P2.T9. Risk Management & Investment Management

Andrew Ang, Asset Management: A Systematic Approach to Factor Investing

Bionic Turtle FRM Practice Questions

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Chapter 6: Factor Theory

Chapter 7: Factors

Chapter 10: Alpha

Chapter 6: Factor Theory

P2.T9.20.1. Factor theory: What is a Factor?

Learning objectives: Provide examples of factors that impact asset prices and explain the theory of factor risk premiums. Describe the capital asset pricing model (CAPM) including its assumptions and explain how factor risk is addressed in the CAPM. Explain implications of using the CAPM to value assets, including equilibrium and optimal holdings, exposure to factor risk, its treatment of diversification benefits and shortcomings of the CAPM.

20.1.1. Janice is preparing to conduct factor regressions in order to discover the factor loadings in her firm's equity portfolio. She will begin by regressing three explanatory (aka, independent) variables: the market factor (MKT) plus two additional factors. Each of the following pairs of factors are good candidates for these additional factors **EXCEPT** which of the following pair is NOT a good candidate?

a) Quality and momentum (style factors)
b) Strategy and reputation (style factors)
c) Economic growth and inflation (macro factors)
d) Real interest rates and liquidity (macro factors)

20.1.2. Andrew Ang says that "the factor risk premium has an economic story."[1] Which of the following is the **BEST** summary of the factor risk premium?

a) The factor risk premium is compensation for suffering losses during a specific set of bad times
b) The factor risk premium is a reward for selecting a set of equities that outperforms over a given period
c) The factor risk premium is an orthogonal linear combination of variables that maximizes the total variance
d) The factor risk premium is the excess return due to the selection of a set of style factors within a single asset class; aka, smart beta

[1] Andrew Ang, Asset Management: A Systematic Approach to Factor Investing (NY: Oxford University Press, 2014).

20.1.3. A study group of FRM candidates is reviewing the material on factor theory. They begin with a recap of the capital asset pricing model (CAPM) because Andrew Ang writes that "We [can] describe the theory of factor risk by starting with the most basic factor risk premium theory—the CAPM, which specifies just one factor: the market portfolio."[2] While Ang says that CAPM is a failure, he also says "the basic intuition of the CAPM still holds true"[2] and that CAPM gets several things right. In this way, Ang says that CAPM continues to teach valuable lessons.

Each member of the group speaks about which lesson is most interesting to them. Individually, they make the following statements:

I. Allison says that traditional portfolio asset allocation (and rebalancing) into asset class labels such as hedge funds (or alternatives) is not optimal portfolio construction
II. Betty says that each investor has their own optimal exposure to each factor risk, which is analogous to CAPM's view that each investor's level of exposure to the market portfolio is different
III. Chris says that equilibrium ensures each factor's risk premium cannot be arbitraged away and will persist at least until the economy changes
IV. Donald says that portfolio risk should be measured by its factor betas (aka, exposures)
V. Eric says that high-beta assets, which in factor theory are those assets whose returns have a higher covariance with the bad times index, cov(R_i, m), have lower risk premiums and lower expected returns

Which of the statements is (are) **TRUE**?

a) All five statements are true
b) Allison and Betty are incorrect, but the other statements are true
c) Donald and Eric are incorrect, but the other statements are true
d) None of the statements are true; i.e., all of the statements are inaccurate

[2] Andrew Ang, Asset Management: A Systematic Approach to Factor Investing (NY: Oxford University Press, 2014).

Answers:

20.1.1. B. False. In reality, it is difficult to invest directly in reputation, and it seems almost impossible to imagine how to operationalize strategy as an investable factor. According to Andrew Ang (see https://www.blackrock.com/us/individual/investment-ideas/what-is-factor-investing) there are two primary types of factors: macroeconomic factors and style factors. Macroeconomic factors include economic growth, credit (default risk), real interest rates, emerging markets (political and sovereign risk), inflation, and liquidity. Style factors include value, quality, minimum volatility, size, momentum, and carry.

In this regard, each of (A), (C), and (D) is TRUE:

- Quality and momentum are genuine style factors
- Economic growth and inflation are genuine macro factors
- Real interest rates and liquidity are genuine macro factors

20.1.2. A. True: The factor risk premium is compensation for suffering losses during a specific set of bad times. The most important phrase in Ang's book might be "bad times." It is the first plank in factor theory, and it elegantly captures the notion of greater reward for greater risk. The key point is that factor risk premiums are compensation for assuming the risk of greater losses during bad times. To borrow the CAPM as a single-factor instance, the idea is that a high-beta stock has a higher expected return because during bad times (e.g., a market crash) we expect it will incur greater losses. On the other hand, under this framework, why does a low-beta stock offer a lower expected return? Because if the market crashes, we expect it to experience a smaller loss. The notion remains "greater reward for greater risk," but risk is framed entirely in terms of the size of the expected loss that will be experienced during "bad times." Further, we must move beyond single-factor CAPM: factor theory is multifactor as there are multiple definitions of bad times.

20.1.3. A. True: All five statements are true

- **Allison is correct:** traditional portfolio asset allocation (and rebalancing) into asset class labels such as hedge funds (or alternatives) is not optimal portfolio construction because, as Ang explains in his metaphor, asset classes are just labels, they are not the nutrients themselves. Further, assets are bundles of factors.
- **Betty is correct:** each investor has their own optimal exposure to each factor risk, which is analogous to CAPM's view that each investor's level of exposure to the market portfolio is different
- **Chris is correct:** equilibrium ensures each factor's risk premium cannot be arbitraged away and will persist at least until the economy changes
- **Donald is correct:** portfolio risk should be measured by its factor betas (aka, exposures)
- **Eric is correct:** high-beta assets, which in factor theory are those assets whose returns have a higher covariance with the bad times index, cov(R_i, m), have lower risk premiums and lower expected returns

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