds. Greater concentrations of investment company holdings reduced liquidity. There is a direct (positive) relationship between the number of market makers and overall liquidity.

3.2 Which of the following effects resulting from monetary policy decisions has been most beneficial to liquidity?

- A. Increases in risk appetite by market makers.
- B. Large-scale asset purchases by central banks.
- C. Narrowing the range of assets eligible for repo transactions.
- D. European Union (EU) restrictions on sovereign credit default swaps.

Correct answer: A

When market makers have increased risk appetites, this leads to increased inventories and overall trading, which has a positive impact on market liquidity. Large-scale asset purchases have been both positive (due to the central bank's role as a dependable buyer) and negative (purchases of these assets may make them scarce). Expanding (rather than narrowing) the range of assets eligible for repo transactions would increase liquidity. EU restrictions on sovereign credit default swaps have harmed overall liquidity in the European sovereign bond market.

3.3 All of the following statements regarding liquidity spillovers are correct except:

- A. spillovers have a greater impact when the economy is experiencing a high level of financial stress.
- B. in the years following the most recent financial crisis, spillovers have exhibited greater levels of volatility.
- C. a liquidity spillover will likely have a greater impact on assets that are correlated versus those that are uncorrelated.
- D. liquidity shocks originating in the high-yield bond market will typically have a significant impact on the investment-grade bond market.

Correct answer: D

A liquidity shock that originates in the investment-grade bond market will likely have a greater impact on the high-yield bond market, rather than the other way around. All of the other statements are accurate.

3.4 Which of the following policy recommendations should mitigate some of the concerns associated with low-liquidity markets?

- A. Implement greater restrictions on derivatives trading.

- B. Narrow the range of assets allowed by banks as collateral for repo transactions.
- C. Reduce the mismatch associated with illiquid mutual fund holdings and investor redemptions.
- D. Make electronic trading platforms available only to traders and market makers trading above a certain threshold.

Correct answer: C

Reducing the mismatch associated with illiquid mutual fund holdings and the ability of fund investors to easily redeem their holdings will help reduce the risk of low-liquidity markets. The other three recommendations would all serve to lower liquidity even further.

3.5 A bond dealer states that given recent regulatory changes, there is now more financing of low-risk assets such as repurchase agreements (repos). In addition, he believes that dealers have now increased their holdings of corporate bonds. The dealer is:

- A. correct with regard to both statements.
- B. correct with regard to his statement on repos only.
- C. correct with regard to his statement on corporate bonds only.
- D. incorrect with regard to both statements.

Correct answer: D

Capital and liquidity requirements for large dealers have increased substantially following the 2007-2009 financial crisis. For U.S. Treasuries, the key change is a cap in the amount of leverage permitted by dealers. The change resulted in much less financing of low-risk assets such as repos. Changes in the corporate bond space resulted in dealers holding far fewer corporate bonds than they did previously.

Market Liquidity—Resilient or Fleeting?

Factors Affect Market Liquidity

- **High-yield and emerging market** bonds have **lower** market liquidity than investment-grade bonds.
- **Benign cyclical conditions** are masking liquidity risks.
- **Regulatory changes** are likely to have had mixed effects on market liquidity.
- Changes in the **investor base** have likely increased liquidity risk.
- **Monetary policy** has had a positive impact on market liquidity in recent years but may have increased liquidity risk.

How Monetary Policy Affects Market Liquidity

- relax market makers' funding constraints
- Adding a bond in the list of eligible collateral for repo
- Quantitative easing improved liquidity, but then degraded it.
- unconventional monetary policy only affects the liquidity of investment-grade bonds
- a positive impact on the liquidity resilience of foreign currency markets

具体说明

Market liquidity 驱动因素

- Market-making and funding constraints
- Search costs
- Investor base
- Risk appetite
- Structural factors
- Cyclical factors

流动性可以在资产之间传递 (Liquidity Spillovers)

- could be amplified when:**
- highly leveraged
 - asset are correlated
 - start fire sales

结论

- **investment-grade** bond as a **source** of liquidity spillovers
- Should monitor investment-grade corporate bonds

<i>Policy To Bolster Market Liquidity And Resilience</i>		
<i>On Market Microstructure Design</i>	<i>On The Role of Central Banks</i>	<i>On the Regulation of Financial Intermediaries</i>
<ul style="list-style-type: none"> Reforming the design of markets <ul style="list-style-type: none"> <i>instrument standardization</i> Designing circuit breakers <i>based on liquidity conditions</i> <i>Enhancing transparency</i> Open access to <i>electronic</i> platforms Restrictions on the use of financial derivatives should be reevaluated. 	<ul style="list-style-type: none"> Central banks should <i>take into account the effects on market liquidity</i> when making policy. Central banks should <i>routinely monitor</i> market liquidity, especially in the investment-grade bond market. In period of financial market stress, central banks could use <i>various instruments</i> to enhance market liquidity. <ul style="list-style-type: none"> By accepting with appropriate haircuts By accepting a wide range of assets as collateral for repo transactions 	<ul style="list-style-type: none"> Liquidity stress testing for banks and investment funds should be conducted taking into account the <i>systemic effects of market illiquidity</i>. <i>liquidity mismatches</i> in the asset management industry should be <i>mitigated</i>.

4 Algorithmic Trading Briefing Note

4.1 Increased testing of algorithms or trading strategies would be the most appropriate response to which of the following risks?

- A. Amplified systemic risk.
- B. Substantial intraday risk.
- C. Lagging internal controls.
- D. Rapid occurrence of significant losses.

Correct answer: D

Mitigating the problem of the rapid occurrence of significant losses could be in the form of increased testing of algorithms or strategies as well as additional proposed requirements by market regulators to improve controls.

More frequent reporting throughout the day would help mitigate intraday risk. Making a concerted effort to fully develop internal controls to keep up with HFT and algorithmic clients would help mitigate the risks associated with lagging internal controls and amplified systemic risk.

4.2 During which stage of a trading product's lifecycle would stress testing most likely be performed?

- A. Development stage.
- B. Initial testing stage.

- C. Ongoing maintenance stage.
- D. Rollout stage.

Correct answer: C

A new or revised algorithm or strategy requires testing during the development (initial testing), rollout, and ongoing maintenance stages. During the ongoing maintenance stage, stress testing could be performed to consider the impact of increased or extreme market activity and external events.

During the development stage (initial testing), there must be testing in a nonlive trading setup. Such testing is needed to ensure that the controls are sufficiently robust. During the rollout stage, the algorithms are introduced in a systematic and conservative manner. For example, there should be testing of adherence to limits on price, position, and number of financial instruments pertaining to the use of the algorithm.

4.3 The concept of defense-in-depth is the primary focus for which of the following activities?

- A. Reporting by the trading desk.
- B. Updating and improving controls.
- C. Testing algorithms and strategies.
- D. Governance and management oversight.

Correct answer: B

A defense-in-depth process includes a wide variety of controls as well as a system of control redundancy throughout the firm in an effort to update and improve controls. Defense- in-depth aims to lower the chances of an erroneous and significant order actually being executed.

The trading desk focuses on providing relevant reports to one or more of the risk management group, senior management, or the board to allow them to assess the firms total risk. Testing of new or revised algorithms or strategies focuses on testing during the development, rollout, and ongoing maintenance stages. Governance and management oversight focuses on having a centralized risk management process and the application of controls consistently throughout the firm.

4.4 Firms are least likely to require controls in which of the following trading areas?

- A. Order execution.
- B. Order generation.
- C. Order handling.
- D. Order termination.

Correct answer: D

The trading department must have controls over order generation, order handling, and order

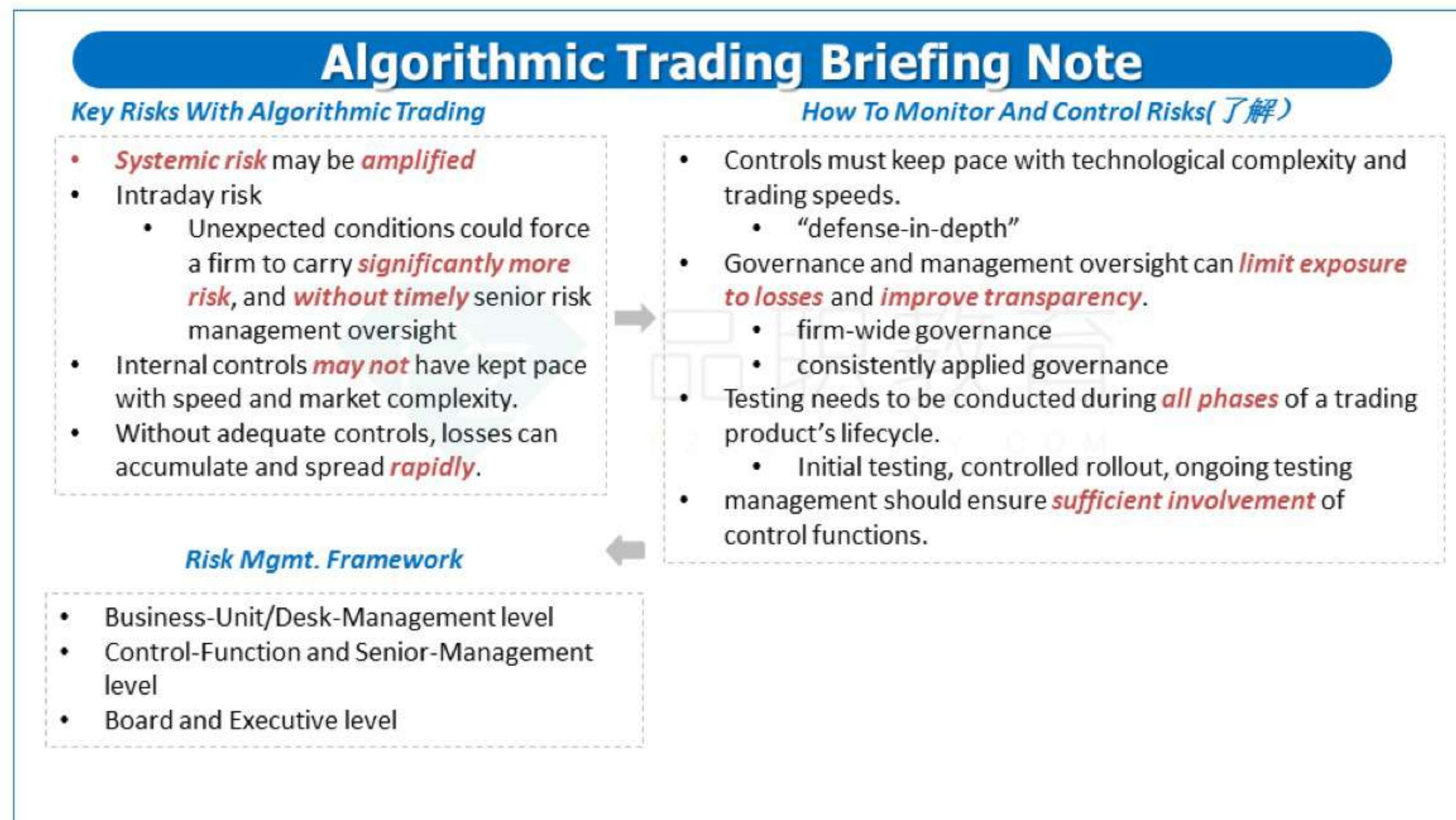
execution. There is no specific mention of order termination.

4.5 Which of the following parties is most likely to execute trading incident response processes?

- A. Trading desk.
- B. Senior management.
- C. Control-function group.
- D. Business-unit management.

Correct answer: C

Control-function groups need to work together to ensure coordinated responses to trading incidents. Incident response processes need to be communicated to senior management, but senior management does not ultimately execute them. An individual trading desk or business unit may be the cause of an incident that requires one or more control-function groups to respond to the incident.



5 Hanging Up the Phone-Electronic Trading in Fixed Income Markets and Its Implications

5.1 A trading process that provides platform participants with guaranteed prices, usually for smaller transactions is best described as:

- A. click to trade (CTT).
- B. high-frequency trading (HFT).
- C. over-the-counter (OTC).

- D. request for quote (RFQ).

Correct answer: A

A CTT process provides participants with guaranteed prices, usually for smaller transactions.

5.2 High-frequency trading (HFT) is least likely to be described as:

- A. large transaction sizes.
- B. generating many orders.
- C. large numbers of orders canceled.
- D. open positions being held for very brief periods.

Correct answer: A

Trading characteristics of HFT include (1) many orders generated, (2) open positions held for a very short time (e.g., seconds), and (3) canceling a large number of orders generated (e.g., often over 80%).

5.3 Which of the following factors is least likely a key driving force behind the electronification of trading in fixed-income markets?

- A. Lower costs.
- B. Increased regulation.
- C. Improving market liquidity.
- D. Greater selection of securities.

Correct answer: D

The main drivers behind electronification are the possibility of lower trading costs and improved market liquidity. Since the financial crisis of 2007—2009, new regulations such as the required clearing of standardized OTC derivatives, additional trade reporting details, and greater pre- and post-trade transparency have encouraged trading on electronic trading platforms (ETPs).

5.4 Which of the following statements regarding the impact of electronification on market quality is correct?

- A. Principal trading firms are now the main source of liquidity in many fixed-income markets.
- B. Electronification can assist in exploiting arbitrage opportunities in the market.
- C. During periods of market stress, bank dealers maintain narrow bid-ask spreads.
- D. Trading algorithms have developed in complexity so as to easily account for significant price changes during periods of market stress.

Correct answer: B

In a quicker electronic environment, arbitrage opportunities can be spotted and profited upon with greater speed. The information is then rapidly incorporated into securities prices, thereby increasing price efficiency.

Although there has been a shift from voice to electronic trading, dealers continue to be the main source of liquidity in many fixed-income markets. PTFs that are market makers have taken on the role as a secondary source of liquidity but can only do so for a brief time.

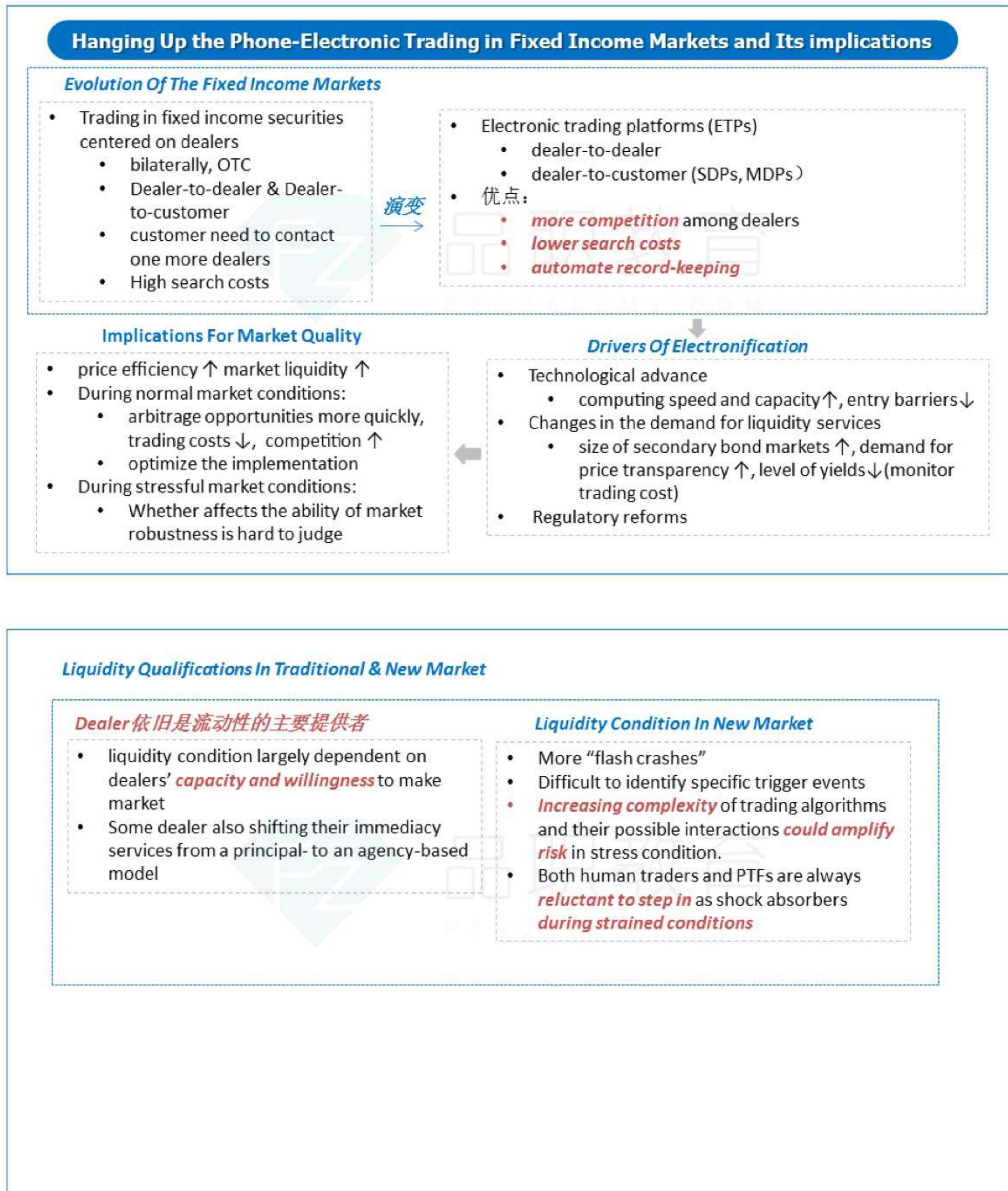
During periods of market stress, PTFs reduced market depth the most, yet kept narrow bid-ask spreads, while bank dealers simply widened their bid-ask spreads. The risk involved with trading algorithms may be magnified during periods of market stress. For example, significant price changes during such periods are often challenging to account for in trading algorithms.

5.5 Which of the following statements regarding measuring liquidity conditions and high-frequency trading (HFT) is most accurate?

- A. The shortening lifespan of orders makes it more difficult to determine market liquidity.
- B. HFT strategies allow for very competitive pricing with tighter bid-ask spreads only in normal states.
- C. To avoid the risk of getting picked off by market orders, HFT strategies often engage in larger trade and quote sizes.
- D. Traditional liquidity metrics such as implementation shortfall may no longer be as relevant in the new market environment.

Correct answer: A

With HFT, it is more difficult to determine market liquidity because orders could be canceled at a moment's notice. HFT strategies allow for very competitive pricing with tighter bid-ask spreads in normal and very volatile states. To avoid the risk of getting picked off by market orders, HFT strategies often engage in smaller trade and quote sizes. The new market environment requires new metrics, such as implementation shortfall, to evaluate market quality with greater precision.



6 How Have Central Banks Implemented Negative Policy Rates?

6.1 Which of the following central banks that have adopted negative policy rates did not do so to encourage inflation to rise up to a healthy target rate?

- A. The European Central Bank.
- B. The Swedish central bank.
- C. The Swiss central bank.
- D. The Australian central bank.

Correct answer: C

The European central bank and the Swedish central bank both lowered policy rates into negative territory to encourage inflation. The Australian central bank has not adopted a negative rate regime. The Swiss central bank adopted negative policy rates to combat an appreciating currency started by the ECB's negative rate program.

6.2 Which of the following statements about negative interest rate policy (NIRP) implementation is not accurate?

- A. The existing structure of most central banks allowed for only deposits above a specified threshold to be charged a negative rate.
- B. Negative interest rate policies have been implemented within existing central bank frameworks with some modifications.
- C. One consideration that still needs to be addressed is constant net asset value(NAV) on money market mutual funds.
- D. Hedging of interest rate risk using swap contracts may need adjustments in a negative rate world.

Correct answer: A

Central banks did largely implement NIRP within their existing frameworks, but they needed to alter their terms of business to allow for negative rates on only assets on deposits above a certain threshold level. This only applies to a few of the central banks that impose the threshold model. Central banks will still need to address the constant NAV issue on money market mutual funds. New hedging instruments may be necessary since existing interest rate swaps were not set up for a negative rate regime.

6.3 Which of the following statements best captures the translation of negative policy rates into market rates?

- A. Negative policy rates have driven up sovereign debt yields into positive values.
- B. Negative policy rates have increased commercial bank lending rates in certain loan classes.
- C. Negative policy rates have not yet reached nonsovereign money market instruments.
- D. Negative policy rates have been passed along to retail banking customers.

Correct answer: B

Negative policy rates have translated into negative yields on sovereign debt obligations and have also passed-through to nonsovereign money market instruments. They have been passed along to most wholesale depositors (by commercial banks) but not to retail customers.

Lending rates for retail customers have actually risen somewhat to offset the negative rates carried by the bank in other depository accounts.

6.4 Which of the following statements is correct relative to the theoretical lower bound for nominal interest rates?

- A. The theoretical lower bound for interest rates is zero.
- B. The theoretical lower bound is not impacted by the measure of pass-through to bank customers.
- C. There is no theoretical lower bound.
- D. The theoretical lower bound for interest rates is close to but slightly less than zero.

Correct answer: D

The theoretical lower bound for interest rates is close to but slightly less than zero to account for storage costs of owning large quantities of cash. The lower bound is greatly impacted by pass-through to customers. If negative rates are passed-through to retail customers, then the true theoretical lower bound might be more apparent as all bank customers would then feel the effect of negative rates. The trouble is that this could create substantial withdrawal requests and move in the opposite direction of the desired stimulus.

6.5 Which of the following options is a known potential risk of NIRP programs?

- A. Decreased lending rates for borrowers.
- B. Domestic currency appreciation.
- C. Reduced credibility for central banks.
- D. Decreased bank service fees.

Correct answer: C

The credibility of central banks has been called into question as a result of NIRP programs. One risk of negative interest rate programs is increased lending rates. This occurs when commercial banks decide to not pass along negative rates to retail customers. Increased lending rates will slow the economy and not boost GDP. Another risk is domestic currency depreciation.

Negative rates will lower a country's currency with regard to trading partners and potentially lead to currency wars. Also, banks may increase fees to offset the cost of NIRP.

6.6 Central banks have held operational jurisdiction over various global economies for many years. Which of the following statements is incorrect regarding recent negative interest rate policy developments?

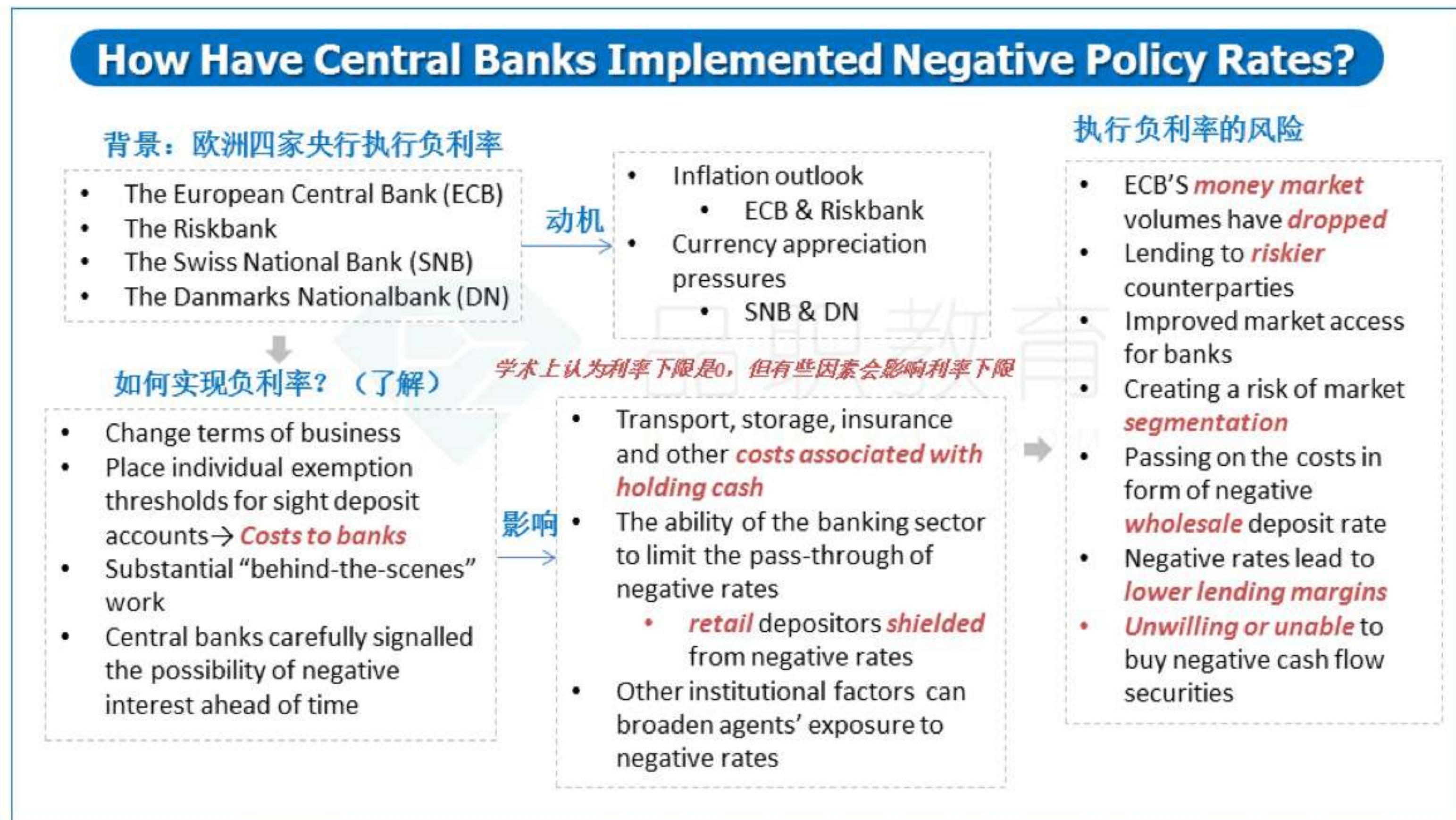
- A. Many of the central banks that have deployed negative rate policies have done so to address inflation concerns.
- B. Some central banks had to alter existing infrastructure in order to accommodate negative policy rates.
- C. Every country that has instituted negative interest rate policies has done so on a

stand-alone basis using existing infrastructure.

- D. Some central banks have combined negative policy rates with asset purchase programs.

Correct answer: C

Many of the central banks that have instituted negative policy rates have done so to address inflation concerns. In most cases, they needed to make structural changes to the existing central banking framework to permit the customized application of negative policy rates. Some have paired negative policy rate programs with asset purchases as well.



7 Corporate Debt in Emerging Economies: A Threat to Financial Stability?

7.1 Which of the following is not expected to be a result of the reversal of quantitative easing by the Federal Reserve?

- Global borrowing costs will likely increase.
- Emerging market economies will see their balance sheets improve.
- There will be a tighter supply of dollars available in global financial markets.
- The Federal Reserve will reduce the amount of money it injects into the economy.

Correct answer: B

When the Federal Reserve reverses quantitative easing, it will taper off and eventually stop injecting money into the economy. Interest rates and borrowing costs will rise, and there will be a tighter supply of dollars available in global markets. Emerging market economies will not see their balance sheets improve as a result of the Feds actions.

7.2 The risk a borrower faces if it finds it difficult to renew a loan is called:

- A. rollover risk.
- B. maturity risk.
- C. speculative risk.
- D. reinvestment risk.

Correct answer: A

Borrowers may not be able to renew debt, called rollover risk, as lenders may be sensitive to shifts in financial opportunities in other market segments. Lenders may also be sensitive to macroeconomic, sectoral, or firm-level (projection) shocks. Additionally, lenders may be forced to liquidate positions to meet redemption requests.

7.3 Corporations in emerging markets have an incentive to borrow, then on-lend the funds, because:

- A. they have highly leveraged balance sheets, making lending a highly profitable venture.
- B. they are subject to financial regulations, like banks, and are therefore encouraged to on-lend.
- C. they are not subject to the same financial regulations as banks and can therefore act as intermediaries while avoiding the costs of regulation.
- D. they are prohibited from borrowing in global financial markets unless they invest a proportion directly in capital markets or make loans to other corporations.

Correct answer: C

Corporations in emerging markets have an incentive to borrow then on-lend (i.e., lend money that has been borrowed previously from an organization or person) the funds because they can avoid the high regulatory costs borne by financial institutions.

7.4 To combat the potential threat to financial stability that results from excessive corporate debt in emerging markets, increasing the assumed run-off rate would strengthen bank:

- A. capital.
- B. liquidity.
- C. concentration limits.
- D. off-balance sheet regulations.

Correct answer: B

Banks must have liquid assets sufficient to cover liquidity needs over a 30-day stress period. Run-off rates, the rate at which various deposits will be withdrawn, must be assumed. There are minimum international standards, but supervisors should set run-off rates higher for corporates

with greater foreign exchange exposures, again tying it to the company's FX β .

Corporate Debt in Emerging Economies: A Threat to Financial Stability?

Trends Of Emerging Economics

- During 1999-2007, international financial standing of many emerging economies **improved**, the international B/S of these countries grew **stronger**.
- However, a combination of domestic and external factors may result in financial **instability** in some emerging economies.
 - tighter funding conditions** → cost of borrowing local currency ↑
 - Expected dollar appreciation** → the value of dollar debt↑
- International financial position of **nonfinancial firms** have been drawing increasing attention
 - Large corporate can directly obtain funding from international banks, bond market, and non-bank intermediaries
 - Small firms borrow from their own banks in foreign currency terms, or from domestic financial sector.

macro-financial
fundamentals have
deteriorated

Risk Factors

- Maturity mismatches
- Currency risk
- Rollover risk
 - Caused by a fickle investor base
- Speculative risk

风险如何传导到金融系统？

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- losses would increase the riskiness of domestic financial intermediaries.
- If it cannot rollover its foreign liabilities, the corporate may need to **withdraw liquid asset from domestic financial system**
- When large corporations lose access to bond markets, they **turn to banks**.
- If the corporate hedged its foreign currency exposure **using derivatives** in which the domestic bank is a counterparty, settlement could lead to impairment of the bank.

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- corporates are making short-term loans to non-bank financial intermediaries that are in turn **counterparties to the banks**.
- a high stock of foreign currency corporate debt may **increase the incentive** for sovereigns to **default on domestic-currency debt** rather than engage in currency depreciation.
- High corporate leverage** may pose macroeconomic or sectoral risks if financial losses threaten the viability of the firm

Direct Policy Implications

- Risk-weighted capital requirements
- Liquidity requirements and liquidity coverage ratio(LCR)
- Limit the exposures** of banks to large firms or subsidize lending to SMEs
- Central clearing of all derivatives contracts

Indirect Policy Implications

- Any entity that is providing banking services should face **the same regulations** and the same supervision as a bank.
- less indebted** the fiscal authority, the more room for maneuver