Bubbles

- History of financial markets dotted with episodes described as *bubbles* - periods in which asset prices seem to vastly exceed fundamentals.
- However not much agreement among economists on which economic mechanisms generate such episodes.
Discussions of bubbles often concentrate solely on the behavior of prices.

- The most common definition of a bubble is as a period in which prices exceed fundamental valuation.
- Any valuation however depends on a model of fundamentals.
- Valuations are always ex-post wrong.

Additional empirical regularities help determine “reasonable” mechanisms that generate bubbles.

- Social costs of bubbles
Plan

1. Present some stylized facts concerning bubbles.
2. Discuss a particular model for bubbles and argue that it fits these facts.
3. Present some additional evidence.
4. Policy questions.
Three stylized facts

1. Asset price bubbles coincide with increases in trading volume.
2. Asset price bubble implosions seem to coincide with increases in asset supply.
3. Asset price bubbles often coincide with financial or technological innovations.

- Price volatility...
Bubbles and trading volume: South Sea Bubble

- Extraordinary rise and fall of price of South Sea Company shares and other similar joint-stock companies in 1720.
- \( \sim 2,000 \) transactions per year in Bank of England stock 1717-1719, 6,846 transactions (100\% of stocks outstanding) in 1720.
- East India Company and Royal African Company turned over 150\% of stock outstanding in 1720.
- Carlos, Neal and Wandschneider (2006)
Bubbles and trading volume: Roaring Twenties

- Accounts of stock-market boom of late 1920s emphasize overtrading in 28-29.
- Annual turnover at NYSE climbs from 100% per annum in 1925-27 to over 140% in 1928 and 1929. (Davis, Neal and White, 2005)
- All-time daily records of share trading volume were reached 10 times in 1928 and 3 times in 1929. New record not set until April 1, 1968, when LBJ announced he would not seek re-election (Hong and Stein, 2006)
Bubbles and trading volume: Internet...

- During the DotCom bubble internet stocks had 3 times the turnover of other similar stocks.
- Lamont and Thaler’s 6 cases of spinoffs average 38% daily turnover.
  - Typical NYSE stock turnover of 100% per year.
- Cochrane (2002) documents cross sectional correlation between the ratio of market value to book value of a stock and that stock’s turnover.
Asset price bubbles implosion and increases in asset supply

- In 1720, new issues by the South Sea Company doubled the amount of shares outstanding.
- Royal African Company more than tripled.
- Numerous other joint-stock companies started (Bubbles).
- Bubble Act of 1720: Parliament banned joint-stock companies not authorized by Royal Charter or the extension of corporate charters into new ventures.
  - South Sea Company used Act to sue old chartered companies that changed activities and attracted speculators.
Asset price bubbles implosion and increase in asset’s supply

- Extraordinary number of lock up expirations for DotCom companies in H1 2000. (Ofek and Richardson, 2003)
- Venture capital firms that had distributed 3.9 billion to limited partners in third quarter of 1999, distributed 21 billion in 2000 Q1. (Janeway, 2013)
- Credit Bubble.
  - ABX index, synthetic Collateralized Debt Obligation (CDO) and the implosion of the credit bubble.
Asset price bubbles and the arrival of “new technologies”

• Railroad, electricity, automobiles, radio, micro-electronics, personal computers, bio-technology, and internet.

• US credit bubble: New financial instruments and hedging techniques allowed for better risk management and lower risk premia.
  • real estate bubble.

• Bubbles may actually generate benefits.
  • Cheaper credit for risky innovative activities.

• Credit bubbles destroy the financial system and have typically very costly aftermaths.
Bubbles: Theories

- Rational Bubbles
  - Prices exceed fundamental value because they are expected to exceed fundamental value by even more tomorrow.
  - Difficulty dealing with finite-lived assets.
  - Does not generate correlation with trading volume.

- A positive shock is amplified by extrapolation of past returns (Shiller, 2000)

- **Limited arbitrage**
  - Asymmetry between costs of going short vs. long.
  - Heterogeneous beliefs (Miller, 1977; Harrison and Kreps, 1978.)
  - Bolton, Hong and Xiong
Principal assumptions

- Costly shorting
- Heterogeneous beliefs from overconfidence, the tendency of people to overestimate the precision of their knowledge.
- Far from being standard in economics
  - Economic models typically assume symmetric costs between going long and going short
  - Results showing that rational investors with common priors cannot agree to disagree.
  - No trade theorems: Unless some traders trade for “irrational” reasons, there is no trade. (K. Arrow, *The New Palgrave*)
Evidence for costly short-sale

- Some obvious cases
  - Housing
  - CDO’s before the introduction of ABX and synthetic CDO’s.
- Shorting mechanisms for stocks (D’Avolio, 2002)
- Stocks with higher dispersion of earnings forecasts have lower future returns (Diether, Malloy and Scherbina, 2002)
  - It is easier for optimists to express their beliefs in markets.
Evidence of overconfidence

- Documented among: Engineers (Kidd, 1970), Entrepreneurs (Cooper, Woo, and Dukelberg, 1988)... 
- Expert political judgment (Tetlock, 2005).
- Ben David, Graham and Harvey, 2010 on CFO predictions of S&P returns.
  - Realized returns are within executives [10%,90%] intervals 33% of the time.
A sketch of a model

- Investors in model estimate the “state” of the system using signals they believe are related to that state.
  - Filtering.
- Investors have heterogeneous beliefs
  - Some investors attribute excessive informativeness to certain signals. Others may be rational
  - Group A is “rational” but group B thinks that opinion of a business commentator correlates well with future dividends.
  - Overconfidence (miscalibration): Some investors overestimate how much they know.
  - No learning about overconfidence (horizon).
  - Investors know relative opinions fluctuate.
A sketch of a model

- Buyers know that in the future optimists may be willing to pay more than their own reservation value.
- Short sales are costly
  - Optimists have an easier time expressing their opinions.
- Buyer acquires right to future dividends plus resale option.
- Even “rational” investors are willing to pay more than they think the asset is worth.
- Investors (also) face risk of fluctuations of others opinions
  - Sentiment Risk (Dumas, Kurshev and Uppal, 2009)
  - Excess volatility (Grossman and Schiller, 1981)
- Bubble = value of resale option.
Consequences

- A higher degree of overconfidence leads to higher prices and a higher value for the resale option.
- Also leads to more volatile relative opinions and thus higher trading volume.
- Lower borrowing costs make resale option more valuable.
- Shorter horizon implies fewer opportunities to resell, thus smaller bubble.
- When investors have limited capacity to bear risk, an increase in the supply of the asset is absorbed by less optimistic buyers.
Consequences

- Valuation that marginal buyer has of the future payoffs declines as supply increases.
  - Lower discounted fundamental value of the asset.
- Buyer also knows that because the larger supply needs to be absorbed, future marginal buyers are likely to be less optimistic and thus the value of the resale option declines.
- **Increase in asset supply diminishes the bubble.**
  - Shorting
Consequences

- Insiders that have more precise knowledge of future prospects will increase supply in response to bubble.
  - Investors may learn from insider sales and put less weight on signals they previously overweighted.
- Leverage.
Further tests of model

- China’s A and B stocks (Mei, Scheinkman and Xiong, 2009)
- China’s put warrants (Xiong and Yu, 2010).
  - Panel of prices, trading volume etc... of 18 put warrants trading in 2005-2007.
  - Chinese stock market boom in 2005-2007 made these options deep out-of-the-money.
  - Price much higher than value justified by fundamentals.
    - Black-Scholes price
    - Looser upper bounds
Further tests of model

- **Daily turnover** $\sim 300\%$ for warrants with “zero” B-S value.
  - Lamont and Thaler’s 6 cases of spinoffs average $38\%$ daily turnover.
- Xiong and Yu looked at periods in which the B-S value of a warrant was less than $0.05$ of a yuan penny (trading tick was $0.1$ penny)
  - Warrants typically traded for several yuan.
- Identified bubble as the price of warrant in these periods.
- Bubble declines as expiration approaches.
- Bubble positively related to trading volume in panel.
- Bubble positively related to price volatility.
- Larger float of a warrant associated with smaller bubble.
WuLiangYe Corporation

Figure 1 plots the daily closing prices of WuLiang stock and the put warrant during its lifetime. The WuLiang stock had a stock split of 1 to 1.402 during the life of the warrant. As the warrant is adjusted for the stock split and dividend payouts, Figure 1 is based on the pre-split share unit, but adjusts for dividend payout. For consistency, we use pre-split share unit throughout our discussion of the WuLiang warrant in this section. The WuLiang stock price increased from 7.11 Yuan on April 3, 2006 to a peak of 71.56 Yuan on October 15, 2007, and then retreated to around 26 Yuan when the warrant expired. While the put warrant was initially issued in the money, the big run up of WuLiang stock price soon pushed the warrant out of money after two weeks, and it never came back in the money. Despite this, the warrant price...
Lessons

- Could we use signals associated with bubbles such as inordinate trading volume or high leverage, to detect and perhaps stop bubbles?
  1. We know next to nothing about false positives.
  2. Not obvious that we should try to stop all bubbles. Relationship between bubbles and technological innovation suggests that some of these episodes may play positive role in economic growth.
  - Credit bubbles have proven to have devastating consequences.
Lessons

- Policy makers should consider limiting leverage and facilitating, instead of impeding, short-selling.
  - Following implosion of credit bubble, SEC banned short-sales of financial stocks. In 8/11, as markets questioned health of European financial institutions, France, Italy, Spain and Belgium banned short-sales of financial stocks.
  - Interventions gave temporary respite to markets for financials, but caused losses to investors that were short these assets and had to cover their positions.
  - Investors learned one more time that it is dangerous to bet against overvalued assets.
  - Synthetic CDOs.