CFM 301 Review 2:

EMH and Behavioral Finance

A Feud Next Door

On Oct. 18, 2004, the Wall Street Journal runs a page-A1 story featuring a feud of two Chicago finance profs

A Feud Next Door

On Oct. 18, 2004, the Wall Street Journal runs a page-A1 story featuring a feud of two Chicago finance profs

- Eugene Fama: Founder of Efficient Market Theory—financial markets are highly efficient in reflecting the underlying value of stocks.

A Feud Next Door

On Oct. 18, 2004, the Wall Street Journal runs a page-A1 story featuring a feud of two Chicago finance profs

- Eugene Fama: Founder of Efficient Market Theory—financial markets are highly efficient in reflecting the underlying value of stocks.
- Richard Thaler, a member of the "behaviorist" school of economic thought, contend that markets can veer off course when individuals make stupid decisions.

A Feud Next Door

On Oct. 18, 2004, the Wall Street Journal runs a page-A1 story featuring a feud of two Chicago finance profs

- Eugene Fama: Founder of Efficient Market Theory—financial markets are highly efficient in reflecting the underlying value of stocks.
- Richard Thaler, a member of the "behaviorist" school of economic thought, contend that markets can veer off course when individuals make stupid decisions.

- Fama: behavioral economists like Mr. Thaler "haven't really established anything" in more than 20 years of research.
- Thaler: Fama "is the only guy on earth who doesn't think there was a bubble in Nasdaq in 2000."

What is an "efficient" market

- Fama (1970):
  "A market in which prices always 'fully reflect' available information is 'efficient'."

What is an "efficient" market

- Fama (1970):
  "A market in which prices always 'fully reflect' available information is 'efficient'."
- Burton Malkiel (1992), author of "A Random Walk Down Wall Street"
  "A capital market is fully efficient if it correctly reflects all information in determining security prices. Formally, the market is said to be efficient with respect to some information set if security prices would be unaffected by revealing that information to all market participants. Moreover, efficiency with respect to an information set implies that it is impossible to make economic profits by trading on the basis of [the information in that set]."

What is an "efficient" market

- Fama (1970):
  "A market in which prices always 'fully reflect' available information is 'efficient'."
- Burton Malkiel (1992), author of "A Random Walk Down Wall Street"
  "A capital market is fully efficient if it correctly reflects all information in determining security prices. Formally, the market is said to be efficient with respect to some information set if security prices would be unaffected by revealing that information to all market participants. Moreover, efficiency with respect to an information set implies that it is impossible to make economic profits by trading on the basis of [the information in that set]."

  These views helped to spawn the idea of passive money management and index funds.

Versions of Efficiency

- Weak Form:
  Stock prices fully reflect all information contained in past prices and volume.
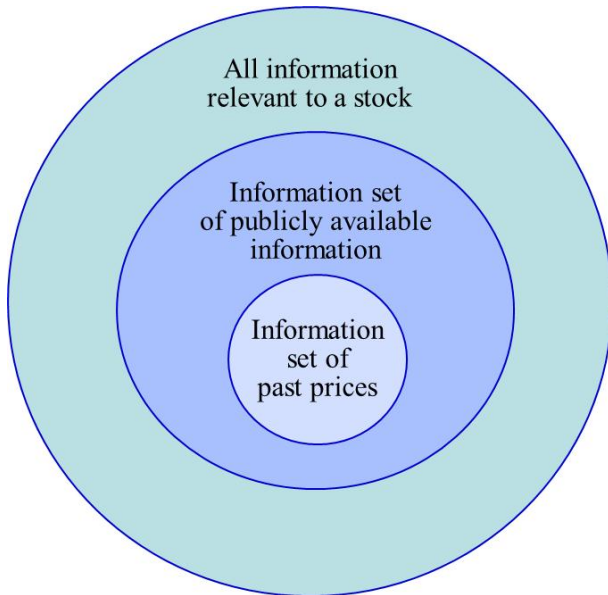
Versions of Efficiency

- Weak Form:
  Stock prices fully reflect all information contained in past prices and volume.
- Semi-strong Form:
  - Stock prices fully reflect all publicly available information.
  - Publicly available information includes historic prices and published accounting statements.

Versions of Efficiency

- Weak Form:
  Stock prices fully reflect all information contained in past prices and volume.
- Semi-strong Form:
  - Stock prices fully reflect all publicly available information.
  - Publicly available information includes historic prices and published accounting statements.
- Strong Form:
  Stock prices fully reflect all information, public or private.

Graphically

All information relevant to a stock

Information set of publicly available information

Information set of past prices

Violations of Efficiency?

- That technical traders can make money violates which form?

Violations of Efficiency?

- That technical traders can make money violates which form?
- Reading the Wall Street Journal and devising a profitable trading strategy violates which form?

Violations of Efficiency?

- That technical traders can make money violates which form?
- Reading the Wall Street Journal and devising a profitable trading strategy violates which form?
- Corporate insiders making profitable trades violates which form?

Weak-form Efficiency: Random Walk of stock prices

- Prediction of EMH: Random Walk of stock prices
  - prices are unforecastable based on current or historical prices, or

Weak-form Efficiency: Random Walk of stock prices

- Prediction of EMH: Random Walk of stock prices
  - prices are unforecastable based on current or historical prices, or
  - Price changes are random, or

Weak-form Efficiency: Random Walk of stock prices

- Prediction of EMH: Random Walk of stock prices
  - prices are unforecastable based on current or historical prices, or
  - Price changes are random, or
  - returns are unforecastable

Weak-form Efficiency: Random Walk of stock prices

- Prediction of EMH: Random Walk of stock prices
    - prices are unforecastable based on current or historical prices, or
    - Price changes are random, or
    - returns are unforecastable
- To test the weak form, one can focus on return predictability, i.e. forecast future returns using past returns
- Evidence is mostly favorable.

Challenges to EMH: Are Investors Rational?

General conclusions of EMH tests

- Majority of empirical tests support weak-form EMH.
- Semi-strong-form EMH support weaker; not much support ofr the strong-from EMH.
- Increasingly more instances of EMH violations are found.

Challenges to EMH: Are Investors Rational?

General conclusions of EMH tests

- Majority of empirical tests support weak-form EMH.
- Semi-strong-form EMH support weaker; not much support ofr the strong-from EMH.
- Increasingly more instances of EMH violations are found.

Psychological biases?

- Investors are not "fully rational". They exhibit "biases" and use simple "heuristics" (rules of thumb) in making decisions.
- Empirical evidence on investor behavior:
  - investors fail to diversify.
  - investors trade actively (Odean).
  - Investors may sell winning stocks and hold onto losing stocks (Odean).

An example

Case 1 Initial endowment: \$300. Consider a choice between:
    option 1 a sure gain of \$100
    option 2 a 50% chance to gain \$200, rest 50% chance to gain \$0.

An example

Case 1 Initial endowment: $300. Consider a choice between:
  option 1 a sure gain of $100
  option 2 a 50% chance to gain $200, rest 50% chance to gain $0.

Case 2 Initial endowment: $500. Consider a choice between:
  option 1 a sure loss of $100
  option 2 a 50% chance to lose $200, rest 50% chance to lose $0

Example cont'd: Reversal in Choice

- Case 1: 72% chose option 1, 28% chose option 2.
- Case 2: 36% chose option 1, 64% chose option 2.
    ⇒ A reversal in Choice
- Problem framed as a gain: decision maker is risk averse.
- Problem framed as a loss: decision maker is risk seeking.

Behavioral Finance

- Investors do not always process information correctly
  Investors often make inconsistent or systematically suboptimal decisions
- A marriage of psychology and finance
- It says psychology plays a role in financial decision making
  - Is it a surprise that we are human?
- Cognitive errors and biases affect investment beliefs, and hence financial choices

A few well-known cognitive biases

- Overconfidence
  - people overestimate the reliability of their knowledge
  - E.g. "Am I a better-than-average driver?"
    95% of British drivers believe they are! (Sutherland 1992)

A few well-known cognitive biases

- Overconfidence
  - people overestimate the reliability of their knowledge
  - E.g. "Am I a better-than-average driver?"
    95% of British drivers believe they are! (Sutherland 1992)
- Loss aversion
  - tendency to strongly prefer avoiding losses to acquiring gains

A few well-known cognitive biases

- Overconfidence
    - people overestimate the reliability of their knowledge
    - E.g. "Am I a better-than-average driver?"
      95% of British drivers believe they are! (Sutherland 1992)
- Loss aversion
    - tendency to strongly prefer avoiding losses to acquiring gains
- Regret avoidance
    - anticipation of a future regret can influence current decision
- Mental accounting
    - tendency to divide total wealth into separate accounts and buckets (Thaler)
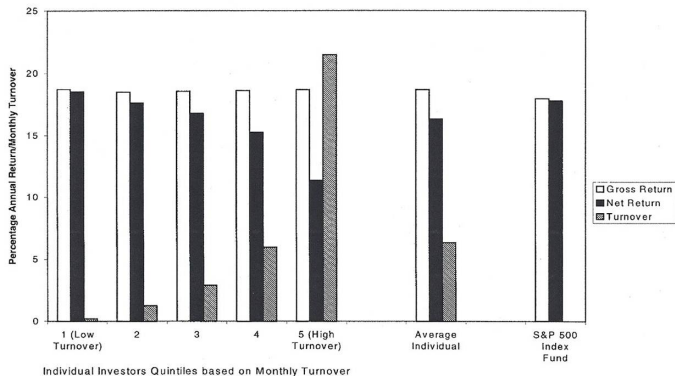
Turnover and Returns

Odean: Investors trade actively. (American Economic Review, 1999)

Barber and Odean: active trading leads to lower return. "Trading is Hazardous to Your Wealth" (Journal of Finance, 2000)

Why investors keep doing this?

Monthly Turnover and Annual Performance of Individual Investors

Loss aversion (—Prospect theory) & Disposition Effect

- Due to Daniel Kahneman and Amos Tversky (1979): Decision maker analyzes gains and losses differently.

- Loss aversion and the disposition effect
  - "Disposition effect": Tendency to sell winners too soon, and hang on to losers for too long (Shefrin and Statman, 1985, Odean 1998)

    "If I haven't realized the loss, then it isn't yet a loss."

Figure 11.1 Prospect theory. Panel A: A conventional utility function is defined in terms of wealth and is concave, resulting in risk aversion. Panel B: Under loss aversion, the utility function is defined in terms of losses relative to current wealth. It is also convex to the left of the origin, giving rise to risk-seeking behaviour in terms of losses.
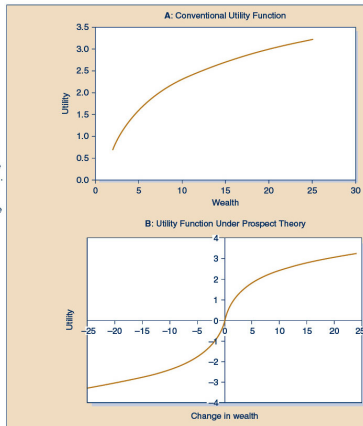
Mis-Reaction and Behavioral Explanation to Factors

- Over-reaction and Under-reaction:
  - Conservatism: If the information is mundane, boring, or commonplace, then people tend to under-react to it.
  - If the information is exciting or dramatic people tend to over-react to it.
- Factors can have both rational (risk-based) or behavioral foundations. Many factors, such as value-growth, can have both explanations.

Application 1: Value vs. Growth

- Fact: Value stocks outperform growth stocks. The CAPM cannot explain this fact.

Application 1: Value vs. Growth

- Fact: Value stocks outperform growth stocks. The CAPM cannot explain this fact.

- Proponents of efficient markets believe that value stocks are riskier than growth stocks. The value effect is a proxy for some unknown risk factor (maybe distress).

- BF economists believe that the value effect is caused by overreaction.

Behavioral Theories: Over-Extrapolation

- Most behavioral explanations of value center around over-reaction/over-extrapolation
  - Investors over-extrapolate past growth rates into the future.
  - Growth firms have had high past growth rates. Prices of these firms are bid up too high reflecting excessive optimism.
  - When growth does not materialize, prices fall so returns are low relative to value firms
  - Value stocks are NOT fundamentally riskier
- Story first put forward by Lakonishok, Shleifer and Vishny (1994)
- Crucial assumption: naive investors over-extrapolate and prices reflect the over-reaction. Contrarian (value) investors outperform by taking the opposite side.
  - Why don't more value investors enter the market and bid up the prices of value stocks removing the value premium?

LSV

- LSV compare actual growth rates to past growth rates and to expected growth rates implied by firm multiples in Table 5
- Panel A: value portfolios have higher fundamentals to price ratios
- Panel B: growth stocks grew substantially faster than value stocks 5 years prior to portfolio formation
- Panel C: In the 5 years post formation, growth rate for growth stocks are lower than 5 years previously, and lower than value stocks. Especially low growth over years $+2$ to $+5$.

Table 5

Fundamental Variables, Past Performance, and Future Performance of Glamour and Value Stocks

Panel 1: At the end of each April between 1968 and 1989, 10-decile portfolios are formed based on the ratio of end-of-previous-year's book value of equity to end-of-April market value of equity. Numbers are presented for the first (lowest B/M) and tenth (highest B/M) deciles. These portfolios are denoted Glamour and Value, respectively.

Panel 2: At the end of each April between 1968 and 1989, 9 groups of stocks are formed. The stocks are independently sorted in ascending order into 3 groups ((1) bottom 30 percent, (2) middle 40 percent, (3) top 30 percent) based on C/P, the ratio of cash flow to market value of equity, and GS, the preformation 5-year weighted average sales growth rank. Numbers are presented for $(C/P_1, GS_3)$, the bottom 30 percent by C/P and the top 30 percent by GS, and for $(C/P_3, GS_1)$ the top 30 percent by C/P and the bottom 30 percent by GS. These portfolios are denoted Glamour and Value, respectively.

All numbers in the table are averages over all formation periods.

E/P, C/P, S/P, D/P, B/M, and $SIZE$, defined below, use the end-of-April market value of equity and preformation year accounting numbers. E/P is the ratio of earnings to market value of equity. C/P is the ratio of cash flow to market value of equity. S/P is the ratio of sales to market value of equity. D/P is the ratio of dividends to market value of equity. B/M is the ratio of book value to market value of equity. $SIZE$ is the total dollar value of equity (in millions). $AEG_{(i,j)}$ is the geometric average growth rate of earnings for the portfolio from year i to year j. $ACG_{(i,j)}$ and $ASG_{(i,j)}$ are defined analogously for cash flow and sales, respectively. $RETURN_{(-3, 0)}$ is the cumulative stock return on the portfolio over the 3 years prior to formation.

	Panel 1		Panel 2	
	Glamour B/M_1	Value B/M_{10}	Glamour $C/P_1, GS_3$	Value $C/P_3, GS_1$
Panel A: Fundamental Variables				
E/P	0.029	0.004	0.054	0.114
C/P	0.059	0.172	0.080	0.279
S/P	0.993	6.849	1.115	5.279
D/P	0.012	0.032	0.014	0.039
B/M	0.225	1.998	0.385	1.414
$SIZE$	663	120	681	390
Panel B: Past Performance—Growth Rates and Past Returns				
$AEG_{(-5, 0)}$	0.309	-0.274	0.142	0.082
$ACG_{(-5, 0)}$	0.217	-0.013	0.210	0.078
$ASG_{(-5, 0)}$	0.091	0.030	0.112	0.013
$RETURN_{(-3, 0)}$	1.455	-0.119	1.390	0.225
Panel C: Future Performance				
$AEG_{(0, 5)}$	0.050	0.436	0.089	0.086
$ACG_{(0, 5)}$	0.127	0.070	0.112	0.052
$ASG_{(0, 5)}$	0.062	0.020	0.100	0.037
$AEG_{(2, 5)}$	0.070	0.215	0.084	0.147
$ACG_{(2, 5)}$	0.086	0.111	0.095	0.088
$ASG_{(2, 5)}$	0.059	0.023	0.082	0.038

Application 2: Momentum - Reversals

- Jegadeesh and Titman (2001) track the returns of momentum portfolios up to 5 years post-formation.
- Momentum profits reverse in years 2-5.
  - De Bondt and Thaler (1987): "Further Evidence on Investor Overreaction and Stock Market Seasonality"
  - What's Thaler's explanation?

Event Month

1965 to 1997 — — 1965 to 1981 · · · · · 1982 to 1997
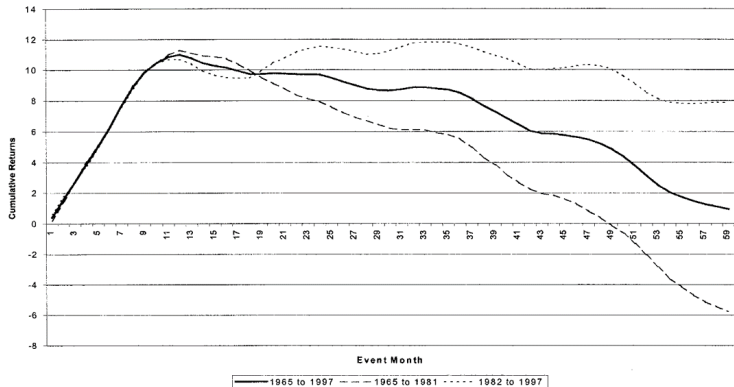
Behavioral Theories – Momentum

- Behavioral explanations of momentum come in two main flavors:
  - Under-reaction: good news comes out but investors under-react. Then, prices slowly drift upwards to the rational price.
  - Over-reaction: irrational investors over-react to positive news. This over-reaction is gradual, so stock prices display momentum for a period of time but then eventually reverse and return to fundamental value.
  - Most combine elements of under- and over-reaction
- The under-reaction captures momentum, while the over-reaction captures long-term mean reversion.

Behavioral Theories – Momentum

Barberis, Shleifer and Vishny (1998): Under-reaction

- Uses two psychological biases
  - Conservatism: Investors underreact to information because they stick to their prior beliefs. This causes momentum.
  - Representative heuristic: investors mistakenly conclude that firms with high earnings growth in the past continue to experience high earnings growth in the future. Representativeness causes investors to assume commonality between similar objects (here past and future growth rates). Representativeness leads to long-term mean reversion.

- No role for any rational investors

Risk Theories: Momentum

- Momentum is hard to explain with a risk story. But, there seem to be some risk components of momentum profits.
  - Momentum profitability varies over the business cycle
  - Momentum strongest during bull markets (this is also consistent with over-reaction)
  - There are downside risk components to momentum profits
  - Links to liquidity risk

Summary: Who's right? Fama or Thaler?

- Perhaps we should take the view that Behavioral Finance does not replace but complements traditional models in Finance.

Summary: Who's right? Fama or Thaler?

- Perhaps we should take the view that Behavioral Finance does not replace but complements traditional models in Finance.
- Here is why:
    - Investor behavior does have an impact on the behavior of financial markets. How much? Not clear.
        - Thaler "haven't really established anything"

Summary: Who's right? Fama or Thaler?

- Perhaps we should take the view that Behavioral Finance does not replace but complements traditional models in Finance.
- Here is why:
  - Investor behavior does have an impact on the behavior of financial markets. How much? Not clear.
    - Thaler "haven't really established anything"
  - Both "social" and "psychological" must be taken into account in explaining the behavior of financial markets.

Summary: Who's right? Fama or Thaler?

- Perhaps we should take the view that Behavioral Finance does not replace but complements traditional models in Finance.
- Here is why:
  - Investor behavior does have an impact on the behavior of financial markets. How much? Not clear.
    - Thaler "haven't really established anything"
  - Both "social" and "psychological" must be taken into account in explaining the behavior of financial markets.
  - Investor factors may be widespread; and some can be explained by behavioral finance.