202012 CFA 二级押题—答案

Ethical and Professional Standards

The following information relates to 1-6

1. Solution: A.

Standard III(B): Fair Dealing requires members and candidates to deal fairly and objectively with all clients. Certain clients cannot be favored over other clients when their investment objectives and circumstances are similar. Therefore, the most appropriate way to handle the reallocation of an illiquid share is to reduce each client's proportion on a pro rata, or weighted, basis.

2. Solution: B

Lan's actions do not violate Standard IV (A) – Duties to Employers. Lan does not use company time to make arrangements for his new venture, nor does he misappropriate any information (financial models or client contacts) from his former employer. All of Lan's actions are permissible under Standard IV (A).

3. Solution: B.

Richard has not violated Standard III (E)–Preservation of Confidentiality, which involves information about former, current, and prospective clients.

4. Solution: C.

According to Standard IV(B) and Standard VI(A), members should disclose all potential conflicts of interest, should disclose the substantial time involved in managing family accounts and, when engaging in independent practice for compensation, should not render services until receiving written consent from all parties.

5. Solution: C.

The records created by Richard supporting the research model he developed are the records of former employer. Taking the documents with him to Atlantic without former employer's permission violates Standard V(C)-Record retention and Ⅳ(A)-Loyalty to employer. To use the

model in the future, Richard must re-create the records supporting his model at the new firm.

6. Solution: B.

B is correct because the offering of increased benefits to encourage staff retention would not necessarily stop the unethical behavior causing staff turnover and would effectively be asking the ethical employees to ignore the unethical behavior, thus being complicit in the behavior. Under Standard I (A) Knowledge of the Law, CFA charterholders and candidates must disassociate themselves from unethical behavior. Because the unethical business practices are seen as systemic, it would likely require them to leave the firm. Implementing a whistleblowing policy and adopting a corporate code of ethics would likely help to build a foundation of strong ethical behavior.

The following information relates to 7-12

7. Solution: B.

Disclosure of the managers' involvement with CFA Institute is not a violation of Standard VII(A)–Conduct as Members and Candidates in the CFA Program, because it does not reveal any confidential information. But the CFA designation must always be used as an adjective. In this situation, the designation has not been used as an adjective, thus the statement is in violation of Standard VII(B)–Reference to CFA Institute, the CFA Designation, and the CFA Program (i.e., the statement should read "the entire research team is made up of CFA charterholders," rather than "they are all CFA's"). Members must not exaggerate the meaning or implications of membership in CFA Institute or holding the CFA designation, which Tang does, violating Standard VII(B).

A is incorrect because members must not exaggerate the meaning or implications of membership in CFA Institute or holding the CFA designation. Statements that overstate the competency of an individual or imply that superior performance can be expected from someone with the CFA designation are not allowed under the Standard.

C is incorrect because the CFA designation must always be used as an adjective, i.e., "the entire research team is made up of CFA charterholders."

8. Solution: C

The performance return claim is a violation of Standard V(B)–Communication with Clients and Prospective Clients, which requires opinion to be separated from fact. In addition, Standard I(C)–Misrepresentation prohibits members and candidates from guaranteeing clients any specific return on volatile investments. In the case of complex analyses, such as proprietary investment analytics software used by CleanTech, analysts must clearly separate fact from statistical conjecture and should identify the known limitations of an analysis, which has been done.

A is incorrect because the investment software has determined investment returns on green transportation companies based on a multiple factor regression analysis, so there is diligence and reasonable basis for the opinion as required by Standard V(A)–Diligence and Reasonable Basis. In addition, disclosure of key risks associated with such software has been provided.

B is incorrect because Standard V(B)–Communication with Clients and Prospective Clients, which requires a balanced discussion of how this investment would perform should tax incentives change or be eliminated completely, has been addressed.

9. Solution: A.

A is correct because Standard III(C) Suitability does not appear to have been violated because the fund is characterized as a high-risk investment and it is clearly stated that EnergyAlgae is also a high-risk investment. CleanTech's statement that the hedge fund benefited from the increase in share value for EnergyAlgae last year is a violation of Standard I(C) Misrepresentation because the fund had only recently invested in the stock so did not benefit from the large move in the stock's price. Standard II (A) Material Nonpublic Information has also been violated by the board member who shared material nonpublic information with the hedge fund and by the fund because it acted on the information.

10. Solution: C.

A reasonable and diligent effort was not made when the analysis on EnergyAlgae was updated on only an annual basis because the information on the company could change materially in such a high-risk industry, a violation of Standard V(A)–Diligence and Reasonable Basis. In addition, when the company reports financial results on a semiannual basis, an annual update to a research report would not be timely.

A and B are incorrect because the earnings projections along with the operational analysis are components of a reasonable and diligent effort. Third-party research may be relied upon only when a reasonable and diligent effort has been made to determine the research is sound, which in this case appears to have been performed.

11. Solution: A.

According to Standard I(B)–Independence and Objectivity, full and fair disclosure of all matters that could reasonably be expected to impair independence and objectivity must be made to all

clients. In this case, the controlling position in the broker held by the founders of CleanTech, as well as the fact that Slar has underwritten two stocks the hedge fund holds and whose recommendations the fund relied on to make these investments, must be disclosed to all clients so they are better able to judge motives and possible biases for themselves.

C is incorrect because the controlling position in the broker as well as the fact that this firm has underwritten two stocks the hedge fund holds and whose recommendations the fund relied upon to make these investments must be disclosed to all clients so they may be better able to judge motives and possible biases for themselves according to Standard VI(A)–Disclosure of Conflicts; however, there is no requirement the position be eliminated.

B is incorrect because all clients should be made aware of the ownership structure along with other relevant information as required by Standard V(B)–Communication with Clients and Prospective Clients, and there should not be selective disclosure of just one piece of relevant information concerning the arrangement.

12. Solution: B.

The hedge fund had priority in trading the stock ahead of employees. The hedge fund is effectively the client. But it does not alleviate the stock price manipulation that was engaged in by the fund and its employees, a violation of Standard II(B)–Market Manipulation. In addition, there does not appear to be an adequate basis for recommending the stock (i.e., negative information on the company's products from potential customers and suppliers), a violation of Standard V(A)–Diligence and Reasonable Basis.

A is incorrect because there does not appear to be an adequate basis for recommending the two stocks in violation of Standard V(A)–Diligence and Reasonable Basis.

C is incorrect because both the hedge fund and its employees have engaged in practices that distort prices in violation of Standard II(B)–Market Manipulation. This appears to be a classic "pump and dump" fraud where worthless stock is promoted to the public and once it reaches a certain price level the insiders who helped boost the share price sell off their shares, leaving other investors holding stock that has little or no value.

Quantitative

The following information relates to 13-17

13. Solution: A.

The calculation for the covariance is $\frac{1}{n-1}\sum_{i=1}^{n}(X_i-\bar{X})(Y_i-\bar{Y})=-0.1886$. The variance of sample X and sample Y are $\frac{1}{n-1}\sum_{i=1}^{n}(X_i-\bar{X})^2=0.0454$ and $\frac{1}{n-1}\sum_{i=1}^{n}(Y_i-\bar{Y})^2=8.4123$ respectively. Then σ_X σ_Y can be derived. The correlation is calculated as follows:

$$\rho=\frac{COV(X,Y)}{\sigma_X\sigma_Y}=\frac{-0.1886}{0.2130\times 2.9004}=-0.3053$$

14. Solution: C.

The t-statistic of the intercept is calculated as follows: $t-statistic=\frac{\hat{b}_0-0}{S_{\hat{b}_0}}$. Thus,

$$S_{\hat{b}_0}=\frac{\hat{b}_0}{t-statistic}=\frac{5.4975}{6.5322}=0.8416$$

15. Solution: B.

The calculation for the confidence interval is −4.1589 ± (2.011 × 1.8718). The upper bound is −0.3947. The 2.011 is the critical t-value for the 5% level of significance (2.5% in one tail) for 48 degrees of freedom.

16. Solution: B.

SEE is calculated as follows:

$$SEE=\sqrt{MSE}=\sqrt{373.7638/48}=2.7905$$

17. Solution: C.

$$F=\frac{MSR}{MSE}=\frac{38.4404/1}{373.7638/48}=4.9367$$

The following information relates to 18-21

18. Solution: A.

If the exchange rate series is a random walk, then the first-differenced series will yield $b_0 = 0$ and $b_1 = 0$, and the error terms will not be serially correlated. The data in Exhibit 1 show that this is the case: Neither the intercept nor the coefficient on the first lag of the first-differenced exchange rate in Regression 2 differs significantly from zero because the t-statistics of both coefficients are less than the critical t-statistic of 1.98. Also, the residual autocorrelations do not differ significantly from zero because the t-statistics of all autocorrelations are less than the critical t-statistic of 1.98. Therefore, because all random walks have unit roots, the exchange rate time series used to run Regression 1 has a unit root.

19. Solution: C.

The quarterly sales for March 2016 is calculated as follows:

$\ln \text{Sales}_t - \ln \text{Sales}_{t-1} = b0 + b1(\ln \text{Sales}_{t-1} - \ln \text{Sales}_{t-2}) + b2(\ln \text{Sales}_{t-4} - \ln \text{Sales}_{t-5})$.

$\ln \text{Sales}_t - \ln 3.868 = 0.0092 - 0.1279(\ln 3.868 - \ln 3.780) + 0.7239(\ln 3.836 - \ln 3.418)$.

$\ln \text{Sales}_t - 1.35274 = 0.0092 - 0.1279(1.35274 - 1.32972) + 0.7239(1.34443 - 1.22906)$.

$\ln \text{Sales}_t = 1.35274 + 0.0092 - 0.1279(0.02301) + 0.7239(0.11538)$.

$\ln \text{Sales}_t = 1.44251$.

$\text{Sales}_t = e^{1.44251} = 4.231$.

20. Solution: A.

When two time series have a unit root but are co-integrated, the error term in the linear regression of one time series on the other will be covariance stationary. Exhibit 5 shows that the series of stock prices of Company #2 and the oil prices both contain a unit root, and the two time series are co-integrated. As a result, the regression coefficients and standard errors are consistent and can be used for hypothesis tests. Although the co-integrated regression estimates the long-term relation between the two series, it may not be the best model of the short-term relationship.

21. Solution: C.

As a result of the exponential trend in the time series of stock prices for Company #3, Busse would want to take the natural log of the series and then first-difference it. Because the time series also has serial correlation in the residuals from the trend model, Busse should use a more complex model, such as an autoregressive (AR) model.

The following information relates to 22-24

22. Solution: B.

B is correct. Martin initially plans to use ML to develop a model that assigns new clients to the appropriate portfolio based on their responses to the questions. The analysis is a form of supervised learning. Like regression, supervised learning involves ML algorithms that infer patterns between a set of inputs (the X's, in this case the individual interview question responses) and the desired output (Y, the target ending portfolio value). The inferred pattern is then used to map a given input set into a predicted output.

A is incorrect. Categorical learning is a means to classify variables, not a method of machine learning.

C is incorrect. Unsupervised learning has no target output. Rather, the machine simply analyzes the structure of the data and seeks patterns within it.

23. Solution: A.

A is correct. Martin wants to classify clients into five different clusters (five strategic investment portfolios), according to the retirement portfolio that is most suitable for their needs.

B is incorrect. 50 is the number of features in the dataset for each interview conducted. These features will be used in the classification process to determine which portfolio is most suitable.

C is incorrect. 300 is the number of interviews conducted, not the number of clusters into which these 300 observations will be sorted.

24. Solution: C.

C is correct. Method 3 is principal components analysis (PCA). In a dataset with many correlated features, as Martin has, PCA could be used. PCA reduces the number of variables needed to explain the variation in the data.

A is incorrect. Method 1 is the ensemble method. This method combines the predictions from multiple models; it does not combine features.

B is incorrect. Method 2 is the bagging method. This method increases the number of datasets by sampling randomly from the original dataset. It does not change the number of features.

Economics

The following information relates to 25

25. Solution: A.

Using quotes from Dealer A, she can find

$$\frac{\text{MXN}}{\text{GBP}} = \frac{\text{MXN}}{\text{USD}} \times \frac{\text{USD}}{\text{GBP}}$$

The bid from Dealer A for MXN/GBP is effectively

$$\left(\frac{\text{MXN}}{\text{GBP}}\right)_{bid} = \left(\frac{\text{MXN}}{\text{USD}}\right)_{bid} \times \left(\frac{\text{USD}}{\text{GBP}}\right)_{bid}$$
$$= 17.147 \times 1.5762 = 27.0271$$

The offer from Dealer A is

$$\left(\frac{\text{MXN}}{\text{GBP}}\right)_{offer} = \left(\frac{\text{MXN}}{\text{USD}}\right)_{offer} \times \left(\frac{\text{USD}}{\text{GBP}}\right)_{offer}$$
$$= 17.330 \times 1.5766 = 27.3225$$

To compare with Dealer B's quote, she must take the inverse of MXN/GBP, so that she has an offer to sell MXN at a rate of 1/27.0271 = GBP 0.0370 and a bid to purchase MXN at a rate of 1/27.3225 = GBP 0.0366. Dealer A is effectively quoting GBP/MXN at 0.0366/0.0370. Although she can effectively buy pesos more cheaply from Dealer A (GBP 0.0370 from Dealer A, versus GBP 0.0372 from Dealer B), she cannot resell them to Dealer B for a higher price than GBP 0.0366. There is no profit from triangular arbitrage.

The following information relates to 26

26. Solution: B

Given low capital mobility, a restrictive monetary and fiscal policy should lead to domestic currency appreciation under the Mundell-Fleming model.

The following information relates to 27-29

27. Solution: A.

- Drawbridge sold AUD 5 million forward to the settlement date at an all-in forward price of 0.8940 (USD/AUD).
- To mark the position to market, Drawbridge offsets the forward transaction by buying AUD 5 million three months forward to the settlement date.
- For the offsetting forward contract, because the AUD is the base currency in the USD/AUD quote, buying AUD forward means paying the offer for both the spot rate and forward points.

I. The all-in three-month forward rate is calculated as 0.9066 – 0.00364 =0.90296

II. This gives a net cash flow on settlement day of 5,000,000 ×(0.8940 – 0.90296) = –USD44,800 (This is a cash outflow because Drawbridge sold the AUD forward and the AUD appreciated against the USD).

- To determine the mark-to-market value of the original forward position, calculate the present value of the USD cash outflow using the three-month USD discount rate: –USD44,8000/[1 + 0.0023(90/360)] = –USD44,774.

B is incorrect. The present value of the cash flow was not calculated

C is incorrect. The cash flow was calculated using the bid rate instead of the offer rate.

- The all-in three-month forward rate = 0.9062 – 0.00368 = 0.90252
- This gives a net cash flow on settlement day of 5,000,000 × (0.8940 – 0.90252) = –USD42,600, and the present value is calculated as –USD42,600/[1 + 0.0023(90/360)] =

–USD42,576.

28. Solution: B.

There is a direct relationship, not an indirect one, between estimated potential GDP growth and credit quality: Higher growth leads to higher quality—that is, an improvement in the likelihood of promised cash flows occurring.

C is incorrect. Gillibrand's statement is accurate. In the long run, the growth rate of GDP dominates. The ratio of earnings to GDP can neither rise nor decline forever, so over the long term it must approximate zero. Similarly, the P/E ratio cannot grow or contract forever, so over the long term it must also approximate zero. Thus, the drivers of potential GDP are ultimately the drivers of stock market performance.

A is incorrect. Navarro's statement is accurate. The growth rate of potential GDP is an important determinant of the level of real interest rates, and thus real asset returns in general, in the economy. Faster growth in potential GDP means consumers expect their real income to rise more rapidly. Thus, higher rates of potential GDP growth translate into higher real interest rates and higher expected real asset returns in general.

29. Solution: C.

Absolute convergence means that developing countries, regardless of their characteristics, will eventually catch up with developed countries and match them in per capita output. The neoclassical model assumes all countries have access to the same technology and, as a result, per capita income in all countries should eventually grow at the same rate.

A is incorrect. Conditional convergence means convergence is conditional on the countries having the same saving rate, population growth rate, and production function. If these conditions hold, the neoclassical model implies convergence to the same level of per capita output as well as the same steady state growth rate.

B is incorrect. Club convergence is where only rich and middle-income countries that are members of the club are converging to the income level of the richest countries in the world. This

means the countries with the lowest per capita income in the club grow at the fastest rate. Countries outside the club continue to fall behind.

The following information relates to 30

30. Solution: A

The purpose of the government-appointed member is to prevent a majority for either the farmers or the manufacturers within the regulatory agency. Further, the limit to the service of the government-appointed member prevents preferential treatment to the regulated entities that could develop over time. Both constructs are to prevent "regulatory capture," which is preferential treatment toward one or both of the regulated groups.

B is incorrect because regulatory arbitrage occurs when a regulated entity uses different regulatory environments to its economic advantage.

C is incorrect because regulatory competition occurs when regulatory agencies compete to attract certain "regulated" entities by creating a desirable regulatory environment for a given entity.

Financial Reporting and Analysis

The following information relates to 31

31. Solution: C

		Source
Pension Plan A	$3,150	Exhibit 1: Employer contributions
Health Care Plan	950	Exhibit 1: Employer contributions
Pension Plan B	2,750	Exhibit 2: Employer contributions
Total cash outflow	$6,850	

The following information relates to 32-34

32. Solution: B

The functional currency is the currency of the primary economic environment in which an entity operates. Using the IFRS factors for determining the functional currency, Thames' functional currency is most likely the pound sterling. The company sets their prices in pounds based on competitive factors in the British market; it is financed, to date, by a British private equity firm; and it receives its revenues primarily in pounds.

33. Solution: A

Thames incurs fuel and lease costs in US dollars. During the year the US dollar has strengthened relative to the British pound (see Exhibit 1) thereby making purchases (costs) in US dollars more expensive for Thames and thus decreasing operating income.

34. Solution: A

Between incurring the fees and the year-end the euro appreciated against the GBP (from Exhibit 1 £0.7400/€ to £0.7500/€) and Thames would report an unrealized loss (from holding a liability in an appreciating currency) in net income. The payable would be originally recorded when the

landing fees were incurred during the final quarter (£0.7400), but revalued at year-end to £0.7500; an increase in a liability results in a loss.

The following information relates to 35-38

35. Solution: C

1. Determination of annual unit credit (benefit)

- Estimated final salary (Exhibit 1): $71,261
- Estimated annual (end of year) payment in retirement (six years of service,2014–2019): $71,261 × 1.75% × 6 = $7,482.41
- Present value of estimated future payments as of the start of retirement (keystrokes using a financial calculator): PV of 7,482.41 for 25 years at 7.5% (N = 25, I = 7.5, PMT = 7,482.41, Mode: End; PV = ?) = $83,406
- Annual unit credit at time of retirement per service year: 83,406/6 = $13,901

2. Determination of build-up of pension obligation for the employee

	Calculation for 2014	2014	Calculation for 2015	2015
Open obligation		0	From close of 2014	$9,683
Interest cost at 7.5%		0	$9,683 x 0.075	$726
Current service cost (PV of the unit credit)	$13,901/[(1+0.075)^5]	$9,683	$13,901/[(1+0.075)^4]	$10,409
Closing obligation		$9,683		**$20,818**

36. Solution: B

The yield on high quality corporate bonds is the appropriate discount rate that should be used to calculate the present value of the future benefits because it represents the rate at which the defined-benefit obligation could be effectively settled.

A is incorrect. Not the company's own cost of debt but the rate on high grade corporate bonds should be used.

C is incorrect. The rate on high grade corporate bonds should be used.

37. Solution: C

The current service cost will decrease, not increase. A higher discount rate means that the present value of the future benefits earned in retirement will be lower and thus the annual unit credit will be lower. Therefore, the current service cost will decrease.

A is incorrect. The interest cost is the amount charged on the opening obligation (which will be lower), and this decrease may be sufficient to offset the increase in the interest rate: the final result will depend on the magnitude of the rate change and the time to retirement.

B is incorrect. The opening obligation will indeed decrease with a higher discount rate.

38. Solution: C

Under US GAAP, the periodic pension cost is calculated as follows:

	$ Thousands
Current service cost	1,151
Interest cost on the obligation	5,441
Less expected return on plan assets	-4,597
Plus amortization of past service costs	272
Periodic pension cost	2,267

The following information relates to 39-42

39. Solution: A

Bardem classified the Papelco bonds as held-to-maturity, thus, under IFRS, the interest income is calculated using the effective interest method using the market rate of interest at the date of purchase (3.4%) on the price paid ($5,000,000).

End of year	Interest received at coupon rate	Interest income at historical market rate	Amortization of premium	Amortized cost
0				€5,000,000
1	0.04 x €4,800,000 = €192,000	0.034 x €5,000,000 = €170,000	€192,000 - €170,000 = €22,000	€4,978,000

40. Solution: A

Domingues' statement that Bardem will be required to use the equity method is accurate. The equity method of accounting is required when an investor holds 20% to 50% of the voting rights of an associate unless circumstances clearly demonstrate that the investor cannot exercise significant influence. Holding a seat on the board is a factor to consider, but is not required to demonstrate influence.

B is incorrect. Although the equity method is required for joint ventures, it is also required for investments in associates.

C is incorrect. Representation on the board is one way of exerting influence, but there are other ways that influence can be evidenced.

41. Solution: A

Bardem's purchase price for Ariana will include goodwill of €6.25 per the calculation below. Under the equity method the goodwill is included in the investment amount on Bardem's balance sheet.

Cost of the acquisition (€ millions)		80.00
Less:		
Fair value of net identifiable assets	295	
Bardem's share thereof	25%	
295 x 25%		73.75
Goodwill		6.25

42. Solution: A

Both IFRS and US GAAP prohibit the reversal of impairment losses recognized using the equity method, even if the fair value later increases. Under the equity method goodwill is included in the value of the investment and is not tested separately. Impairment losses exceeding goodwill are allocated pro-rata to the unit's non-cash assets when the investor has control over the investee, not under the equity method.

B is incorrect. IFRS includes goodwill in the carrying value of the investment, so it is not separately tested for impairment.

C is incorrect. Impairment losses exceeding goodwill are allocated pro-rata to the unit's non-cash assets.

The following information relates to 43-46

43. Solution: C

The change in revenue recognition to an earlier point, before the product has been produced or delivered, is an aggressive accounting policy that would lower the company's quality of earnings.

A is incorrect. The change in the warranty expense reflects updated information, and failure to act on it would underestimate earnings.

B is incorrect. The stock grants are expensed over the estimated service life of the employees, in this case the 3 years till it vests, and does not distort the quality of earnings.

44. Solution: C

Deposits received	$3 million
Deposit as percentage of order	25%
Revenue recognized on receipt of order	$3 million/0.25 = $12 million
Gross profit margin	Gross profit/Sales = $53,000/$100,000 = 53%
Increment to gross profit from early recognition policy	53% × $12 million = $6.36 million

45. Solution: A

The classification of warranty expense as a non-operating item reduces Galaxy's earnings quality. High-quality earnings allow investors to identify core or recurring earnings, and Galaxy's core earnings are overstated when an operating cost, like warranties, are classified as non-operating. The company disclosed the change in classification in both the MD&A and notes to the financial statements, thereby exhibiting high financial reporting quality.

B is incorrect. Galaxy has explained the change—the change may not be GAAP, but they did disclose it, exhibiting a reasonable level of reporting quality because it is still possible to assess a company's results

C is incorrect. The reclassification of an expense between operating and non-operating or

non-recurring does not affect net income (and hence return on sales) but would affect the operating margin and the interpretation of core earnings.

46. Solution: B

A DSRI (days sales in receivable index) greater than 1 indicates an inappropriate relationship between accounts receivable and revenue recognition and is a potential signal of earnings manipulation. For Galaxy, it is the largest positive contributor (DSRI = 1.619) that would increase the M score. Larger values for the M-score (and contributors) are more indicative of earnings manipulation. Increasing leverage could predispose a company to manipulate earnings, but here the leverage index is negative indicating that leverage has decreased.

A is incorrect. Higher M-scores (less negative) indicate an increased probability of earnings manipulation. Here the lower (more negative score) would indicate that the company is less likely to be manipulating earnings.

C is incorrect. Increasing leverage could predispose a company to manipulate earnings, but here the leverage index is negative, indicating that leverage has decreased.

The following information relates to 47-48

47. Solution: A.

Risk-weighted assets	601,312
Common equity tier I capital	87,390
Additional tier I capital	16,401
Tier 1 capital	103,791
Tier 2 capital	25,447
Total regulatory capital	129,238

Tier 1 ratio=$\frac{103,791}{601,312}=17.3\%$

Total capital ratio=$\frac{129,238}{601,312}=21.5\%$

48. Solution: A.

	2015	2016	2017
High quality liquid assets	111,432	127,352	198,393
Net outflows	100,483	112,482	196,429
Liquidity coverage ratio=$\frac{high\ quality\ liquid\ assets}{net\ outflows}$	111%	113%	101%

The liquidity coverage ratio actually increased from 2015 to 2016, hence choice B is incorrect.

The net cash outflows are given for 30 days. An LCR ratio of 100% would mean JJK could withstand 30 days of stress-level outflows. To calculate the number of days JJK can withstand, multiply the LCR by 30.

	2015	2016	2017
Number of days of stress volume of cash outflows	30×1.11 33.3	30×1.13 34.0	30×1.01 30.3

Hence A is correct, the number of days decreased by 3 days from 33.3 to 30.3.

Available net stable funding excludes highly liquid assets, hence C is incorrect.

The following information relates to 49

49. Solution: B

Allowing the bondholders of the target firm to "put" bonds back to the target company at a price above par is consistent with a poison put.

The following information relates to 50-51

50. Solution: B

Statement 1 is least accurate. Although the amount of cash distributed is the same, only those shareholders who have their shares purchased by the company will receive any cash.

A is incorrect. Statement 2 is correct. Management is not obligated to follow through after stating an intention to repurchase shares, whereas they must meet a declared dividend statement.

C is incorrect. Statement 3 is correct. Research showed that 45% of private repurchases between 1984 and 2001 were actually made at discounts, indicating that many direct negotiation repurchases are generated by the liquidity needs of large investors who are in a weak negotiating position.

51. Solution: C

EPS before the repurchase	from Exhibit 2	$1.24
Surplus cash available for repurchase	$836 million	
# shares outstanding before repurchase	100 million	
Share price at time of repurchase	$38.00	
Price premium for repurchase	10%	
Repurchase price per share	$38.00 × 110%	$41.80
# shares repurchased	$836 million ÷ $41.80 per share	20 million
# shares outstanding after repurchase	100 million – 20 million	80 million

EPS after the repurchase	$124 million ÷ 80 million shares	$1.55
% increase in EPS	($1.55 – $1.24) ÷ $1.24	**25%**

The following information relates to 52

52. Solution: C

Initial outlay = FCInv + NWCInv=$150 + ($80 – $45) = $185 thousand

Cash flow at year 1=S – C – D × (1 – t) + D = $60.0 × (1 – 40%) + $30.0 = $66.0 thousand.

Cash flow at year 2=S – C – D × (1 – t) + D = $66.0 × (1 – 40%) + $30.0 = $69.6 thousand.

Cash flow at year 3=S – C – D × (1 – t) + D = $75.0 × (1 – 40%) + $30.0 = $75.0 thousand.

Cash flow at year 4=S – C – D × (1 – t) + D = $87.0 × (1 – 40%) + $30.0 = $82.2 thousand.

Cash flow at year 5=S – C – D × (1 – t) + D = $102.0 × (1 – 40%) + $30.0 = $91.2 thousand.

TNOCF=NWCInv+Sal-(Sal-B)*t=35 + 10 – (10-0)*40% = 41 thousand

NPV=-185+66/(1.1)+69.6/(1.1)^2+75/(1.1)^3+82.2/(1.1)^4+91.2/(1.1)^5+41/(1.1)^5=127.098

The following information relates to 53

53. Solution: B

Staggered boards do allow for continuity of the knowledge and experience in the company, which is essential for good corporate governance.

The following information relates to 54

54. Solution: A

Proposition I is necessary to obtain Proposition II. Proposition II states that the cost of equity (re) is linearly related to the debt-to-equity (D/E) level (see Exhibit 1, page 107): re = r0 + (r0 - rd)*(D/E) or re = r0 + (r0 - rd)*(1 – tax rate)*(D/E), where r0 is the cost of capital and rd is the cost of debt. Consequently, if D/E is lower, the cost of equity is reduced.

Equity

The following information relates to 55

55. Solution: C

A string of favorable inflation and productivity surprises may result in a series of high returns that increase the historical mean estimate of the equity risk premium. To mitigate that concern, the analyst may adjust the historical estimate downward based on an independent forward-looking estimate.

The following information relates to 56

56. Solution: B

BKKQ has the largest PVGO, which is calculated as follows:

PVGO (ABTD) = $P_0 - E_1/r = 80.00 - [7.30/0.105] = C\$10.48$,

PVGO (BKKQ) = $P_0 - E_1/r = 39.00 - [2.12/0.08] = C\$12.50$,

PVGO (CPMN) = $P_0 - E_1/r = 27.39 - [1.90/0.12] = C\$11.56$,

where P_0 is the current price per share, E_1 is the forecasted earnings per share, and r is the required rate of return.

The following information relates to 57

57. Solution: C

The following information relates to 58

58. Solution: C

Transactions between the company and its shareholders (through cash dividends, share repurchases, and share issuances) do not affect free cash flow. However, leverage changes, such as the use of more debt financing, have some impact on free cash flow because they increase

the interest tax shield (reduce corporate taxes because of the tax deductibility of interest) and reduce the cash flow available to equity.

The following information relates to 59-60

59. Solution: B.

FCFF = NI + NCC + Int (1 - Tax Rate) - FCInv - WCInv Net income (given) = $626;

Interest Expense (given) = $186;

Tax rate = 294/920 = 32% Non-cash charges (depreciation) (given) = $243;

Fixed capital investment (given) = $535

WC Investment	2012 ($)	2011 ($)	Net increase($)
Current assets excluding cash	1,290 - 32 = 1,258	1,199 - 21 = 1,178	
Current liabilities	2,783	2,678	
Working capital	-1,525	-1,500	-25
FCFF = 626 + 243 + 186(1 - 0.32) - 535 -(-25) = 485.48 = $485 million			

60. Solution: B.

FCFE = FCFF - Interest (1 - T) + Net borrowing

Given: 2012 FCFF base case estimate = $500; Interest exp = $186; Tax rate = 32%

	2012	2011	Net increase
Long-term debt ($)	2,249	2,449	-200
FCFE = 500 - 186 × (1 - 0.32) + (-200) = $174 million			

The following information relates to 61

61. Solution: C

Residual income per share for the next three years is calculated as follows.

	Year 1	Year 2	Year 3
Beginning book value per share (€)	45.25	51.61	58.25
Earnings per share	7.82	8.17	8.54
Less dividends per share	1.46	1.53	1.59
Change in retained earnings	6.36	6.64	6.95
Ending book value per share	51.61	58.25	65.20
Earnings per share	7.82	8.17	8.54
Less per share equity charge*	3.94	4.49	5.07
Residual income	3.88	3.68	3.47

* Per share equity charge = Beginning book value per share x Cost of equity

Year 1 per share equity charge = 45.25 x 0.087 = 3.94·

Year 2 per share equity charge = 51.61 x 0.087 = 4.49

Year 3 per share equity charge = 58.25 x 0.087 = 5.07

Because Castovan forecasts that residual income per share will be constant into perpetuity, equal to Year 3 residual income per share, the present value of the terminal value is calculated using a persistence factor of 1.

$$\text{Present value of terminal value} = \frac{8.54-(0.087\times 58.25)}{(1+0.087-1)(1+0.087)^2}$$
$$= \frac{3.47}{(0.087)(1+0.087)^2}$$
$$= 33.78$$

So, the intrinsic value of TTCI is then calculated as follows.

$$V_0 = €45.25 + \frac{3.88}{1.087} + \frac{3.68}{1.087^2} + 33.78 = €85.71$$

The following information relates to 62

62. Solution: C

FCFF = EBITDA(1 – Tax rate) + Depreciation(Tax rate) – FC_{Inv} – WC_{Inv}

FCFE = FCFF – Interest(1 – Tax rate) + Net borrowing

($ millions)		
EBITDA (1 – Tax rate)[a]	275 (1 – 0.35)	$178.75
Plus: Depreciation (Tax rate)[a]	82.5(0.35)	28.87
Less: Net investment in fixed capital		(165.3)
Less: Net increase in working capital[b]		1.8
Less: Interest (1 – Tax rate)[a]	16 (1 – 0.35)	(10.38)
Plus: Net borrowing	(157.5 + 20) – (150 + 15)	12.5
Free cash flow to equity		$46.24
FCFE per share	46.24/50	$0.92
a Jatin's tax rate = 35%, which is different from the original tax rate. b Net increase in Net Working Capital 2013 is less by $1.80, so it is a positive number.		

The following information relates to 63

63. Solution: C

The Fama–French estimate of the required return on equity is calculated as:

$r_i = R_f + \beta_i^{mkt} RMRF + \beta_i^{size} \text{SMB} + \beta_i^{value} HML$

For the given information we have:

$r_i = 0.01 + 0.82 \times 0.08 + 0.75 \times 0.02 + 0.15 \times 0.04 = 0.09660 = 9.7\%$

The following information relates to 64

64. Solution: A

The justified forward P/E is calculated as follows:

$$\frac{P_0}{E_1} = \frac{D_1 / E_1}{r - g}$$
$$= \frac{(2.91/6.00)}{(0.15 - 0.06)} = 5.4$$

The following information relates to 65-66

65. Solution: C

The E/P based on trailing earnings would offer the most meaningful ranking of the shares. Using E/P places Gesticular's negative EPS in the numerator rather than the denominator, leading to a more meaningful ranking.

66. Solution: C

The EPS figure that Silveira should use is diluted trailing EPS of R$0.81, adjusted as follows:

Subtract the R$0.04 non-recurring legal gain.

Add R$0.03 for the non-recurring factory integration charge.

No adjustment needs to be made for the R$0.01 charge related to depreciation because it is a recurring charge.

Therefore, underlying trailing EPS = R$0.81 – R$0.04 + R$0.03 = R$0.80 and trailing P/E using underlying trailing EPS = R$14.72/R$0.80 = 18.4.

The following information relates to 67

67. Solution: C

Economies of scale are a situation in which average costs decrease with increasing sales volume. Chrome's gross margins have been increasing with net sales. Gross margins that increase with sales levels provide evidence of economies of scale, assuming that higher levels of sales reflect increased unit sales. Gross margin more directly reflects the cost of sales than does profit margin.

Metric	**2010**	**2011**	**2012**
Net sales	$46.8	$50.5	$53.9
Gross profit	28.6	32.1	35.1
Gross margin (gross profit/net sales)	61.11%	63.56%	65.12%

The following information relates to 68

68. Solution: B

The electric scooter industry is new and growing and the contribution of Omikroon's electric scooter division is forecast to expand over 10 years.

The following information relates to 69

69. Solution: C.

The Fama–French estimate of the required return on equity is calculated as:

$$r_i = R_F + b_i^{mkt} RMRF + b_i^{size} SMB + b_i^{value} HML$$

For the given information we have:

$$r_i = 0.01 + 0.82 \times 0.08 + 0.75 \times 0.02 + 0.15 \times 0.04 = 0.09660 = 9.7\%$$

The following information relates to 70

70. Solution: A.

Normalizing EPS (for 2016) using the method of average return on equity is accomplished by (1) averaging the ROE over the six-year period from 2010-2015, and then (2) multiplying the average ROE times the 2015 BVPS. ROE (average) = (0.178 + 0.178 + 0.122 + 0.177 + 0.114 + 0.160) / 6 = 0.155. EPS (normalized) = 0.155(10.66) = 1.652. The P/E ratio based on this normalized EPS is 26.5 / 1.652 = 16.04.

The following information relates to 71

71. Solution: B.

Statement 3 by Raman is most accurate. The residual income model, also called the excess earnings method, does not have the same weakness as the FCFE approach, because it is an estimate of the profit of the company after deducting the cost of all capital: debt and equity. Further, it makes no assumptions about future earnings and dividend growth.

The following information relates to 72

72. Solution: B

Both discounts apply and they are multiplicative rather than additive:

1 – (1 – 0.20)(1 – 0.15) = 1 – 0.68 = 32 percent`

Fixed income

The following information relates to 73-74

73. Solution: B

Gomaa is correct. The option-adjusted spread (OAS) is the constant spread that is added to all one-period forward rates on the interest rate tree and results in the present value of the bond's cash flows, or arbitrage-free value, equaling the bond's market price. Gomaa also correctly describes how to use OAS for relative valuation. For two bonds that have otherwise similar characteristics, the bond with the higher OAS is underpriced, or, alternatively, the bond with the lower OAS is overpriced.

A is incorrect. Morgan is incorrect. The OAS is the constant spread that is added to all one period forward rates on the interest rate tree (not the term structure) and results in the present value of the bond's cash flows, or arbitrage free value, equaling the bonds market price.

C is incorrect. Scahill is incorrect. For two bonds that are otherwise similar in all respects, the bond with the lower OAS is most likely overpriced not underpriced.

74. Solution: A

Morgan's response to Scahill is incorrect. As interest rate volatility declines, the embedded call option becomes cheaper; thus, the higher the arbitrage-free value (or model value) of the callable bond.

Callable bond value = Value of straight bond – Value of call option

A higher value for the callable bond means that a higher spread needs to be added to one-period forward rates to make the arbitrage-free bond value equal to the market price (i.e., the OAS is higher). For putable bonds as interest rate volatility declines, the value of the put option declines as does the arbitrage-free value of the putable bond.

Putable bond value = Value of straight bond + Value of put option

This implies that a lower spread needs to be added to one-period forward rates to make the arbitrage free bond value equal to the market price. Thus, in this instance, the OAS is lower.

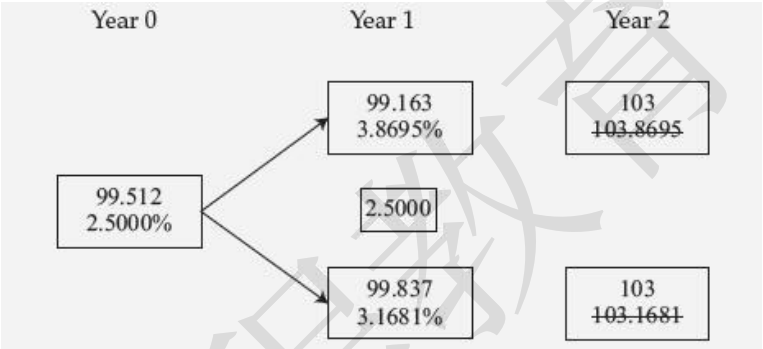
B is incorrect. Morgan is correct about the impact on OAS for callable bonds.

C is incorrect. Morgan is correct about the impact on OAS for putable bonds.

The following information relates to 75

75. Solution: C

Value of capped bond = Value of the straight bond – Value of embedded cap. To calculate this value, we need to calculate the value from the binomial interest rate tree, capping all cash flows at $3 (3% of $100). The valuation is highlighted below.



Without a cap, the value of this floater would be 100 because in every scenario, the coupon paid would be equal to the discount rate. But because the coupon rate is capped at 3.000%, which is lower than the highest interest rates in the tree, the value of the capped floater will be lower than the value of the straight bond

We start by calculating the bond values at Year 1 by discounting the cash flow (capped at 3% of par) for Year 2 with the two possible rates:

99.163 = 103/1.038695

99.837 = 103/1.031681

Year 0 is calculated by discounting the values in the two future states emanating from the present state plus the coupon at the appropriate rate in the present state:

99.512 = [2.5+(0.5x99.163+0.5x99.837)]/1.025

Valuation of the embedded cap = 100 – 99.512 = 0.488

The following information relates to 76-77

76. Solution: A

Both points that Marlin makes regarding structural models of credit risk are correct.

B is incorrect because the first point is correct.

C is incorrect because the second point is correct.

77. Solution: A

The advantage of a reduced form model:

- Model's inputs are observable
- Reflect the changing business cycle

The advantage of a structural model:

- Provides an option analogy

The following information relates to 78-81

78. Solution: B

B is correct because Akron is incorrect regarding uncertainty and the pure expectations theory. The pure expectations theory has an assumption of risk neutrality, that is, investors are unaffected by uncertainty and risk premiums do not exist.

79. Solution: A

A is correct since Akron is incorrect in stating that the strategy will increase total return even if rates rise unexpectedly. If rates rise by more than predicted by forward rates, then the bond will lose value as it is priced using higher rates.

80. Solution: B

B is correct since the TED spread is not used for individual bonds but rather is an indicator of

perceived risk in the general economy. The TED spread is calculated as the difference between Libor and the yield on a T-bill of equal maturity.

81. Solution: B

B is correct as the swap spread represents the return that investors require for credit and liquidity. Since dealers are quoting the bond flat to swaps or swaps + 0 basis points there is no added spread to swaps. The swap spread is measured over the "on-the-run" or most recently issued government security, in this case the Bund. Simple interpolation is used to calculate the swap spread.

First, calculate the Bond yield for the maturity: $0.41 + 0.86 \times (0.50 - 0.41) = 0.49$

Second, calculate the swap rate for the maturity: $1.05 + 0.86 \times (1.16 - 1.05) = 1.14$

Third, the difference represents the swap spread: $1.14 - 0.49 = 0.66$

The following information relates to 82

82. Solution: A.

The calculation process of VND is as following:

Date 4:

1000+130.804=1130.804

1000+104.164=1104.164

1000+86.307=1086.307

1000+74.338=1074.338

Exposure at Date 4

=0.125x1130.804+0.375x1104.164+0.375x1086.307+0.125x1074.338=1097.069

Date 3:

1130.804/(1+8.0804%)=1046.2618

1104.164/(1+5.4164%)=1047.4309

1086.307/(1+3.6307%)=1048.2482

1074.338/(1+2.4338%)=1048.8120

Exposure at Date 3

=0.125x1046.2618+0.375x1047.4309+0.375x1048.2482+0.125x1048.8120+0.25x93.99+0.5x79.493+0.25x69.77=1128.45

Date 2:

(0.5x1046.2618+0.5x1047.4309+93.999)/(1+4.3999%)=1092.7648

(0.5x1047.4309+0.5x1048.2482+79.493)/(1+2.9493%)=1095.0367

(0.5x1048.2482+0.5x1048.8120+69.77)/(1+1.977%)=1096.6199

Exposure at date

2=0.25x1092.7648+0.5x1095.0367+0.25x1096.6199+0.5x71.18+0.5x64.197=1162.553

Date 1:

(0.5x1092.7648+0.5x1095.0367+71.18)/(1+2.118%)=1140.9161

(0.5x1095.0367+0.5x1096.6199+64.197)/(1+1.4197%)=1143.7869

Exposure at date 1=0.5x1140.9161+0.5x1143.7869+47.5=1189.852

Date 0:

(0.5x1140.9161+0.5x1143.7869+47.5)/(1-0.25%)=**1192.8336**

The following table shows that the credit valuation adjustment (CVA) for the bond is €46.8585, the sum of the present values of expected loss.

Date	Exposure	Recovery	LGD	POD	POS	Expected Loss	DF	PV of Expected Loss
0								

1	1189.8520	237.9704	951.8816	0.0150	0.9850	14.2782	0.9709	13.8624
2	1162.5530	232.5106	930.0424	0.0148	0.9702	13.7414	0.9426	12.9526
3	1128.4500	225.6900	902.7600	0.0146	0.9557	13.1379	0.9151	12.0230
4	1097.0690	219.4138	877.6552	0.0143	0.9413	12.5812	0.8885	11.1782
							CVA =	**€50.0162**

Fair value of the bond=VND-CVA=1192.8336-50.0162=1142.817

The following information relates to 83-84

83. Solution: A

An approximation for the upfront premium is the (Credit spread –Fixed coupon rate) × Duration of the CDS. To buy 8-year CDS protection, Forster Investment Advisors would have to pay an approximate upfront premium of 1200 basis points [(500 – 300) × 6], or 12% of the notional.

84. Solution: A

Forster Investment Advisors purchased protection, and therefore is economically short and benefits from an increase in the company's spread. Since putting on the protection, the credit spread increased by 150 basis points, and Forster Investment Advisors realizes the gain by entering into a new offsetting contract (sells the protection for a higher premium to another party).

Derivatives

The following information relates to 85-86

85. Solution: B.

B is correct. The no-arbitrage futures price is equal to the following:

$F_0(T) = FV_{0,T}(T)[B_0(T + Y) + AI_0 – PVCI_{0,T}]$

$F_0(T) = (1 + 0.003)0.25(112.00 + 0.08 – 0)$

$F_0(T) = (1 + 0.003)0.25(112.08) = 112.1640$

The adjusted price of the futures contract is equal to the conversion factor multiplied by the quoted futures price:

$F_0(T) = CF(T)QF_0(T)$

$F_0(T) = (0.90)(125) = 112.50$

Adding the accrued interest of 0.20 in three months (futures contract expiration) to the adjusted price of the futures contract gives a total price of 112.70.

This difference means that the futures contract is overpriced by 112.70 – 112.1640 = 0.5360. The available arbitrage profit is the present value of this difference: $0.5360/(1.003)^{0.25} = 0.5356$.

86. Solution: A.

A is correct. The value of Troubadour's euro/yen forward position is calculated as

$V_t(T) = PV_{t,T}[F_t(T) – F_0(T)]$

$V_t(T) = (100.05 – 100.20)/(1 + 0.0030)^{2/12} = –0.149925$ (per ¥100 par value)

Therefore, the value of the Troubadour's forward position is

$V_t(T) = \frac{-0.149925}{100} \times 100million = -¥149,925$

The following information relates to 87-89

87. Solution: C.

C is correct. The swap pricing equation is

$$r_{FIX} = \frac{1 - PV_{0,t_n}(1)}{\sum_{i=1}^{n} PV_{0,t_i}(1)}$$

That is, the fixed swap rate is equal to 1 minus the final present value factor (in this case, Year 3) divided by the sum of the present values (in this case, the sum of Years 1, 2, and 3). The sum of present values for Years 1, 2, and 3 is calculated as

$$\sum_{i=1}^{n} PV_{0,t_i}(1) = 0.990099 + 0.977876 + 0.965136 = 2.933111$$

Thus, the fixed-swap rate is calculated as

$$r_{FIX} = \frac{1 - 0.965136}{2.933111} = 0.01189 \text{ or } 1.19\%$$

88. Solution: B.

B is correct. The value of a swap from the perspective of the receive-fixed party is calculated as

$$V = NA(FS_0 - FS_t)\sum_{i=1}^{n'} PV_{t,t_i}$$

The swap has two years remaining until expiration. The sum of the present values for Years 1 and 2 is

$$\sum_{i=1}^{n'} PV_{t,t_i} = 0.990099 + 0.977876 = 1.967975$$

Given the current equilibrium two-year swap rate of 1.00% and the fixed swap rate at initiation of 3.00%, the swap value per dollar notional is calculated as

$$V = (0.03 - 0.0112) \times 1.967975 = 0.036998$$

The current value of the swap, from the perspective of the receive-fixed party, is \$50,000,000 × 0.036998 = \$1,849,897.

From the perspective of the bank, as the receive-floating party, the value of the swap is –\$1,849,897.

89. Solution: A.

A is correct. The current value of the 6 × 9 FRA is calculated as

$V_g(0,h,m) = \{[FRA(g,h-g,m) - FRA(0,h,m)]t_m\}/[1 + D_g(h + m - g)t_{h+m-g}]$

The 6 × 9 FRA expires six months after initiation. The bank entered into the FRA 90 days ago; thus, the FRA will expire in 90 days. To value the FRA, the first step is to compute the new FRA rate, which is the rate on Day 90 of an FRA that expires in 90 days in which the underlying is the 90-day Libor, or FRA(90,90,90):

$FRA(g,h-g,m) = \{[1 + L_g(h - g + m)t_{h-g+m}]/[1 + L_0(h - g)t_{h-g}] - 1\}/t_m$

$FRA(90,90,90) = \{[1 + L_{90}(180 - 90 + 90)(180/360)]/[1 + L_{90}(180 - 90)(90/360)] - 1\}/(90/360)$

$FRA(90,90,90) = \{[1 + L_{90}(180)(180/360)]/[1 + L_{90}(90)(90/360)] - 1\}/(90/360)$

Exhibit 4 indicates that $L_{90}(180) = 0.95\%$ and $L_{90}(90) = 0.90\%$, so

$FRA(90,90,90) = \{[1 + 0.0095(180/360)]/[1 + 0.0090(90/360)] - 1\}/(90/360)$

$FRA(90,90,90) = [(1.00475/1.00225) - 1](4) = 0.009978$, or 0.9978%

Therefore, given the FRA rate at initiation of 0.70% and notional principal of $20 million from Exhibit 1, the current value of the forward contract is calculated as

$V_g(0,h,m) = V_{90}(0,180,90)$

$V_{90}(0,180,90) = \$20,000,000[(0.009978 - 0.0070)(90/360)]/[1 + 0.0095(180/360)].$

$V_{90}(0,180,90) = \$14,887.75/1.00475 = \$14,817.37.$

The following information relates to 90-92

90. Solution: A.

A is correct. Using the expectations approach, the risk-neutral probability of an up move is

$\pi = [FV(1) - d]/(u - d) = (1.03 - 0.800)/(1.300 - 0.800) = 0.46$.

The terminal value calculations for the exercise values at Time Step 2 are

$c^{++} = Max(0,u^2S - X) = Max[0,1.30^2(38) - 40] = Max(0,24.22) = 24.22$.

$c^{-+} = Max(0,udS - X) = Max[0,1.30(0.80)(38) - 40] = Max(0,-0.48) = 0$.

$c^{--} = Max(0,d^2S - X) = Max[0,0.80^2(38) - 40] = Max(0,-15.68) = 0$.

Discounting back for two years, the value of the call option at Time Step 0 is

$c = PV[\pi^2c^{++} + 2\pi(1 - \pi)c^{-+} + (1 - \pi)2c^{--}]$.

$c = [1/(1.03)]^2[0.46^2(24.22) + 2(0.46)(0.54)(0) + 0.54^2(0)]$.

$c = [1/(1.03)]^2[5.1250] = 4.8308$.

91. Solution: B.

B is correct. Using the expectations approach, the risk-neutral probability of an up move is

$\pi = [FV(1) - d]/(u - d) = (1.03 - 0.800)/(1.300 - 0.800) = 0.46$.

An American-style put can be exercised early. At Time Step 1, for the up move, p^+ is 0.2517 and the put is out of the money and should not be exercised early ($X < S$, $40 < 49.4$). However, at Time Step 1, p^- is 8.4350 and the put is in the money by 9.60 ($X - S = 40 - 30.40$). So, the put is exercised early, and the value of early exercise (9.60) replaces the value of not exercising early (8.4350) in the binomial tree. The value of the put at Time Step 0 is now

$p = PV[\pi p^+ + (1 - \pi)p^-] = [1/(1.03)][0.46(0.2517) + 0.54(9.60)] = 5.1454$.

92. Solution: C.

C is correct. Both statements are correct. The expected future payoff is calculated using risk-neutral probabilities, and the expected payoff is discounted at the risk-free rate.

The following information relates to 93-94

93. Solution: B.

B is correct. The formula for the BSM price of a put option is $p = e^{-rt}XN(-d_2) - SN(-d_1)$. $N(-d_1) = 1 - N(d_1) = 1 - 0.6217 = 0.3783$, and $N(-d_2) = 1 - N(d_2) = 1 - 0.5596 = 0.4404$.

Note that the BSM model can be represented as a portfolio of the stock (n_SS) and zero-coupon bonds (n_BB). For a put, the number of shares is $nS = -N(-d_1) < 0$ and the number of bonds is $nB = -N(d_2) > 0$. The value of the replicating portfolio is $n_SS + n_BB = -0.3783(57.03) + 0.4404(54.97) = \$2.6343$ (the value of the put option with slight rounding error). B is a risk-free bond priced at $\exp(-rt)(X) = \exp(-0.0022 \times 0.25)(55) = \$54.97$.

94. Solution: B.

B is correct. Lee is pointing out the option price's sensitivity to small changes in time. In the BSM approach, option price sensitivity to changes in time is given by the option Greek theta.

The following information relates to 95-96

95. Solution: A.

A is correct. Comment 2 is incorrect. There is a difference between the pricing and the valuation of forward commitments. Pricing involves determining the appropriate forward commitment price or rate when initiating the forward commitment contract. Valuation involves determining the appropriate value of the forward commitment, typically after it has been initiated. Note that in the vignette, the timing of both the pricing and valuation has been reversed.

B is incorrect because Comment 3 is correct.

C is incorrect because Comment 1 is correct.

96. Solution: B.

B is correct. Characteristic 2 is incorrect. The conversion factor in a futures contract does not apply to accrued interest. It is a mathematical adjustment to the amount required when settling a futures contract that is supposed to make all eligible bonds equal the same amount—for example, adjust each bond to an equivalent 6% coupon bond. When multiple bonds can be delivered for a particular maturity of a futures contract, a cheapest-to-deliver bond typically emerges after adjusting for the conversion factor.

A is incorrect because Characteristic 1 is correct.

C is incorrect because Characteristic 3 is correct.

Alternative Investments

The following information relates to 97-98

97. Solution: C

There are two components to this valuation. The first component is the cash flows for the first seven years. The second component is the terminal value.

PV of CFs in years 1-7:

PMT = 7.0; I/Y = 10; N = 7. The PV = WL $34.08 million

PV of terminal value:

An appropriate terminal cap rate can be calculated using the following equation:

cap rate = discount rate — growth rate = 10% - 3.25% = 6.75%. The terminal value is calculated using the following inputs: WL $8.5 million divided by the terminal cap rate of 6.75%. The value in Year 7 is WL$ 125.93 million, discounting this value to the present:

FV = WL $125.93 million; N = 7, I/Y =10 results in a present value of WL $64.62 million.

WL $34.08 + WL $64.62 = WL $98.7 million.

98. Solution: C

NAVPS based on forecasted NOI:

Option #2 (REIT)	(in WL$ millions)
Recent NOI	140.0
Subtract: Non-cash rents	- 5.0
Add: Full-year adjustment for acquisition	+ 5.0
Pro forma cash NOI	140.0
Projected NOI @ 2.5% growth	143.5
Estimated value of operating real estate @ cap rate of 7.0%	2050.0
Add: Other assets	+ 50.0
Estimated gross value	2100.0
Subtract: Total liabilities	- 300.0

NAV	1800.0

NAVPS $= 1800 / 15 = 120$, which is lower than the current market price of WL $125.00. This REIT is selling at a premium to NAVPS.

The following information relates to 99-100

99. Solution: A.

Characteristic 3 describes venture capital investments, which are commonly the result of relationships between venture capitalists and entrepreneurs (existing shareholders or owners). Most buyout transactions are auctions, which involve multiple potential acquirers.

100. Solution: B.

Total value to paid in (TVPI) equals distributed to paid in (DPI) plus residual value to paid in (RVPI), where DPI is the sum of distributions divided by paid-in capital [(19+38)/125] = 0.46 and RVPI is NAV after distributions divided by paid-in capital (122.7/125) = 0.98. TVPI = 0.46 + 0.98 = 1.44.

The following information relates to 101

101. Solution: C.

C is correct. Using the basic VC method, the price per share can be calculated for the general case in a five-step procedure:

Step 1: POST = V/(1 + r) = £32/[(1.4)6] = £32/7.5295= £4.2499

Step 2: PRE = POST – I = £4.2499 – £3.00= £1.2499 million

Step 3: F = I/POST = £3.0/£4.2499= 70.5899%

Step 4: y = x[F/(1 – F)] = 500,000[0.7059/(1 – 0.7059]= 1,200,000

Step 5: p1 = I/y = £3,000,000/1,200,000= £2.50

A is incorrect. A incorrectly uses POST instead of I in Step 5.

B is incorrect. B incorrectly uses 1,200,000 as the total share count, not the share count for Yushan for its investment. After backing out the initial 500,000 shares, the price per share is £3,000,000/700,000 = £4.2857.

The following information relates to 102

102. Solution: B.

A speculator's goal is to take distinct market positions, deliberately taking on risk by betting on rising or falling prices. Billingsley took a long position in wheat futures, expecting to profit from an increase in the price of wheat. Billingsley may achieve the expected gains if the price of wheat increases, but he is also exposed to significant losses if the price of wheat falls. Therefore, Billingsley is a speculator.

A is incorrect because a market participant is classified as a hedger if an existing or expected cash position is compensated for via an opposite future. Billingsley did not enter into the wheat futures contracts to offset an existing or expected cash position.

C is incorrect because an arbitrageur tries to take advantage of time-or location-based price differences in commodity futures markets, or between spot and futures markets, in order to generate riskless profits. Billingsley's trades in wheat were long-only and were not riskless.

Portfolio Management

The following information relates to 103-108

103. Solution: A.

A monthly VaR cannot be annualized by simply multiplying by 12. The monthly return and standard deviation would need to be annualized and VaR recalculated. An assumption of a normal distribution is invalid if options were in the portfolio.

104. Solution: B.

The estimated loss under the condition that VaR has been exceeded is known as conditional VaR.

105. Solution: A.

The $225,000 is a minimum monthly loss that will be exceeded 5% of the time. A 1% VaR corresponds to a greater loss than a 5% VaR.

106. Solution: B

The description is of reverse stress testing, which is a form of scenario analysis, not sensitivity analysis. A Monte Carlo simulation would run many repeated scenarios.

107. Solution: A

Fund fees/expenses, sampling and optimization, fund accounting practices, use of depository receipts, index changes, regulatory and tax requirements, and asset manager operations contribute to ETF tracking errors. Service fees paid by APs offset any incidentals that the ETF bears in the creation/redemption process and do not contribute to tracking error.

108. Solution: C

Market fragmentation occurs when the number of venues trading the same instrument increases. As a response, algorithms are used to aggregate liquidity and route orders to the venues that have the best price and market depth.

The following information relates to 109-111

109. Solution: A

The three-factor model is described in the following equation:

$E(R_P) = \beta_{ROE} + \beta_{MKT} + \beta_{INV} + Rf$

So, (0.9 × 0.031) + (0.88×0.05) + (0.6×0.066) + 0.5 = 0.1165 or 11.7%

B is incorrect because it simply sums up the factor values.

C is incorrect because it does not include the risk-free rate.

110. Solution: B

TIA's three-factor model is a fundamental factor model because it consider such factors as return on equity, capital investment, and equity returns. Macroeconomic factors (e.g., interest rates, inflation risk, business cycle risk, or credit spreads) and statistical factors (e.g., historical covariances) are not mentioned.

C is incorrect because TIA's 3-factor model uses a fundamental factor model, which includes factors such as return on equity, capital investment, and equity returns.

A is incorrect because TIA's 3-factor model uses a fundamental factor model, which includes factors such as return on equity, capital investment, and equity returns.

111. Solution: A

The Pacific Rim portfolio has the highest tracking error. Tracking error is a synonym for tracking risk or active risk. A well-executed passive investment strategy would achieve the lowest amount of tracking error, whereas an aggressive active equity manager would be expected to have the highest tracking error.

B is incorrect because the Eurozone portfolio has the lowest excess return over its local index (12.4% vs. 8.5% = excess return of 3.9%).

C is incorrect because the Japan portfolio has the highest information ratio, which is not a measure of high tracking error.

The following information relates to 112-114

112. Solution: B.

Short-term TIPS are a proxy for real default-free interest rates in the United States. Real default-free interest rates should be positively related to GDP growth and positively related to the expected volatility of GDP growth. Expected increases in GDP volatility would put upward pressure on short-term TIPS rates, all else being held equal.

A is incorrect. Rutherford is incorrect about the impact higher GDP volatility should have on short-term TIPS rates.

C is incorrect. Rutherford is correct about the impact higher GDP growth should have on short-term TIPS rates

113. Solution: B.

There is a direct relationship, not an indirect one, between estimated potential GDP growth and credit quality: Higher growth leads to higher quality—that is, an improvement in the likelihood of promised cash flows occurring.

C is incorrect. Gillibrand's statement is accurate. In the long run, the growth rate of GDP dominates. The ratio of earnings to GDP can neither rise nor decline forever, so over the long term it must approximate zero. Similarly, the P/E ratio cannot grow or contract forever, so over the long term it must also approximate zero. Thus, the drivers of potential GDP are ultimately the drivers of stock market performance.

A is incorrect. Navarro's statement is accurate. The growth rate of potential GDP is an important determinant of the level of real interest rates, and thus real asset returns in general, in the economy. Faster growth in potential GDP means consumers expect their real income to rise more rapidly. Thus, higher rates of potential GDP growth translate into higher real interest rates and higher expected real asset returns in general.

114. Solution: A.

Observation 3 regarding consumption hedging is incorrect. Because of the pro-cyclicality of

economies and corporate profits, equities are not a good hedge against bad consumption outcomes, which is one of the reasons equity investors require a risk premium.

C is incorrect. Corporate profitability tends to sharply recover with any uptick in demand during a recession given leaner cost structures at that time and can be an important indicator of the business cycle.

B is incorrect. Given inferior consumption hedging properties, equity investors should demand a risk premium relative to fixed-income investors. Equity risk premiums tend to be highly correlated with corporate bond spreads.

The following information relates to 115-118

115. Solution: A

$$E(R_A)=\sum w_{p,j}E(R_{p,j})-\sum w_{B,j}E(R_{B,j})=11.07\%-10.44\%=0.63\%$$

1. Regarding Ogle's Statements 1 and 2:

A. both statements are incorrect.

B. one statement is correct and one is incorrect.

C. both statements are correct.

116. Solution: C.

Both statements are correct. Information ratio, unlike the Sharpe ratio, is affected by an allocation to cash or by the use of leverage. For an unconstrained optimization, a change in aggressiveness in active weights changes both the active return and active risk proportionally, leaving the information ratio unchanged.

117. Solution: A.

The optimal amount of active risk is:

$$\text{STD}(R_A) = \frac{IR}{SR_B} STD(R_B) = \frac{0.15}{0.333} 18.0\% = 8.11\%$$

The weight on the active portfolio (Indigo) would be 8.11%/8.0% = 1.014 and the weight on the benchmark portfolio would be 1 - 1.014 = - 0.014.

We can demonstrate that these weights achieve the maximum Sharpe ratio (of 0.365). Note that 8.11% is the optimal level of active risk, and that Indigo has an expected active return of 1.014(1.2%) = 1.217% over the benchmark (and a total excess return of 6.0% + 1.217% = 7.217%. The portfolio total risk is

$$\text{STD}(R_P)^2 = \text{STD}(R_B)^2 + \text{STD}(R_A)^2 = 18.0^2 + 8.111^2 = 389.788$$

Taking the square root, STD(R_P) = 19.743, and the optimal Sharpe ratio is indeed 7.217/19.743 = 0.365.

118. Solution: C.

The expected information ratio is the single best criterion for evaluating active investment managers' performance given the same benchmark. Selecting the highest information ratio manager will produce the highest Sharpe ratio for the portfolio.

A is incorrect because active risk alone will not lead to the highest Sharpe ratio given the fund's risk aversion. The highest information ratio manager will produce the highest Sharpe ratio for the fund.

B is incorrect because the committee should focus on the information ratio. It is the single best criterion for evaluating active investment manager's performance given the same benchmark.

The following information relates to 119-120

119. Solution: B.

Dealer B's quotes are $12.21–$12.31 for a midquote of $12.26.

per share effective spread transaction cost

= (side) × (transaction price – midquote price)

= (+1) × (12.27 − 12.26) = $0.01

effective spread = 2 × (per share effective spread transaction cost)

= 2 × 0.01 = $0.02

120. Solution: A.

Mollie executes a market sell order for 3000 shares. Based on the limit order book, the trader would first sell 2500 shares at $12.22 (highest bid，Dealer A) and then sell the remaining 500 shares at $12.21(second highest bid, Dealer B). Therefore, the approximate price per share received by Mollie for selling the 3000 shares is equal to

[(2500×12.22)+(500×12.21)]/3000=$12.218 ($12.22 rounded)