

# Bubbles in Asset Prices



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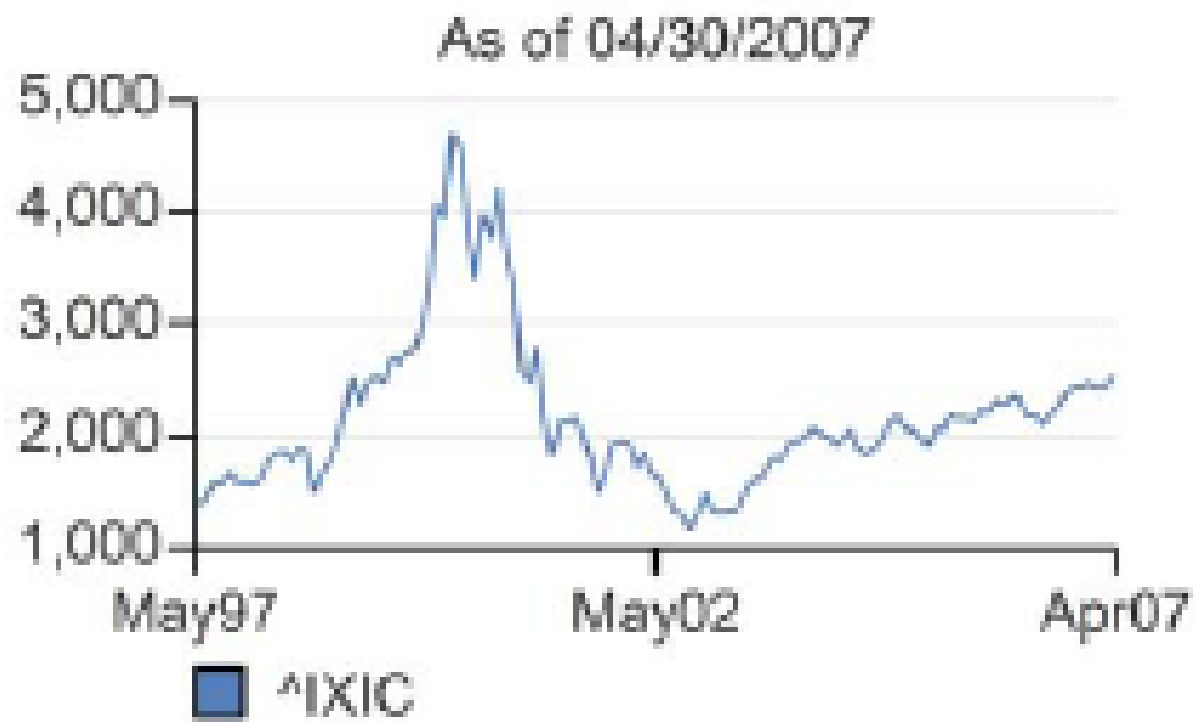
# Bubbles in Asset Prices

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- Bubbles a source of concern for centuries
  - Makes for very entertaining reading
  - Not always very good history
- Will outline
  - Theory
  - Empirical analysis
    - Real-world (field) financial markets
    - Experimental markets

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## NASDAQ Composite Index



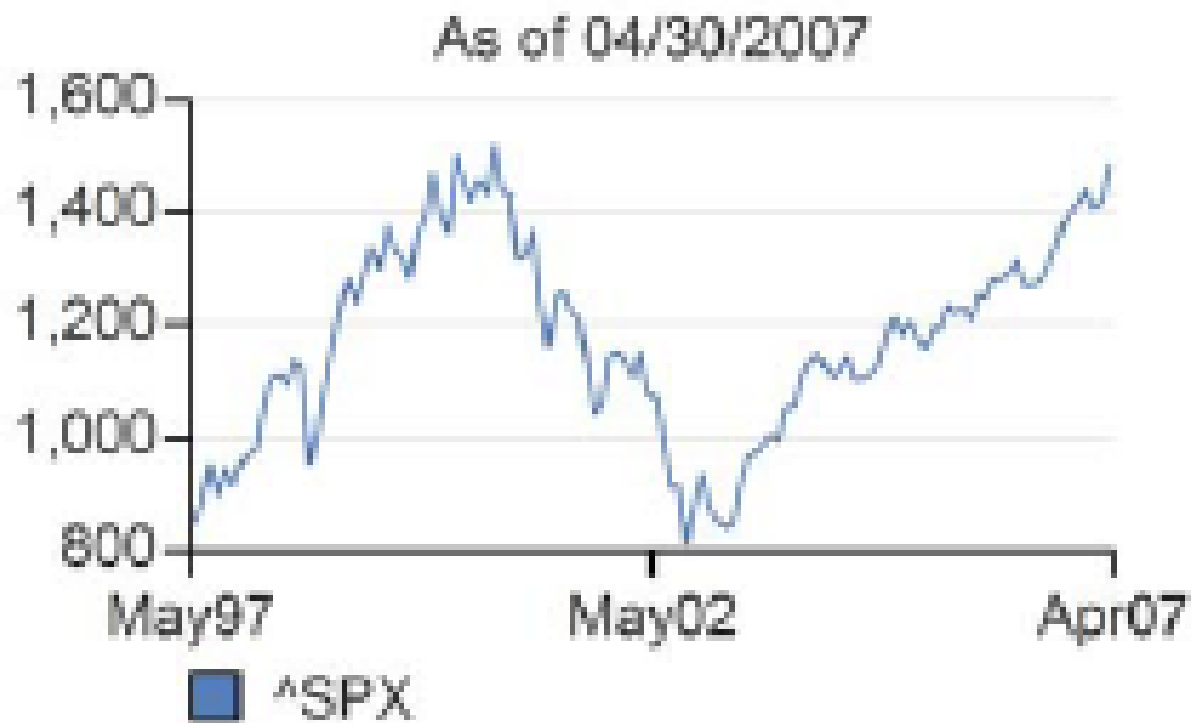
# Observations

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- Big price rise and big fall
- Some of underlying stocks fell by 95 percent
- Not only small companies
  - Value weighted index
  - Even a large company such as Microsoft fell by about half
  - As did Dell
- Less dramatically, see a similar pattern in overall market indexes
  - Price of overall U.S. market not back to level in middle of 2000 as of May 31, 2006

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## S&P 500 Index

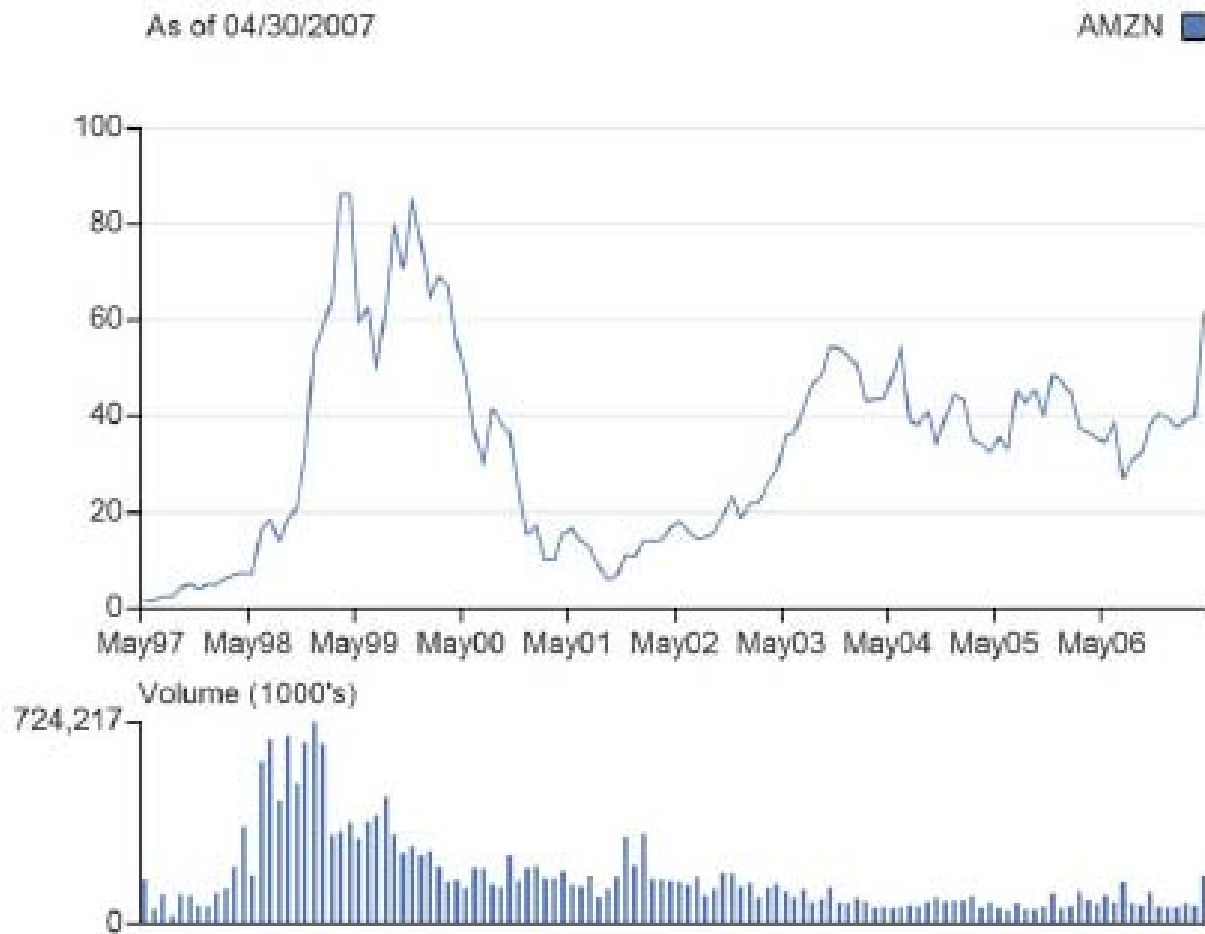


# Caveats About Indexes

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- These are price indexes
  - Reflect prices only
  - Not reinvested dividends
- Reinvested dividends generally not important for NASDAQ
  - But Microsoft trades on NASDAQ and has had significant dividends in recent years
  - Means that recovery is more than implied by price alone
- Still, there is a big increase and a later decrease

# Amazon



# Bubble?

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- To be interesting, a bubble must be more than a rise and then a fall
  - Maybe predictable fall?
  - Easy to find quotes that technology stocks were overvalued in late 1990s
- Price higher than justified by the fundamentals
  - This is a common definition
  - Begg question: “What are the fundamentals?”
  - Does everyone have to agree?

# Bubbles and Optimizing Behavior

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- Optimizing is a neutral word
  - Term “rational” is loaded
    - Definition – having reason or understanding
    - Antonym is “irrational”
      - Definition – lacking usual or normal mental clarity or coherence
- It’s easy to rationalize behavior with irrational (incoherent) behavior
  - Madness, euphoria (just stupidity of others)
  - Task is to find a coherent explanation, which lends predictability to the behavior
  - Hard to have a coherent explanation based on incoherent behavior

# Why Might Bubbles Arise?

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- Inconsistent beliefs
  - Greater fool theory
    - Everyone believes that they can find someone more foolish than themselves who will pay even more for the asset
  - Speculative euphoria
- Consistent beliefs but limited participation
  - No short sales
  - Price **may** reflect only the beliefs of those who have the more optimistic beliefs

# Short Sale Constraints

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- Short sale constraint theory
  - Agents holding stock have more optimistic beliefs than those not holding stock
  - Agents on average, including those who would short stock if they could, have correct beliefs
  - Agents in market do not infer beliefs of those not in the market

# Short Sale Constraint

## Theoretical Issue

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- If short sale constraints always lead to overvaluation, agents in the market are ignoring information available to them
  - Information that some are not holding stock because they think that price is too high
  - Just need to read newspaper to know this
  - Similar to “winner’s curse” in auction theory
- Short sale constraints need not lead to overvaluation in general
  - Could argue that overvaluation does not occur on average
    - Sometimes price too high, sometimes too low
    - Ex post, can tell when it was too high

# Older Theory

## Rational Bubbles

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- Theory is very simple
- Suppose that there is a bubble value  $b_t$  added to the fundamental value
  - The fundamental value has the expected return  $r_t$
  - If the bubble value has the expected return  $r_t$ , then it pays to hold the asset
    - $b_t$  rises over time at rate sufficient that expected return is  $r_t$
- Can have nonzero probability of bubble bursting
  - Just affects rate of increase of value of bubble until it bursts
  - Has to rise faster to compensate for possible fall

# Newer Theories

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- Short-sale constraint theory popular in some circles in finance these days
- General equilibrium theories
  - Overlapping generations
  - Infinite-horizon agents

# Overlapping Generations

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- Can have positive prices for assets that never have a payoff
- Partly depends on relationship between growth rate of economy and return on assets
  - Growth rate greater than return on assets
  - Not really necessary or sufficient

# Infinite-Horizon Agents

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- Sequential trading and incomplete markets
- Can become uncertain what the “fundamental” value of asset is

# Learning and Bubbles

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- Agents may be learning about a new situation
  - Sometimes their estimate of the payoffs in a new industry are too high
  - They learn that they are wrong and price falls
    - Is this a bubble?

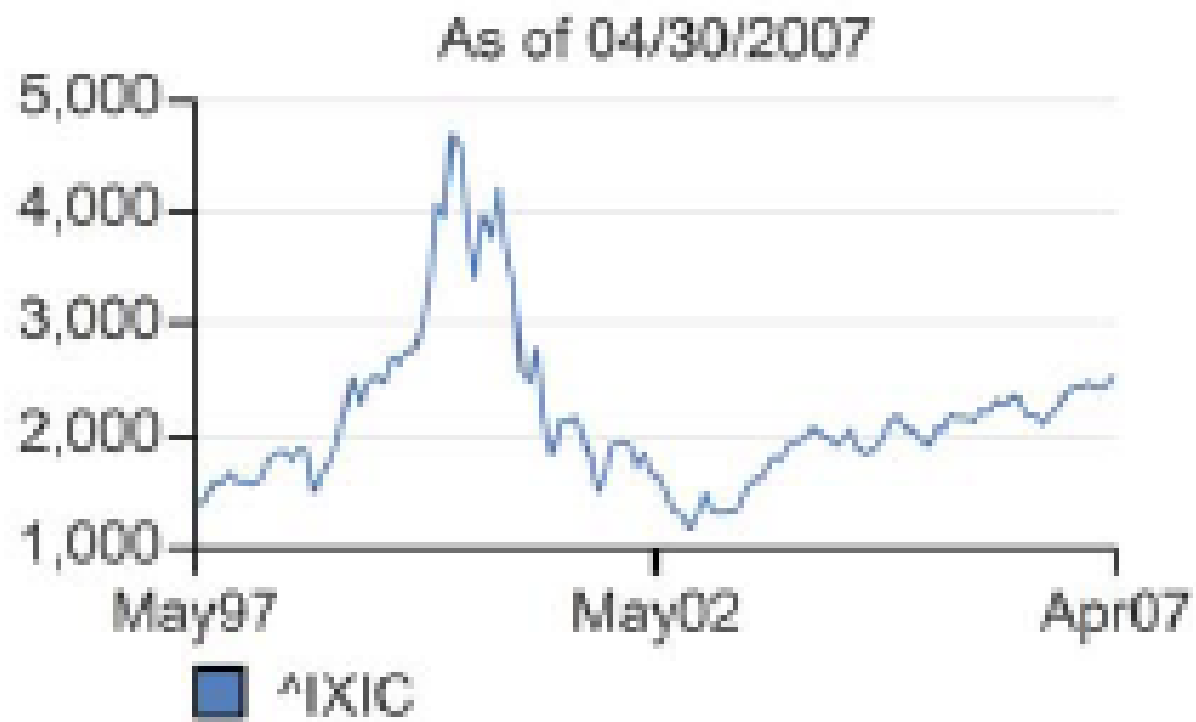
# Test for Bubbles

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- For every bubble explanation of a situation, there exists a fundamental explanation
  - Essentially, unobserved fundamental factors can account for the observations
- Becomes a matter of the overall consistency and credibility of an explanation

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## NASDAQ Composite Index



# Experiments

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- Experiments are a partial way out
- Experiments with human subjects make it possible to control the fundamental price
  - The experimenter determines and knows the fundamental price
  - Fundamental price need not be estimated; it is a known quantity
  - It is hard to assert that there are unobserved fundamental factors

# Bubble Experiments

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- Many such papers
  - Vernon Smith, Lucy Ackert and many others have done such experiments
    - Even when participants know the number of periods, terminal value and dividend payments, price tends to exceed the fundamental value
      - Close to the end of the experiment, price moves toward terminal value
  - Mapping from these experiments to the market environment not clear
    - Price deviations big or small?
    - Learning by participants

# Experimental Results on Bubbles

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- Many papers
  - First is Smith, Suchanek and Williams  
*Econometrica* 1988
  - Others try to see why results occur
  - For example
    - Failure to understand value of asset
      - Backward induction
    - Lack of common knowledge of rationality
      - Greater fool theory

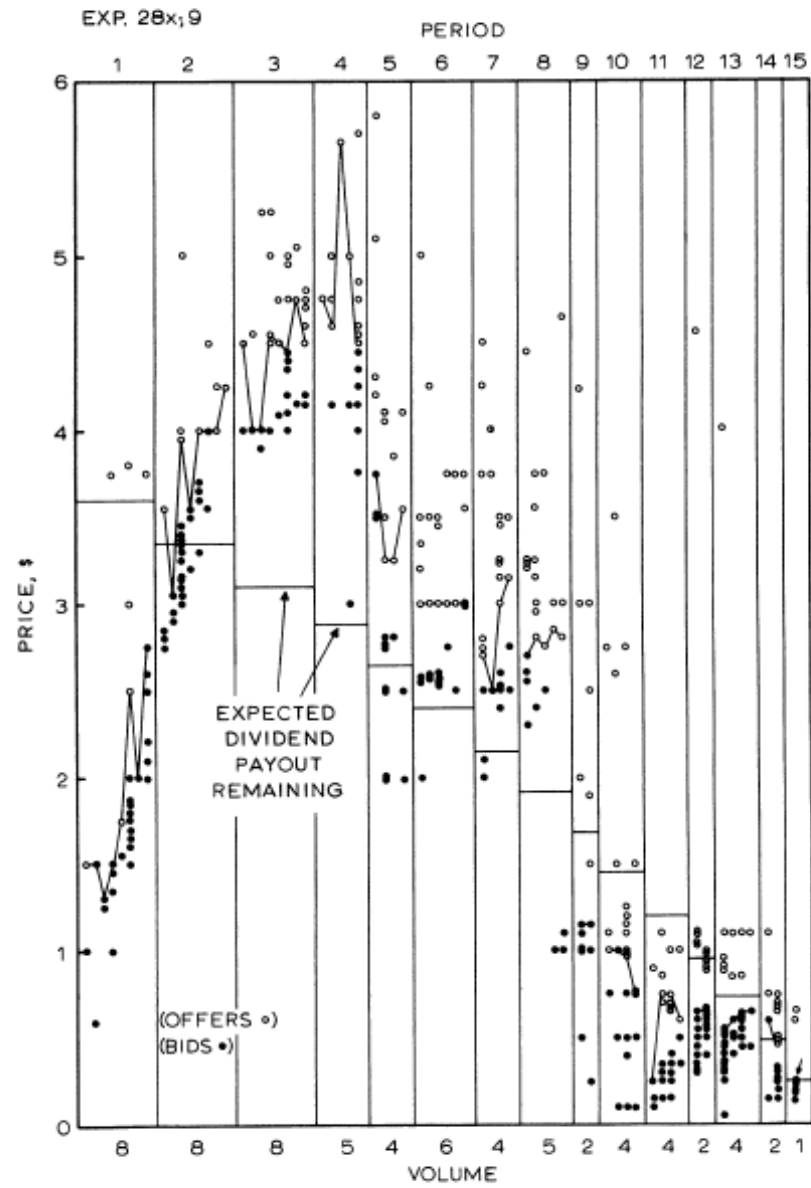


FIGURE 9

# Generalization Outside of Laboratory

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- This always is a difficult issue
  - Have behavior in controlled environment
  - What does this imply about behavior outside this controlled environment?

# Conclusion

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- Bubbles are a very interesting, and tricky, line of research
- Good and bad papers
  - Some results just reflect priors of researcher
  - Some are informative about the data and how they can be interpreted
  - I am inclined to think that experimental analysis is most likely to be illuminating about new ways to think of market data