**Behavioral Finance**

* Starting point
  + Up to know we have assumed that all investors are rational
  + This implies 2 things:
    - When investors receive new info, they update their beliefs in a way that’s consistent with our models of probability
    - Individuals’ choices maximize their expected utility
  + We want to look at how one or both assumptions can fail
* Proper functioning
  + Recall from our discussion of market efficiency that prices should be generally correct
    - If investors observe a mispriced security, they will attempt to implement a strategy to take advantage
    - This activity will put pressure on the price and fix the mispricing
  + This doesn’t seem to be reflected in reality
    - What if there are irrational (less rational) investors?
    - What might prevent the rational trader from fixing these mistakes caused by other traders?
* Limits to Arbitrage
  + Arbitrage strategies can be costly to implement
    - The arbitrage trade could cost more than the expected payoff
    - Commissions, bid-ask spread, price impact, cost of research, etc.
  + Fundamental risk
    - True arbitrage is riskless, which relies on a perfect hedge
    - In practice, traders must rely on another risky asset to hedge
      * This would be an imperfect hedge
      * Leaves some firm-specific risk exposure
* Noise Trader Risk
  + Temporary mispricings may get worse before they get better
    - The strategy to take advantage might result in short-term losses or even require additional capital
  + A portfolio manager attempting to exploit the mispricing may be hamstrung by less-sophisticated clients
    - Clients see negative returns and withdraw their funds
    - In order to fund the redemptions, the manager must close the position
  + Even traders without clients might be limited
    - If they run out of money or hit margin requirements, they may have to close out early
* Evidence on limits to arbitrage
  + Royal Dutch Shell maintains twin shares:
    - Royal Dutch primarily trades in the US
      * Its shares represent a claim on 60% on the firm’s total cash flows
    - Shell primarily trades in the UK
      * Its shares represent a claim on 40% of the firm’s total cash flows
  + If these shares were priced according to their fundamental value, Royal Dutch’s market capitalization should equal 1.5x that of Shell
* Psychology of Investors
  + We want to look at some of the deviations from rationality that investors may exhibit
  + We expect to see these affect two sets of biases:
    - Beliefs
    - Preferences
* Overconfidence
  + Evidence shows that people tend to overestimate their own abilities
  + Often shows up as over-optimism:
    - Predict higher expected returns and lower variances
    - Effectively poor estimation of probabilities
  + Self-attribution bias
    - Past success is due to ability, while past failure is due to bad luck
    - Investors with good prior results believe they are skilled
  + Hindsight bias
    - After an event occurs, people think they predicted it beforehand
    - If one believes this is true, they might believe they can predict the future
* Representativeness—Illustration
  + Kahneman and Tversky illustrate this bias with the following question:
    - Linda is 31 years old, single, outspoken, and very bright. She majored in philosophy. As a student, she was deeply concerned with the issues of discrimination and social justice, and also participated in anti-nuclear demonstrations. Which of the following is more likely?
      * Linda is a bank teller
      * Linda is a bank teller and is active in the feminist movement
  + Many people choose option 2; however, our theories of probabilities tell us that option 1 should be more likely to be accurate
    - Option 1 is implied by option 2
    - In order for her to be both a bank teller and active in the feminist movement, she must be a bank teller
  + Kahneman and Tversky define representativeness as the degree to which an event (i) is similar in essential characteristics to its parent population, and (ii) reflects its salient features of the process by which it’s generated
    - The fact that something is more representative does not make it more likely
* Representativeness—Other Aspects
  + Sample size neglect
    - People are too quick to infer the underlying process with too few data points
  + Is a financial analyst with 4 good stock picks talented?
    - Hot Hand Fallacy: believing that someone who has had success with a random event has a greater chance of success on additional attempts
* Other biases
  + Conservatism
    - Opposite of representativeness
    - If the data doesn’t seem to be representative, people don’t react enough and rely too much on their priors
  + Belief perseverance
    - Once people form an opinion, they hold onto it too tightly and for too long
    - View contradicting evidence with skepticism
  + Confirmation bias
    - People misinterpret evidence that contradicts their beliefs as being supportive
    - If people start out believing in EMH, they may continue to believe it even after finding evidence against it
  + Anchoring
    - When forming estimates, people start with an (arbitrary) value and adjust away from that
    - Framing effect: people react differently to something whether it is presented as a loss or a gain
  + Availability biases
    - Estimated probabilities may be biased by whether all memories are equally retrievable
* Incorporating Psych into Finance
  + We want to understand investment behavior and asset prices
  + So far, we have relied on the theory that people evaluate risks based on expected utility
    - In practice, the axioms underlying this theory are violated
  + We will incorporate this in 2 ways: prospect theory and ambiguity aversion
* Prospect Theory—Scenarios

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| --- | --- |
| Given $1,000 and offered 2 gambles:   1. 50% chance of receiving $1,000 ($2,000) or a 50% chance of receiving $0 ($1,000) 2. A 100% chance of receiving $500 ($1,500) | Given $2,000 and offered 2 gambles:   1. 50% chance of losing $1,000 ($1,000) or a 50% chance of losing $0 ($2,000) 2. A 100% chance of losing $500 ($1,500) |

* Follow Up
  + First scenario:
    - An overwhelming amount of people choose option 2
    - Interpretation: people are willing to settle for a reasonable level of gains
  + Second scenario:
    - Overwhelming amount of people choose option 1
    - Interpretation: people are willing to engage in more risk-seeking behaviors to avoid losses
* Prospect Theory
  + Under our usual models, a person should have chosen the same answer to both questions, as the outcomes are identical
  + Instead:
    - Presenting them as gains resulted in people being more risk-averse
    - Presenting them as losses resulted them being more risk-seeking
  + People are more upset by losses than they are happy by gains
* Ambiguity Aversion—Scenarios

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| --- | --- |
| An urn has 50 red balls and 50 blue balls. You are offered one of two gambles pending a ball being drawn from the urn:   1. You receive $8 no matter what 2. You receive $20 if a red ball is drawn and $0 if a blue ball is drawn | An urn has 100 balls total. Each ball is either red or blue. You are offered one of two gambles pending a ball being drawn from the urn:   1. You receive $8 no matter what 2. You receive $20 if a red ball is drawn and $0 if a blue ball is drawn |

* Follow Up
  + First scenario:
    - If you choose option 1, you are risk averse but cannot say anything about your ambiguity aversion
    - We know the probability of each outcome and we are able to evaluate the risk
  + Second scenario:
    - If you choose option 1, you are ambiguity averse but cannot say anything about your risk aversion
    - We don’t know the probability of each outcome, so we are unable to evaluate the risk objectively
* Ambiguity Aversion
  + Ambiguity aversion is the preference for known risks over unknown risks
  + The urns are an application of the Ellsburg Paradox
    - The second urn could have more or less red balls than the first urn, or even the same number
    - The probabilities are identical (expected red balls = 50)
  + Application:
    - Increased demand for insurance, as individuals don’t know all of the potential events (or probabilities of those events) that will affect their lives or property
* Biases in Effect—Market Efficiency
  + A firm announces surprisingly good earnings, but conservative investors don’t react “enough”
    - The increase in price is too little
    - Post-earnings announcement drift, Momentum
  + After a series of good earnings announcements, representativeness causes people to overreact
    - Prices rise too much, causing subsequent returns to be too low on average
    - Long-term reversals, scaled-price ratio effect
  + If an investors is loss averse and focuses on individual sticks, he finds it painful when holding a stock that has several periods of poor returns
    - Perceives the stock as riskier and discounts subsequent cash flows at a higher rate
    - Value premium
* Biases in Effect—Excessive Trading
  + Actual trading volume in stock markets is much higher than would be predicted by rational models
  + Barber and Odean (2000) studied individual trading accounts at a national discount broker
    - Average investor returns less than benchmark, largely due to excessive trading and associated transaction costs
  + Excessive trading often linked to overconfidence
    - Men tend to score higher than women for overconfidence
    - Men trade ~45% more in their brokerage accounts than women, but lose more on trading costs
* More Biases
  + Disposition Effect
    - Investors reluctant to sell stocks that are losers, but quick to sell stocks that are winners
    - Inconsistent with tax considerations
    - Stocks that are sold outperform stocks that are held onto
  + Hyperbolic discounting
    - People display present biased preferences and discount the future at a higher rate
    - Behavior implication: I’ll do it tomorrow
    - Finance implication: very low participation rates in savings plans like 401K’s
    - Regulatory implication: change in the law allowed firms to require that individuals opt out of retirement savings plans rather than opt in