
CHAPTER 2

BUBBLES AND BELIEFS

A Model with a Keynesian Beauty Contest

The Japanese Bubble of the mid-1980s

The Internet Bubble of 1998-2000

**a crash course
on crises:**

macroeconomic

concepts for

run-ups,

collapses, and

recoveries

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BUBBLES AND MACRO ECONOMIC IMPLICATIONS

- Financial crisis are often preceded by:
 - large increase in the price of assets
 - frenzy of speculators trying to buy and sell assets for quick profit
 - These speculative price increases (often called **bubbles**) go far back in history
 - 1634-37: Tulip mania in Amsterdam, a tulip worth more than a mansion
 - 1719-20: South sea bubble in UK, Mississippi bubble in France
 - Sometimes these bubbles have severe macroeconomic implications
 - When the bubble pops, the price decline came with collapses of the financial system
 - Sharp increases in unemployment that only slowly receded
 - Macro-prudential policies are policies meant to lean against the build up of bubbles
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A KEYNESIAN BEAUTY CONTEST

FUNDAMENTAL VALUE AND MARKET PRICES

- **Market price of an asset:** what people are willing to buy and sell it for
 - **Fundamental value of an asset:** the discounted present value of its payoffs
 - Payoffs: dividends for stocks, interest payments for bonds, and rents for real estate
 - Discounting: by how much the money is worth (marginal utility)
 - **Bubble:** when the *market price > fundamental value*
 - Keynes' General Theory distinguishes investors from speculators
 - **Investors:** buy an asset for its dividend stream (fundamental value)
 - **Speculators:** buy an asset for its resale value before the bubble deflates. They believe they can sell the asset at an even *higher* price to other investors in the future
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PHASES OF THE BUBBLE

Initial displacement

A new technology or financial innovation leads to expectations of increased profits and economic growth

Boom Phase

Low volatility, credit expansion, increases in investment.

Asset prices rise with growing momentum.

The price starts to exceed the fundamental improvements from the innovation

Phase of Euphoria

High trading value and price volatility. Investors trade the overvalued assets in frenzy.

The investors may be aware, or at least suspicious, that there may be a bubble, but are confident that they can sell the assets in the future before it pops

Phase of Profit Taking

Sophisticated investors start to reduce their positions and realising profits.

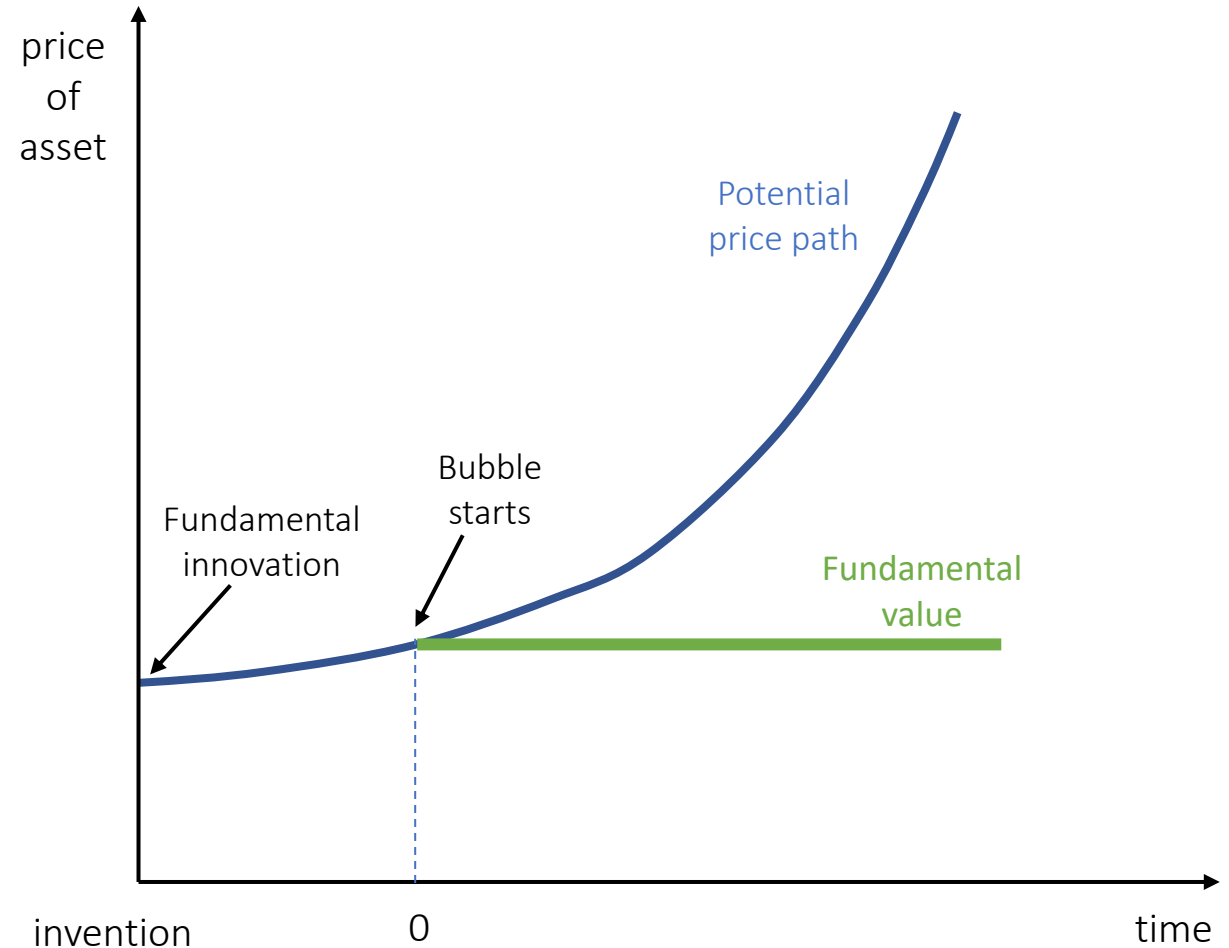
During this phase, there may be enough demand from less sophisticated investors who may be new to that particular market

Panic Phase

At some point prices start to fall rapidly, leading to a panic phase, when investors dump the asset

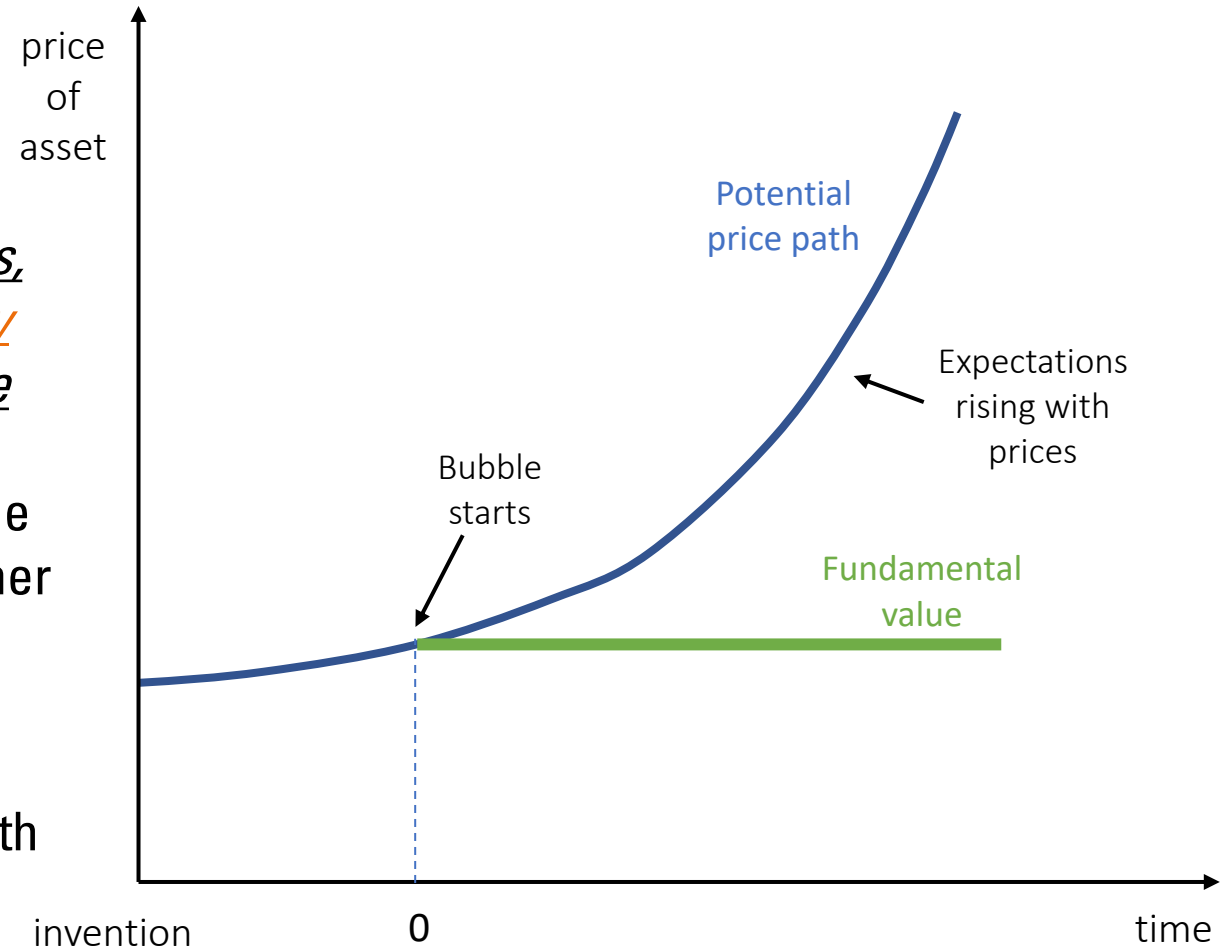
A MODEL OF BUBBLES: FUNDAMENTALS AND BUBBLE

- Invention: a fundamental innovation that has value that is rising over time
- In this initial displacement phase, the good news of innovation pushes the price up
- At some point, say date 0, fundamental value slows down. For simplicity, say it becomes constant
- If asset price continues to rise: a bubble emerges



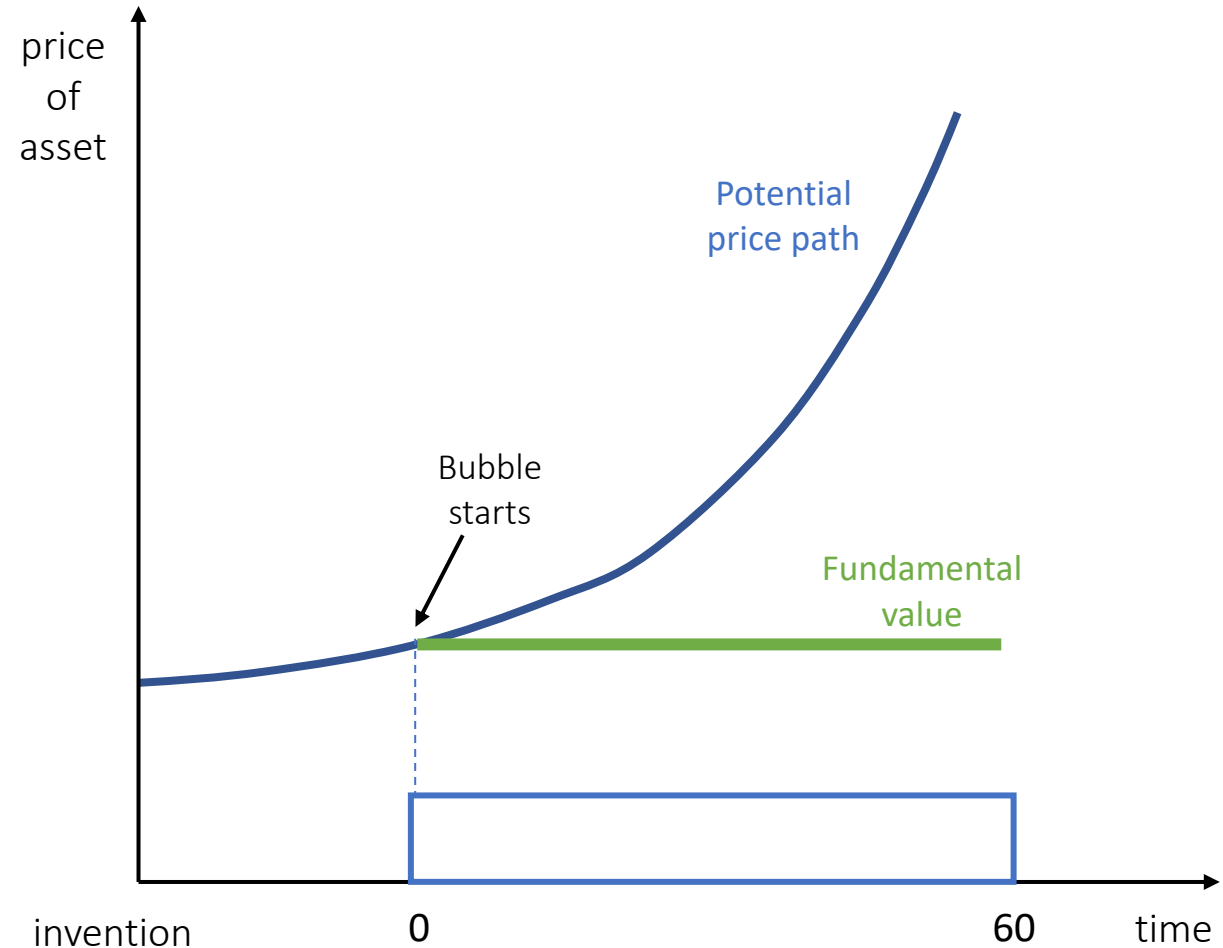
A MODEL OF BUBBLES: SPECULATORS

- Consider two groups of speculators
 1. **Sophisticated** ones
 2. **Momentum** ones
 - Extrapolative expectations: as price increases, the momentum investors become *increasingly optimistic* of price to increase further in future
- When bubble starts, momentum investors see price continuing to rise, extrapolate it will continue further
- The rise in prices in the displacement phase confirms their (mistaken) belief that current price growth can be extrapolated into future price growth



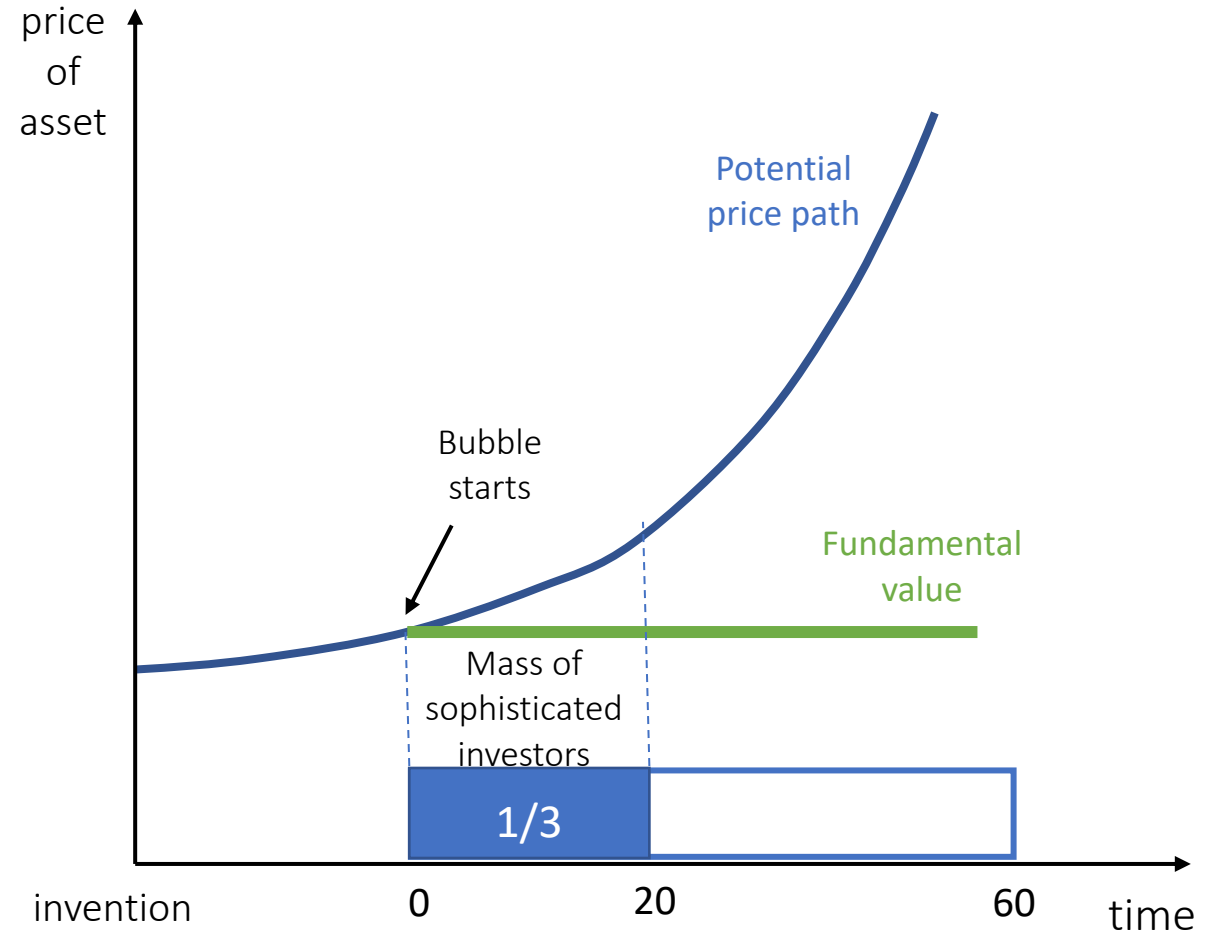
A MODEL OF BUBBLES: SPECULATORS

- After date 0, the momentum speculators with extrapolative expectations keep buying even though the price exceeds the fundamental value
- Sophisticated speculators do not want to lean against the bubble at the beginning. It is more profitable to choose to **ride** the bubble
- This is risky. The bubble asset price could burst on them at some date.
- Say it could burst sometime between time 0 and 60



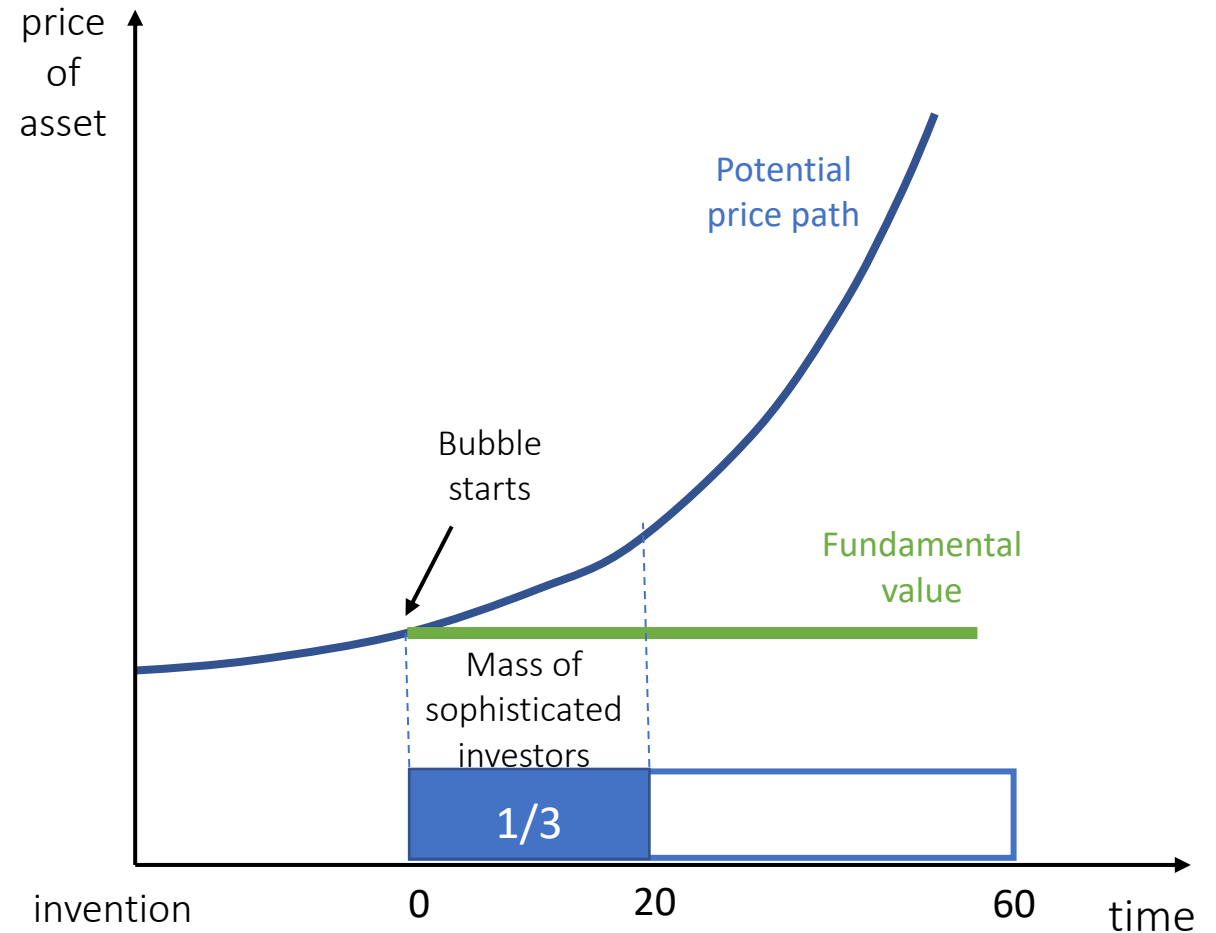
A MODEL OF BUBBLES: BELIEFS

- **Coordination problem:** each speculator tries to forecast how long the bubble will persist, which is governed by trading behavior of other investors
- Keynes: *"It is not a case of choosing those [faces] that, to the best of one's judgment... We have reached the third degree where we devote our intelligence to anticipating what average opinion expects the average opinion to be."*
- **Assumption:** price goes up unless **1/3 or more** sophisticated investor lean against



A MODEL OF BUBBLES: SOPHISTICATED ACTIONS

- Sophisticated investors stop riding bubble just before the threshold is reached.
- Suppose one sophisticated investor believes that others will ride between period 0 and 60 after the bubble appears, with equal number of agents in each period
- **Expect the bubble to burst in 20 periods after the bubble had started**
 - $(1/3) \times 60 = 20$ periods
 - To maximize profit, attack the bubble at exactly 20 periods



FUNDAMENTAL VALUE AND MARKET PRICES

- If all sell at period 20, only **first 1/3** will be able to sell at the high price. The remaining 2/3 will suffer losses
- Each, individually, wants to sell at period 19 for the sure gain
- But all others think the same way
- Incentive to sell at period 18 ... and so on
- Eventually, all sophisticated investors will sell at period 0, **no bubble will persist**

First level of reasoning

Sell at period 20 right before bubble burst

Second level of reasoning

Sell at period 19, to realise slightly smaller sure gain than taking higher gain with 1/3 chances

Third level of reasoning

Sell at period 18, knowing other fully rational investors will be on the second level of reasoning

...

Twentieth level of reasoning

Sell at period 0

A MODEL OF BUBBLES: FUNDAMENTALS AND BUBBLE

- In experiments, when people are asked to play this game, they do not draw out the implications of backward induction to their fullest. Instead: a **distribution of traders** wish to sell at different time
- The key for a fully rational trader is to predict how many reasoners in each level are active. With these estimates, the investor can figure out the optimal length of time riding the bubbles
- Wants to ride the bubble up to the period where finally the **higher-level agents** are more than 1/3 of the population. This allows the bubble to **arise and persist**

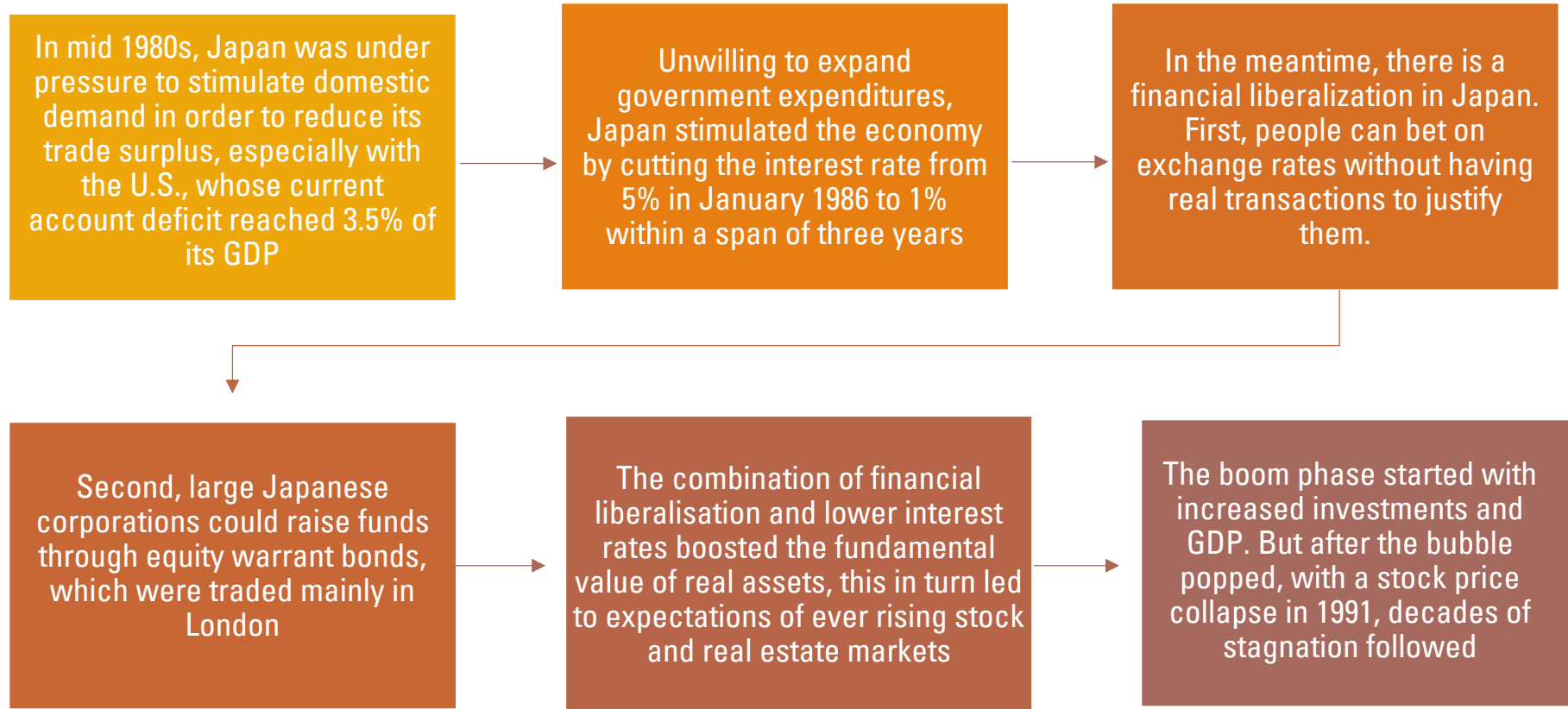
Timing of attack on bubble

- Depend on both the **number of extrapolative agents** and their impact on prices, as well as on the **number of sophisticated agents** at *lower levels of reasoning*.
 - More of either will let the bubble to persist longer
- **Extrapolative expectations** are a key driving force of the bubble, even the sophisticated traders who know the existence of bubble will not overturn at first

The Japanese bubble of the mid 1980s

- In the late 1980s, Japan experienced a large stock market and real estate bubble
 - Stock prices more than quadrupled
 - Commercial real estate prices increased more than six-fold in a span of 11 years
 - Initial rise in the values can be justified by changes in **two** fundamentals:
 - Fall in interest rates
 - Financial liberalization
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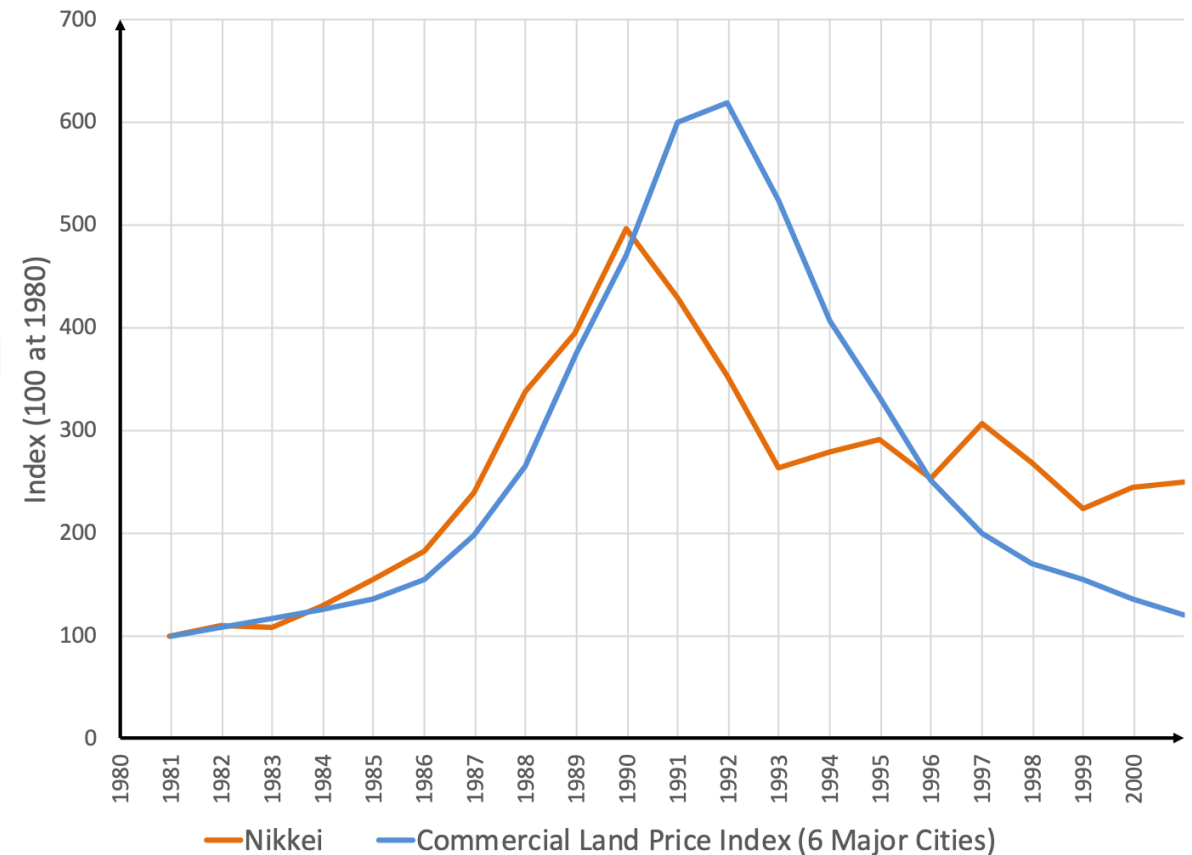
DEVELOPMENT OF THE JAPANESE BUBBLE IN THE 1980S



STOCK MARKET BUBBLE IN JAPAN 1980S

- The red line represents change in Nikkei Stock Average (stock market index for the Tokyo Stock Exchange)
- Stock market prices spiked in mid 1980s. They increased by 224% in December 1989 compared to January 1985
- In 1990, the stock market prices had fallen by 39%, and decreased further by 26% in 1992

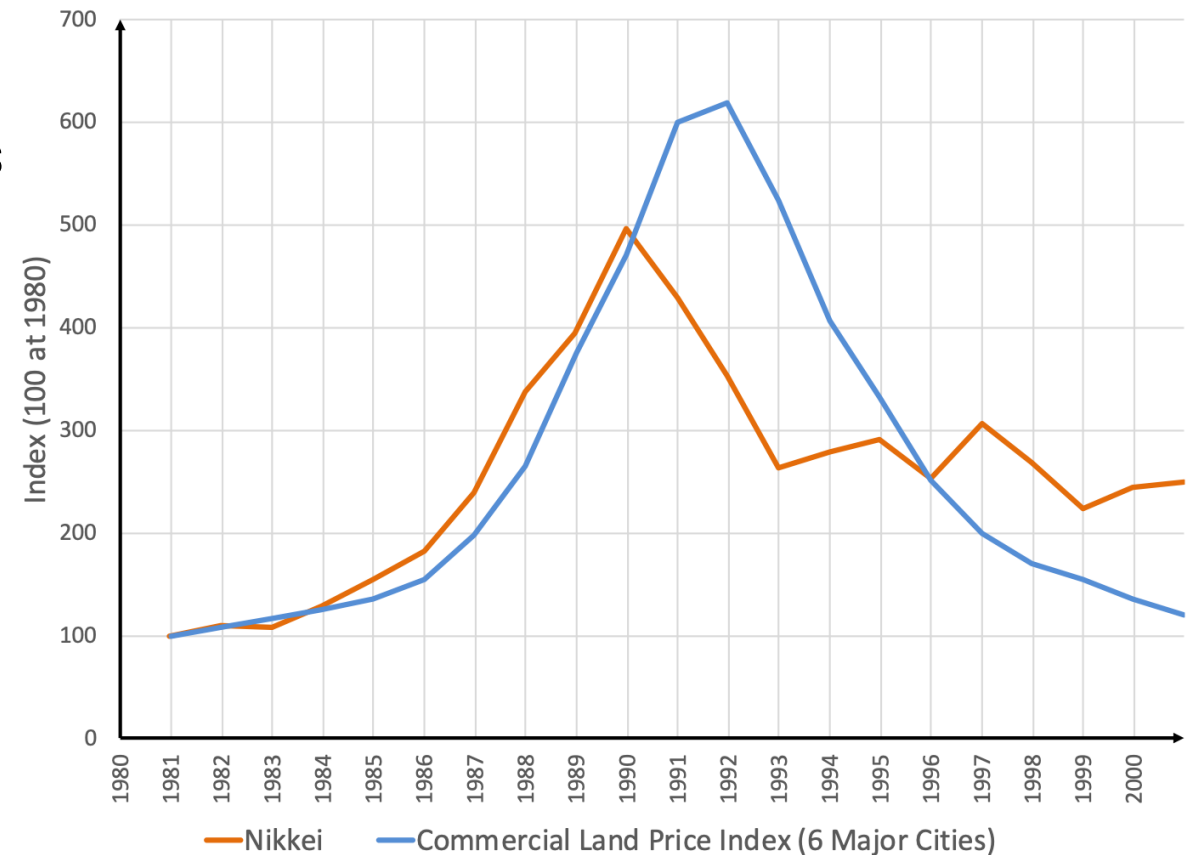
Stock and land prices in Japan



HOUSING BUBBLE IN JAPAN 1980S

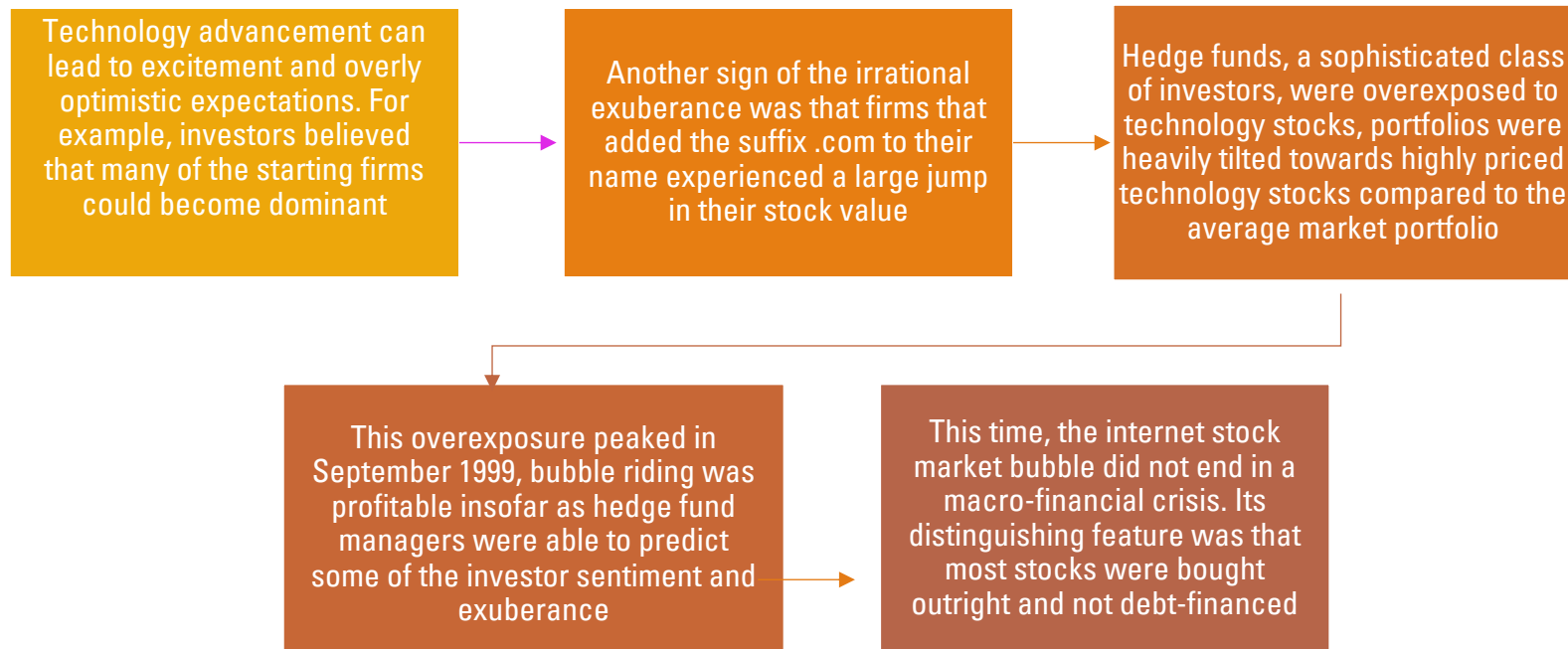
- Blue line shows commercial land price index
- At the peak, the total land value of Japan was roughly 20% of total wealth of the world. Chiyoda City, the land around the emperor's palace in Tokyo was estimated to worth the same as all the land in California or Canada
- Commercial land prices declined 13% in 1992 compared to 1991
- The burst of stock and housing bubble in was followed by decades of stagnation

Stock and land prices in Japan



The internet bubble of 1998-2000

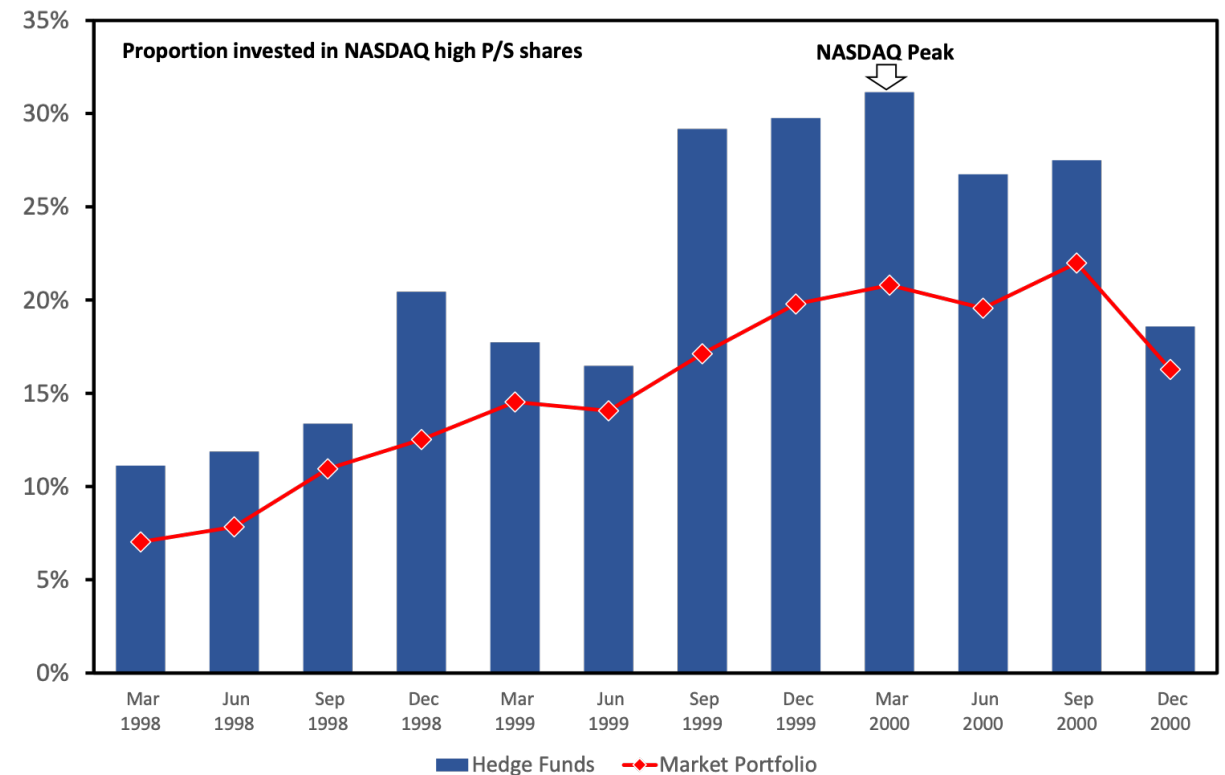
Technological innovation drove the bubble



THE U.S. TECH BUBBLE OF THE LATE 1990S

- The figure shows, for main hedge funds, the proportion they invested in stocks with high prices
- Sophisticated investors “ride” the bubble. Over-exposed to technology stocks instead of acting as a price corrective force
- Why are fund managers particularly prone towards riding bubbles? Relative benchmarking makes not riding the bubble risky for them. If lean against too early, they will be under-perform a benchmark index, and investors will leave the fund.

Hedge funds' holdings of technology stocks 1998-2000



OTHER BUBBLES, MACRO-PRUDENTIAL REGULATION

- Bubbles without technological innovation are **NOT** accompanied by lasting productivity gains
 - In 2000, no financial crisis , because most stocks were **bought outright** and **not debt-financed**
 - Debt financing and leverage concentrates risk in the hands of a few and has adverse knock-on effects on the financial system, leads to larger dislocations in the real economy
 - **Macro-prudential regulation**: lean against credit-financed bubbles to reduce the likelihood that they emerge or persist.
 - Policy often focuses on constraining the amount of credit and leverage that could be used to finance the bubble. Since the bubbles are difficult to identify
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SUMMARY

- Bubbles emerge and persist as the result of **extrapolative expectations** of irrational investors, which push up the prices of assets when fundamental value is slowing down.
- Even if the sophisticated investors are aware of the bubble, they preferred not to lean against it initially as they want to ride the bubble
- If all sophisticated investors are **fully rational**, the bubble will not persist. However, empirically they will be on different **level of reasoning**
- The time bubble persist depends on both the number of irrational investors and the number sophisticated investors
- **Macro-prudential regulation** aim to lean against the credit-financed bubbles by constraining the amount of credit and leverage on bubbles

