

# 10 Things We Don't Understand About Finance

3: The CAPM Is Missing Something!

# Models

- Need two features
  - Simple enough to understand
  - Complex enough to be generally applicable
- Does the CAPM satisfy these?
  - It is simpler than its (formal) competitors
  - But, it has flaws
    - It isn't clear that these flaws are terribly important

# Factors

- This is the term used in finance to indicate variables that effect risk premiums of assets
  - The risk-free rate is more of a baseline than a factor
  - The CAPM implies there is only one factor
    - The market risk premium
  - The problem with the CAPM is that there is evidence that some other factors exist
    - But, it isn't clear what those are yet

# What Does the CAPM Get Right?

- It captures the existence of a positive risk for return tradeoff
- It implies that diversifiable risk is unimportant
  - Otherwise mergers would lead to gains in value, and
  - Mutual funds would be worth more than their underlying portfolios.

# Pros and Cons of the CAPM

- Pros
  - Simple
  - Collapses everything into one factor
- Cons
  - Doesn't allow for other factors
  - Requires accurate measurement of the market risk premium

# Risk-Return Tradeoff Puzzles

- These are the signs that the CAPM is missing something
- Two varieties
  - Statistical
    - Data mining is a problem
  - Theoretical
- Sometimes called anomalies

# Beta Doesn't Predict Returns Perfectly

- The CAPM predicts that the return on a firm's stock is its beta times the risk premium of the market plus the risk-free rate
- But,
  - Low beta firms tend to perform better than the CAPM predicts
  - High beta firms tend to perform worse than the model predicts

# Black's [1972] Result On Constrained Borrowing

- If investors ability to borrow is constrained in either quantity, or by a higher rate than lending, then we would expect low beta stocks to overperform (and high beta stocks to underperform)

# Fama and French Anomalies

- Expected returns are positively correlated with
  - Firm size
    - Banz [1981] shows that the importance of this effect seems to be diminishing – which could be a sign of arbitrage
  - Book to market ratio

# Statistical Puzzles

- Proving or Disproving the CAPM is difficult to do conclusively – can you disprove it if you haven't made the right assumptions?
  - Should the market portfolio be formed by weighting firms equally or weights proportional to firm value?
  - Roll [1977] pointed out that the market portfolio should – but doesn't – include everything
  - The model is about expected future returns, but we only observe past actual returns
  - The model assumes that you can borrow and lend at the same rate, in unlimited quantities
  - Are T-bills completely risk free?

# Theoretical Puzzles

- The market can only hedge so much risk
  - But, what if your tastes are different from the market?
  - Can it make sense for you to overinvest in something you happen to like better than the market does?
    - For example, could the Enron employees who invested there just have really liked Enron?
- Are there other factors besides the market risk premium?

# Alternative Models

- Merton's [1973] intertemporal CAPM
- Breeden's [1979] consumption-CAPM
- Ross' [1976] arbitrage pricing theory
- Fama and French's [1992] three factor model

# Merton's Intertemporal CAPM

- The market risk premium is the one and only factor, but investors have idiosyncratic tastes and preferences across which they hedge
  - If you like cars, your personal risk might be best diversified by a portfolio heavy on car companies
- Pro – big foundation for future work
- Con - incomplete

# Breeden's Consumption-CAPM

- Builds on Merton [1973]
  - Hedging is against future consumption risk
- Assumes that investors are not interested in maximizing their portfolio, but rather in maximizing the consumption they get from their portfolio
  - Pro – it is not as critical to measure the market premium accurately
  - Con – you have to measure consumption more accurately

# Two Puzzles About the Consumption-CAPM

- The consumption-CAPM is the most economically solid theory
- But it implies two weird things about the data
  - Equity Premium Puzzle: returns to equity are higher than is consistent with other behaviors
  - Risk-Free Rate Puzzle: returns to debt are lower than is consistent with other behaviors

# Ross' [1976] Arbitrage Pricing Theory

- Allows for an unlimited number of factors
  - All constructed as risk premium
- Pros
  - Easy to model returns of similar firms depending on similar factors
  - Doesn't depend critically on accurate measurement of the market risk premium
- Cons
  - Doesn't tell you what the factors should be

# Fama and French's [1993] Three Factor Model

- Essentially an APT model with the market premium, a size premium, and a book-to-market premium as factors
  - So it addresses the con of the APT
- Depending on the industry, a firm's risk premium is composed of
  - 4 to 7% from the market
  - -1 to +2% from firm size
  - -4 to +2% from book-to-market

# The Proof Is In the Pudding

- The CAPM has been around for 40 years and is still going strong
  - But, it has flaws
- There are alternatives, but none has yet to prove itself better