Lecture Notes 18: Review Sample Multiple Choice Problems

1. Assuming true-model returns are identically independently distributed (i.i.d), which events violate market efficiency?
   I. Positive correlation between Monday’s return and the return over the preceding week.
   II. Abnormal positive returns on the day of announcement for companies that announce worker bonus plans.
   III. Abnormal positive returns in the fiscal year prior to the announcement of a worker bonus plan.
   a. I only.
   b. II only.
   c. III only.
   d. I and II only.
   e. I and III only.

2. On Jan 1, 2009, we set up a target-date-immunized portfolio of bonds to fund an obligation due on Jan 1, 2018. The portfolio includes coupon bonds that have 10-year maturities. It also includes bonds that have 6% coupon rates. It is now Jan 1, 2010. The yield curve is flat; it hasn’t changed since we set up the portfolio. To remain immunized we should
   I. Do nothing
   II. Reallocate our investment in 10-year maturities from low-coupon to high-coupon bonds.
   III. Reallocate our investment in 10-year maturities from high-coupon to low-coupon bonds.
   IV. Reallocate our investment in 6% coupon bonds from short-maturity bonds to long-maturity bonds.
   V. Reallocate our investment in 6% coupon bonds from long-maturity bonds to short-maturity bonds.
   a. I
   b. II and/or IV
   c. II and/or V
   d. III and/or IV
   e. III and/or V

3. The yield curve is flat at 12%. An insurance company has an obligation to pay out $25,000 at the end of years two, four and six. It wishes to form an immunized portfolio from 3- and 8-year zero-coupon bonds. The portfolio weight (by value) in the 3-year zero should be:
   a. 80%
   b. 86%
   c. 88%
   d. 92%
   e. 96%

4. XYZ is currently selling at $100 per share. One year from now it will be trading at either 75 or 110. The market believes that the probability of the “up” movement is 80%; you believe the probability of the “up” movement is only 50%. The interest rate is 6% (compounded annually). A call option with an exercise price of 70 should sell in the market for:
   a. 29.77
   b. 27.36
   c. 28.00
   d. 28.11
   e. 33.96
5. The current interest rate is 10% compounded annually. The spot price of Kryptonite is $10/gram and the forward price for delivery in one year is $12. Storage costs are 3% per year. Assuming that you already own Kryptonite, you should:
   a. Do nothing.
   b. Sell Kryptonite in the spot market; repurchase it forward.
   c. Purchase more Kryptonite in the spot market; sell it forward.
   d. None of the above

6. In the market, the prices of one-, two- and three-year $100-par zero bonds are 92.593, 85.103 and 77.645 (as % of par). The market price of a 3-year 12% coupon, $100-par bond should be
   a. 100.00
   b. 108.13
   c. 108.29
   d. 109.10

7. In the market, the prices of one-, two- and three-year $100-par zero bonds are 92.593, 85.103 and 77.645 (as % of par). Today, we wish to negotiate a rate on a one-year loan that starts at the end of the second year. This rate should be:
   a. 8.4%
   b. 8.6%
   c. 8.8%
   d. 9.6%

8. In the market, the prices of one-, two- and three-year $100-par zero bonds are 92.593, 85.103 and 77.645 (as % of par). If I invest $100 for one year, and then roll it into the second and third years at the implied forward rates, at the end of year 3, I will have
   a. $128.79
   b. $127.37
   c. $126.91
   d. $125.99

9. A grateful alum wishes to set up an endowment for the Stern School that will pay an annual perpetuity of $10M, starting one year from now. The yield curve is flat at 8%. To immunize the intended payments, the endowment fund should have a duration of
   a. 10.00 years
   b. 12.50 years
   c. 13.50 years
   d. You can’t immunize a liability with an infinite maturity.

10. An insurance company has an obligation of $10 M per year (in perpetuity), with the first payment due three years from today. The yield curve is flat at 10%. The size and duration of the liability is
    a. $82.6M / 13 years
    b. $82.6M / infinite
    c. $75.1M / 14 years
    d. $100M / infinite

11. Suppose that the Japanese yen is at ¥105 per $ for immediate delivery, ¥103 per $ for delivery in one year, r_{US}=5% and r_{Japan}=1%. An investor with $1M to invest should
    a. Do nothing.
    b. Convert the $ to ¥, invest in Japan.
    c. Keep the money in $, invest at the US rate.
    d. Can’t say without knowing whether the investor wants the investment proceeds in $ or ¥.
12. Microsoft is currently trading at $110 per share. You purchased 100 shares some time ago at $95 and want to avoid having the value of your portfolio drop below $10,000. You are considering 
   Buying a 3-month put option with an exercise price of $100. The cost of the put will be $2 per 
   share. 
   Leaving a stop-loss sell order with your broker, to be triggered at $100 per share. 
Which of the following facts are true and relevant to your decision. 
I. Both strategies guarantee that you will receive at least $100 per share when and if you sell.  
II. If the price of Microsoft stock is $150 at the end of three months, the only difference 
    between the strategies is with the put strategy, you’re out the $2 you spent for the put.

a. I only  
b. II only  
c. I and II  
d. Neither I nor II

13. The yields on zero coupon bonds are \( y_1=8\% \), \( y_2=8.2\% \), \( y_3=8.6\% \). According to the pure expectations hypothesis, what is the market’s implicit expectation of the spot rate for a one-year investment starting at the beginning of the second year?

a. 8.2\%  
b. 8.4\%  
c. 0.2\%  
d. Can’t say without knowing the liquidity premium.

14. A 9.3\% annual coupon bond with a 10-year maturity and a $1,000 par value has a yield to maturity of 8\%. Assuming that the yield curve is flat and doesn’t shift, the holding period return you would achieve from buying the bond, holding it for one year and selling it is:

a. 9.3\%  
b. 8.0\%  
c. More than 8\%, since the bond is selling at a premium.  
d. Less than 8\%, since the bond is selling at a discount.

15. One year from now, an insurance company must make the first annual payment in a $5M per year perpetuity. The yield curve is flat at 8\%. They are funding this obligation with a portfolio consisting of 5- and 20-year zero coupon bonds. To most closely achieve target-date immunization, the fraction of the portfolio that should be in the 5-year bonds is:

a. 0\%  
b. 43\%  
c. 57\%  
d. Short as much of the 5-year bond as possible; put proceeds in 20-year bond

16. The S&P index is currently at 460. The one-year interest rate is 7\% and the dividend yield on the S&P index is 4\%. The settlement price on an index futures contract with a 1-year maturity is 485.00 According for forward(futures)/spot parity, the price of the futures contract should be

a. 473.80  
b. 510.60  
c. 499.55  
d. 485.00
17. You purchased an Intel call option with X=80 for $5. If the stock is presently trading at 92, the intrinsic value of the call (per share is):
   a. 12
   b. 7
   c. –7
   d. –12

18. The principle of forward-spot parity
   a. specifies the relation between the forward price and the expected future spot price
   b. is driven by arbitrage possibilities
   c. is only applicable to commodities and foreign exchange
   d. all of the above

19. 20. see BKM end of chapter problems (2 will appear on the Final).

21. 22. Market Tracking questions
Answers:

1. a: I implies that if the return over the preceding week was high, Monday’s return is also likely to be high: we can make abnormal trading profits by buying at the close on Friday (if the market was up that week) and selling at the close on Monday. Neither II nor III implies any such profits.

2. c: As of 1/1/09, the portfolio has a nine year duration and it includes a coupon bond. One year later, we will need an eight year duration, but the duration of the portfolio will not have fallen by a full year (because it includes the coupon bond). Therefore, we need to decrease the duration of the portfolio. II and V will do this.

3. b: 
<table>
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<th>Year</th>
<th>2</th>
<th>4</th>
<th>6</th>
</tr>
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<tr>
<td>CF</td>
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<td>25</td>
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<tr>
<td>PV</td>
<td>19.93</td>
<td>15.89</td>
<td>12.67</td>
</tr>
<tr>
<td>Weight</td>
<td>41.1%</td>
<td>32.8%</td>
<td>26.1%</td>
</tr>
</tbody>
</table>

\[ D = 0.411 \times 2 + 0.328 \times 4 + 0.261 \times 6 = 3.7 \] Let x be the fraction in 3-yr zero. Then 3.7 = 3x + (1-x)8 \Rightarrow x=0.86

4. e: C+=40, C-=5 \Rightarrow H=1. Alternatively, the hedge portfolio has final value 110H-40 or 75H-5. Setting these equal implies H=1. Then 110H-40 = 75H-5 = 70. PV(70,6%,1) = 66.04 = 100 – C \Rightarrow C=33.96

5. c: By fwd-spot parity, we should have F=10(1+3%+10%) = 11.30. So at 12, the fwd is overvalued.

6. c: \[ y_1=8\%; \quad y_2=8.4\%; \quad y_3=8.8\% \]
   \[ P = PV(12,8\%,1)+PV(12,8.4\%,2)+PV(112,8.8\%,3) = 11.11 + 10.21 + 86.96 = 108.28 \]

7. d: Same data as last problem. \[ 1.088^3 = 1.084^2 (1+f) \Rightarrow f=9.6\% \]

8. a: Same data as last problem. \[ FV(100,8.8\%,3)=128.79. \] (The indicated strategy must be equivalent to a three year investment in a three year bond.)

9. c: \[ D = (1+y)/y = 1.08/.08 = 13.5 \]

10. a: The PV of the perpetuity as of the end of year 2 is \[ 10/.10 = 100. \] Taking it back an additional 2 years: \[ PV(100,10\%,2) = 82.6. \] The D as of the end of year 2 is \[ 1.10/.10=11. \] Taking it back an additional 2 years gives D=11+2=13.

11. c: Investing in the US gives a FV=1.05 ($M). Converting the $ into ¥, investing at the ¥ rate and converting back again at the forward rate gives ¥105M \times 1.01 / 103 = $1.03M.

12. d: I is false because a stop-loss order does not guarantee you’ll receive $100. II is false because the price might drop below $100 and then recover. If you’d entered the stop-loss order, you’d no longer own the stock. With the put option, you’d still own the stock.

13. b: \[ 1.08(1+f)=1.082^2 \Rightarrow f=8.4\%, \] which by the exp hypoth is equal to the expected short spot rate one year from now.

14. b: You receive the ytm in this case.

15. b: The duration of the perpetuity is \[ 1.08/.08 = 13.5 = 5x+(1-x)20 \] where x is the fraction in the 5-year zero. x=43%.

16. a: By parity, F should be 460(1+7%-.4%)=473.8

17. a: Intrinsic Value=S-X=92-80=12, the payoff from immediately exercising the option.

18. b