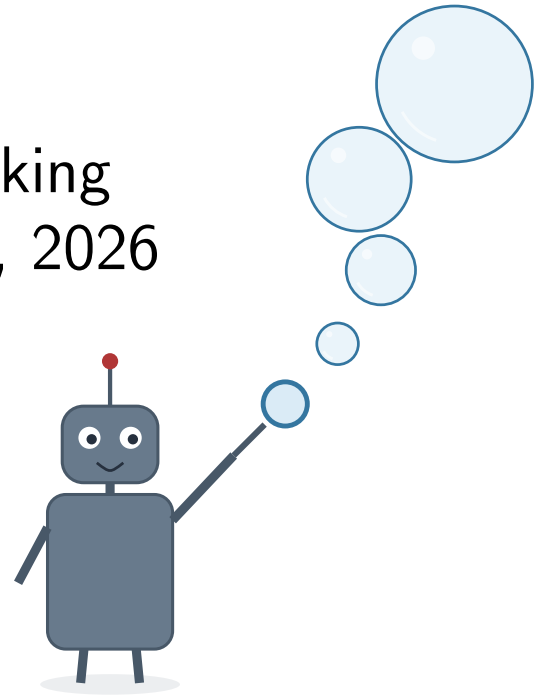
AI and stock price bubbles

Ľuboš Pástor
University of Chicago, Booth School of Business

New Challenges in Central Banking
Czech National Bank, October 6, 2026



Investors know about the AI bubble. They're buying AI stock anyway.

Daniel de Visé
USA TODAY

Dec. 29, 2025, 4:59 a.m. ET

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TD C'est ça, être plus humain.
Les étudiants et les nouveaux diplômés, qui souscrivent une assurance auto en ligne, peuvent économiser 10 %.
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Is the AI boom fueling a new stock market bubble?

The market's hottest stocks — Apple, Nvidia, Meta — mirror the hype of past crashes. Is the AI optimism about to burst?

Investors know about the AI bubble.
They're buying AI stock anyway.

Dec. 29, 2(

Tesla's 'Ridiculously Overvalued': What Michael Burry and Other Tesla Bears See

Image Credit: Unsplash

By James Royal | Published: December 4, 2025

One of the biggest investors from *The Big Short* is now calling one of the Magnificent 7 stocks, Tesla, a short.

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Tesla's 'Ridiculously Overvalued': What Michael Burry and Other Tesla Bears See

ECONOMY • MARKETS

Sam Altman might be right: He's not the only one who thinks the stock market is in 'bubble' territory

By **Jim Edwards**
Executive Editor, Global News

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August 19, 2025, 8:28 AM ET

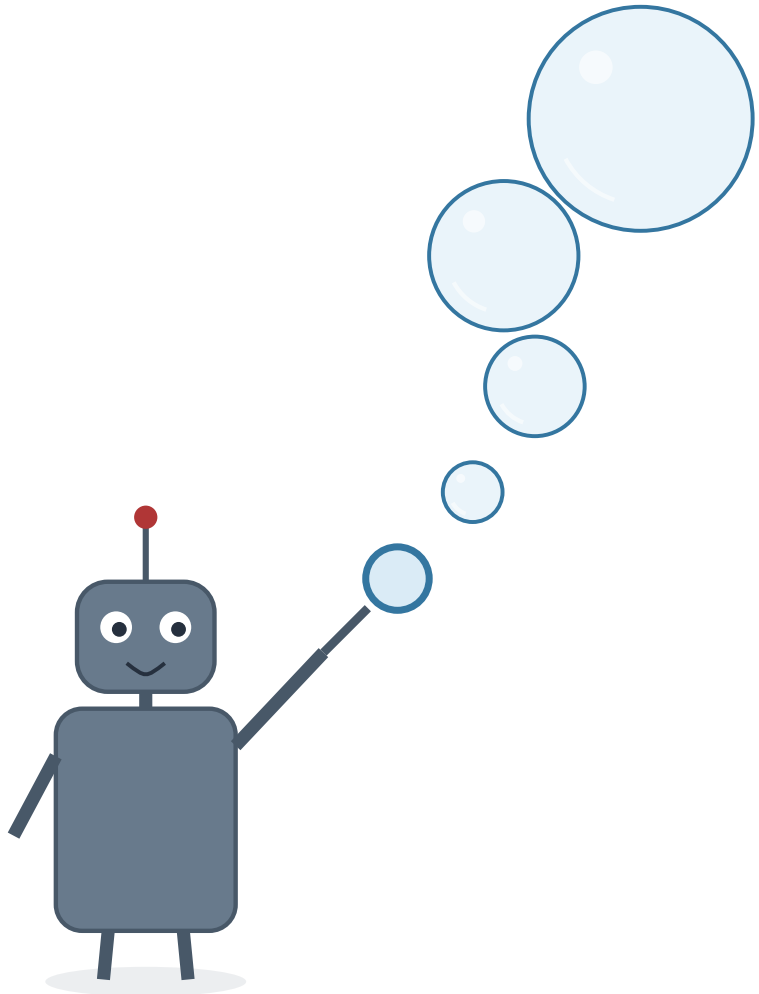
CEO of OpenAI Sam Altman at the Sun Valley Lodge for the Allen & Company Sun Valley Conference on July 8, 2025, in Sun Valley, Idaho.

Is the A
The marke
burst?

One of the biggest investors from *The Big Short* is now calling one of the Magnificent 7 stocks, Tesla, a short.

Is there an AI bubble?

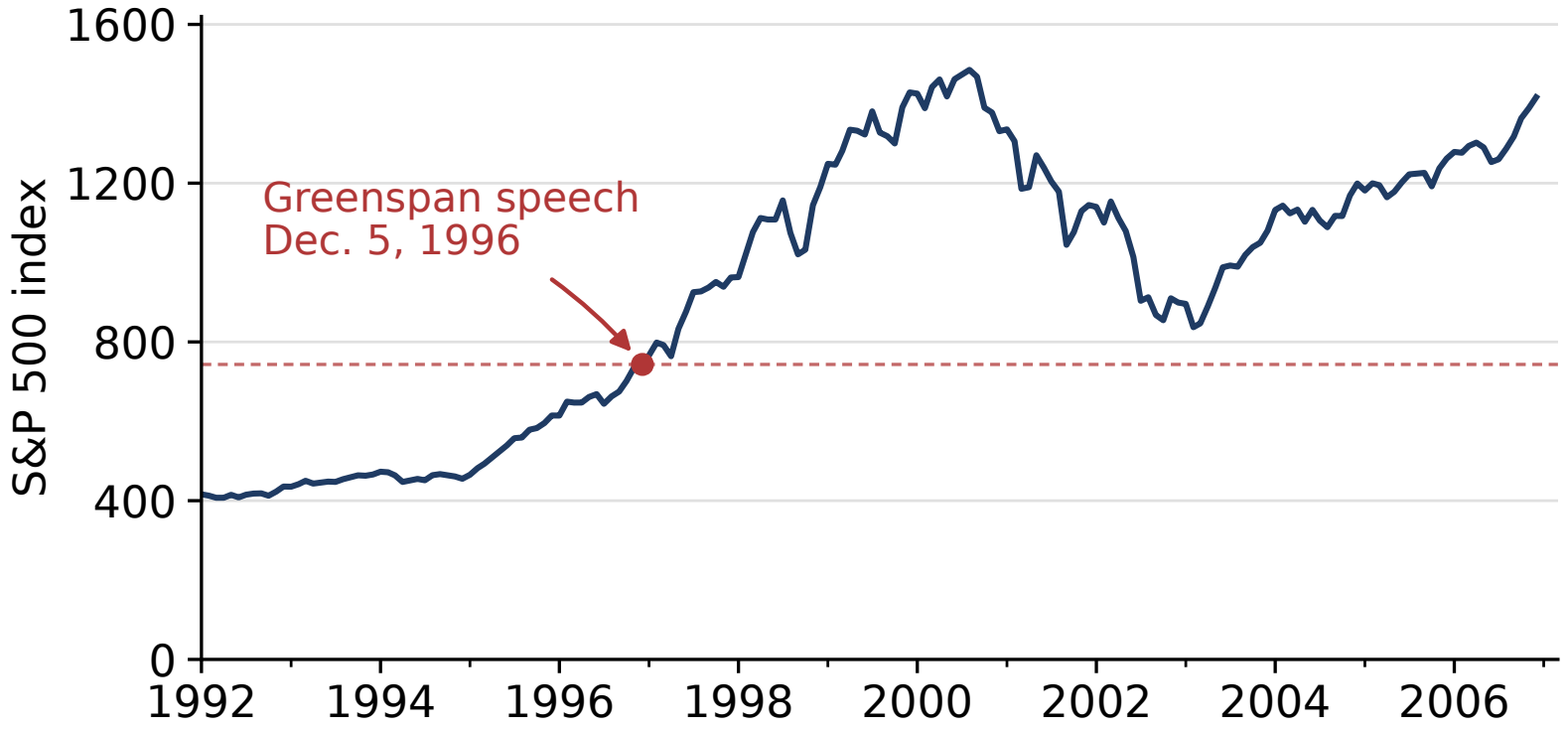
1. Hard to tell
2. Does it matter?



Hard to tell, even for central bankers

- **Example:** Alan Greenspan, Fed Chairman, 1996

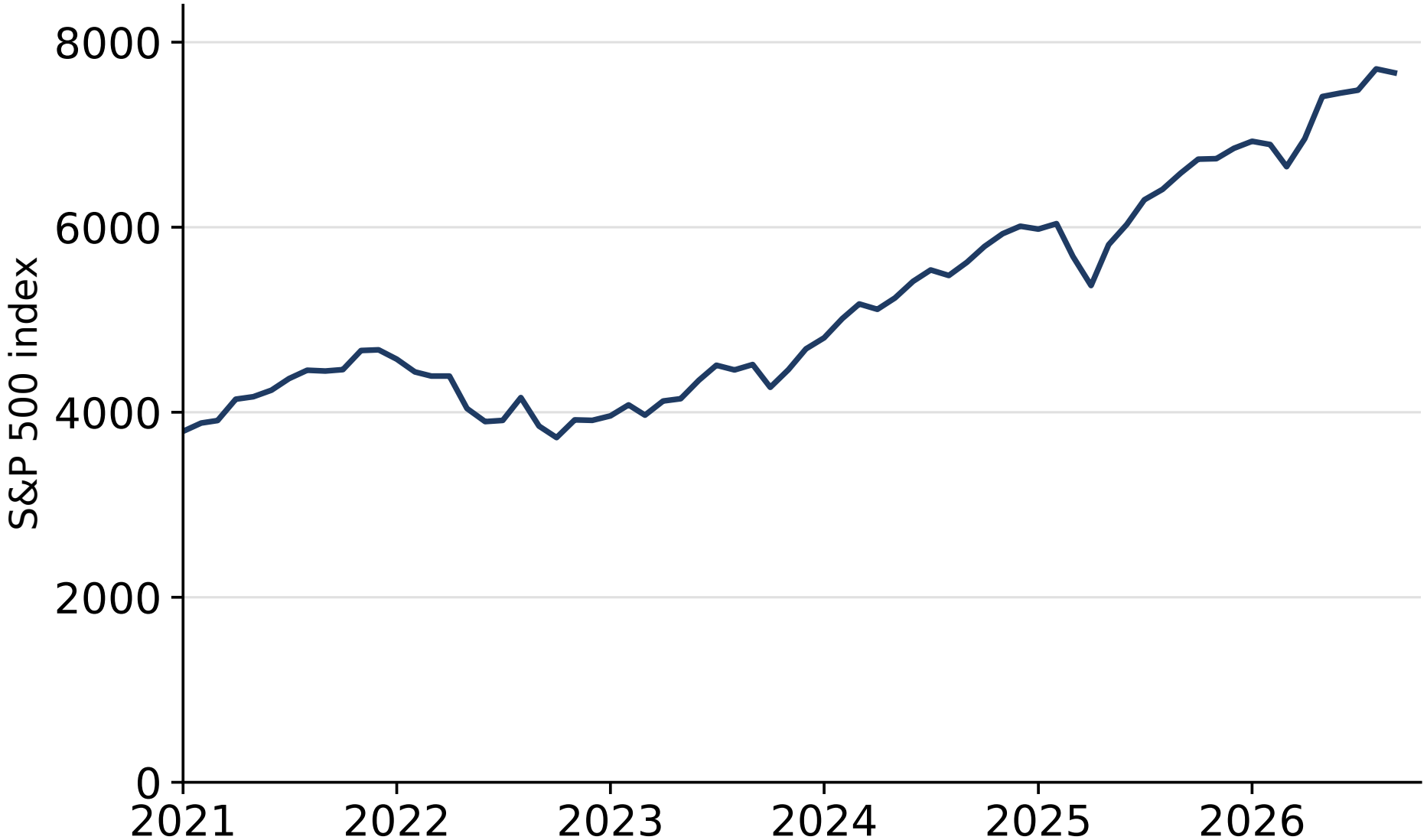
  "How do we know when **irrational exuberance** *has unduly escalated asset values, which then become subject to unexpected and prolonged contractions...?"*



Source: Shiller's monthly S&P 500 series (monthly averages of daily closes).

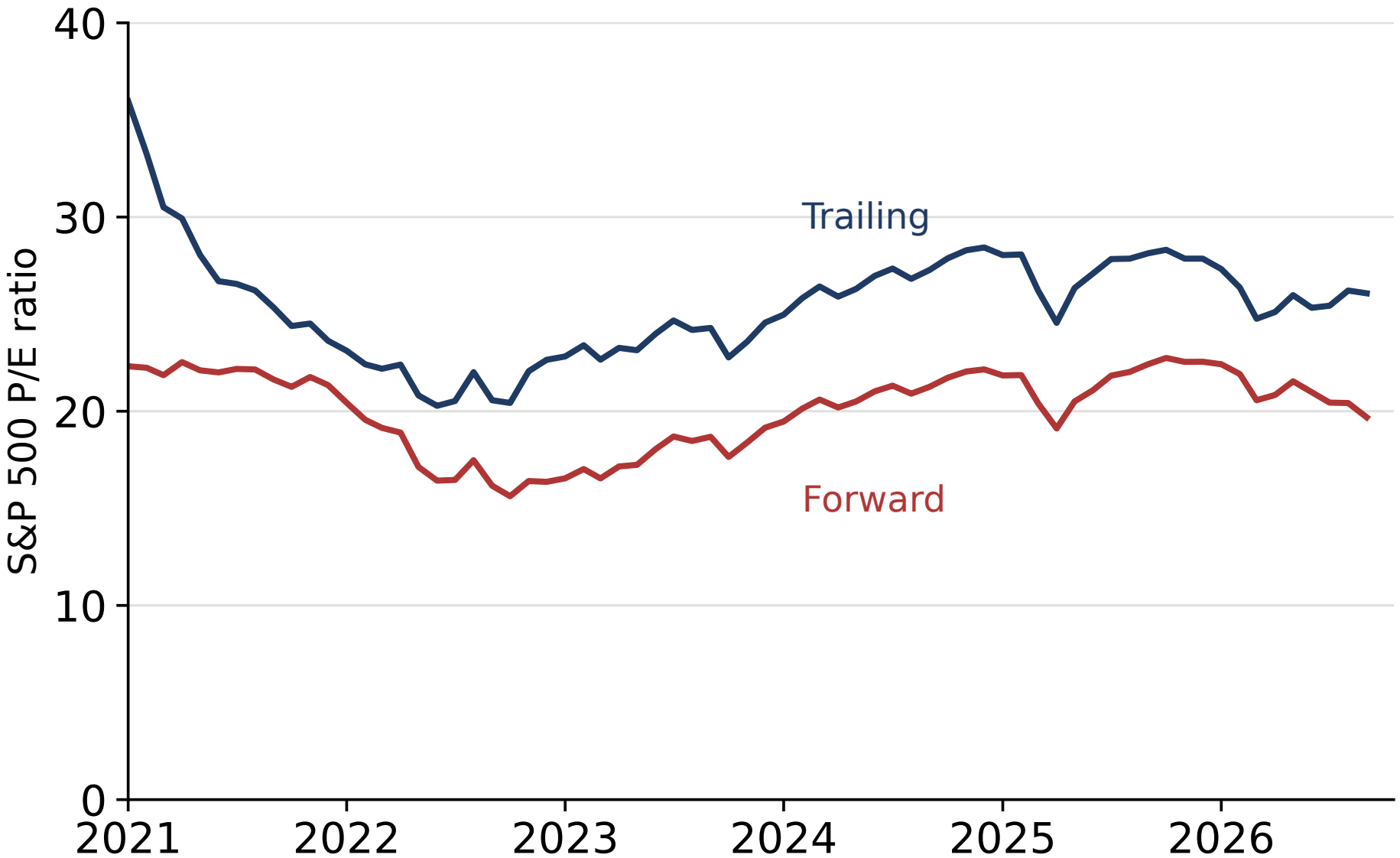
- Not surprising—markets are pretty efficient!

S&P 500 index level



Source: Shiller's monthly S&P 500 series, extended after June 2023 with FRED data.

S&P 500 price/earnings ratios



Source: Shiller/FRED prices; GAAP trailing earnings; FactSet forward estimates, interpolated.

Hard to tell: Three of my research papers

- Was there a Nasdaq bubble in the late 1990s? (with Veronesi) *Journal of Financial Economics, 2006*
  - Uncertainty about new technologies can explain high stock prices

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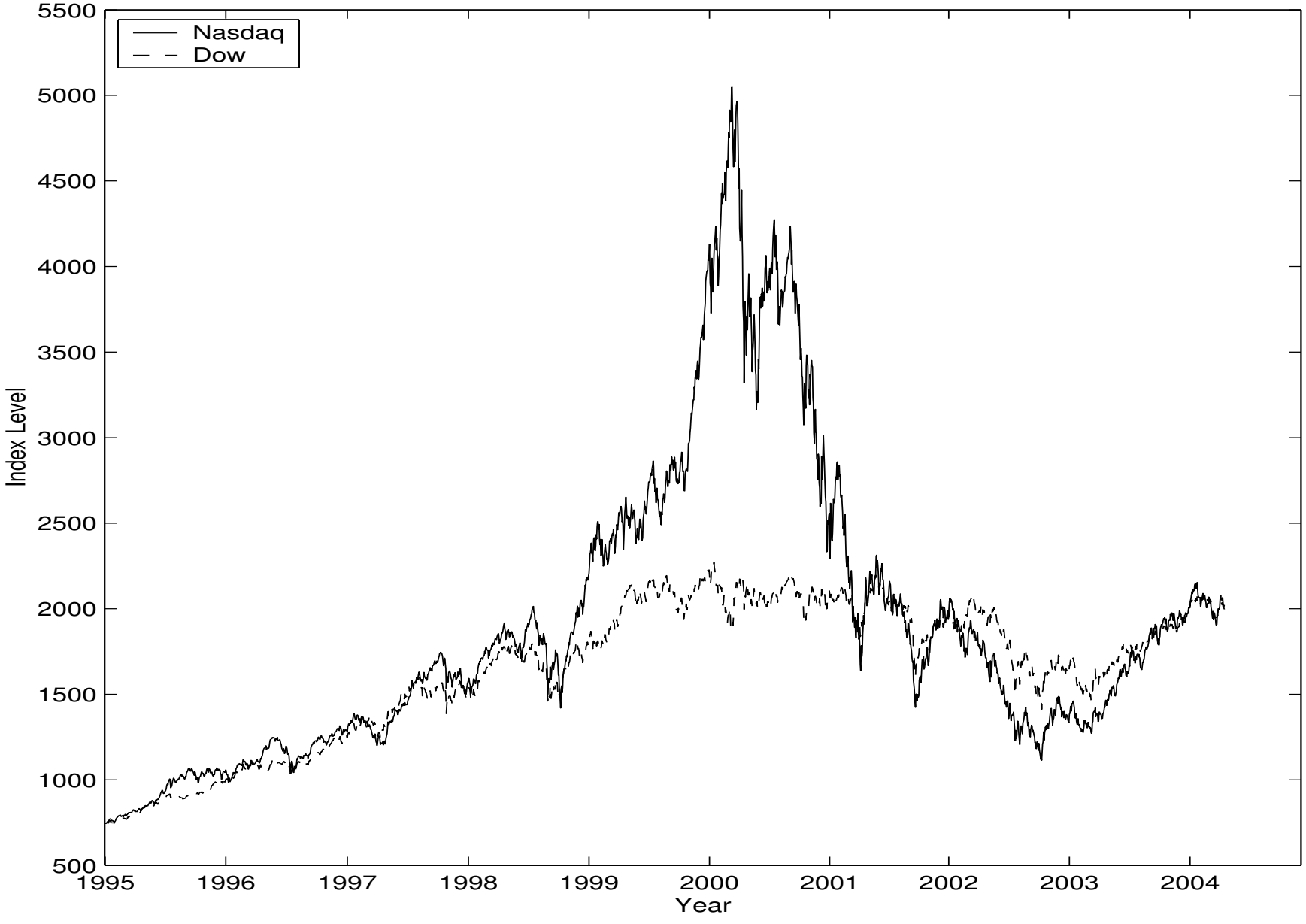
- The hidden cost of stock market concentration:
  When funds hit regulatory limits (with Sikorskaya and Wang)
  Working paper, September 2026
  - Have the Magnificent 7 stocks actually been underpriced?

"Was there a Nasdaq bubble in the late 1990s?" (JFE)



Uncertainty about the growth rate raises stock valuations

- P: stock price, D: dividend, g: dividend growth, r: discount rate
- Gordon growth model:

When g is known: $$\frac{P}{D} = \frac{1}{r-g}$$

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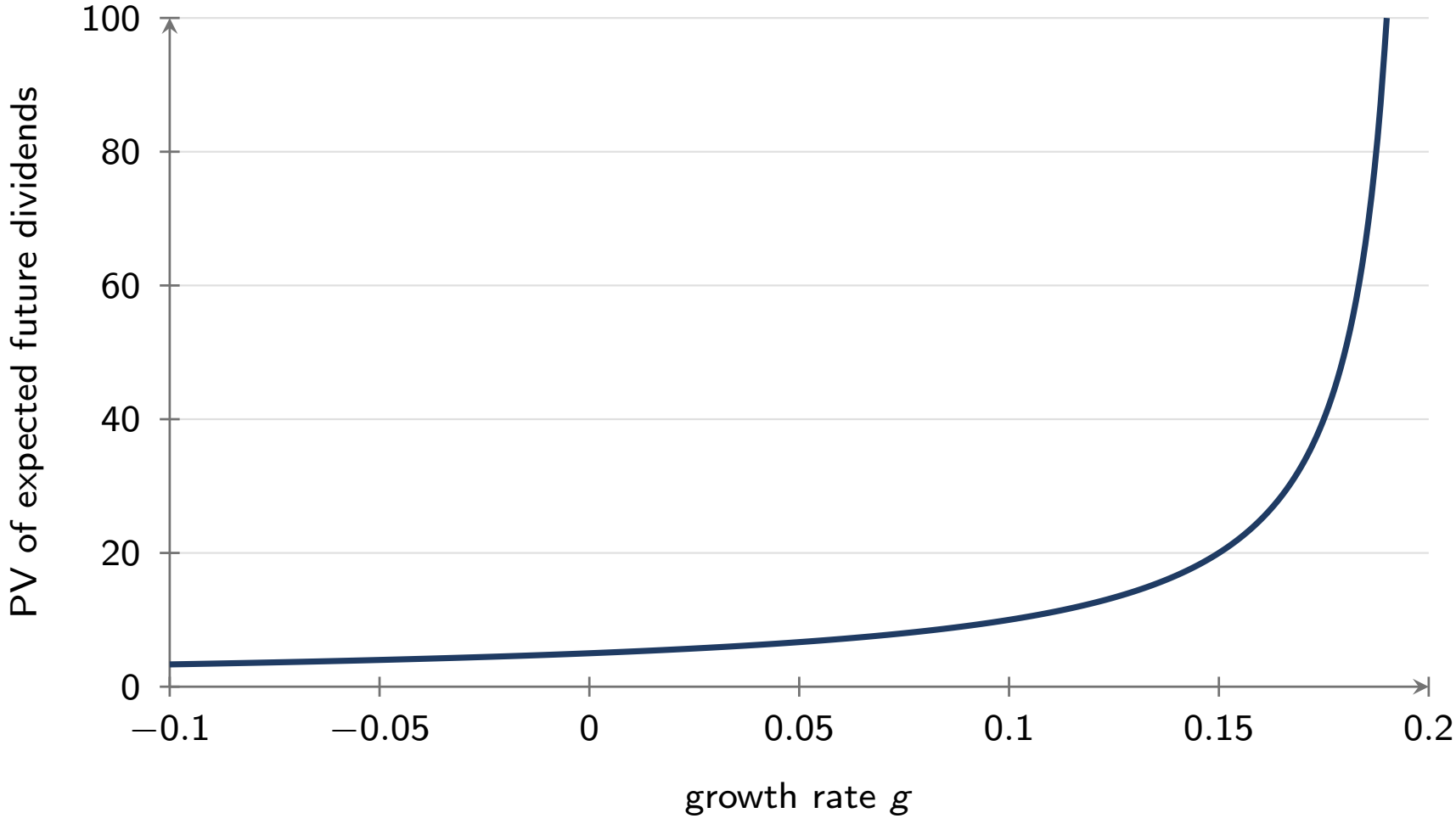
When g is unknown: $$\frac{P}{D} = \mathrm{E}\left(\frac{1}{r-g}\right) > \frac{1}{r-\mathrm{E}(g)}$$

$1/(r-g)$ is convex in g $\Rightarrow$ Uncertainty about g increases P/D

Why does uncertainty about g increase firm value?



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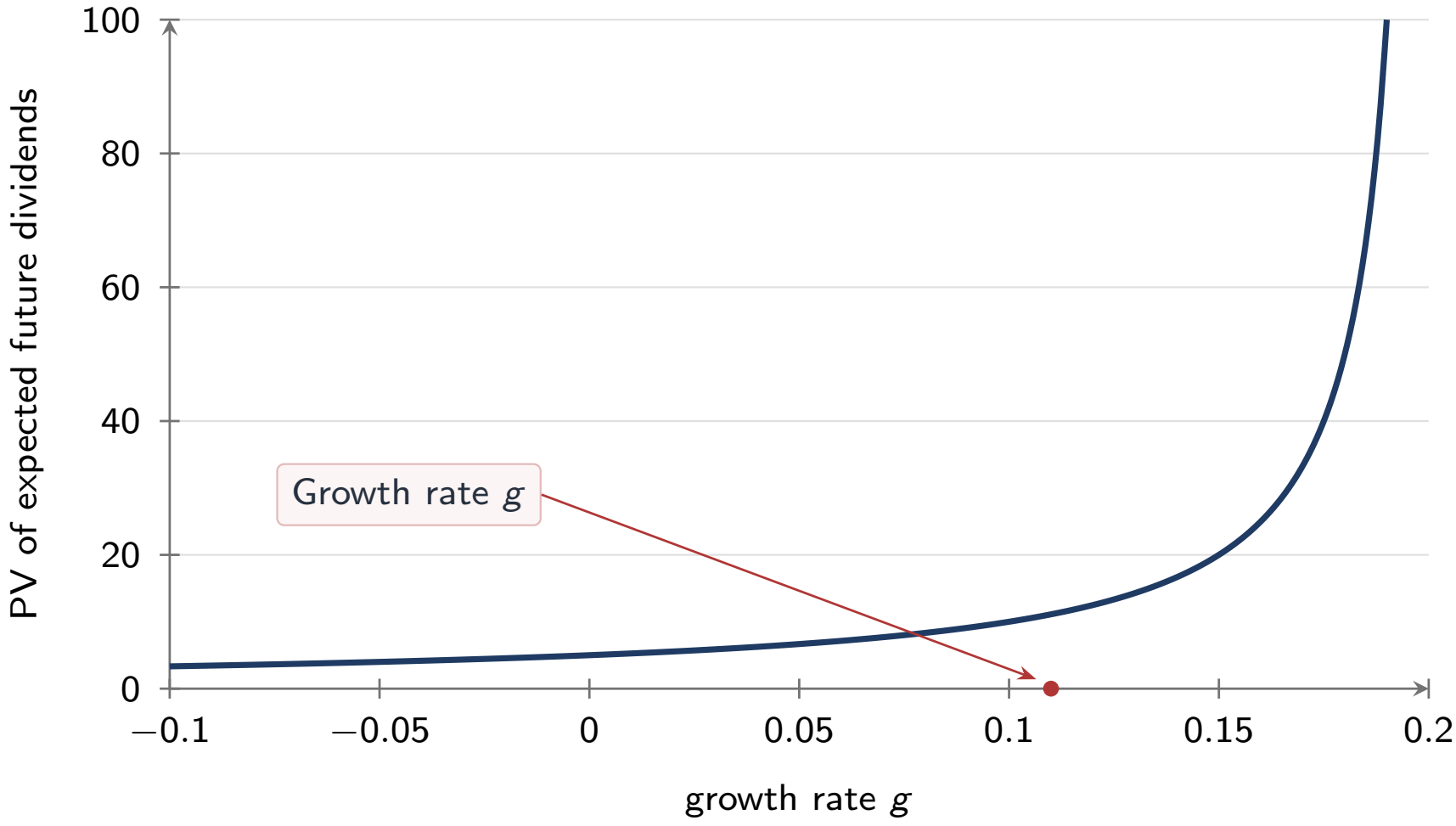

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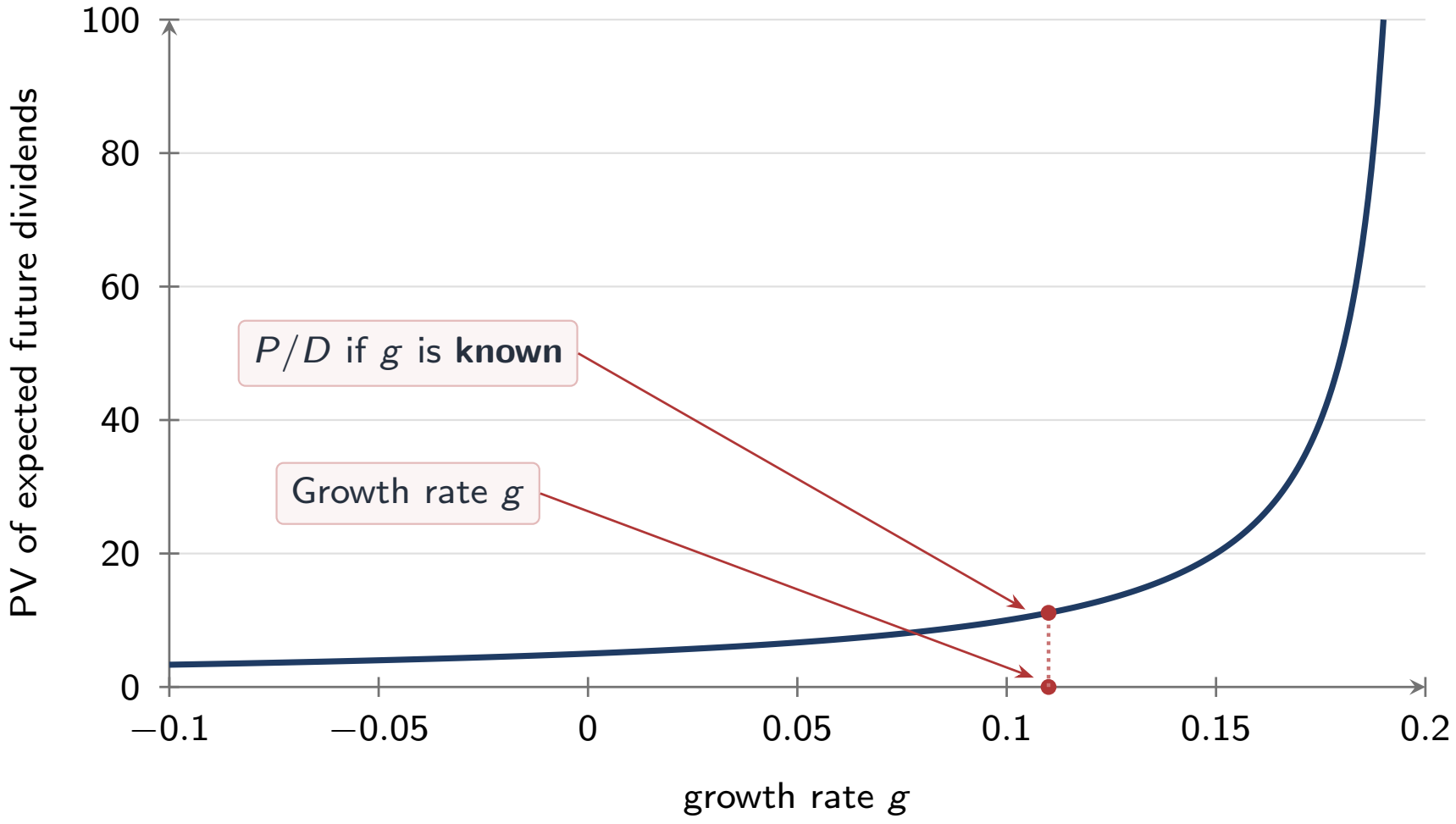

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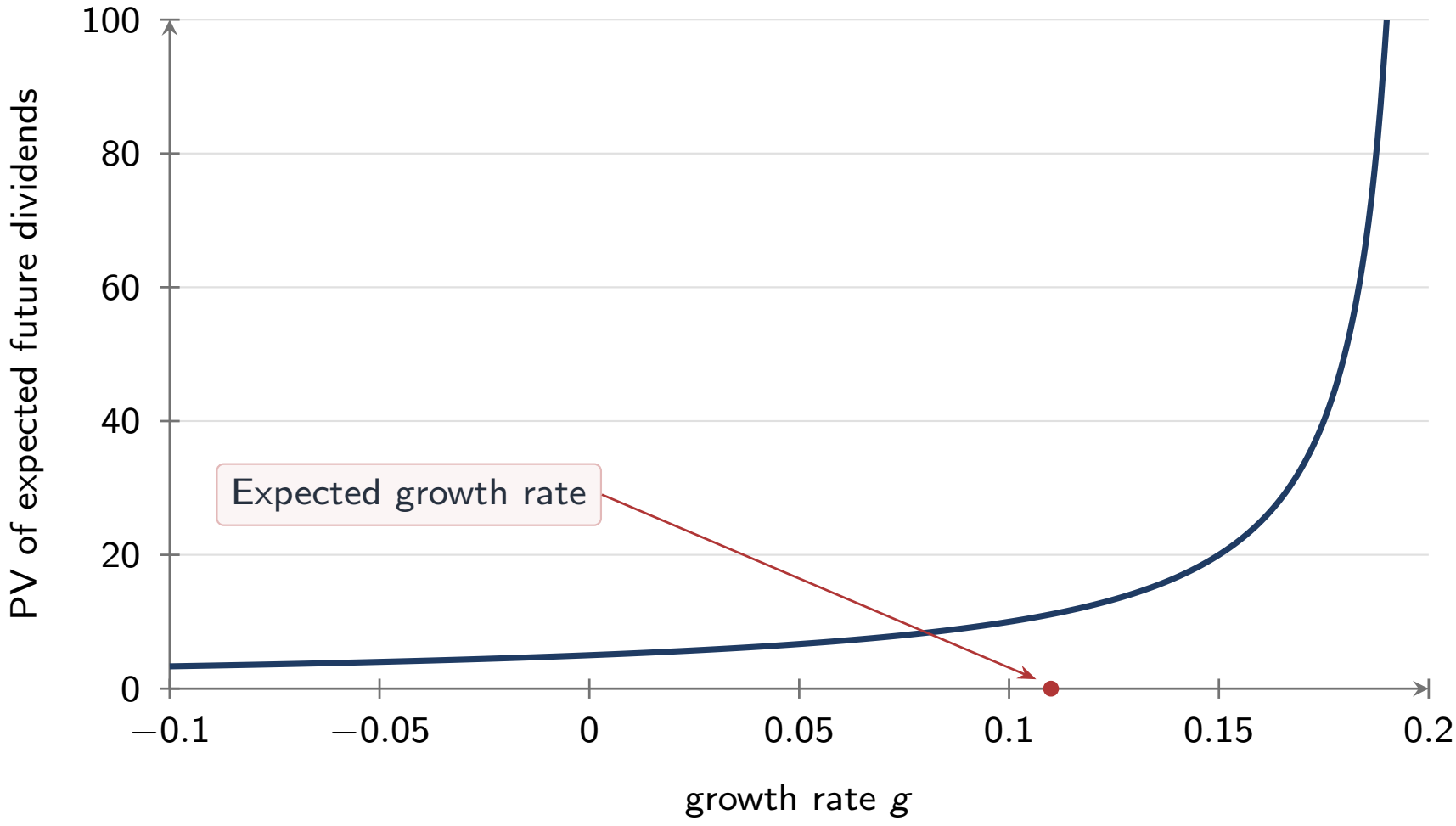

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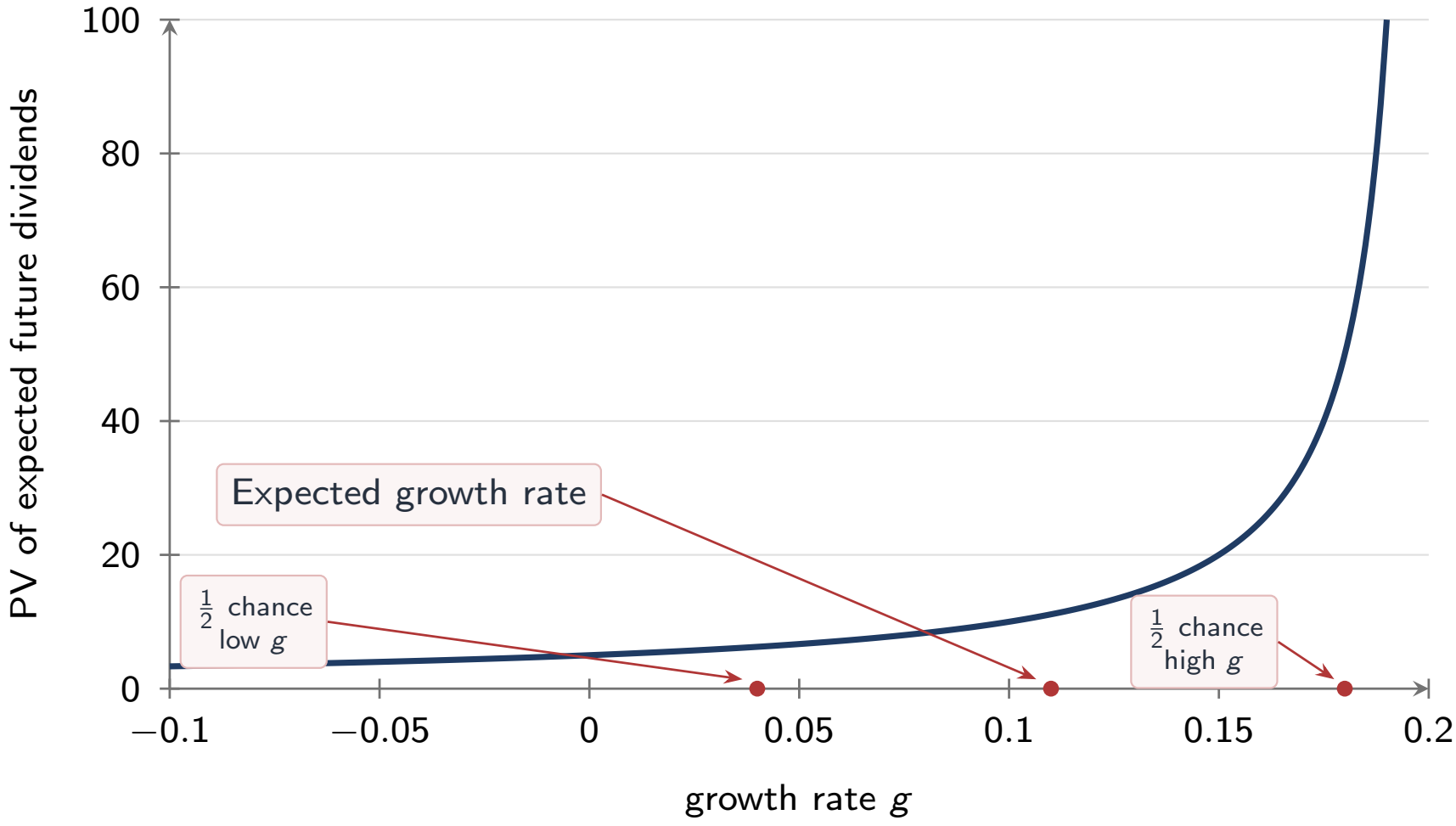

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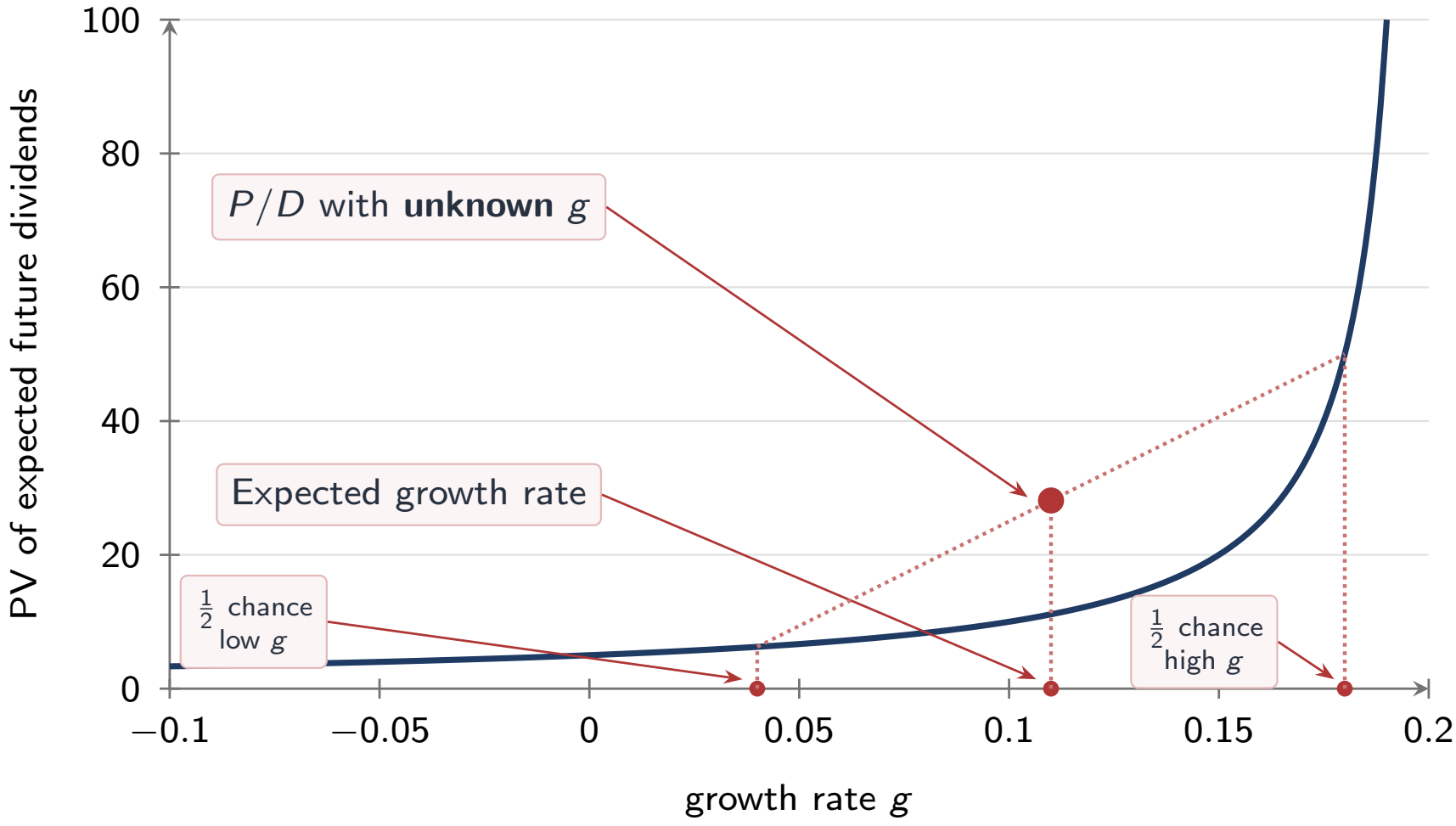

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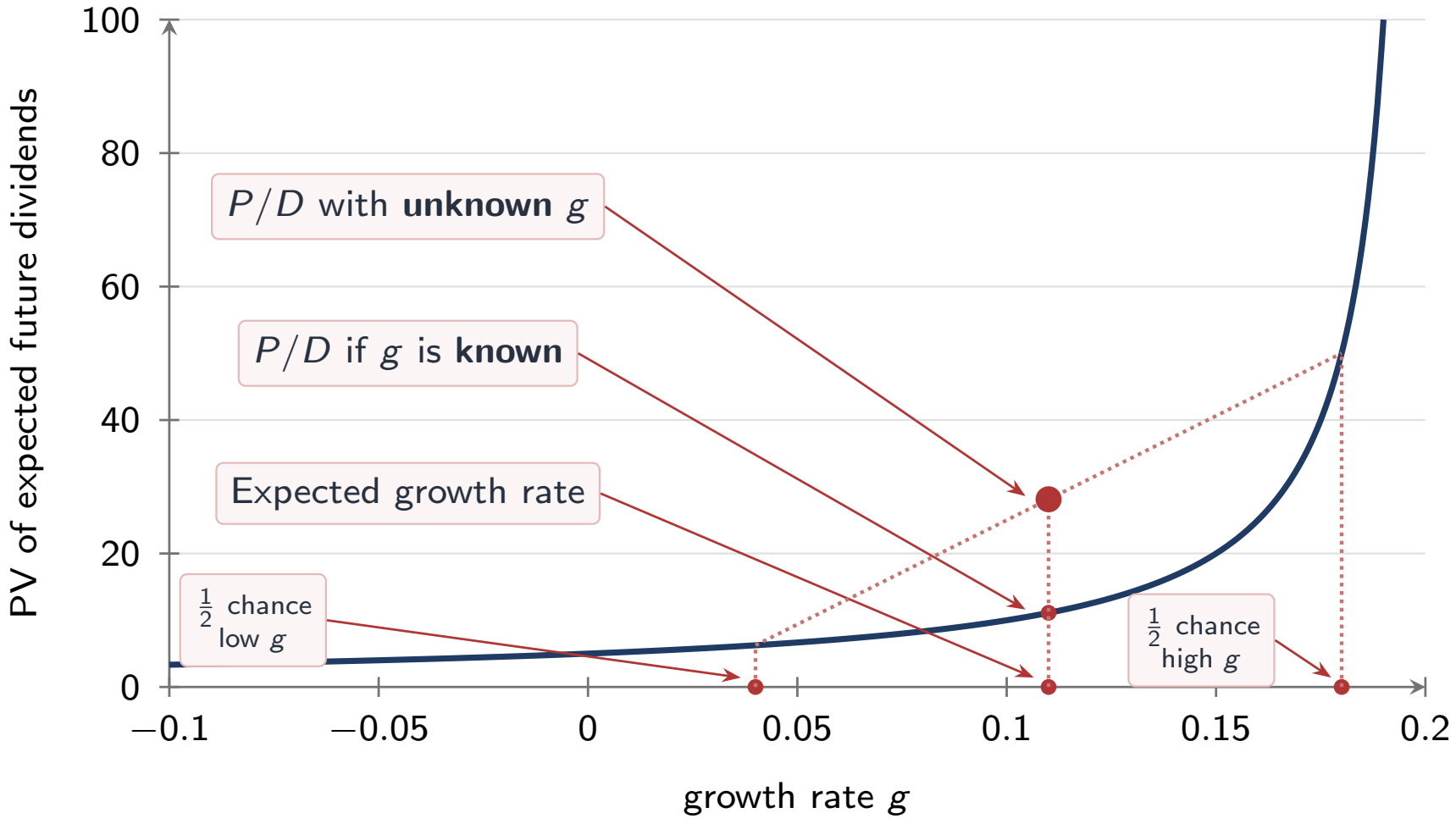

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- We build and calibrate a valuation model that focuses on P/B not P/D (because many tech firms pay no dividends)
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  - For both NASDAQ as a whole and 12 high-profile companies

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- Plausible because matches not only P/B but also return volatility
  - Firms with the **highest P/Bs** also had the **most volatile** returns
  - Not a coincidence—these are the highest uncertainty firms
- Tech stock prices were not only high but also highly volatile
  - High uncertainty about g can explain both

"Technological revolutions and stock prices" (AER)

"Technological revolutions and financial bubbles seem to go hand in hand."

"Every previous technological revolution has created a speculative bubble... With each wave of technology, share prices soared and later fell" (The Economist, Sep 21, 2000)

- Stock prices tend to exhibit **bubble-like patterns** during technological revolutions, especially for innovative firms
  - Examples: late 1990s (Internet), early 1980s (biotech, PC), 1960s (electronics), 1920s (electricity, automobiles), 1850s (railroads)

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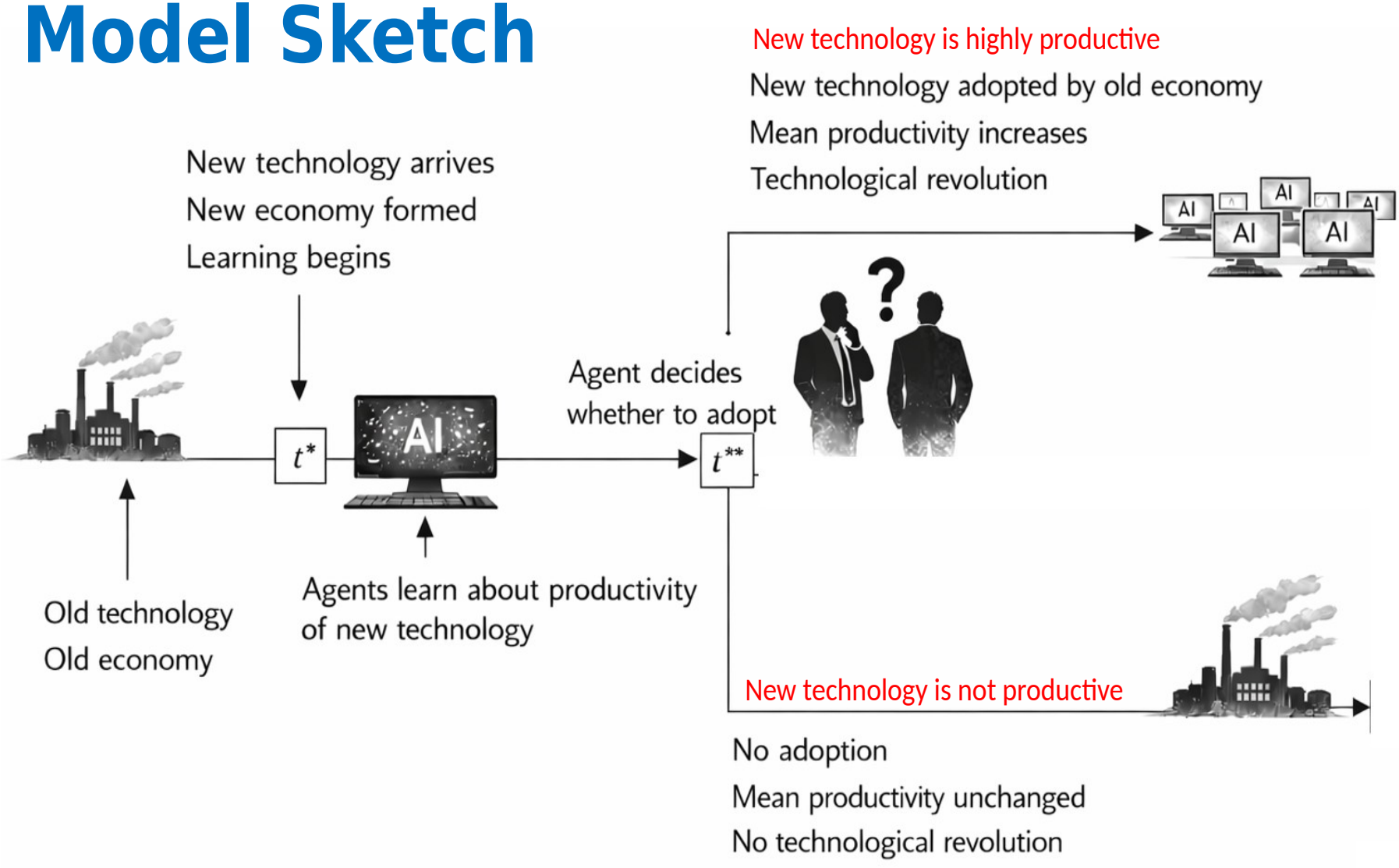
  - Examples: late 1990s (Internet), early 1980s (biotech, PC), 1960s (electronics), 1920s (electricity, automobiles), 1850s (railroads)
- These patterns are commonly attributed to irrationality
  - *"Investors get too excited about the new technology"*
- We propose a **rational** explanation
  - Our GE model produces "bubbles" during technological revolutions

Model Sketch



Our story for "bubbles" during technological revolutions

- New technology $\Rightarrow$ **high uncertainty** about future productivity
  - To learn, new technology is initially deployed on a small scale
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  - Initially **rise** due to good news about the new technology's productivity
    - Expected cash flows $\uparrow \Rightarrow$ Stock prices $\uparrow$
  - Eventually **fall** as uncertainty transforms: **idiosyncratic** $\rightarrow$ **systematic**
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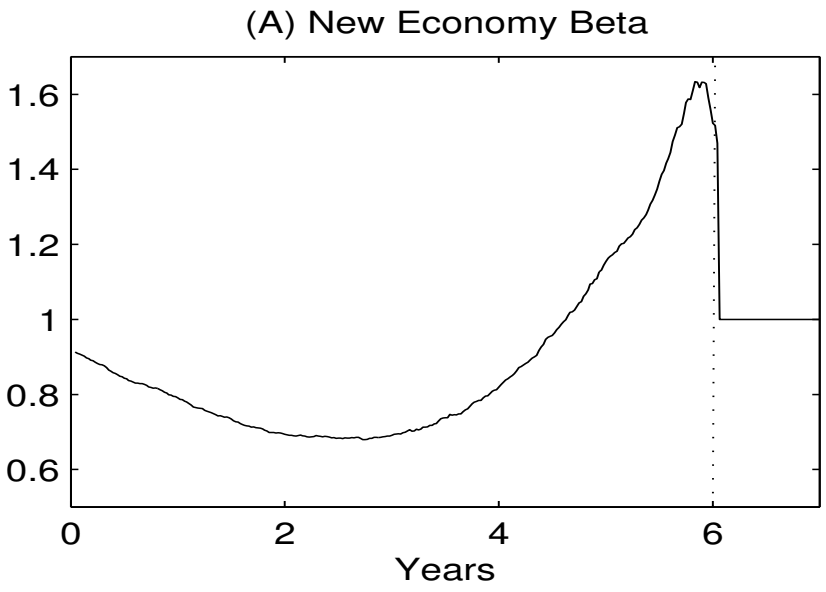
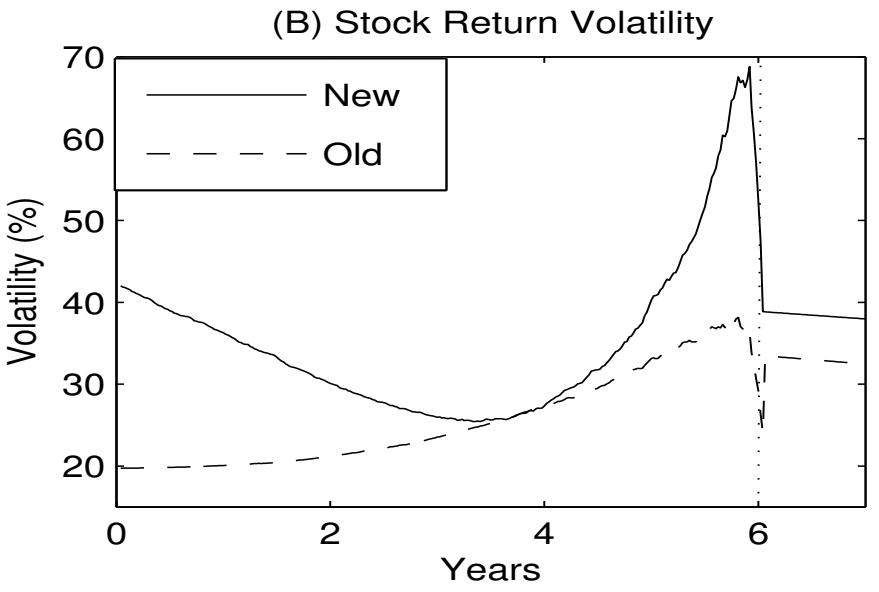
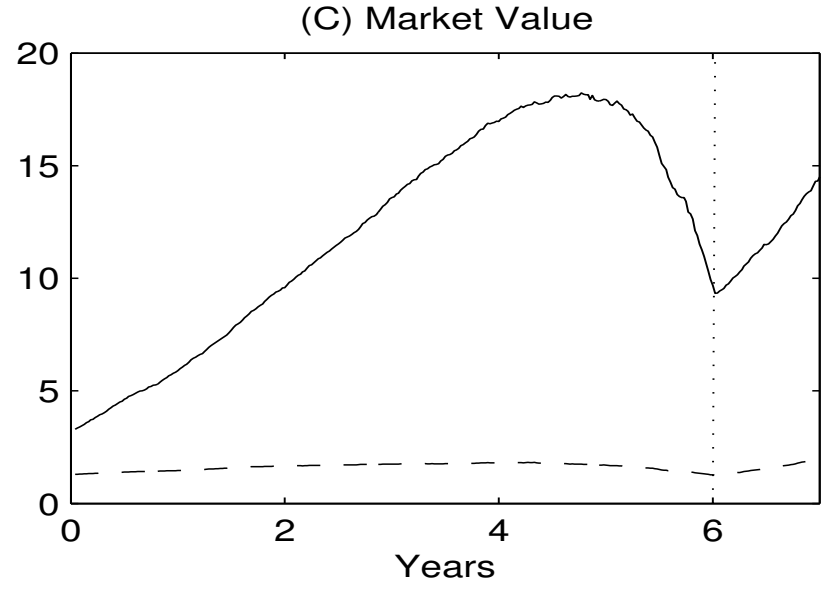
- A "bubble" is **observable ex post** but **unpredictable ex ante**
  - Ex post, we focus on technologies that led to technological revolutions
  - Investors don't know in real time whether a revolution will happen

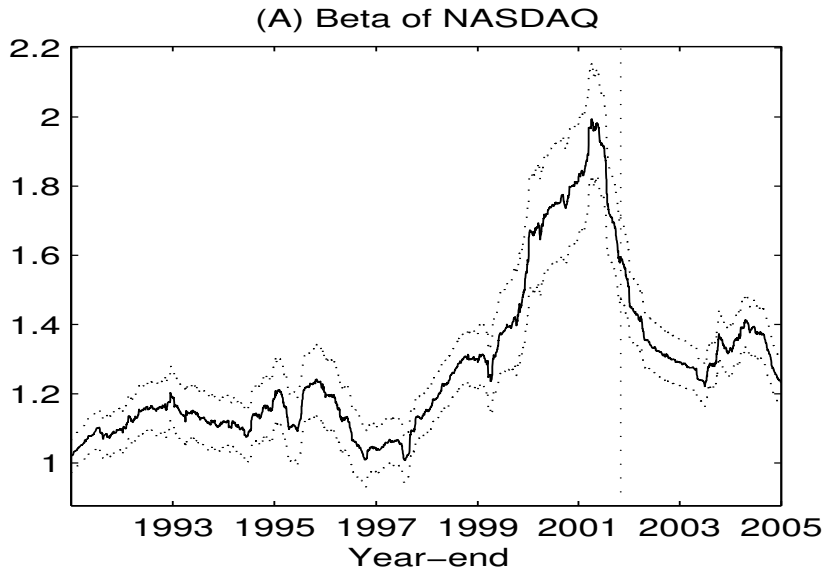
Theoretical predictions

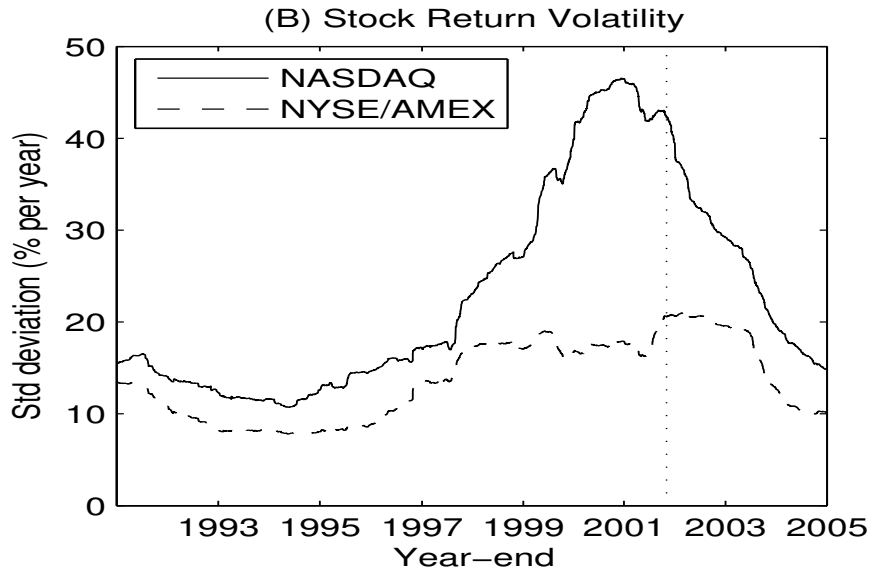


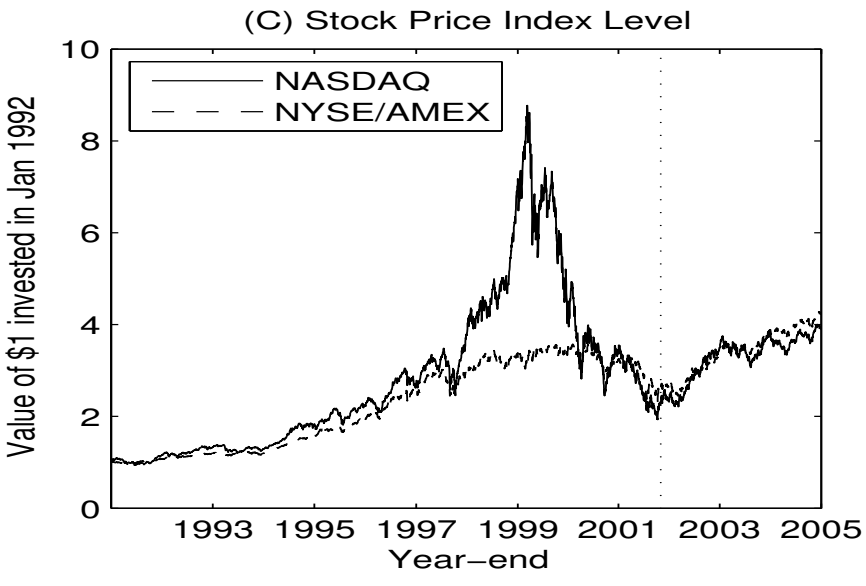




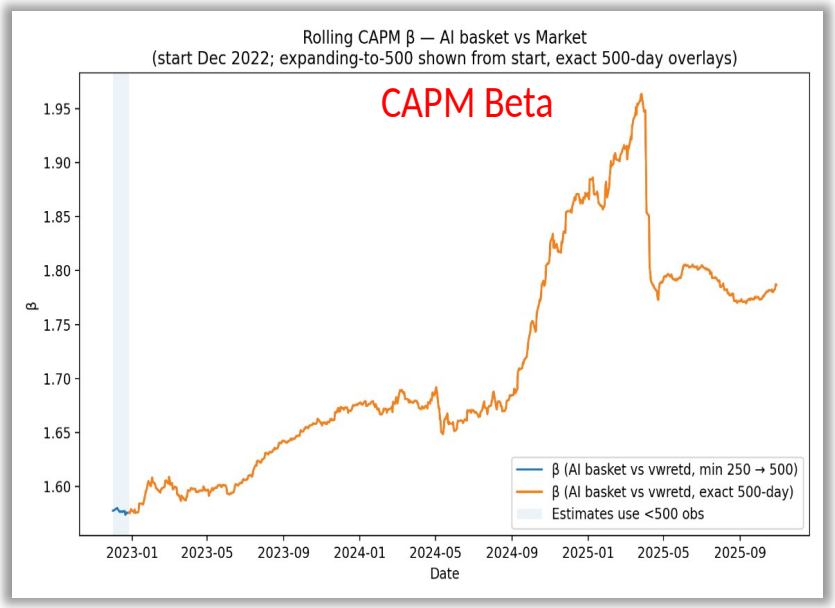
Data: Internet revolution

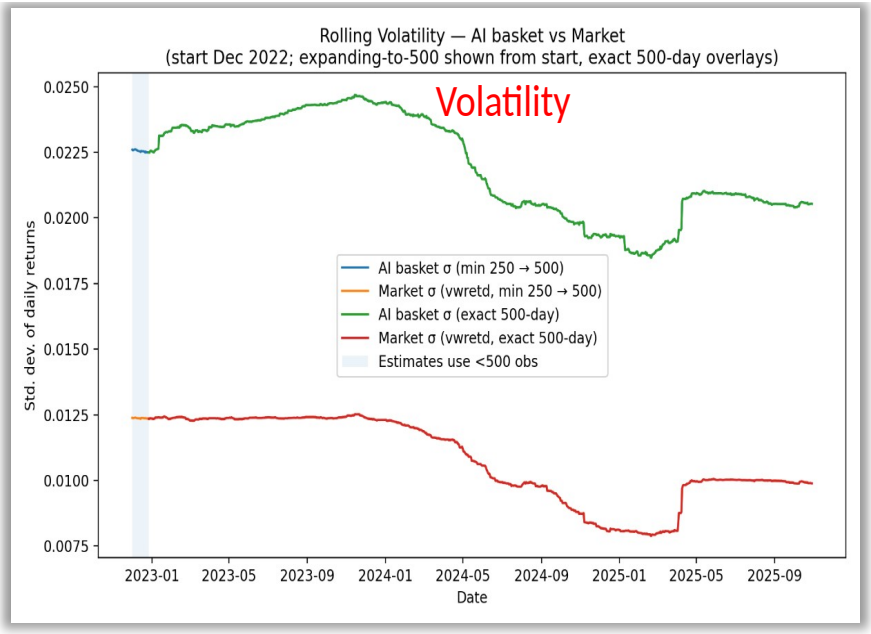


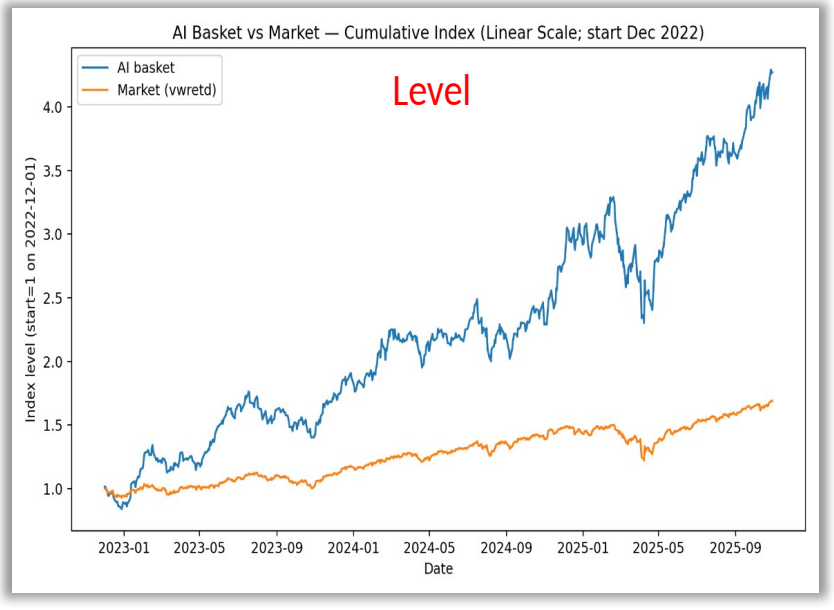




Data: AI revolution







AI basket = Portfolio of 28 AI stocks constructed by AI.
Source: Pietro Veronesi.

Investors k
They're buy

Dec. 29, 2

Tesla
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ECONOMY • MARKETS

Sam Altman
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By Jim Edwards
Executive Editor, Global News

August 19, 2025, 8:28 AM ET

S&P 500 Concentration Is Worrying Me More And More

Nov 07, 2025, 8:36 AM ET | **S&P 500 Futures (SPX)**, **SP500**, **SPY**, **IVV**, **VOO**, **DJI**, **NDX**, **DIA**, **QQQ**, **IWM** | 20 Comments | 1 Like

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Summary

- Market concentration in the S&P 500 is at historic highs, with top holdings dominating index performance and risk exposure.
- The index's structure leaves investors heavily exposed to mega-cap technology stocks, especially NVDA, which now exceeds the market cap of whole European markets.

CEO of OpenAI Sam Altman at the Sun Valley Lodge for the Allen & Company Sun Valley Conference on July 8, 2025, in Sun Valley, Idaho.

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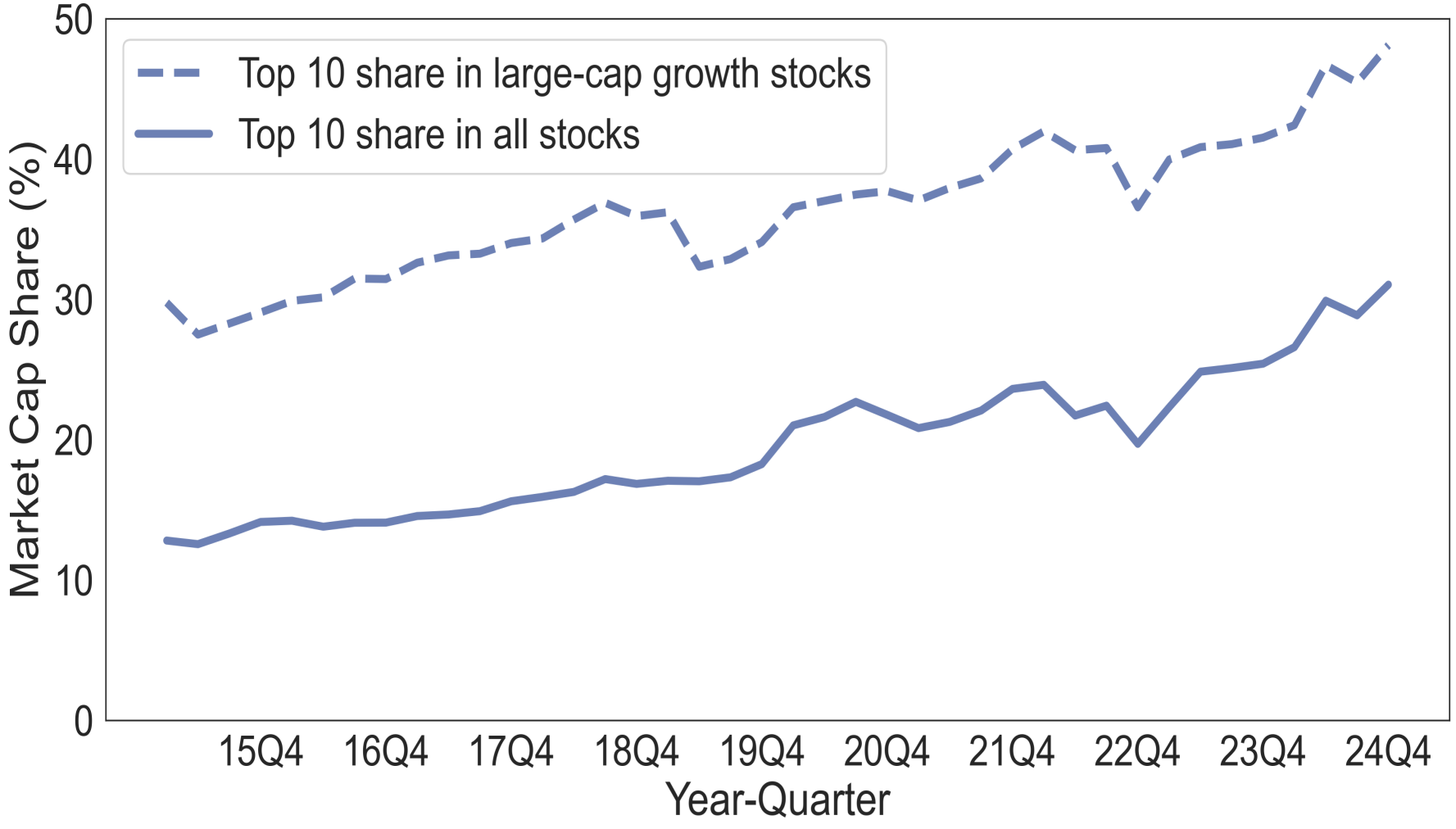
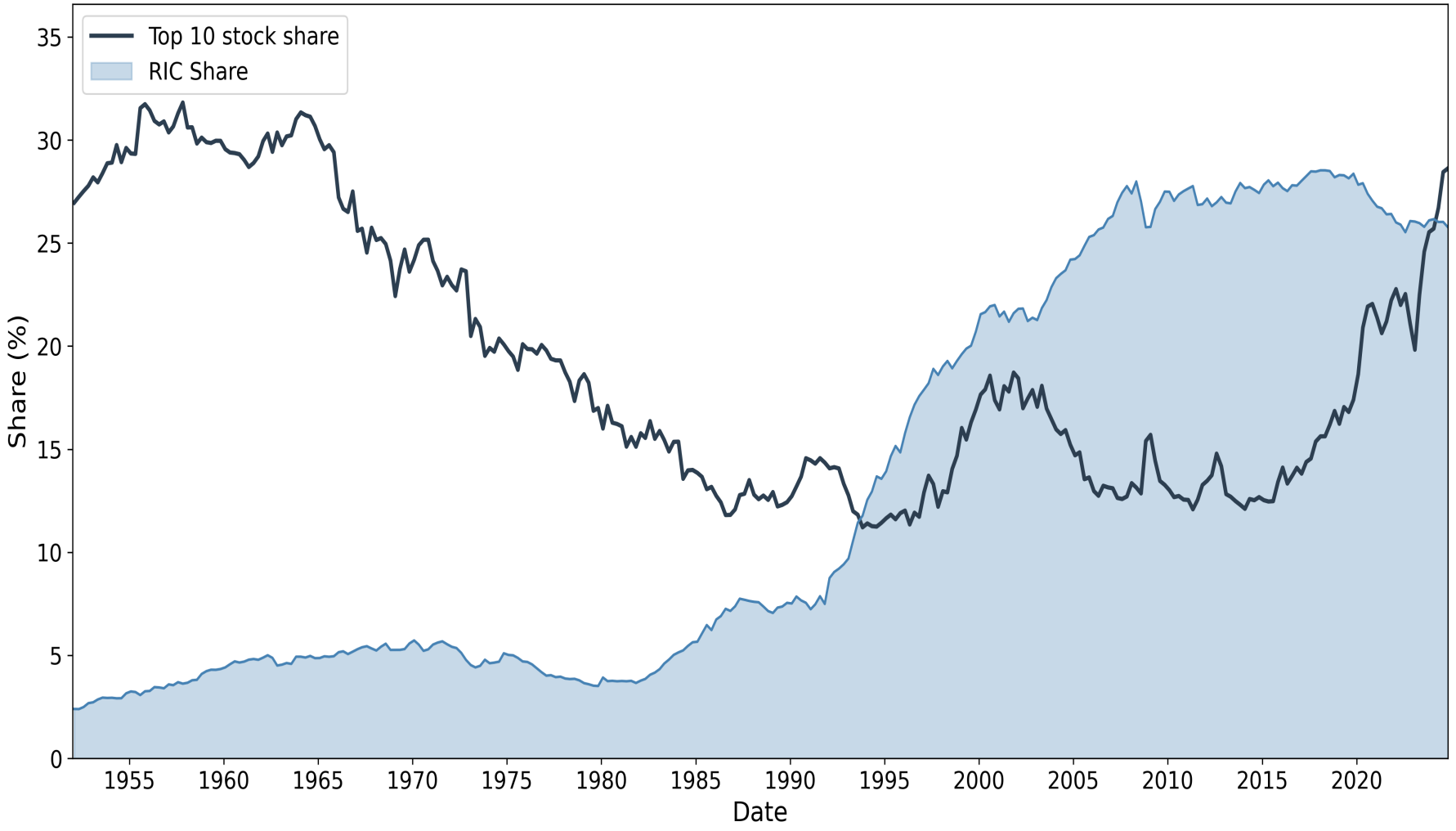
“The hidden cost of stock market concentration” (WP)



High market concentration & high RIC share

RICs = Regulated investment companies (mutual funds, ETFs, closed-end funds)



50/5 rule (U.S. Internal Revenue Code, 1936)

- For all RIC funds, the sum of a fund's **large positions** (portfolio weights $> 5\%$) **cannot exceed 50%** of fund assets
- Market concentration $\uparrow \Rightarrow$ Rule harder to satisfy
- Examples of funds with violations (end 2024):
  - Fidelity's \$68 billion Blue Chip Growth Fund
  - T Rowe Price's \$63 billion Blue Chip Growth Fund

Example: Fidelity Blue Chip Growth ($68B AUM, 2024Q4)

2024Q1

Holdings	Weights	
NVIDIA	11.30%	**43.5%**
MICROSOFT	9.65%	
AMAZON	8.29%	
APPLE	8.22%	
ALPHABET	6.01%	
META	4.90%	
MARVELL	3.45%	
ELI LILLY	2.33%	
SNAP	2.28%	
NETFLIX	2.23%	

2024Q4

Holdings	Weights	
NVIDIA	14.34%	**52.0%**
APPLE	11.14%	
AMAZON	8.16%	
MICROSOFT	7.34%	
ALPHABET	5.92%	
META	5.13%	
MARVELL	3.10%	
ELI LILLY	2.60%	
NETFLIX	2.20%	
SNAP	1.51%	

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  - Fidelity's \$68 billion Blue Chip Growth Fund
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- Rule **constrains funds' positions in the largest firms**

Our paper shows...

- 50/5 constraint has become binding for **large-cap growth** funds
- Constrained funds **trim their largest positions**
- Funds underperform when constrained
- Constrained ownership positively **predicts stock returns**

$\Rightarrow$ *Have mega-cap stocks been underpriced?*

Could purchase constraints lead to underpricing?

- Mirror image of a classic mechanism
- Short-sale constraints suppress pessimists' views $\Rightarrow$ Overpricing
  - Long literature starting with Miller (1977)
  - Small, illiquid stocks

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- Purchase constraints suppress optimists' views $\Rightarrow$ Underpricing
  - This paper
  - Large, liquid stocks

Measuring constraint tightness: Fund buffers

- For fund f in quarter t, compute

$$Buffer_{f,t} = 50\% \quad - \sum_{s \in LargePos_{f,t}} Weight_{f,s,t}$$

"Large position" if weight $> 5\%$

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Buffer $= 50 - 43.5 = 6.5\%$

2024Q4

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Buffer $= 50 - 52.0 = -2.0\%$

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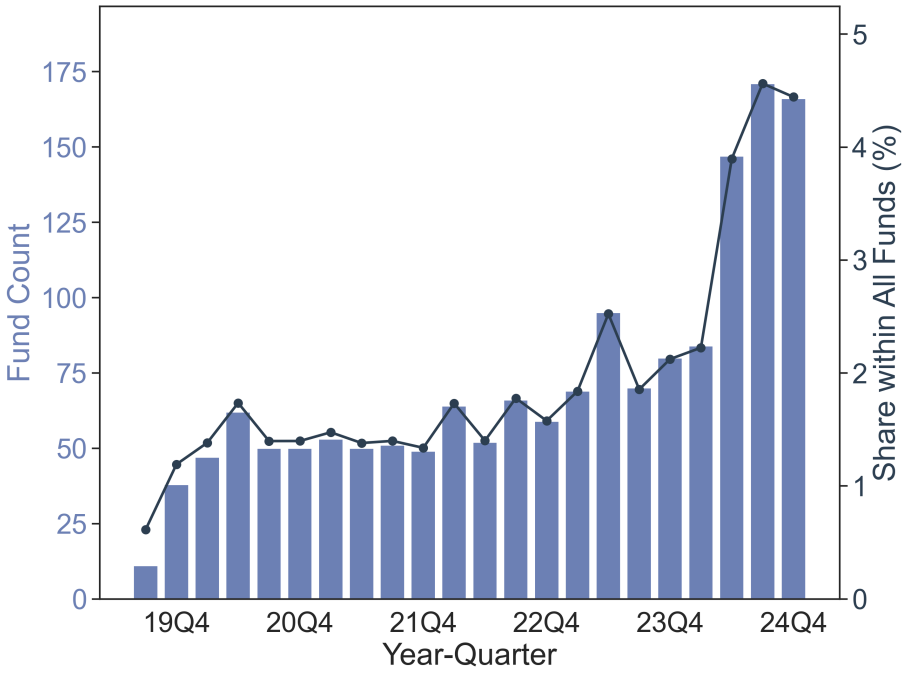
"Large position" if weight $> 5\%$

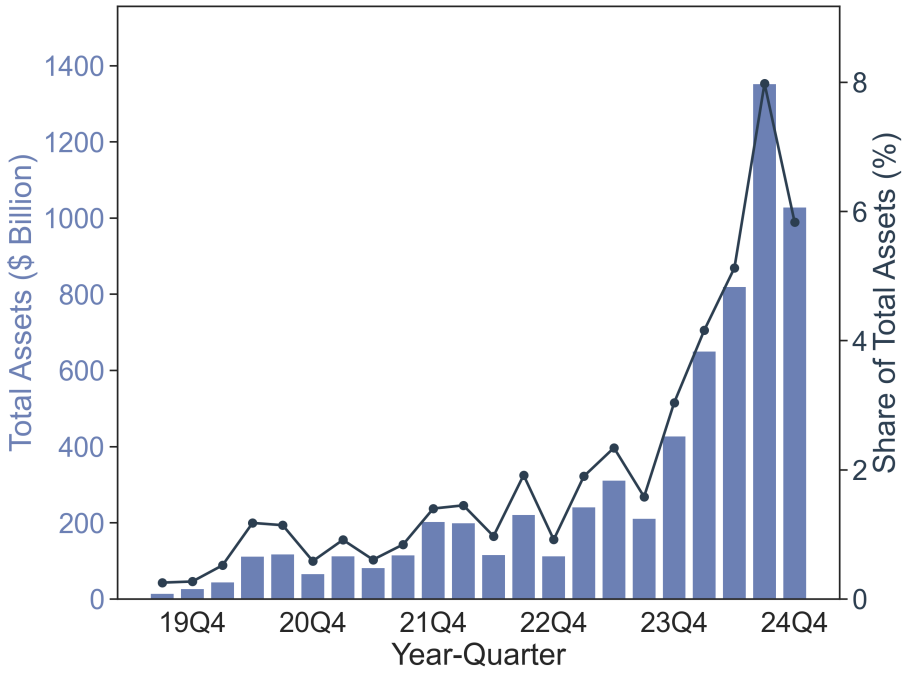
- **Negative-buffer fund**: $Buffer_{f,t} < 0$
  - Violates 50/5 rule
- **Constrained fund**: $0 \leq Buffer_{f,t} < 5\%$
  - One large position away from violation

50/5 constraints have tightened

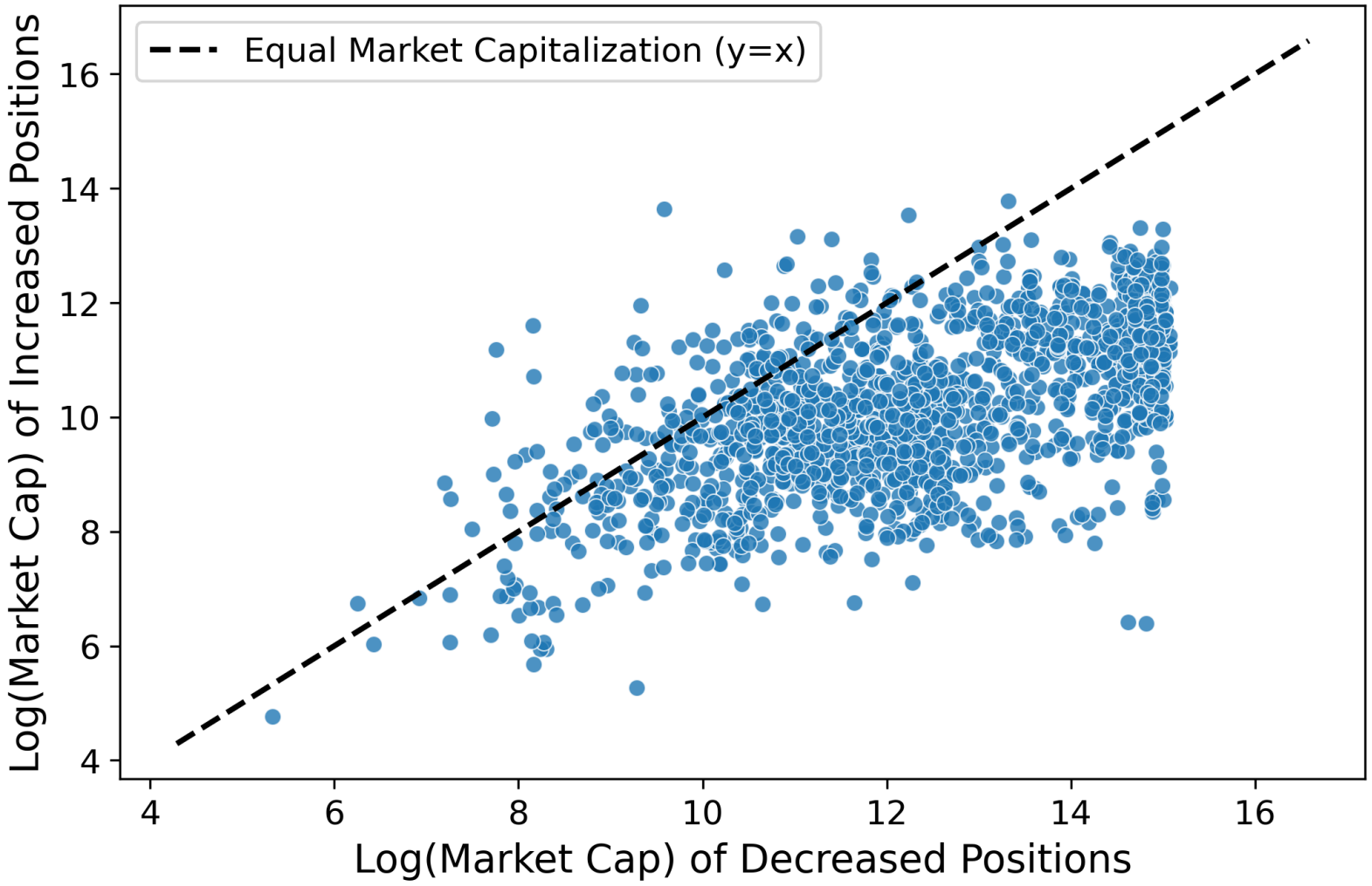
Panel A: Number of constrained funds



Panel B: Assets of constrained funds



Constrained funds substitute toward smaller-cap holdings



Constrained fund ownership predicts stock returns

- A stock's **constrained ownership** C = Fraction of the stock's shares owned in large positions by constrained funds
  - High-C stocks are likely underweighted in constrained portfolios
  - Highest C values: Mag 7 stocks (Nvidia, Microsoft,...)

- Find that high-C stocks have high future returns
  - *So, have the Mag 7 stocks been underpriced?*

Do bubbles matter for financial stability?

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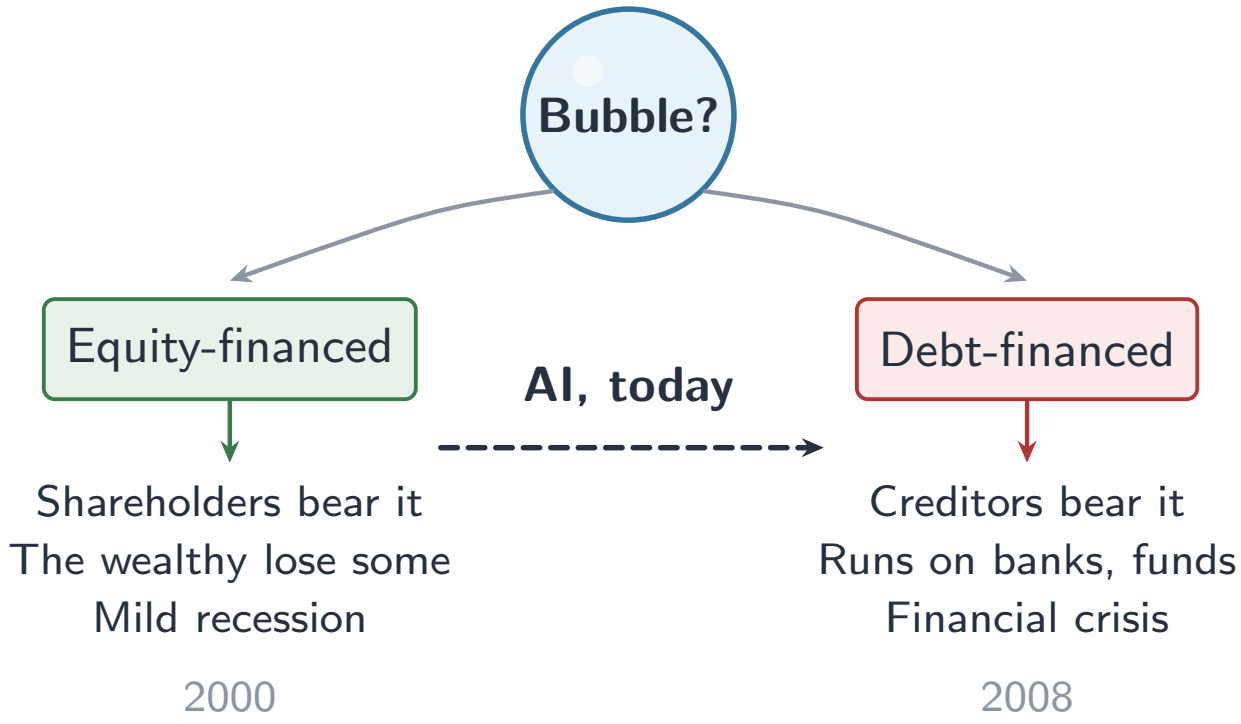
- Depends. How much is **debt**-financed? Who is holding the debt?



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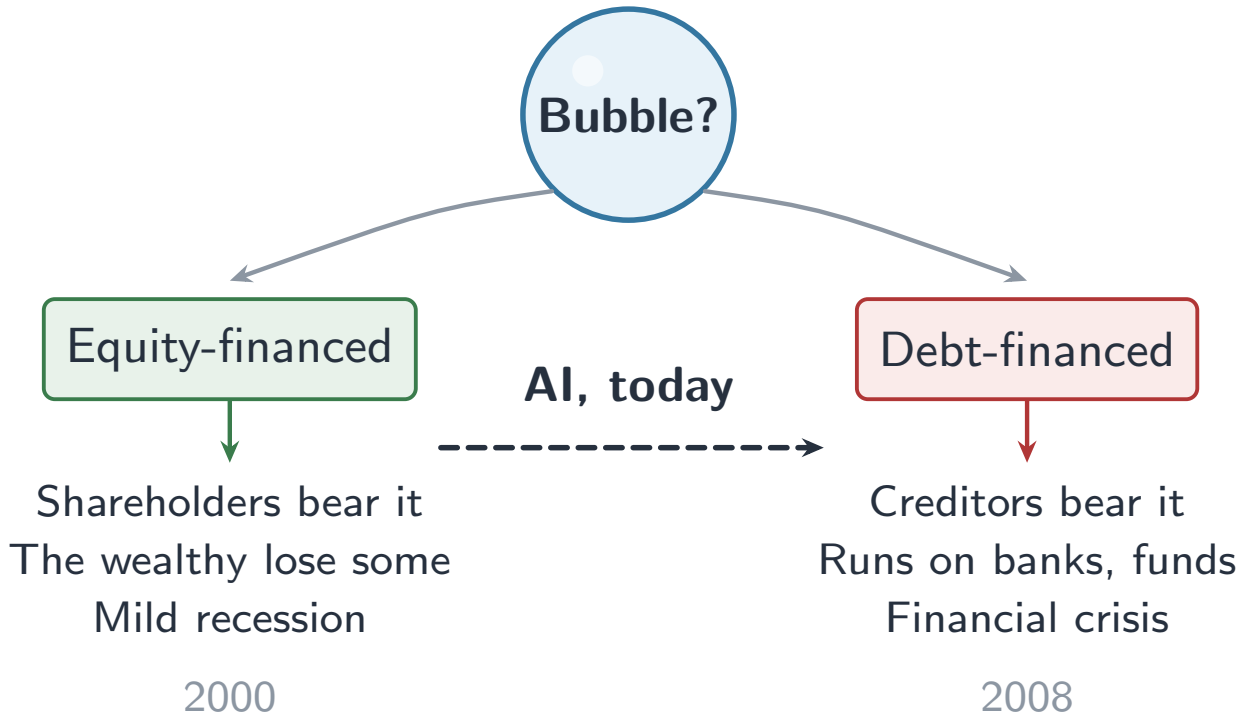
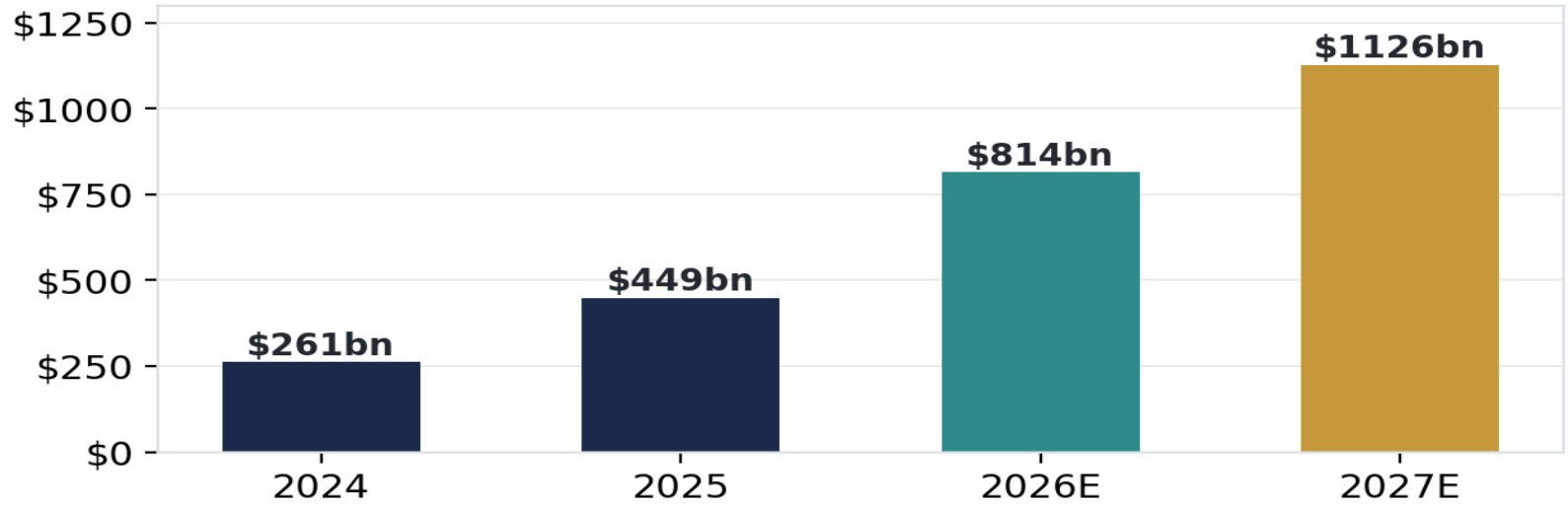


- **2026:** AI capex is increasingly financed by bonds, private credit
  - Growing off-balance sheet arrangements (leases, guarantees, etc.)

Exhibit 1 · Hyperscaler capital expenditure, 2024–2027E

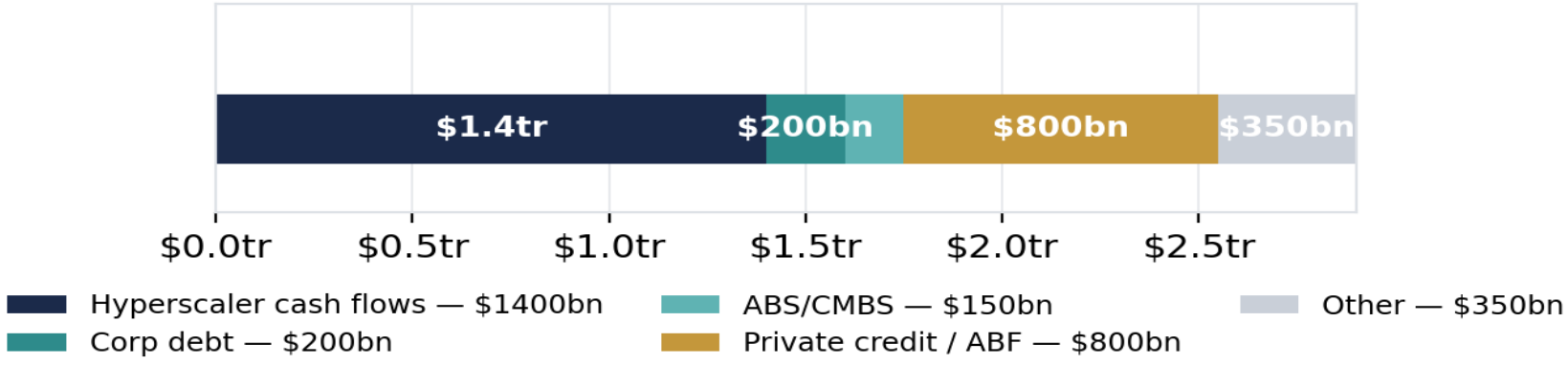
Combined capital expenditure, five largest spenders ($bn)



Source: Company data, Morgan Stanley Research estimates (May 2026).

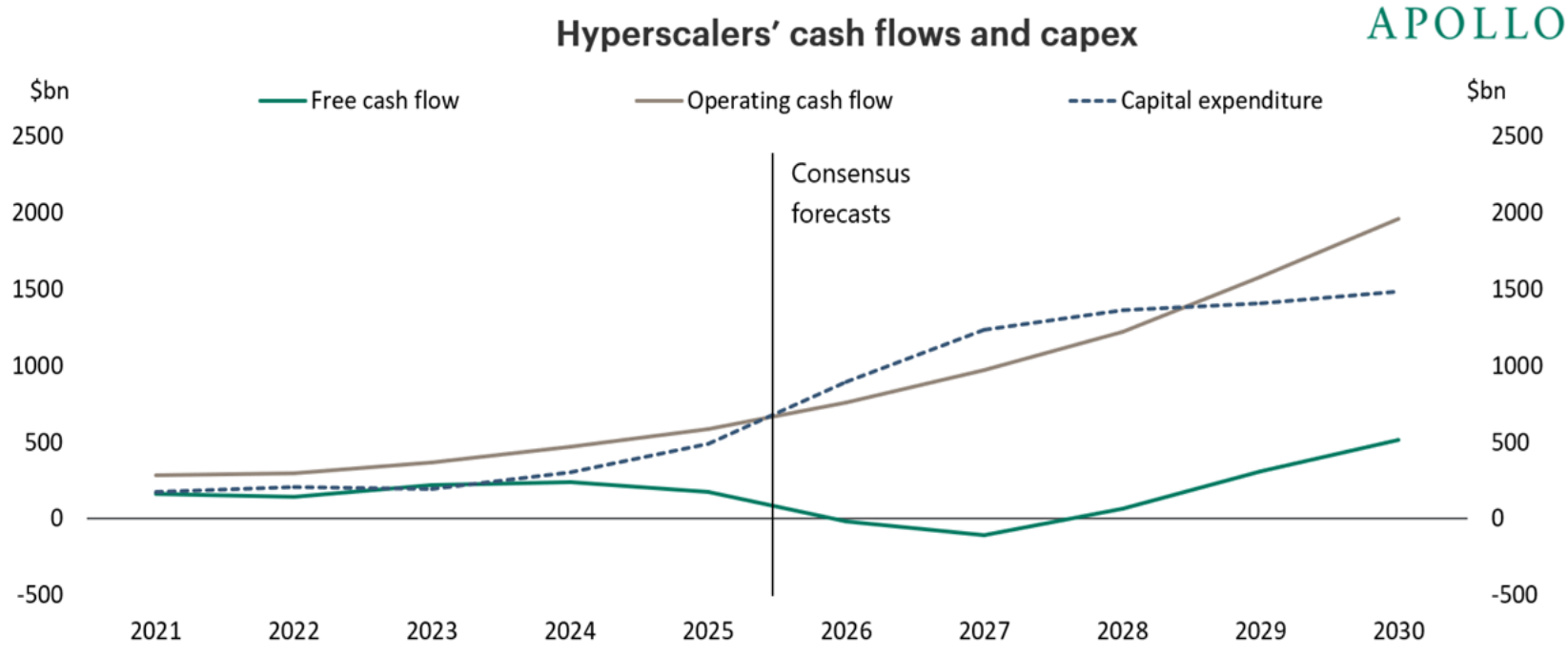
Exhibit 2 · Estimated financing sources for global data center capex, 2025–2028

Morgan Stanley Research estimates ($bn)



Source: Morgan Stanley Research (Jul 2025). Private credit components are led by asset-based finance.

Consensus expects hyperscalers to grow operating cash flow from $600bn in 2025 to $2trn in 2030

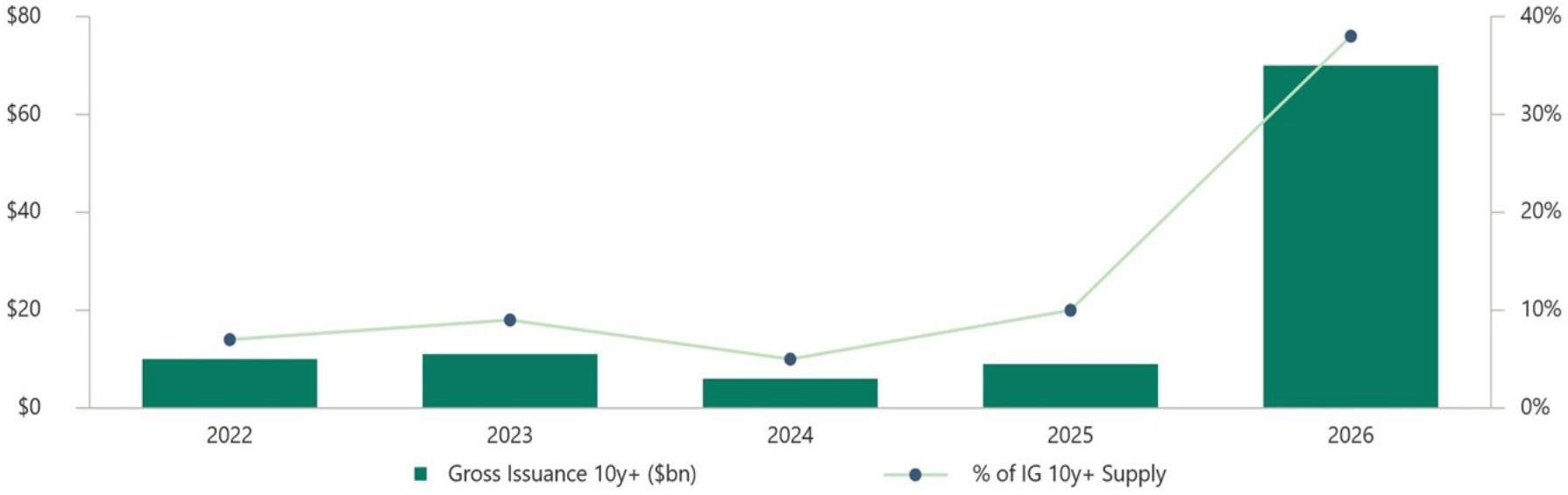


Note: Hyperscalers are: Google, Meta, Amazon, Microsoft and Oracle. Sources: FactSet, Apollo Chief Economist

Apollo, September 21, 2026

APOLLO

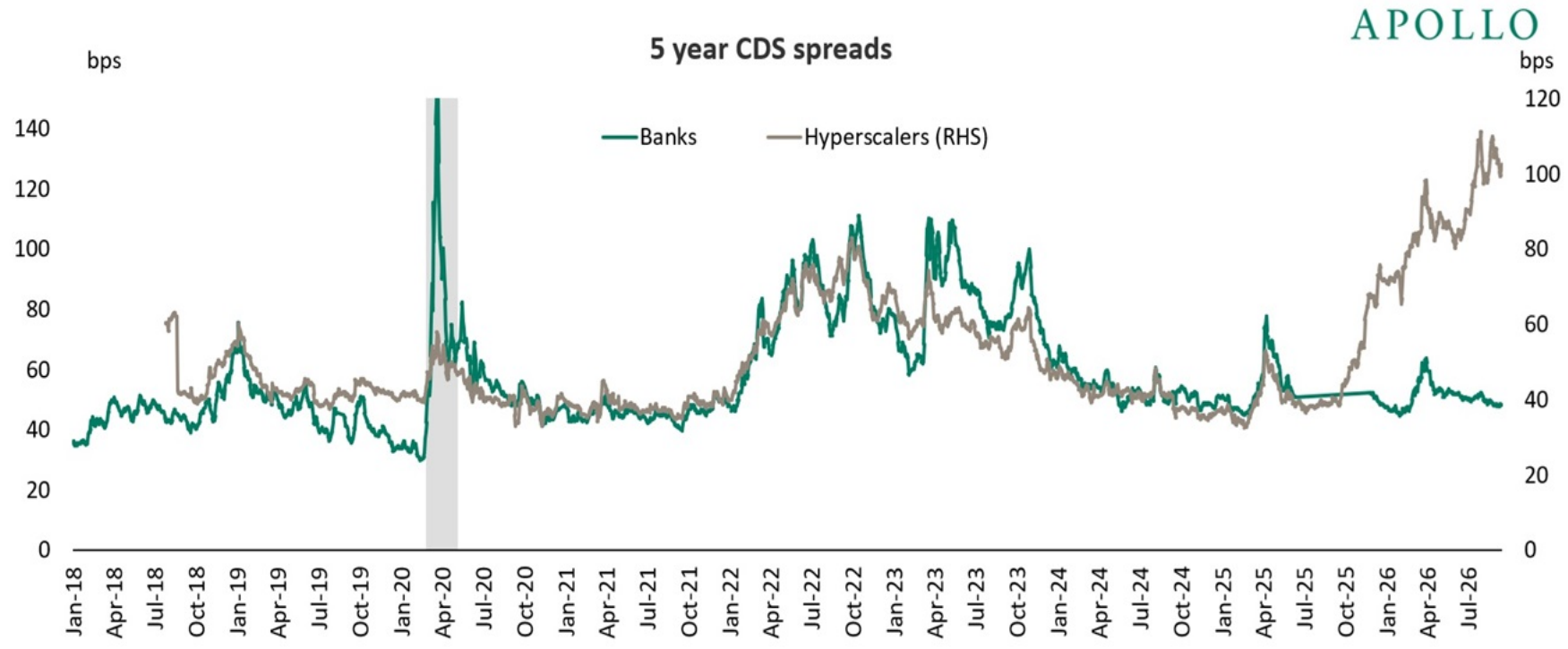
AI-related issuance accounts for nearly 40% of longer duration supply



Note: Data as of July 2026. Sources: Bloomberg, Barclays, Apollo Analysts

Apollo, August 14, 2026

CDS spreads decoupling for banks and hyperscalers



Note: Banks include JP Morgan, Citi Group, Bank of America, Wells Fargo and US Bancorp. Hyperscalers include Amazon, Google, Microsoft and Oracle. Sources: Bloomberg, Apollo Chief Economist

Apollo, September 16, 2026

AI vs. Internet

	Late 1990s	**Today**
Hyped firms	Unprofitable entrants	Profitable incumbents
Leaders' P/E	Very high	High
Concentration	High	Very high
Capital investment	High	Very high
Asset life	Long (fiber: decades)	Short (GPUs: years)
Financing	Equity (mostly)	Debt (increasingly)
Transparency	High (public markets)	Lower (also private)

- AI looks better on **price**, worse on **structure**

Conclusions

- Is there an AI bubble? Hard to tell. High prices can be rational.
  1. Uncertainty about growth raises valuations
  2. Prices can fall because discount rates rise, not because investors erred
  3. In fact, market concentration may have left the Mag 7 underpriced

- What to watch out for during the AI revolution?
  - **The financing mix.** Equity vs. debt.
  - **Who is holding the debt?** Can there be runs?
  - **What is hard to see?** Private markets, off-balance-sheet vehicles
  - **Market concentration.** Limited diversification amplifies losses.

- Watch the **debt**, not the **multiple**
  - Valuations are a weak signal. Leverage is a strong one.