FNCE90056:
Investment Management

Week 12: Behavioral Finance, Review and Exam Information

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The plan for today

- Behavioral finance (don't worry - this won't be part of the exam)

- A brief revision

- Exam information

- Q & A

Behavioral Finance

Behavioral Finance

- The CAPM is based on the assumption that *all* investors are **rational**.

- Recently, fueled by some of the evidence on the "irrationality" of markets, several academics have proposed that traditional finance theory is somehow "wrong".

- Their arguments rely on several evidence, mostly experimental, that investors consistently make the wrong choices.

  ▶ They argue that these behavioral biases need to be taken into account in asset pricing theories.
  ▶ In this lecture, we will review some of these biases, which serves as motivation for having theories that relax the assumption that *all* investors are rational.

Hot-Hand Fallacy

Question: Let me toss a fair coin 6 times, which of the following sequences is more likely to occur? (1) HHHTTT; or (2) HTHTTH.

- Rational: The two sequences are equally likely.

- Irrational: Most people erroneously believe that the second sequence is more likely than the first because it appears random.

Many people will be far too quick to perceive causal regularity in random sequences of events - Gilovich, Vallone, and Tversky [1985]

Implications:

- Investors tend to see patterns in historical data that are not really there. Such 'data-mined' relationships that are not based on economic theory need not be robust.

- Investors often believe that fund managers who have been successful for a few years in a row to be "hot" players.

Loss Aversion / Disposition Effect

Question:
First choose between (A) receive $5000; and (B) a 50% chance to win $10,000 and a 50% chance to win nothing;
Then choose between: (C) lose $5000; and (D) a 50% chance to lose $10,000 and a 50% chance to lose nothing.

- Rational: If you choose (A) in the first one then you would choose (C) in the second one.

- Irrational*: People are more likely to choose (D) over (C) than (B) over (A).

Many people Having difficulty in making peace with their losses and they have propensity to lock in sure gains than to lock in sure loss.

Implications:

- Individuals are more likely to sell stocks that have risen in price rather than those that have fallen in price (Odean 2001): a losing (winning) stock is held for a median of 124 (102) days.

(* Loss aversion is not necessarily irrational; it just implies that we need to use non-symmetrical utility)

Overconfidence

People tend to be overconfident of their own abilities.

- ○ 90% of people surveyed in Sweden believe that they are above average in driving skill.

- ○ 12,500 financial executives asked to forecast returns; realized market returns are within the executives' 80% confidence intervals only 33% of the time (Ben-David, Graham and Harvey, 2010).

Implications:

- Overconfidence tends to induce people to take more risks.

- Individuals who trade the most frequently post exceptionally poor investment results (Barber and Odean [2000]).

- Men traded 45% more than women and chose stocks in smaller companies, higher price-to-book, and higher betas; Men earned 1.4% less on risk adjusted basis (Barber and Odean [2001]).

Implications

- Investors often display behavioral biases and make mistakes.

    - we should be wary of theories that assume that *all* investors are rational.
    - Bias and mistakes distort prices, making capital markets give misleading signals.

- There are theories that relax this assumption by assuming that there are *some* sophisticated investors in the market.

    - In absent any constraints, they will eliminate any arbitrage opportunities.

- Caveat

    - Most evidence is based on experiments where the stakes are small.
    - If investors make so many mistakes, the 'professionals' should be doing quite well. Do they?

Review

Learning outcomes

- Discuss core concepts in investment management, including risk, return, risk premium and risk aversion; (W1 and everywhere)

- Analyse the portfolio selection problem, with emphasis on the mean variance framework; (W2, W3)

- Explain the benefits of diversification and the main drivers of those benefits; (W2)

- Critically evaluate alternative theories of asset pricing and their application in the valuation of securities; (W3, W4, W5)

- Develop techniques to evaluate the performance of portfolio managers; (W11)

- Analyse critical issues in the valuation of fixed income securities and the management of fixed income portfolios; (W6, W7, W8, W10)

- Critically evaluate the theories of the term structure of interest rates and their application to fixed income portfolio management. (W10)

Topics

- Week 1: Risk aversion and investment strategies

- Week 2: Modern Portfolio Theory

- Week 3: Capital Asset Pricing Model (CAPM)

- Week 4: Empirical evidence on CAPM

- Week 5: Arbitrage Pricing Theory and multifactor models

- Week 6: Fixed income valuation

- Week 7: Coupon bonds

- Week 8: Term structure

- ~~Week 9: (Midterm test)~~

- Week 10: Interest rate risk

- Week 11: Portfolio performance evaluation

Week 1: Risk aversion and investment strategies

Key concepts

- Return: expected returns, standard deviation, Sharpe ratio.
- Risk aversion and utility functions.
- Portfolio choice with one risk-free and one risky asset: capital allocation line and optimal allocation.
- Return distributions: normal distribution and deviations from normality.

Things we will not test you on:

○ Functional forms of PDF, CDF, skewness, kurtosis

Week 2: Modern Portfolio Theory

Key concepts

- Returns and variances of portfolios with multiple risky assets

- Covariance and correlation

- Diversification

- Investment evaluation using CAL

- Optimal portfolio allocation with 2+ risky assets: efficient frontier of risky assets, global minimum variance portfolio, tangency portfolio.

- CAL based on modern portfolio theory

Things we will not test you on:

○ Matrix representation of portfolio return/risk

Week 3: Capital Asset Pricing Model

Key concepts

- The (additional) assumption of the CAPM.
- Market portfolio and the capital market line.
- The fundamental implication of the CAPM for any asset i:
  $E(r_i) - r_f = \beta_i(E(r_i) - r_f)$, and the security market line.
- CAPM β: for risk-free, for the market portfolio, and for other assets.
- CAPM alpha.
- Estimation of β using regression: static regression and rolling-window regression.
- β for a new firm: comparables, characteristics-based model prediction.

Things we will not test you on:

○ Solving for GMV and tangency portfolios using Lagrangian.

Week 4: Empirical evidence on the CAPM

Key concepts

- Decomposition of risk into systematic and idiosyncratic component.
- Empirical tests of the CAPM: the Fama-French two-stage regressions.
- Anomalies against the CAPM: (1) size effect; (2) value effect; (3) momentum effect.
- Alternative explanations of these anomalies.
- Efficient market hypothesis: three forms of EMH.

Things we will not test you on:

○ Information on past Nobel prize winners.

Week 5: Arbitrage pricing theory and multifactor models

Key concepts

- The assumptions of APT: no arbitrage, factor structure, no transaction costs and tax.
- Definition of arbitrage.
- Definition of factor structure.
- Multifactor security market line under the APT: factors and factor risk premia.
- Key examples of APT factors.

Things we will not test you on:

○ memorizing macro and fundamental factors (except key models like FF3 and Carhart), principal component analysis.

Week 6: Fixed income

Key concepts

- Definition: coupon vs zero-coupon.
- Credit risk and credit rating.
- US government debt: Treasury bills, Treasury notes, Treasury bonds, STRIPS and TIPS.
- Quotation convention for government debt.
- Zero-coupon bonds and discount factor: definition, no-arbitrage relation, relation with interest rates.
- Money market rates: Fed fund rates, Eurodollar rates, LIBOR, commercial paper rates.

Things we will not test you on:

○ Other debt markets: MBS, swaps, GSE debt, derivatives.

Week 7: Coupon bonds

Key concepts

- Pricing of coupon bonds using discount factor, or interest rates (with different compounding frequency).
- Estimating the term structure of interest rates using bootstrapping.
- Bond yields: definition, relationship with coupon rate,
- Inflation risk: nominal vs real interest rate.

Things we will not test you on:

- ○ Annuity formula and its proof.

Week 8: Term Structure

Key concepts

- Definition: zero rates, forward rates, actual rates.
- Forward rates: no-arbitrage determination (with different compounding frequency), forward discount factors.
- Term structure models: Expectation hypothesis and other models (preferred habitats hypothesis).
- Modern bond pricing models: level, slope and curvature factors (and their relation with monetary policy, Taylor rules).

Things we will not test you on:

○ recovering forward rates with continuous compounding.

Week 10: Interest rate risk

Key concepts

- The relationship between bond price and interest rate and impact of other things (maturity, coupon, yield).
- Measures: Modified duration, Macaulay duration, dollar duration, price value of a basis point.
- Definition and interpretation of interest rate risk measures.
- Convexity: how does it improve bond price approximation.
- Portfolio duration and convexity.
- Immunisation against interest rate risk.

Things we will not test you on:

○ Proof of the duration formula, duration of perpetuity, high convexity position.

Week 11: Portfolio performance evaluation

Key concepts

- Fee vs fund manager's value adding
- Sources of managers' value adding: stock picking, factor/market timing, economies of scale / access to markets.
- Return-based performance metrics: (1) Sharpe ratio; (2) M^2; (3) Jensen's α; (4) Information ratio.
- Market timing.
- Style analysis.

Things we will not test you on:

○ Proof of M^2 and SR equivalence, empirical evidence on mutual funds' alphas.

Exam Information

Assessment = weekly quizzes + 2 exams

- 10 weekly multiple-choice quizzes, 1% each (10%)
  (Please note: on time completion with a 50% or above mark will give you 1% for that quiz)

- Mid-semester test (35%)

- **Final exam (55%)**
  - Closed book exam.
  - No formula sheet.
  - Official university approved calculator only: Casio FX-82.
  - 15 min reading time + 120 min writing time.
  - Cover content from all weeks: W1 to W5 (< 10 out of 55), and W7 to W11 (> 40 out of 55).

Exam Format

- **Section A: 10 multiple choice questions (15 marks)**
    - Q1-5 are worth 2 marks each; and, Q6-10 are worth 1 mark each.
    - Answer each question by writing your CAPITAL letter answer in the box provided.
    - Choose only one answer for each question - the best and most complete answer to the question.
    - Answers written outside the box will not be marked.
    - Please write you answer in clear hand writing.

Example:

1. (2 mark) What is your lecturer's name?

    A. Andrew

    B. Angela

    C. Amber

    D. Andrea

    E. None of the other answers are correct

Write your CAPITAL letter answer in this Box:

Exam Format (Cont.)

- **Section B: 5 short answer questions (40 marks)**

  - Question 11: $3 + 2 + 3 = 8$ marks
  - Question 12: $3 + 3 + 3 + 2 = 11$ marks
  - Question 13: $1 + 2 + 4 + 2 + 3 + 3 = 15$ marks
  - Question 14: 3 marks
  - Question 15: 3 marks

- Answer the short answer questions in the box below each question.

- Write down your working, not just the final answers.

- If you need additional space, you can use the pages marked "extra answer space" at the end of the exam paper. Be sure to clearly alert the grader the fact that you have used the extra space in the answer space provided for each question. If you don't follow this instruction your answer will not be graded.

Advice for Exam and Preparation

- **Preparation**
  - Lecture materials (lecture notes, including your own notes).

  - Quiz questions and solutions

  - Quiz solution videos (on canvas) and TA's answers to questions posted on Ed Discussion
    - Mid-semester test (20 questions!)
    - 10 Weekly quizzes (159 questions!)

Consultation

- **Additional consultation hours:**
  - Wed 29 October 10:30am - 11:30am, by Andrea at Rm 12.046 The Spot
  - Wed 5 November 10:30am - 11:30am, by Andrea at Rm 12.046 The Spot
  - Tue 28 October 4:00pm - 5:00pm, by Jun via Zoom
  - Tue 4 November 4:00pm - 5:00pm, by Jun via Zoom

- Don't wait until the last minute!

- Ed Discussion also work - but they are not viable for anything other than simple issues.

- For fairness reasons I will not answer one-on-one questions about the exam – so ask questions now or on Ed Discussion!

Questions?

The End (.. for this subject)

Thank you for taking FNCE90056 Investment Management with Jun and I in 2025SM2!