

Problem set 3: Answers
266: Fi. Markets and Institutions
Spring 2015
Jon Faust

Directions. You are to do this problem set alone.

Due Date/time. Your work is due by beginning of class (10:30am) April 28. You can hand the work in to me at the beginning of class. If you put the work under my office door or in my mailbox, it must be in before I leave for lecture at about 10:20 am.

Questions. If you have questions, email me or one of the TAs, raise them in class, or come to office hours.

Grading. All parts have equal value.

Note: Be sure to note the proper units (e.g., millions, billions, etc.) in the following answers.

1 Hedge funds, alpha, beta.

If the results of the capital asset pricing model (CAPM) were correct, the only way to earn an expected return greater than the risk free rate using publicly available information is by taking risk. Using our standard notation, the CAPM says that for any portfolio, A ,

$$i_{A,t}^e = i_t^{rf} + \beta(i_{M,t}^e - i_t^{rf})$$

or, rearranging,

$$i_{A,t}^e - i_t^{rf} = \beta(i_{M,t}^e - i_t^{rf}).$$

This second form of the equation says that the ‘excess return’ above the risk free rate on portfolio A must entirely be attributable to a nonzero β . Remember that β captures the key feature of risk: how the asset return varies with the overall market portfolio return.

Analysts often modify the CAPM equation with an ‘alpha’:

$$i_{A,t}^e - i_t^{rf} = \alpha + \beta(i_{M,t}^e - i_t^{rf}).$$

Now the excess expected return can be due to alpha or beta.

- 1.1 From a standpoint of portfolio theory, why is earning ‘alpha’ greater than the risk free rate so desirable?

Answer:

Earning alpha higher than the risk free rate implies earning a higher return than the risk free rate, without taking on more market risk. Getting a higher return without suffering more risk is a good thing.

- 1.2 You invest \$1 million in a hedge fund for 1 year. At the end of the year, the fund is worth \$1.15 million. What is the implied rate of return over the year on the assets of the fund. (Note: we will later consider fees. For this part, ignore the fees.)

Answer:

$$\begin{aligned} 1 &= \frac{1.15}{1+r} \\ r &= 0.15 \end{aligned}$$

or 15%

- 1.3 Each year, the fund charges a management fee of 2 percent of asset values at the beginning of the year. It also charges an incentive fee of 20 percent of any increase in value between the beginning and end of the year. Continuing from the previous part, what is the value of the investor’s position at the end of the year, after all fees?

Answer:

Various interpretations of this are possible. The preferred interpretation is that \$0.98 million is invested on your behalf (after the initial fee is deducted). Your account grows at the rate 15 %, so the value at the end of the year is,

$$1.15 \times 0.98 = 1.127$$

The gain, then, is \$0.127 million (that is 127,000 dollars). The hedge fund takes 20% of the gain, leaving,

$$0.8 \times .127 = 0.1016$$

So from your perspective, you invested \$1 million and at the end of the year have claim to \$1.1016 million.

Some people will have made have interpreted things a bit differently, but the answer for most reasonably interpretations is about \$1.1 million,

- 1.4 What rate of return (after fees) did the investor make on her \$1 million investment?

From the previous part, 10.16%

- 1.5 Continuing. Suppose that the hedge fund return is risky. Thus, with 70 percent probability the \$1 million invested will be worth \$1.643 million at the end of the year. With 30 percent probability the value falls to zero at the end of the year. What is the expected value of hedge fund assets at the end of the year?

Answer:

$$(0.7)(1.643) + (0.3)(0) = 1.15$$

- 1.6 And what is the expected rate of return to the investor (after fees) in this case?

Answer:

The expected value to the investor at the end of the year the sum of the outcomes times their probabilities. Thirty percent of the time the investor gets zero. Seventy percent of the time the investor gets 1.643 less 20 percent of the gain. The gain is $(1.643 - 0.98)$ (some folks will have used 1 rather than 0.98 in this formula, and so the fee is $0.2 \times (1.643 - 0.98)$). The the expected value to the investor in a year's time is:

$$(0.7)[1.643 - 0.2(1.643 - 0.98)] \approx 1.057$$

So, the expected rate of return is 5.7%.

Note if the assets increase to \$1.15 for certain as in the first parts, the return of the investor is pretty good, at around 10 percent. If that 1.15 only happens on average and is a combination of very good and very bad outcomes, the expected return of the investor is much less. This is because, the hedge fund shares in the gains, but does not share in the losses.

2 Etsy had an IPO on April 15. For this question, googling Etsy IPO should get you to the answers.

2.1 How many shares did Etsy sell? What was the IPO price?

Answer:

IPO price: \$16 a share; they sold 16.7 million shares.

2.2 And the price of Etsy shares at the close of the market April 15 [corrected to April 16]?

Answer:

\$30 at the end of the day.

2.3 What was the closing price of Etsy shares on April 22, one week after the IPO.

Answer:

About \$25.

2.4 What is a 'bookrunner' for an IPO?

Answer:

A bookrunner is one of the main underwriters in the issuance of new equity.

2.5 What investment banks were bookrunners for the Etsy IPO?

Answer:

The joint bookrunners were Goldman Sachs and Morgan Stanley, with Allen & Company serving as co-manager.

3 Interest rates, negative.

- 3.1 Why would anyone lend money at a negative interest rate? For example, why would they buy a zero coupon bond for more than the face value?

Answer:

In the absence of safe investment opportunities yielding expected positive returns, investors may want to simply store their money. If storage costs are large, they might prefer buying bonds even if they imply a (small) negative return.

- 3.2 Name a country that recently sold 10-year bonds with an implied negative nominal interest rate?

Answer:

On April 8, Switzerland issued bonds maturing in 2025 at an implied yield of $-.05\%$.

- 3.3 Continuing from previous part: If the expectations theory of the term structure held, what does a negative 10-year yield suggest about the expected path of short-term interest rates over the next 10 years?

Answer:

The expectations theory of the term structure implies that the 10-year yield today is the average of the expected 1-year rates for the next 10 years:

$$i_{10,t} = \frac{1}{10} \sum_{t=0}^9 i_{1,t+1}^e$$

A negative 10-year yield today implies that the average expected value of the short-term rate for the next 10 years is negative.

- 3.4 Approximately what is the yield at present on German 10-year government bonds? And the yield on U.S. 10-year bonds?

Answer:

The precise value depends on when you took the reading. Any answer with the U.S. 10-year around 2 percent (generally a bit less) and the German 10-year at 0.30% or lower is fine.

3.5 According to the uncovered interest rate parity (UIP) theory, what do the values in the previous question suggest will happen to the value of the dollar versus the euro over the next 10 years?

Answer:

UIP predicts that if the US rate is higher, the dollar should depreciate with respect to the Euro. If not, investors in US Treasuries would profit based on the interest rate differential, as well as the currency appreciation.

$$RAP_t^e = -(i_{\$,t} - i_{e,t})$$

Given the 10-year rates quoted above, this would imply that the dollar would fall in value by about 1.7% (that is, 2.0-0.3) per year on average for the next decade.

3.6 Parts 3 and 5 of this problem derive implied expectations from financial market data using simple theories (the expectations theory of the term structure and UIP). What is missing from these theories that might mean that those derived expectations may not actually represent actual expectations of market participants?

Answer:

The “liquidity premium” is missing. For example, we could write:

$$i_{10,t} = \frac{1}{10} \sum_{t=0}^9 i_{1,t+1}^e + l_t$$

If $l_t < 0$, the expected path of short term rates might be positive. Similarly UIP may not hold due to a liquidity premium, so that the dollar would not be expected to depreciate at the rate implied by the interest rate differential.

4 Unconventional monetary policy

- 4.1 Lower for longer. Under one standard view, a central bank facing a weak economy, undesirably low inflation, and whose policy rate is at its lower bound should promise to keep that policy rate at zero considerably longer than ‘normal times’ reasoning might dictate. A promise to deliver a policy rate that is ‘lower for longer’ is one form of forward guidance.

Explain the reasoning suggesting that this promise of rates that are lower for longer would stimulate the economy when announced.

Answer:

Low rates tend to stimulate higher activity. The Fed cannot lower current short term rates, but credibly promising to keep them low in the future should mean that economic activity will be stronger in the future. But if activity is expected to be stronger in the future that may stimulate both investment and spending in the present. That is, if consumers and producers expect better times in the near future, they will tend to spend more today.

- 4.2 Many central banks have engaged in large scale purchases of longer-term securities. A standard description of this policy is that the central banks are ‘flooding the economy with liquidity’ with the hope that this liquidity will stimulate the economy. Rightly or wrongly, the Fed has a very different account of why large scale asset purchases might stimulate the economy. Explain the Fed’s reasoning.

Answer:

Since the Fed couldn’t lower the fed funds rate, the Fed hoped LSAPs (large-scale asset purchases) – by shifting the demand curve for longer-term securities – would push up their price, and thereby their yields. Lowering the yields on longer-term securities can then lead to lower yields on longer-term assets more generally. Through various channels we have discussed lower rates can stimulate economic activity and inflation.

- 4.3 The large-scale asset purchases have led to an unprecedented level of reserves in the banking system of the U.S. What can banks collectively do to reduce the overall stock of reserves in the banking system?

Answer:

Very little. Banks can individually reduce their own reserve holding,

but this just shifts the reserves to some other bank. The overall level of reserves is set by the Fed.

4.4 And what can they do to reduce the overall stock of excess reserves?

Answer:

Total reserves equal required reserves plus excess reserves, and total reserves are set by the Fed. Since required reserves are a fixed proportion of deposits, banks can affect the division between required and excess by choosing the overall level of deposits, which determines the level of required reserves.

Basically, the Fed sets the level of total reserves and banks then collectively determine the division between required and excess.