

## Econ252 Midterm 1 Answers

### 1. WHAT IS BACKFILL BIAS? WHAT IS SURVIVOR BIAS? HOW DO THEY LEAD TO ERRORS IN EVALUATING INVESTMENT OUTCOMES?

These terms were used by David Swensen in his lecture.

■ **backfill** bias: When a hedge fund is added to an index, the fund's past performance may be "backfilled" into the index. For example, if the fund has been in business for two years at the time it is added to the index, past index values are adjusted for those two years to reflect the fund's performance during that period. Not all indexes backfill, but those that do introduce a bias. Usually, a hedge fund will start contributing data to an index to draw attention to recent strong performance. One of the oldest tricks in [investment management](#) is to launch multiple investment funds and then market those that happen to perform well. The practice is also common among hedge funds, who report the winners to indexes while closing down the losers. Also, index providers generally have criteria for adding a new fund to an existing index. This may include a minimum assets under management requirement, and successful funds are more likely to satisfy this criteria than unsuccessful ones. In summary, successful funds are more likely to be added to an index than unsuccessful ones, so this biases indexes that backfill. While backfilling is obviously a questionable practice, it is also quite understandable. When a provider first launches an index, they have an understandable desire to go back and construct the index for the preceding few years. If you look at [time series](#) of hedge fund index performance data, you will often note that indexes have very strong performance in the first few years, and this may be due to backfilling.

■ **survivorship** bias: When a fund is dropped from an index, past values of the index may be adjusted to remove that dropped fund's past data. Inevitably, a fund will be dropped from an index if it stops providing its performance data to the index provider, and a fund will be more likely to do so following poor performance than good. Also, providers may have criteria for dropping a fund, and this may naturally cause poor performers to be dropped more often than good performers

grading:

- 1 point: stating these are biases that affect assessment of returns, but no specific definitions
- 2 points: for above plus correct definition of one of the biases

- 4 points for complete definitions of both

## 2. WHAT ASSUMPTIONS ARE NEEDED TO DERIVE THE CAPITAL ASSET PRICING MODEL (CAPM)?

FMJF, Pg 253

- one point for each reason listed below
  - o risk averse investors who measure risk in terms of portfolio return standard deviation
  - o all investors have same time horizon
  - o all investors have same expectations about future security returns and risks
  - o capital markets perfect: assets completely divisible, no transactions costs or differential taxes, borrowing and lending rates equal to each other and same for all investors

grading:

- 1 point for each correctly stated assumption
- 0 points for statement of what you need to use the CAPM formula (i.e. beta, risk free rate, market return)

## 3. HOW DID UNIVERSITY ENDOWMENT MANAGERS REACT TO THE STOCK MARKET CRASH OF 1987, AND HOW, ACCORDING TO DAVID SWENSON, SHOULD THEY HAVE REACTED?

university endowments allocation to stocks contracted in the years following 1987 by more than the decline in the stock market, and so this indicates that they were selling stocks in reaction to the price decline. This appears to be market timing, which Swensen advises against. Because they did this, they missed out on some of the rise in stock the stock market in the early 1980s.

grading:

- 0 point: incorrect explanation of what endowment managers did
- 1 point: general statement of endowments leaving the market but no specific mention of assets they left, assets they entered, etc.
- 2 points: mention endowments reduced allocation to stocks
- 4 points: mention endowments reduced allocation to stocks and Swenson said they should have stayed in stocks

## 4. HOW MAY THE “DEMOCRATIZATION OF FINANCE” BE ADVANCED THROUGH FINANCIAL INNOVATION?

Open Yale courses

The democratization of finance refers to the use of finance by more and more people, which was the subject of Lecture 3, as well as the Introduction to my book *New Financial Order* (Introduction) that is clickable on the reading list. Example: an insurance policy, social security, etc., institutions that are designed for the broad public.

grading:

- 2 points: answer that democratization of finance is the use of finance by more and more people
- 4 points: answer that democratization of finance is the use of finance by more and more people and given an example of finance that is used by the broad public (insurance, social security)

**5. HOW ARE CLOSED END FUNDS DIFFERENT FROM OPEN-END FUNDS? WHY MIGHT THE PRICE OF A SHARE OF A CLOSED END FUND DIFFER FROM ITS NET ASSET VALUE?**

CEF funds issue a fixed number of shares upon inception and the shares are traded on an exchange. There are 3 important differences between OEF and CEF

- a) the number of shares of an OEF varies because the fund sponsor will sell new shares to investors and buy existing shares from shareholders. CEFs have a constant number of shares outstanding because the fund sponsor doesn't redeem shares and sell new shares to investors (except at the time of a new underwriting)
- b) price of OEF=NAV. Price of CEF may be above or below NAV
- c) CEF shares are traded on an exchange

Price of a share of CEF depends on the supply and demand so it may be above or below NAV. Eg., if investors become pessimistic about future prospects of the fund, they will push the price below NAV

grading:

- 0 points: no answer
- 1 point each for
  - mention difference in # of outstanding shares between CEF and OEF
  - mention OEF value equals NAV, CEF can be below or above
  - CEF shares traded on an exchange
- 4 points: mention all above plus explanation that supply and demand explain why CEF can be above or below NAV

**6. A TREASURY INFLATION PROTECTED SECURITY PAYS A COUPON RATE OF 10 PERCENT AND THE ANNUAL INFLATION RATE IS 5 PERCENT. SUPPOSE YOU PURCHASE \$100 OF PAR VALUE OF THIS ISSUE. AFTER ONE YEAR, WHAT IS THE AMOUNT OF COUPON PAYMENT YOU WILL RECEIVE?**

Coupon payment =  $(100) * (1 + .05) * (.1) = 10.5$

I.e. the coupon rate is paid of the principal amount adjusted for inflation.

0 points – just giving a number without any work shown

2 points – clearly showed that understood both inflation AND coupon rate are needed to calculate the coupon, but did not use them in the correct way.

4 points – correct calculation

**7. A CHANGE IN THE MONEY SUPPLY HAS THREE DIFFERENT EFFECTS UPON THE LEVEL OF THE INTEREST RATE: THE LIQUIDITY EFFECT, THE INCOME EFFECT, AND THE PRICE EXPECTATIONS EFFECT. BRIEFLY DESCRIBE THESE THREE EFFECTS.**

Liquidity effect: represents the initial reaction of the interest rate to a change in the money supply. A rise in money supply shifts the supply curve outward causing a decline in interest rate.

Income effect: an increase in MS is generally expansionary, i.e. aggregate income increases. Demand for money is a function of income so demand curve shifts out causing a rise in interest rate.

Price Expectations effect: although an increase in MS is an economically expansionary policy, the resultant increase in income depends substantially on the amount of slack in the economy. If the economy is operating at full-employment level, then an increase in MS will largely stimulate expectations of a rising price level. Since money demand is a function of expected price level, the price expectations effect is a shift in demand and thus an increase in interest rate.

grading:

- 0 points: description of effects that does not clearly explain how they are effects of the money supply on the interest rate

- 2 point: correctly define one of the effects

- 3 points: correctly define two of the effects

- 4 points: correctly define three of the effects

**8. WHAT, ACCORDING TO SIEGEL, IS THE BROAD HISTORICAL TREND IN STOCK MARKET VOLATILITY, AND WHAT KIND OF EVENTS AFFECT VOLATILITY?**

Siegel, Chapter 16, especially page figures 16-3 or 16-4.

grading:

- 0 points: only discuss that stocks best return in the long run, no discussion of volatility

- 1 point: general statement about stocks being best in the long run and mention something about market volatility, but no specific discussion of how market volatility has changed over time

- 2 points: state that Siegel points out that it is striking that “there is so little overall trend of any sort in the volatility of the market.” (pg 278)

- 4 points: mention above plus fact that volatility is higher during recessions, lower in booms

#### 9. WHAT IS THE EFFICIENT MARKETS HYPOTHESIS AND WHAT IS ITS RELATION TO THE RANDOM WALK THEORY OF STOCK PRICES?

Lecture 6, the random walk hypothesis says that stock prices are completely unforecastable, which is not absolutely necessary from efficient markets, but represents the idea essential to efficient markets that prices respond only to new information, which is unforecastable.

grading:

- 0 points: no correct definitions
- 1 point: correct definition of either EMH or random walk
- 2 points: random walk hypothesis means that stock prices are completely unforecastable. Correct definition of EMH and random walk, but made some statement about how they directly contradict each other.
- 3 points: above + state that key idea is that news is unforecastable.
- 4 points: state that random walk is consistent with efficient markets hypothesis, plus correct definitions of both

#### 10. HOW DOES THE VALUE FUNCTION OF PROSPECT THEORY DIFFER FROM THE UTILITY FUNCTION OF EXPECTED UTILITY THEORY?

. 3 differences

- a) value function is defined over gains/losses while utility function defined over total wealth
- b) value function concave (convex) over gains(losses), utility function concave everywhere
- c) value function has a kink at the origin, no kink in utility function

grading:

- 1 point each for (a), (b), (c) listed above
- + 1 point if also correctly discussed expected utility in each

## Part II

1. a. 2250 rupees

b.  $=500*(.5*.5/9)^{0.5}=500*.5/3=83.33$  rupees

c. 4000 rs

probability of 9 males =  $.5^9=1/512 < 1\%$ , prob of 8 males =  $9/512$ . So if the company holds 4000 rs. then the prob of insolvency = prob. of 9 males  $< 1\%$ .

Grading:

2 points for each part correctly answered

2.

- a. Standard bowed out shape of the efficient frontier. NO TANGENCY LINE
- b. There's a kink at the tangency portfolio. The slope of the line connecting the point on the y-axis is greater than the slope of the line that goes from the tangency portfolio outward.

Grading:

- a) 2 points. To get full points, you had to show the frontier, correctly label the axes, and show where the two assets are located. Note that without risk-free asset there is no tangency line. 0 points were given if you drew a tangency line.
- b) 4 points. In addition to showing the frontier in part a) you had to show the "kinked tangency" line. Note that the kink is at the point where the standard tangency line is tangent to the risky-asset-only frontier. 0 points were given if you drew the standard tangency line.

3. False. Suppose stock A has a 0.1% standard deviation and stock B has a 50% percent return standard deviation and the two assets are independent. Then a 50/50 portfolio between the two has a greater return standard deviation than investing it all in stock A (use the formula for portfolio variance).

Grading:

6 points. Full points given if clearly explained using an example or a diagram, in addition to writing the correct portfolio variance formula. Some of you got the answer right, but gave incorrect reasoning (little or no credit was given for such answers)

4. Using formulas given in lecture, solve for discount in terms of yield:

$$asked = \frac{360}{30} \frac{100*.06}{.06 + 365/30}, price = 100 - asked * 30 / 360$$

Grading:

4 points for asked, 2 points for price

5. A)  $ER = 3 + 1.5 \times (10 - 3) = 13.5\%$

B)  $PV = 1000 / (1.135) - 200 / (1.135)^2 + 700 / (.135 - .02) (1.135)^2$   
 $= 5,450.88$

Grading:

a) 2 points

b) 4 points. Note that you need to discount the  $700 / (.135 - .02)$  term.

Also, to get full points, you had to simplify the infinite sum using the 'PV of growing stream of payments formula'