

# Behavioral Finance: Mitigating Financial Mistakes

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*Individuals often rely on both economic motivation and behavioral biases in making financial decisions. Behavioral biases seriously distort financial decisions in financial markets, corporations, and households. A small number of principles potentially explain these behavioral effects, which provides guidance on how to alleviate them in financial decisions. As these financial mistakes are especially pronounced in households, two policy implications for Singapore are discussed.*

1. Traditional and Behavioral Finance
2. Specific Behavioral Biases
3. Ladder of Financial Decision Impact
  - Impact on Asset Prices
  - Behavioral Biases in Firms
  - Biases in Households
4. Two Policy Implications for Singapore

- Financial Decision-Making
  - We make numerous decisions every day
    - Eat lunch at the hawkers market, café, or restaurant
    - Uber vs MRT
  - Rely on decision heuristics to navigate
    - Rules of thumb
    - Shortcuts to make life easier
  - Unfortunately, Mental shortcuts → predictable errors
- Key: Mitigating these “frictions” or biases

# Traditional Finance

- Models of rational individuals
  - With new information they correctly update beliefs
  - They understand their ability to forecast the future
  - Their beliefs about the future drive their decisions
- Artificial Intelligence in Television/Movies
  - “Data” on *Star Trek: The Next Generation*
  - “Robby the Robot” on *Forbidden Planet*
  - They always make the logical decision
    - Immediately process new information
    - They understand their errors or ranges of their forecast
    - Decisions based on these forecast
    - Decisions aimed at achieving long-term outcomes
- Important decisions: Choices based on best expected outcomes

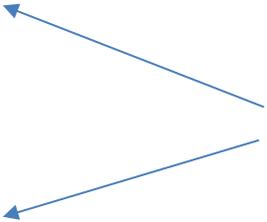


- Sometimes individuals are not fully rational
  - Fail to update beliefs correctly
  - Make inconsistent choices
  - Result: Behavioral based distortions
- Should we really be concerned about this?
  - Milton Friedman (1976 Nobel Prize)
    - Greedy rational individuals will exploit irrationals
    - Example: Singtel stock pushed up by irrational investors
      - Rational investors short Singtel
      - Rational investors buy Starhub
- Risky and costly to exploit the errors of irrational traders (Limits to Arbitrage)
  - Fundamental Risk: Unexpected bad news about Starhub
  - Noise Trader Risk: Mispricing could persist
  - Implementation Costs: Borrow Singtel stock
  - What if irrationality effects entire industry?
  - Is Starhub a good substitute for Singtel?

# Private Firms

- Choose between 2 real transportation companies (in SGD)
  - Invest in Firm A
    - 2017 Revenue: 15.5 billion
    - 2016 & 2017 **Profits: 804 and 360 million**
    - Face of the firm turnover: ~10%
  - Invest in Firm B
    - 2017 Revenue: 9.9 Billion
    - 2016 & 2017 **Losses: 3.5 and 5.9 billion**
    - Face of the firm turnover: +90%
  - Which has higher value? One is 6X more valuable than other
  - Framing Matters
    - How do travel agencies report revenue?
    - Based on ticket revenue or commissions revenue?
- Irrational traders push stock price - how rational traders fix?

Prefer A or B?



# Prominent Biases and Frictions

- Don't make fully rational choices
  - Random Errors
  - Non-Random Errors
- Crucial components in financial models
  - How individuals form expectations
    - Based on beliefs
    - How individuals assess risky investments
  - Systematic errors can generate substantial impact
  - Predictable deviations from the logical choice
    - Step 1: Identify the logical choice
    - Step 2: Evaluate deviations due to bias

# Behavioral Biases

- Overconfidence & Optimism
  - About their judgement
  - Estimates of outcomes
  - Their ability to forecast
  - Overestimate subjective skills
- Familiarity Bias
  - Individuals prefer things with a close association
  - Expect (not just want) familiar sports team to win
- Representativeness
  - Sample size neglect (e.g. hot hand)
  - Law of Small Numbers
- Disposition
  - Keep losing assets
  - Sell winning assets



# More Biases and Frictions

- **Belief Perseverance**
  - Reluctant to update beliefs
  - Resist searching/believing contradict evidence
- **Anchoring**
  - Latch onto an initial estimate and slowly move away
  - Initial value may be arbitrary or manipulated
- **Availability Bias**
  - Focus heavily on recent events or personal events
  - Example: Family trip to Virginal Beach
- **Expert Bias**
  - Relying on the opinions of experts
  - Subject assessment by those with past performance

# Impact on Asset Prices

- Bubbles
  - A bubble occurs when an asset trades above its fundamental value
  - Fundamental value
    - Stocks – based on future dividends and capital gains
    - Bonds – coupons and principal repayment
    - Real Estate – Actual or implied rental income and price appreciation
  - Rational World: If traders rational, bubbles don't emerge
  - Behavioral Biases: Lead to bubble formation
- How lead to bubbles?
  - Extrapolation from small data
  - Overconfidence
  - Over-optimism
- Anatomy of a bubble
  - Good news arrives, think its persistent, prices rise
  - Unanticipated mean reversion, prices fall, borrowers default



# Impact of Bubbles

- Missing the Bubble: Rising markets are exhilarating
  - What if not participating in a rising market
    - Feel like a loser
    - Should I have invested in Bitcoin early?
  - Can I ride the bubble?
    - Need to identify early formation of bubble
    - Recognize when it will burst - Sell before the fall
  - Academic research
    - Bubbles more frequent in difficult to value assets
    - We all think we can successfully ride it - Rarely demonstrate it
- Averting Bubbles
  - Focus on cash flows
  - Not trying to ride bubbles – Bubble Avoidance

# Are Bitcoins a Bubble?



- Investing in digital coins
  - Don't generate cash flows (so not like a stock or bond)
  - Supply: New ones created all the time (same currency and new currencies)
  - Demand: Unknowable
  - No intrinsic value (so not like art)
  - Method to get returns is on price appreciation
- Is it a better Money (facilitate transactions, store of value, lending in crisis)?
- Demand for this currency? Perhaps for illegal transactions

- Difficult to detect
  - Residential Real Estate
  - Commercial Real Estate
  - Security Markets
- Mitigating the impact of bubbles
  - Bubbles will occur
  - More apt to rise in difficult to value assets
    - Lots of unknowns about the future of the assets cash flows
    - Unique assets (Singtel stock vs condo in Bukit Timah)
  - Invest in cash flows - not appreciation from selling to new buyer
  - Requires we understand the cash flows
- Value Investing: Really about bubble avoidance
  - Invest in businesses you understand the cash flows
  - Buy and hold strategy

# Behavioral Biases in Firms

- Individuals manage and invest in companies
- Two types of behavioral biases influence firms
  - Mistakes by investors
  - Mistakes by managers
- Focus on financial mistakes by managers
  - Impacts both managers and directors
  - Difficult to detect
    - Stocks are public transactions
    - Firms make private transactions or decisions
  - Even if detect: Difficult to counter

# Boundaries of the Firm



- Transactions
  - Outside the firm - based on negotiated prices
  - Inside the firm - arise within the hierarchal structure
- Behavioral biases
  - arise more readily within a firm
  - Arbitragers can't mitigate
- Suboptimal managerial behavior
  - Difficult to determine if biased or information based
  - Their decisions are observed with lag
- Ownership structure influences
  - Democratic Decision Making
  - Concentrated Decision Making

- Governance devices
  - Designed to limit conflicts of interest
  - Unintended benefit: They also serve to limit behavioral biases
  - Not as well as "arbitrage" traders in the market
- Mechanisms to Limit
  - Board of directors
  - Shareholder activism
  - Market for corporate

# Types of Bias in Firms

- Overconfident CEOs
  - Underestimate risks
  - Overestimate cash flows
- Managerial Myopia
  - Focus on near term
  - Underweight future
- Disposition Effect
  - Sell assets whose price increased
  - Keep assets with price declines
- Status Quo Bias
  - Preferences for not making changes
  - Resist disruptive changes

# Tradeoff: Bias vs Decision Speed



- Biases Influence firms differently
  - Ownership of firm
  - Control of firm
- Democratic Decision-making firms
  - Formal governance mechanisms
  - Differ around the world
  - Stress: Oversight and checks and balances
  - Slow decision speed
- Concentrated decision-making firms
  - Family firms; State run firms
  - Hierarchical decisions (e.g. founder makes the decisions)
  - Fast decision speed

# Where Biases Pronounced

- Democratic decision making firm
  - Overconfident CEOs
  - Managerial Myopia
- Concentrated decision-making firms
  - Disposition Effect
  - Status Quo Bias

- Democratic Decision-Making Firms
  - Prone to engage in excessive in M&As
  - Prone to Underinvestment
    - Invest half as much as concentrated decision making firms
    - Occurs in both Capex and Labor
- Concentrated Decision-Making Firms
  - Prone to keep underperforming assets
  - Prone to resist changes in technology

# Biases in Household Finance

- Severity of Biases
  - Households > Firms > Real Markets > Financial Markets
- Firms routinely act to exploit biases of individuals
  - Restaurant wine List
    - External Pricing; Observable
    - But internal pricing unobservable
  - Adjustable rate mortgages
- Household decision making
  - No such thing as arbitrage to mitigate
  - Substantial evidence in households
- Household Balance Sheet
  - Liabilities: Borrowing
  - Assets
    - Saving rates
    - Investment choices
  - All strongly influenced by behavioral biases

# Liabilities in Households

- Debt in Singapore
  - Debt per capita: 57K
  - Home loans 75%
  - Credit Card and Personal Loans 20%
  - Government restrictions limit in Singapore
- Evidence of Behavioral Biases
  - Borrowing in 2015
    - 32K people borrowing 24 times their monthly income
    - Most with tertiary education: Difficult to explain as rational
  - Optimism: About job prospects
  - Myopia: Overweight present spending
- Why is Minimum Payment so low on CC
  - Anchors individual on minimum
  - Keeps people in debt:
  - 5% minimum locks in customer
  - 20% of Singapore CC holders: pay minimum
  - Among non-full payers: Clumped at minimum



- Central Provident Fund
  - Typical Account: Generate S\$948 a month
    - 166K - S\$1300 a month
    - 249K – S\$1900
  - Most People
    - Enough to live for 15 years past age 65
    - 50% will live 20 years & 33% will live 25 years
- Evidence on Withdraws
  - Month they turn 55 -> take out large amounts
    - Keep ½ in the bank
    - Earns lower rate than in CPF (1% vs 3%)
    - People resistant to CPF
  - Clear evidence of a Present Period Bias

- Surveys
  - 1/3 Singaporeans not planning for retirement
  - 2/3 Report Insufficient funds
- Most keep 47% in cash at ~1% return
- Need to earn 5% for retirement models
- Factors influencing
  - Expert Bias
  - Familiarity Bias
  - Present Bias

# Choosing an Investment Fund

- Active Funds: Experts Picking Stocks
  - Large Cap Manager
  - Pick best 15 or so stocks in Straight Times Index (STI)
  - Upfront Fees 3% & Annual Mgt Fees 1.5%
- Passive Funds
  - Buy entire index
  - No Expertise
  - No Upfront fees & Annual Mgt Fee 0.3%
- Typical Findings
  - Before Fees: Passive STI beats 72% of active funds
  - After Fees: Passive STI bests 93% of active funds
  - Active Fund Investors: About 7% chance of winning
  - Perhaps Singapore unique in this issue

# US Active Managed Funds

- Odds of Success: Surviving Mutual Funds & Performance



# Perhaps Hedge Funds are different

- Hedge Funds
  - Typical Fees:
    - 2% of AUM
    - 20% of profits
  - Some hedge funds outperform but most don't
  - Upfront Fees 3% & Annual Mgt Fees 2%
  - My personal favorite: Fund of Funds
- The 2007 million dollar wager
  - Warren Buffet vs Protégé Partners (Ted Seides and Jeff Tarrant)
  - Index fund vs Hedge fund performance next 10 years
  - The tally: Driven by fee difference
    - Hedge Funds 22% Return
    - S&P 500 Index Fund: 85%
- Expert and Opportunism Bias influences Fund Choice
- Most households underperform using active funds

# Familiarity Bias and Portfolio Choice



- Rational Finance Models
  - Hold a well diversified portfolio
  - Invest across asset types, industries and countries
  - Large body of evidence: Individuals poorly diversified
  - Especially Important in Singapore
    - Retirement savings at individual level
    - CPF Fund: Investment in aggregate Singapore
- Home Bias: Investing in the familiar
- Investors exhibit pronounced home bias
  - Investor allocations
  - Concern is especially severe in small developed economies
  - Compounding the problem: Often invest in company where work

# Familiarity Bias and Stocks

Country	% Domestic	% of World Market	Ratio
United States	79%	51%	1.5
Japan	55%	7%	7.9
Australia	66%	2%	33.0
Singapore	39%	.4%	97.5

- Should individual worry about this issue: US city example
  - 1910: NYC, Chicago, Philadelphia, *St Louis*, Boston, *Cleveland*
    - *Cleveland (tech hub) & St Louis (Shipping; Breweries)*
  - 2010: NYC, LA, Chicago, Houston, Philly, Phoenix
    - St Louis (59<sup>th</sup>) & Cleveland (45<sup>th</sup>)
    - Now often ranked in lists of most miserable places to live
  - Impact investor portfolios of those with home bias
- Puerto Rico Bonds

- Mitigating home bias
  - Cash flow from work is most peoples largest income
  - Home purchase is another large investment
  - Rational Model
    - Investing in same market creates undiversified portfolio
    - Security investments should be focused on global markets
- Index Funds
  - Investing outside Singapore difficult if stock picking
  - Relatively easy to buy index funds
    - Global
    - Regional
  - Rational individuals should be more diversified

# Mitigating Financial Mistakes



- The nature of the Problem
- Current Strategy
  - CPF
  - Personal Savings
- Personal Savings: Influence by behavioral biases
  - Allocate heavily into managed funds
  - Poorly diversified
- **Encourage companies to provide**
  - **Defined Contribution Plans**
  - **Company Matches**
  - **Tax incentive for companies that participate**

# Defined Contribution Plans

- How would these help
  - Non-government based savings
  - Can encourage index funds
  - Can encourage diversified portfolios
- Will employees participate?
  - Depends on Implementation
  - Experimental Evidence
    - Opt in (Default non-enrollment): 40%
    - Quick enrollment (Check a box): 50%
    - Default enrollment (Opt out): 90%
- Personal Retirement Accounts
  - Framework Exists: Supplementary Retirement Scheme (SRS)
  - Create new scheme
    - Money from employee and employer put into account
    - Private Sector: Exchange Traded Funds

# Corporate Defined Contribution Plans



- Default Enrollment
  - Welcome to Firm X
  - We participate in the Personal Retirement Account for all employees
    - You save 1% of salary each month
    - We match this 1%
    - You are automatically enrolled in global balanced index fund
    - Please call the HR department to obtain forms to opt out of plan
- Company can set contribution rate 1 - 5%
  - Among accepting employees
  - 70% of employees accept default contribution rate
  - 29% choose a higher number
- Employee Perceptions about these plans
  - 97% of employees report they approve of these plans
  - Among those who opt out 79% Approve

- **Default Enrollment**
  - Includes default allocation
  - Default Fund
    - Diversified Index fund
    - Balanced Index fund or Equity Index fund
  - Empirical Evidence
    - 90% maintain default allocation
    - Can make match in cash or company stock
- **Asset allocation a substantial concern**
  - Cash and real estate equity quite high in Singapore
  - Rational finance models: Need global diversification
- **Non Government Solution**
  - Works via incentives
  - Employees like

# Conclusions

- Traditional Finance Models: Rational Individuals
  - Sometimes individuals are not fully rational
  - Leads to systematic financial errors
- Potential Concerns
  - Asset pricing bubbles: Focus on cash flows
  - Companies: Organizational structure influences types of biases
  - Household Finance
    - Liabilities: Credit card use and payments
    - Investment fund choices: Index funds
    - Home Bias: Diversification
- Policy Recommendations
  - Regulatory: Minimum payments on credit cards gradually raised
  - Corporate Defined Contribution Plans
    - Tax incentives for firms to provide
    - Opt-out enrollment and index fund allocation