

PROBLEM SETS

Quiz

1. Suppose that two factors have been identified for the U.S. economy: the growth rate of industrial production, IP, and the inflation rate, IR. IP is expected to be 3%, and IR 5%. A stock with a beta of 1 on IP and .5 on IR currently is expected to provide a rate of return of 12%. If industrial production actually grows by 5%, while the inflation rate turns out to be 8%, what is your revised estimate of the expected rate of return on the stock?
2. The APT itself does not provide guidance concerning the factors that one might expect to determine risk premiums. How should researchers decide which factors to investigate? Why, for example, is industrial production a reasonable factor to test for a risk premium?
3. If the APT is to be a useful theory, the number of systematic factors in the economy must be small. Why?
4. Suppose that there are two independent economic factors, F_1 and F_2 . The risk-free rate is 6%, and all stocks have independent firm-specific components with a standard deviation of 45%. The following are well-diversified portfolios:

Portfolio	Beta on F_1	Beta on F_2	Expected Return
A	1.5	2.0	31%
B	2.2	-0.2	27%

What is the expected return–beta relationship in this economy?

5. Consider the following data for a one-factor economy. All portfolios are well diversified.

Portfolio	$E(r)$	Beta
A	12%	1.2
F	6%	0.0

Problems

15. Small firms will have relatively high loadings (high betas) on the SMB (small minus big) factor.
- Explain why.
 - Now suppose two unrelated small firms merge. Each will be operated as an independent unit of the merged company. Would you expect the stock market behavior of the merged firm to differ from that of a portfolio of the two previously independent firms? How does the merger affect market capitalization? What is the prediction of the Fama-French model for the risk premium on the combined firm? Do we see here a flaw in the FF model?

1. Jeffrey Bruner, CFA, uses the capital asset pricing model (CAPM) to help identify mispriced securities. A consultant suggests Bruner use arbitrage pricing theory (APT) instead. In comparing CAPM and APT, the consultant made the following arguments:
- Both the CAPM and APT require a mean-variance efficient market portfolio.
 - Neither the CAPM nor APT assumes normally distributed security returns.
 - The CAPM assumes that one specific factor explains security returns but APT does not.
- State whether each of the consultant's arguments is correct or incorrect. Indicate, for each incorrect argument, why the argument is incorrect.
2. Assume that both *X* and *Y* are well-diversified portfolios and the risk-free rate is 8%.



Portfolio	Expected Return	Beta
X	16%	1.00
Y	12	0.25

- In this situation you would conclude that portfolios *X* and *Y*:
- Are in equilibrium.
 - Offer an arbitrage opportunity.
 - Are both underpriced.
 - Are both fairly priced.
3. A zero-investment portfolio with a positive alpha could arise if:
- The expected return of the portfolio equals zero.
 - The capital market line is tangent to the opportunity set.
 - The Law of One Price remains unviolated.
 - A risk-free arbitrage opportunity exists.
4. According to the theory of arbitrage:
- High-beta stocks are consistently overpriced.
 - Low-beta stocks are consistently overpriced.
 - Positive alpha investment opportunities will quickly disappear.
 - Rational investors will pursue arbitrage consistent with their risk tolerance.
5. The arbitrage pricing theory (APT) differs from the single-factor capital asset pricing model (CAPM) because the APT:
- Places more emphasis on market risk.
 - Minimizes the importance of diversification.
 - Recognizes multiple unsystematic risk factors.
 - Recognizes multiple systematic risk factors.
6. An investor takes as large a position as possible when an equilibrium price relationship is violated. This is an example of:
- A dominance argument.
 - The mean-variance efficient frontier.
 - Arbitrage activity.
 - The capital asset pricing model.

7. The feature of arbitrage pricing theory (APT) that offers the greatest potential advantage over the simple CAPM is the:
- Identification of anticipated changes in production, inflation, and term structure of interest rates as key factors explaining the risk–return relationship.
 - Superior measurement of the risk-free rate of return over historical time periods.
 - Variability of coefficients of sensitivity to the APT factors for a given asset over time.
 - Use of several factors instead of a single market index to explain the risk–return relationship.
8. In contrast to the capital asset pricing model, arbitrage pricing theory:
- Requires that markets be in equilibrium.
 - Uses risk premiums based on micro variables.
 - Specifies the number and identifies specific factors that determine expected returns.
 - Does not require the restrictive assumptions concerning the market portfolio.

STANDARD
& POOR'S

Go to www.mhhe.com/edumarketinsight and link to *Industry*. From the pull-down menu link to the *Air Freight and Logistics* industry and click on *Go!*. Review the latest *S&P Industry Survey*. What are the current major risk factors that affect this industry? Which of these factors would you expect to be priced, that is, to command a significant risk premium? Now find the latest *S&P Industry Survey* for the *Biotechnology* sector. What risk factors does this industry face? Which of these factors are likely to affect the firm in the long term and which are likely to change over time?

E-Investments

Unanticipated Inflation

One of the factors in the APT model specified by Chen, Roll, and Ross is the percent change in unanticipated inflation. Who gains and who loses when inflation change? Go to <http://hussmanfunds.com/rsi/infurprises.htm> to see a graph Inflation Surprise Index and Economists' Inflation Forecasts.

SOLUTIONS TO CONCEPT CHECKS

- The GDP beta is 1.2 and GDP growth is 1% better than previously expected. So you will increase your forecast for the stock return by $1.2 \times 1\% = 1.2\%$. The revised forecast is for an 11.2% return.
- With these lower risk premiums, the expected return on the stock will be lower:

$$E(r) = 4\% + 1.2 \times 4\% + (-.3) \times (-2\%) = 9.4\%$$

- This portfolio is not well diversified. The weight on the first security does not decline as n increases. Regardless of how much diversification there is in the rest of the portfolio, you will not shed the firm-specific risk of this security.
 - This portfolio is well diversified. Even though some stocks have three times the weight as other stocks ($1.5/n$ versus $.5/n$), the weight on all stocks approaches zero as n increases. The impact of any individual stock's firm-specific risk will approach zero as n becomes ever larger.
- The SML says that the expected return on the portfolio should be $4\% + (1/3)(10 - 4) = 6\%$. The return actually expected is only 5%, implying that the stock is overpriced and that there is an arbitrage opportunity. Buy \$1 of a portfolio that is $2/3$ invested in T-bills and $1/3$ in the market. The return on this portfolio is $2/3 r_f + 1/3 r_M = 2/3 \times 4\% + 1/3 r_M$. Sell \$1 of portfolio G. The net return on the combined position is: