2020 年 10 月 FRM 二级模拟考试（一）

1. **Answer: D**

A longer forecasting period should be used for non-margined counterparties compared to counterparties who have posted margin.

2. **Answer: A**

A: A higher bond price implies higher collateral quality, so that reduces the credit exposure.

B: The repo rate for a special security is lower.

C: A positive repo rate results in a forward repurchase price that is higher than the bond's initial repo price.

D: A repo transaction's term and rate are not relevant to the maturity and coupon of the underlying security.

3. **Answer: C**

Under the cash flow mapping approach, each payment (and not only the last one) is associated with a different risk factor, so statement I. is incorrect. Statement II. is incorrect because the CF mapping approach is more correct than duration or maturity mapping.

4. **Answer: D**

D is False, the opposite is the case. In general, the liquidity risks are related in potentially causal chains.

5. **Answer: C**

Expected revenue = $1,000 \times 5\% = 50$ million

Operating cost = 6 million

Interest expense = $1,000 \times 1.4\% = 14$ million

Return on EC = $80 \times 1\% = 0.8$ million

EL = $1,000 \times 1\% = 10$ million

RAROC = $(50 - 6 - 14 + 0.8 - 10)(1 - 25\%)/80 = 19.5\%$

6. **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.

7. Answer: B

Severity distribution is generally modeled using a lognormal distribution.

8. Answer: D

The contribution from asset allocation = sum of: (actual weight – benchmark weight) × benchmark return = (0.7 - 0.6) × 5.0% + (0.2 - 0.3) × 3.0% + 0 = + 0.20%;

9. Answer: B

- B is correct.

- A is incorrect. Liquidity stress testing scenarios should also focus on systemic risks

- C is incorrect. Contingent actions should include rolling off of maturing investments to increase bank liquidity.

- D is incorrect. The treasurer in consultation with the CFO may invoke the CFP

10. Answer: B

11. Answer: A

Under the standardized approach, banks must calculate a capital requirement for each business line, rather than at the firm level as in the basic indicator approach.

12. Answer: A

Begin by using the formula for dollar portfolio VaR to compute the annual VaR(5%) for the bond position:

$$VaR_{portfolio}^2 = VaR_{Stocks}^2 + VaR_{Bonds}^2 + 2VaR_{Stocks}VaR_{Bonds}\rho_{Stocks,Bonds}$$
$$(1,367,000)^2 = (1,153,000)^2 + VaR_{Bonds}^2 + 2(1,153,000)VaR_{Bonds}(0)$$
$$VaR_{Bonds} = [(1,367,000)^2 - (1,153,000)^2]^{0.5} = 734.357$$

Next convert the annual VaR_{Bonds} to daily VaR_{Bonds} : $734,357/(250)^{0.5} = 46,445$

13. Answer: B

A higher FICO score reflects better credit quality.

14. Answer: D

The call has a payoff of 95.25 –93 = 2.25 if rates decline and a payoff of 93.75 – 93 = 0.75 if rates

increase. The expected discounted value of the payoffs is [0.55(0.75) + 0.45(2.25)]/1.04 = 1.37.

15. **Answer: C**

The most important factor in determining the value of a basket CDS is the default correlation of the reference entities of the basket. A higher default correlation increases the risk of multiple defaults, which in turn increases the probability that the 25th to default basket CDS will make a payoff. As the likelihood of making a payoff increases, the value of the basket CDS will also increase. If the default correlation is zero (low), the value of the basket CDS will be less than the value of a first-to-default CDS because the first-to-default CDS is more likely to make a payout. Note that perfect correlation will make the values of a first-to-default and a basket CDS equal, while a negative default correlation will decrease the value of a basket CDS relative to a first-to-default CDS.

16. **Answer: C**

Relevant VaR = Max (40,000, 10,000 × 3) = 40,000

Scaling from 95% one-day to 99%, 10-day VaR = 40,000 × 2.326/1.645 × sqrt(10) = $178,856

Relevant SVaR = Max (70,000, 50,000 × 3) = $150,000

Scaling from 95% one-day to 99%, 10-day SVaR = 150,000 × 2.326/1.645 × sqrt(10) = $670,710

Capital requirement = 178,856 + 670,710 = $849,566

17. **Answer: B**

The best credit derivative for this hedge fund is an asset-backed credit-linked note. With leverage of 6 and an investment of $35 million, we know that the notional value of the pool of commercial loans is $210 million. The hedge fund will earn 3.5% on their $35 million in collateral. This translates into $1.225 million. They will also earn the 185 basis point spread on the entire $210 million. This translates into $3.885 million. The hedge fund's percentage return is 14.6% [($1.225 million + $3.885 million)/ $35 million]

18. **Answer: C**

C is correct. The board of directors of banks should ensure that the bank's Framework is subject to independent review by audit or other appropriately trained parties.

A is incorrect. . "Banks should view risk transfer tools as complementary to, rather than a replacement for, thorough internal operational risk control". Risk transfer via outsourcing should not be used to relieve management of their responsibility to manage operational risk, and outsourcing can actually introduce additional operational risks to the bank.

B is incorrect. The board of directors should approve and review the risk appetite of the bank.

D is incorrect. Staff responsible for monitoring and enforcing compliance with the institution's

risk policy should have authority independent from the units they oversee.

19. **Answer: B**

Threshold in margining refers to the level of exposure below which collateral will not be called and only the incremental amount above the threshold would be collateralized. A minimum transfer amount represents the smallest amount of collateral that can be transferred. Independent amount, or initial margin, is the collateral amount that is posted upfront and is independent of any subsequent collateralization.

20. **Answer: C**

Under Merton, equity is call option on firm assets.

Equity value = $1,000 \times 0.8958 - 800 \times e^{-5\% \times 4} \times 0.8045 = 368.83$ million

21. **Answer: D**

The minimum risk portfolio is that where all the marginal VaRs are equal. If Y has a lower marginal VaR, increasing the allocation to that position will increase its marginal VaR relative to that of X. Without return measures, we cannot know how changing the allocations will move the portfolio with respect to the optimal portfolio.

22. **Answer: D**

VaR = $100,000 \times 44 \times 1.645 \times 0.008 = 57,904$

LC = $0.5 \times 0.11/44 \times 100,000 \times 44 = 5,500$

LVaR = $63,404$

23. **Answer: A**

Using the normal distribution as a parametric estimator of VaR implies that 1.65 is the cutoff for 5% significance level (i.e., 95% confidence level).

VaR Bank A: $-12\% + 1.65 \times 10\% = 4.5\%$

VaR Bank B: $-8\% + 1.65 \times 6\% = 1.9\%$

Therefore, VaR (Bank A) is roughly two times greater than VaR (Bank B).

24. **Answer: C**

Steps to calculate terminal cash flows are as follows.

1. Total size of collateral pool at origination: $100 \times \$1,000,000 = \$100,000,000$

2. Senior tranche par = $80,000,000

Junior tranche par = $15,000,000

Equity tranche par $5,000,000

3. Interest from loans: $92 \times 8\% \times \$1,000,000 = \$7,360,000$

4. Redemption at par: $92 \times \$1,000,000 = \$92,000,000$

5. Recovery in final year: $2 \times 40\% \times \$1,000,000 = \$800,000$

6. Value of overcollateralization at end of final year:

$\$10,000,000 \times 1.04 = \$10,400,000$

7. Total available to satisfy all claims = $\$110,560,000$

8. Senior claim = $\$80,000,000 < \$110,560,000$. Senior claim is satisfied without impairment.

9. Junior claim = $\$15,000,000 < \$110,560,000 - \$80,000,000$, so junior claim is satisfied.

10. Equity claim = $\$110,560,000 - \$80,000,000 - \$15,000,000 = \$15,560,000$.

25. Answer: B

The credit spread of Acme Corporation is the key variable that determines the mark-to-market (MtM) value of the CDS and therefore Income Partner's exposure. Specifically, a widening of Acme's credit spreads will product MtM gains in the long CDS position (The CDS will be "in the money") which implies credit exposure face by Income Partners. The credit spread of Institutional Traders, on the other hand, impacts their default probability (PD), which like recovery, is quantified in the CVA.
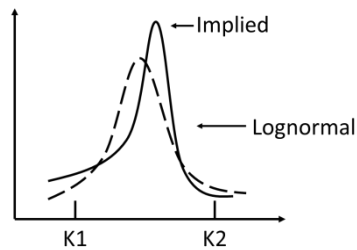
26. Answer: D

A concern is that AI&ML might favor a greater concentration of fewer, larger organizations including advanced third-party AI&ML providers, owners of proprietary sources of big data, and those able to afford heavy investments in such innovative technologies.

FSB FIN: "5.1. Market concentration and systemic importance of institutions: AI and machine learning may affect the type and degree of concentration in financial markets in certain circumstances. For instance, the emergence of a relatively small number of advanced third party providers in AI and machine learning could increase concentration of some functions in the financial system. Similarly, access to big data could be a source of systemic importance, especially if firms are able to leverage their proprietary sources of big data to obtain substantial economies of scope. Finally, the most innovative technologies may be mainly affordable to large companies because the development of uses requires significant investments (for acquiring and maintaining the infrastructure and the skilled workers)."

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

27. Answer: C

(I), (II), and (III) are not necessarily true.

Implied and Lognormal Distribution for Equity Options

28. Answer: D

Under Basel III, core Tier 1 capital includes share capital and retained earnings but does not include goodwill or deferred tax assets. The additional Tier 1 capital category consists of items, such as non-cumulative preferred stock, that were previously Tier 1 but are not common equity. Common equity is referred to by the Basel Committee as "going-concern capital". When the bank is going concern (i.e. has positive equity capital), common equity absorbs losses. Tier 2 capital is referred to as "gone-concern capital". When the bank is no longer a going concern (i.e. has negative capital) losses have to be absorbed by Tier 2 capital.

29. Answer: C

First, determine RAROC as follows:

$ARAROC = RAROC - \beta_E \times (R_M - R_F)$

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

$RAROC = 8\% + 1.5 \times (0.06 - 0.02) = 0.14$

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

$EL = RAROC \times EC$ - revenues + expenses - return on EC

$EL = 0.14 \times \$5M - \$1.3M + \$0.3M - \$0.1M = \$400,000$

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

Worst-case loss = expected loss + unexpected loss

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

Worst-case loss = \$0.9M

30. Answer: A

Statement I is incorrect because age-weighted historical simulation reduces the weighting of each successive observation by a constant decay factor. Statement II is incorrect as volatility-weighted historical simulation uses a multiplicative adjustment not additive. Statement III is incorrect because filtered historical simulation combines the historical simulation model with conditional volatility models.

31. **Answer: D**

Netting, collateralization, and the independent amount (margin) all decrease exposure and, hence, the credit value adjustment. By contrast, the minimum transfer amount increases exposure and the CVA amount.

32. **Answer: C**

- C is correct. An impact tolerance quantifies the amount of disruption that could be tolerated by the bank in the event of a severe but plausible incident. By setting an impact tolerance, the firm is identifying its most crucial operational processes and can then allocate its resources towards these processes with the goal of remaining within the impact tolerance range.

- A is incorrect. Concentration risk is more related to situations in which the bank has a limited number of potential technology vendors to whom it could outsource services or a concentration of counterparty exposures to one asset class, counterparty or market sector. An impact tolerance does not generally help the bank identify concentration risk but can help the bank assess its operational tolerance given an unavoidable concentration.

- B is incorrect. Scenario analysis is used to produce estimates of potential disruption. The impact tolerance is set based o n the results of the scenarios as well as the bank's own experiences in the past.

- D is incorrect. An impact tolerance does not prevent failure of critical processes; rather it determines a tolerance range for a potential failure or disruption.

33. **Answer: B**

A.Incorrect. Left out the accrued interest of 6%*0.25 in the correct equation for cash inflow.

B.Correct. Cash inflow at beginning of repo: (100,000)*(97%+6%*0.25)*(1-10%) = 88,650; Cash outflow at end of repo: 88,650*(1+4%*0.5)=90,423

C.Incorrect. Used 1 instead of 97% for price in the correct equation for cash inflow.

D.Incorrect. Left out haircut of 10% in the correct equation for cash inflow.

34. **Answer: B**

Typically, the arbitrage is to go long in the target's stock and short the acquirer's stock. The arbitrage is not really a hedge protecting a loss if the deal does not go through. The target stock could fall below pre-announcement price, and the acquirer stock could substantially increase.

35. **Answer: C**

The board of directors should periodically monitor and review the RAF.

36. Answer: B

POT GP requires two parameters (i.e., scale and tail/shape) but we must also specify a threshold (u).

37. Answer: C

Bad loans can definitely be passed on through the securitization process. Many suggest that the main reason for the collapse of the securitized mortgage market was due to the low quality of subprime mortgages originated in the years immediately before the market collapse.

38. Answer: C

C is an example of predatory borrowing.

Ashcraft on predatory lending: "The New Jersey Division of Banking and Insurance (2007) defines predatory lending as an activity that involves at least one, and perhaps all three, of the following elements:

- Making unaffordable loans based on the assets of the borrower rather than on the borrower's ability to repay an obligation;

- Inducing a borrower to refinance a loan repeatedly in order to charge high points and fees each time the loan is refinanced ("loan flipping"); or

- Engaging in fraud or deception to conceal the true nature of the loan obligation, or ancillary products, from an unsuspecting or unsophisticated borrower."

39. Answer: B

BIA ORC = 15% × (37 + 71)/2 = $8.1 million

Under SA approach:

Y – 3 = -1.8; Y – 2 = 5.34; Y – 1 = 10.56

SA ORC = average (0, 5.34, 10.56) = $5.3 million

The difference is a reduction of $2.8 million

40. Answer: B

A FICO score of 660 or above is considered by most credit scoring firms as a prime credit. Lower loan-to-value ratios are more favorable than high loan-to-value ratios.

41. Answer: B

- B is correct. Capacity ratio is the ratio of net loans and leases to total assets, so liquidity decreases when net loans and leases increase relative to total assets, because they are often illiquid.

- A is incorrect. Liquidity increases when overnight loans increase relative to overnight borrowing.

- C is incorrect. Liquidity increases when fewer securities are pledged/unavailable to sell relative to total securities.
- D is incorrect. Liquidity increases when loan commitments decreases relative to total assets.

42. Answer: D

Delta hedging is used to frequently adjust the short position. The goal is to neutralize the effects of changes in the underlying stock price during the convertible security's life.

43. Answer: C

The approximation of credit spread = $(1 - RR) \times (PD)$. This implies:

ABC: 200 bps = $(1 - RR) \times (10\%)$, so RR = 80%.

DEF: 300 bps = $(1 - RR) \times (20\%)$, so RR = 85%.

Thus, the market implied recovery rate is lower for ABC. Using loss given default terminology, LGD for ABC = 20% and LGD for DEF = 15%

44. Answer: C

Credit Spread = $3.5\% - 2.0\% - 0.4\% = 1.1\%$

PD = spread/(1 − recovery rate) = $1.1\%/25\% = 4.4\%$

45. Answer: C

Our modern world is filled with computerized commerce. This trend has created a seemingly endless stream of information that can be dissected using machine learning. Overfitting and spurious correlations are two clear issues and traditional spreadsheet analysis is simply not robust enough to capture the interactions in very large pools of data.

46. Answer: B

The 2009 SCAP was a one-time dual-stage test that was replaced by the annual CCAR approval process.

47. Answer: B

dw = 1.240 × sqrt (1/12) and dr = 2.0% × 1.240 × sqrt (1/12) = 0.7159%, such that r = 4.7159%

48. Answer: C

Since the ratio of long-term-liabilities-to-short-term-liabilities is less than 1.5, the following equation for default point (i.e., default threshold) will apply:

Default Point = short-term liabilities + 0.5 × long-term liabilities

Default Point = 1,300 + 0.5 *1,800 = $2,200

The distance to default is then equal to:

DD = (5,000 - 2,200)/500 = 5.6

49. Answer: B

The expected return on common equity is as follow:

$$R_{CE} = R_F + \beta \times (R_M - R_F) = 0.02 + 1.15 \times (7\% - 2\%) = 7.75\%$$

The hurdle rate is computed as follow:

$$h = \frac{(CE \times R_{CE}) + (PE \times R_{PE})}{CE + PE} = \frac{1.5 \times 0.0775 + 0.75 \times 0.06}{1.5 + 0.75} = 7.17\%$$

50. Answer: A

Due to the nature of the banking industry, Basel II/III is more focused on systemic risk as opposed to trying to achieve a safety level for the whole company. However, it does focus on three risk classes, which are all asset-specific (market risk, credit risk, and operational risk). The goal of Basel II/III is to operate above capital requirements under Pillar 1.

51. Answer: C

- A is incorrect. A more bank-specific early-warning-indicator (EWI) would be a decrease in stock price of the bank relative to its peers.
- B is incorrect. A decrease, not an increase, in credit lines is problematic for liquidity.
- C is correct. Wider spreads indicate a loss of market confidence in the bank and a higher cost of funding.
- D is incorrect. Rapid asset growth funded by volatile liabilities would be more problematic.

52. Answer: C

- C is correct. -50+80+120-100+80-70-40-60= -40
- A is incorrect. Flips the sign for borrowings from money market.
- B is incorrect. Flips the sign for scheduled loan repayments and acceptable loan requests.
- D is incorrect. Flips the sign for repayment of bank borrowings.

53. Answer: A

The short stock position is a delta hedge to the long convertible; however, this strategy is long gamma and long Vega.

54. Answer: C

The tree should look like this:
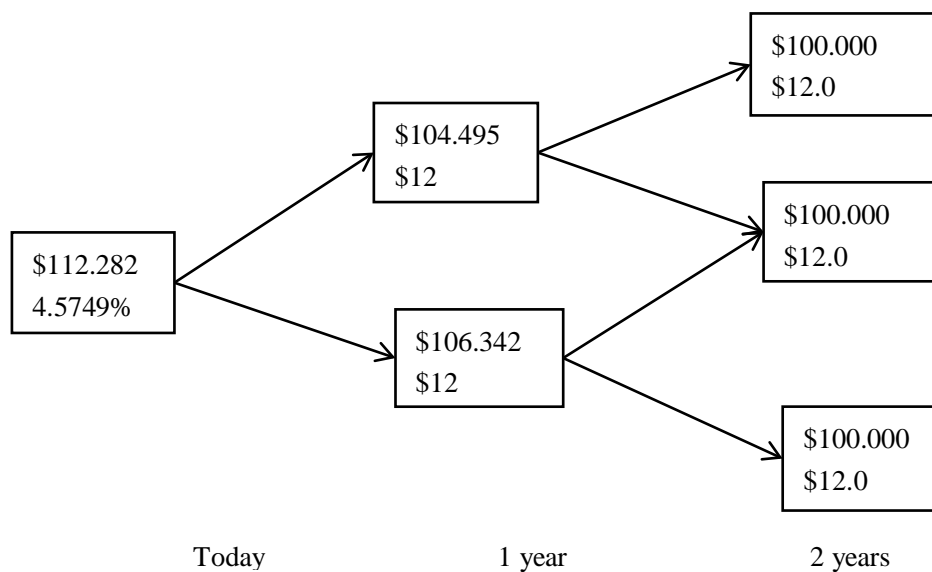
Consider the value of the bond at the upper node for period 1, $V_{1,U}$.

$$V_{1,U} = \frac{1}{2}\left[\frac{\$100+\$12}{1.071826} + \frac{\$100+\$12}{1.071826}\right] = \$104.495$$

Similarly, the value of the bond at the lower node for period 1, $V_{1,L}$ is.:

$$V_{1,L} = \frac{1}{2}\left[\frac{\$100+\$12}{1.053210} + \frac{\$100+\$12}{1.053210}\right] = \$106.342$$

Now calculate V_0, the current value of the bond at node 0:

$$V_0 = \frac{1}{2}\left[\frac{\$104.495+\$12}{1.045749} + \frac{\$106.342+\$12}{1.045749}\right] = \$112.282$$

55. Answer: B

The 30-day liquidity coverage ratio (LCR) is equal to the stock of high-quality liquid assets divided by the net cash outflow over a 30-day period. Under Basel III, this ratio must equal or exceed 100%. Large Bank's liquidity coverage ratio = \$300 / \$285 = 1.053 = 105.3%.

56. Answer: B

Just as an increase in the risk-free rate increases the value of a call option, an increase in the risk-free rate increases the equity value under Merton. However, the risk-free rate has no impact on the Merton PD, the physical drift of 8% is used.

57. Answer: A

Potential explanations for the risk anomaly include: the preferences of investors, leverage constraints on retail investors that drive them to buy pre-leveraged investments in the form of high-beta stocks, and institutional investor constraints like prohibitions against short selling and tracking error tolerance bands.

58. Answer: B

B. False. Passengers in First or Second Class (i.e., Class < 2.5) who are younger than 16 live, but all Third Class passengers (including the young) do not survive; although among Third class, this misclassifies 1 - 370/501 = 26.1% of this group.

59. Answer: A

The swap treats interest rate (via the fixed-for-floating exchange) and liquidity risk (via the cash flow timing of semiannual-for-quarterly). If the swap did not deduct defaulted collateral from the notional, it would also provide credit support.

60. Answer: D

The term structure of expected liquidity, TSL(e), is a combination of the term structures of cumulative expected cash flows (TSECCF) and liquidity generation capacity (TSCLGC)

61. Answer: D

Its primary advantage is that it is simple-to-implement: the basic LVaR simply adds one-half the spread to adjust for liquidity risk.

62. Answer: C

We refer to wrong-way risk as the adverse (negative) correlation between the exposure to the counterparty and its credit quality. Alternatively, it can be stated as the positive correlation between exposure and credit spread.

63. Answer: C

- C is correct. Both pensions and endowments have increased their holdings of alternative assets from about 5% to 20-25%.
- A is incorrect. Municipal bonds have less than 10% turnover, much lower than approximately 35% for OTC equities.
- B is incorrect. US real estate markets are large compared to size of US stocks/bonds.
- D is incorrect. Liquidity dried up in both markets.

64. Answer: B

Bond C yield, for example, given by: N = 4, PV = -96, PMT = 1, FV = 100 and CPT 1/Y = $2.051816 \times 2 = 4.1036\%$

Bond A yield = 3.07% with spread of 3.07% - 1% = 2.07% and implied PD = 2.07%/50% LGD = 4.14%

Bond B yield = 4.5% with spread of 4.5% - 1.5% = 3%, and implied PD = 3%/45% = 6.66%

Bond C yield = 4.1% with spread of 4.1% - 2% = 2.1%, and implied PD = 2.1%/40% = 5.26%

65. Answer: C

node[2,0] = 4% + (1% + 0.8%) × 1/12 – 2 × 2% × sqrt(1/12) = 2.995%

66. Answer: A

While the models varied widely, two widespread defects were particularly important: In general, the models assumed positive future house price appreciation rates while house prices did in fact drop very severely starting in 2007. In addition, correlations among regional housing markets were assumed to be low. Bonds based on pools of loans from different geographical regions were therefore considered well-diversified. In the event, while house prices fell more severely in some regions than others, they fell – and loan defaults were much higher than expected in a stress scenario – in nearly all.

67. Answer: D

Both I and II

68. Answer: A

8.3% – (5.32% + 0.23%) – 0.51% - 0.13% = 2.11%

69. Answer: A

The biggest concern of the CCP framework is the risk of default of a CCP. The failure of a CCP could lead to even greater systemic risk with no market liquidity or settlement process. The loss waterfall process does not provide a solution for the failure of a CCP, only the failure of a CCP member.

70. Answer: D

In the CIR model, the basis-point volatility of the short rate is not independent of the short rate as other simpler model assume. The annualized basis-point volatility increases as a function of the square root of the rate.

71. Answer: C

The Treynor measure is calculated as (Expected Return – Risk Free Rate)/Beta to Index. Assets B, C, D have Treynor measures greater than 0.1. Of these, C has the lowest marginal VaR as its Beta to the portfolio is the lowest.

72. Answer: B

B is correct. The change in the pension fund's surplus (D_S) for the year 2016 is equal to the ending

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surplus (S_1) at the end of 2016 less the initial surplus (S_0) at the end of 2015. That is, $D_S = S_1 - S_0$. The initial surplus is calculated as $S_0 = A_0 - L_0 = 840 - 450 = $ USD 390 million, where $A_0 = $ the firm's initial assets and $L_0 = $ the firm's initial liabilities. Next, we have to calculate S_1, the surplus at the end of 2016. Given the 30% decline in the equity and commodity markets, the new level of assets A1 at the end of 2016 is equal to:

$A_1 = (1 - 0.3) * 840 = $ USD 588 million.

Since the percentage change in liability value $= - D_M * D_y$, where $D_M = $ modified duration $= 12$; and $D_y = $ change in yield $= +2.3\%$, then the new level of liabilities L1 at the end of 2016 can be calculated as:

$L_1 = [1 - (D_M * \Delta y)] * L_0 = [1 - 12*(+0.023)] * 450 = $ USD 325.8 million

Thus, the ending surplus for 2016 $= S_1 = A_1 - L_1 = 588 - 325.8 = $ USD 262.2 million

Therefore, the change in surplus for 2016 $= D_S = S_1 - S_0 = 262.2 - 390 = $ USD - 127.8 million (which implies the pension fund is actually in a deficit situation at the end of 2016).

A is incorrect. USD -325.8 million is the negative amount of liabilities at year-end 2016.

C is incorrect. USD 262.2 million is the year-end 2016 surplus.

D is incorrect. USD 390.0 million is the year-end 2015 surplus.

73. **Answer: C**

This is evident from the definition of the no-trade region for the alpha of the asset. [2 x (risk aversion) x (active risk) x (marginal contribution to active risk)] — (cost of selling) < alpha of asset < [2 x (risk aversion) x (active risk) x (marginal contribution to active risk)] + (cost of purchase)

74. **Answer: B**

1-day normal 95% VaR=-[(0.15/252)-1.645*0.35/sqrt(252)]=3.57%

1-day lognormal 95% VaR=1-exp(0.003/252-0.44*1.645/sqrt(252))=4.45%

75. **Answer: A**

The risk manager will reject the hypothesis that the model is correctly calibrated if the number x of losses exceeding the VaR is such that:

$$\frac{x - pT}{\sqrt{p(1-p)T}} > z = 1.96$$

where p represents the failure rate and is equal to 1-0.995, or 0.5%; and T is the number of observations = 250*10=2500. And z = 1.96 is the two-tail confidence level quantile. If

$$\frac{x - 0.005 \times 2500}{\sqrt{0.005 \times (1 - 0.005) \times 2500}} = 1.96$$

then, x = 19.4. So, the maximum number of exceedances would be 19 to conclude that the model

is calibrated correctly.

76. Answer: A

Mapping several USD/EUR forward contracts to USD/EUR spot exchange rate is an adequate process, because all the forward positions are exposed to a single major risk factor, which is the USD/EUR spot exchange rate. However, this is not a perfect mapping (for instance, the sensitivity of both the forward and the spot exchange rates to a specific risk factor such as changes in interest rates, may differ). While the single aggregation of exposure of this risk factor is acceptable for risk measurement, it is not adequate for pricing of the portfolio.

B is incorrect because any bond must be mapped on yields that best represent its current profile and the yield differences between the corporate bonds and the government bonds disqualify this is the best mapping.

C is incorrect because such procedure maps a simple single source of uncertainty (the payoff at the maturity) to multiple sources of uncertainty (coupon payments and the payoff at the maturity) which violates the first principle of mapping, simplify the source of uncertainty.

D is also incorrect as the stock market index is a more diversified factor than a single stock. In fact, it is usually the reverse, i.e., a position of stock within index is mapped to a position in that index.

77. Answer: A

V(2yr zero)=(50%(1/1.125+1/1.085)/1.10)*EUR 1000=EUR 822.976

78. Answer: A

Expected shortfall is always greater than or equal to VaR for a given confidence level α, since α measures the minimum loss in case the worst α probability event happens and ES accounts for the severity of expected losses beyond VaR.

79. Answer: B

For foreign currency option, the implied distribution gives a relatively high price for the option. The implied volatility is relatively low for at-the-money options but it becomes higher as the option moves either into the money or out of the money. Thus, the implied distribution has heavier tails than the lognormal distribution. For an equity index option price distribution, a downward sloping volatility skew indicates that out of the money puts are more expensive than predicted by the Black-Scholes-Merton model and out of the money calls are cheaper than expected predicted by the Black-Scholes-Merton model. The implied distribution of equity options has heavier left tails and less heavy right tails, compared to the lognormal distribution.

80. Answer: C

Credit spread = RD – Rf = –(1/T)*ln(D/F) – Rf

where D is value of debt, F is Face value, T = maturity, Rf = risk free rate, RD = yield of the debt (Average maturity should be applied).

In this case the credit spread = – (1/2)*ln(100/115) – 0.048 = 6.99% – 4.80% = 2.19%.

A is incorrect. 1.37% is the difference between the bond's semi-annual yield (= 3.43%, as

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calculated in B below) and 2.4%, the semi-annual yield of the Treasury note (=4.8%/2).

B is incorrect. It uses a wrong procedure of not making continuous compounding. Without continuous compounding the average yield on the bond is 6.87% (Calculator: PV = -115, FV = 100, N = 2*2=4, PMT = 0, then I/Y = 6.87%). And 2.07% is the difference between 6.87% and the yield of the Treasury note of 4.8%.

D is incorrect. 3.43% is the semi-annual yield of the company's zero-coupon using the bond-pricing formula (Calculator: PV = -115, FV = 100, N = 2*2=4, PMT = 0).