FROM INNOVATION TO SPECULATION: AI AND THE MAGNIFICENT SEVEN

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June 2026

COWLES FOUNDATION DISCUSSION PAPER NO. 2537

COWLES FOUNDATION FOR RESEARCH IN ECONOMICS

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From Innovation to Speculation: AI and the Magnificent Seven

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Abstract

The AI boom has driven the Nasdaq and the Magnificent Seven tech stocks to record highs. But how much do these new records reflect underlying value, how much is speculation, and how vulnerable are these stocks and the wider market to a major downturn? Our evidence and analyses show clear signs of bubble exuberance in most of these stocks, concentrated in a few names like Nvidia, leading to latent risks for investors who assume their index funds are safely diversified and supported by wider economic fundamentals.

Why Stock Market Bubbles Matter

A stock market bubble is defined as a situation prevailing in the market where an individual stock price (or a market index) deviates significantly and persistently from what may be regarded as its fundamental or intrinsic value. A similar characterization applies to bubbles in other markets, such as real estate and cybercurrency. Since the dot-com bubble in the Nasdaq during the late 1990s, there has been enormous general interest in such phenomena as well as specialist interest among economists.

Bubbles are usually considered to be driven by speculation, self-exciting price expectations, or irrational exuberance, to use the phrase coined by the Alan Greenspan the Federal Reserve Chairman in 1996 with respect to the Nasdaq. Stock market bubbles are more than just fleeting financial phenomena - they carry significant economic and social consequences. When bubbles burst, they often trigger sharp market corrections or crashes, destabilizing financial institutions heavily invested in overvalued stocks. Over its tenure from 1995-2002 the dot-com bubble created and destroyed some US$5 trillion in market capitalization wealth. The share price collapse of major technology companies during the dot-com bubble collapse in the early 2000s exemplifies how a

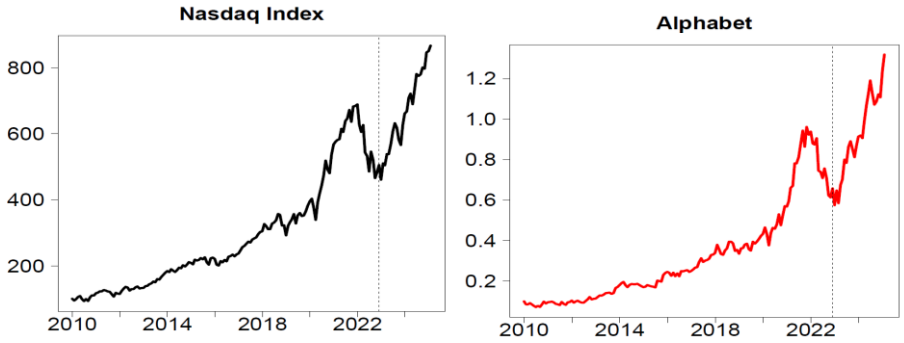
bubble can shake the foundation of financial markets, causing widespread instability and economic fallout.

Bubbles lead to significant wealth destruction for investors. Lured by the promise of rapid financial gains, both retail and institutional investors can pour substantial resources into speculative stocks; and bubbles distort economic decision-making by diverting capital away from productive sectors to speculative ventures. This misallocation of resources stifles innovation in sustainable industries and undermines long-term economic growth.

When a stock market bubble does burst, the repercussions can extend well beyond the financial sector, impacting broader economic activity. Declining asset values can erode consumer confidence, leading to cutbacks in spending, rising unemployment, and decreased investment by companies. In severe cases, these dynamics can contribute to recessions or economic stagnation. Repeated episodes of bubble formation and collapse erode trust in financial markets. When investors lose confidence, it becomes harder for legitimate companies to raise capital, while market participants face heightened concerns about irrational exuberance or manipulation.

The Magnificent Seven: A Snapshot of Speculation

The term "Magnificent Seven" was originally coined by a Bank of America analyst to refer to the seven tech giants: Alphabet, Amazon, Apple, Meta, Microsoft, Nvidia, and Tesla. These firms became the focal point of our study because they have significant market influence that is buoyed by technological innovation, their ability to shape consumer behavior, and their impact on broader economic trends. As of February 15, 2025, their combined market capitalization stood at approximately $17.3 trillion.



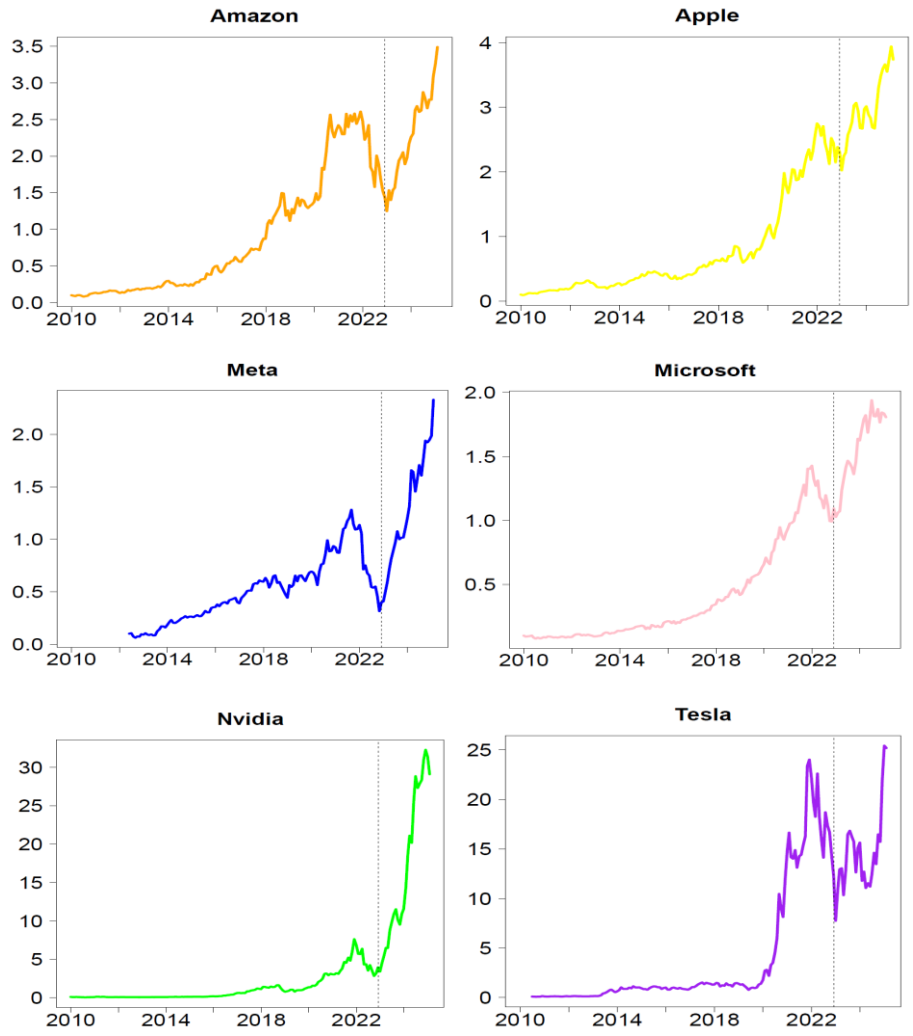


Figure 1: The Nasdaq index and the Magnificent Seven Stocks Prices from January 2010 to January 2025 (adjusted for dividend and stock split and normalized to 100 at the beginning of the sample period). Data Source: Yahoo! Finance and Refinitiv. The vertical line highlights a recent market trough in November 2022.

The Nasdaq and the Magnificent Seven stocks surged sharply from 2019, fuelled by a wave of market optimism. That rally gave way to a broad sell-off between January and November 2022, before an even more dramatic rebound took hold. The recovery has been especially striking in names like Meta and Nvidia, which have powered to new heights in recent years.

What Our Research Found

Our study examines whether the Nasdaq and the Magnificent Seven technology stocks have been

subject to speculative bubbles during the AI boom. We employ advanced econometric methods to detect bubble-like behaviour and to evaluate how much speculation has influenced prices, both in the overall market and in individual stocks. To account for fundamentals, we adjust share prices for dividends and stock splits and remove broader market and industry effects using statistical techniques that account for such factors. We then apply a specialised bubble detection method to the market's price-dividend ratio and to the adjusted share prices. Finally, we use new inferential techniques that account for economic and financial fundamentals to assist in quantifying the scale of speculation whenever a bubble is identified.

The sample is divided into two periods, with November 2022 as the breakpoint, marking the Nasdaq market trough (indicated by the vertical line in the graph). The two periods are January 2010 - November 2022 and December 2022 - January 2025.

Period I: January 2010 - November 2022

Our findings reveal speculative bubbles in the Nasdaq market and across several Magnificent Seven stocks in the first sample period. The Nasdaq surged steadily for several years, climbing to a peak in December 2021. Much of this growth, highlighted in the shaded areas of the chart, was fuelled by bouts of speculative activity, particularly between April 2017 and November 2021.

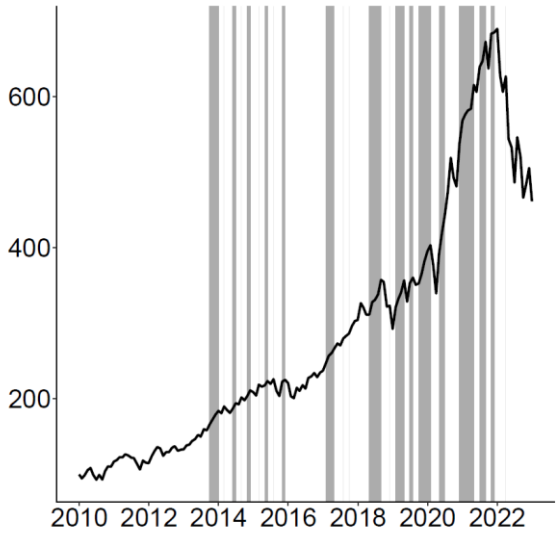
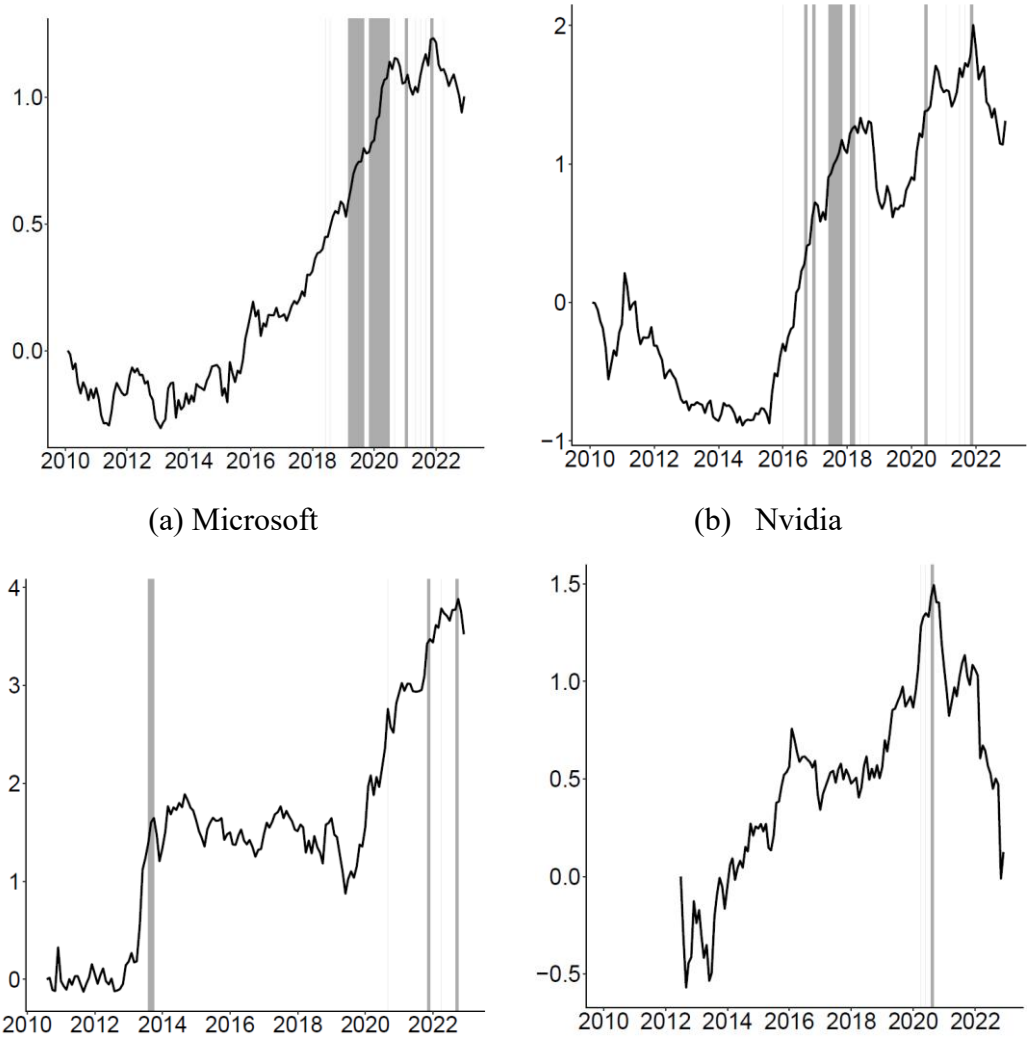


Figure 2: The solid line represents the adjusted Nasdaq composite index. Shaded areas indicate periods where bubbles are identified.

Among the Magnificent Seven stocks, Microsoft and Nvidia stand out as the most speculative, with repeated bubble episodes - Microsoft between 2018 and 2022 and Nvidia stretching back to 2015. Meta and Tesla also experienced bouts of bubble activity, though shorter and less frequent. By contrast, Amazon, Apple, and Alphabet showed little to no speculative phases. When it comes to the speed of price surges, Nvidia and Tesla outpaced the rest of the market, rising far more explosively than their peers.



(a) Microsoft (b) Nvidia

(c) Tesla (d) Meta

Figure 3: The solid lines represent the 'fever' components of the individual stocks. Shaded areas indicate periods where bubbles are identified.

Period II: December 2022 - January 2025

Between December 2022 and January 2025, the Magnificent Seven stocks raced ahead of the

broader Nasdaq, which rose at a slower, steadier pace. Nvidia led the surge with the steepest gains, closely followed by Meta, while Tesla, Amazon and Alphabet posted more moderate but still notable growth. Apple and Microsoft moved more in line with the Nasdaq itself. By the end of the period, Nvidia had pulled far ahead, creating a striking gap with the rest.

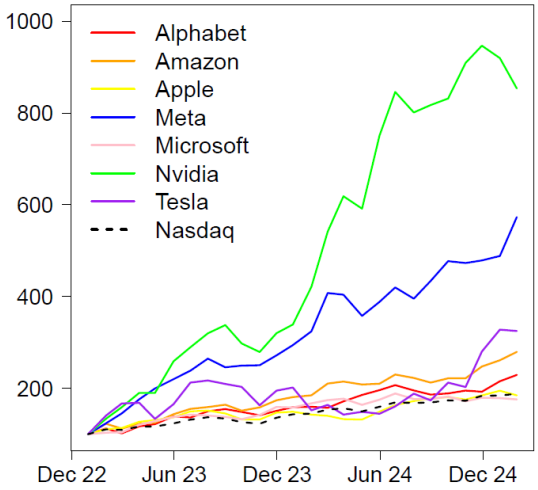


Figure 4: Adjusted prices of the Magnificent Seven stocks and the Nasdaq price index from December 2022 to January 2025.

We applied our econometric bubble detection method to both the overall Nasdaq market and each of the Magnificent Seven stocks over the sample period. As in Period I, we controlled for fundamentals at the market level and isolated stock-specific components by adjusting for company effects and filtering out broader market influences. The results show clear signs of speculative behaviour in the Nasdaq as a whole and in six of the seven major tech stocks. The only exception is Apple, which displayed no meaningful evidence of bubble activity.

These results highlight some variation in speculative dynamics across the group. In Apple's case, a cautious AI strategy has tempered investor sentiment and raised doubts about its future growth, curbing excitement around its prospects. By contrast, Nvidia has fuelled intense investor enthusiasm, with its GPUs at the heart of the AI boom and its stock price soaring on expectations of continued dominance. This surge has elevated Nvidia to a bellwether for the tech sector. Yet the very momentum driving its growth also magnifies risks: while investors eager to ride the AI wave see vast opportunities, the sharp rise in valuations leaves the stock highly vulnerable to bouts of volatility and potential corrections.

Is AI Overhyped?

Our findings speak to a question now dominating market commentary: is the AI rally overhyped? The evidence is clear and supported in formal testing. Speculative bubbles do appear in the Nasdaq and in six of the seven stocks, showing that prices have at times run well ahead of what fundamentals can justify. That hype is uneven rather than uniform. It clusters in particular names and particular windows instead of spreading evenly across the group, which argues against treating the whole AI story as a single mania. Nvidia is the most exposed, because the near vertical climb in its price embeds expectations of continued dominance, while Microsoft and Tesla show repeated but shorter speculative bursts and Apple shows none at all. The balanced reading is not a blanket verdict of bubble or no bubble, but that the speculative premium and market exuberance is real and concentrated where enthusiasm has run hottest. The broader question of whether AI itself is overhyped is a deeper and more complex question that affects society and humanity in ways that go beyond economic fundamentals but which will inevitably involve them, as happened three decades ago with the internet, information technology and computer age itself. In this context it is useful to recall how the MIT Nobel Laureate Robert Solow once characterized it in its early stages: "You can see the computer age everywhere but in the productivity statistics."

Bubbles often originate from technological and financial innovations with many historical instances of technology-driven booms, including railroads in the mid-19th century, television in the mid-20th century, and personal computers in the 1980s. Recent p rime examples are the bursting of the dot-com bubble and the global financial crisis in the first decade of the 21st century. While speculative bubbles may sometimes attract short-term gains, they can destabilize markets when major price corrections occur. For individual stocks, particularly in high-growth sectors like Tech, these bubbles represent heightened risk as abrupt corrections can lead to devastating financial losses. The speculative behavior in the first period was followed by a market downturn in early 2022, with both individual stocks and the market index experiencing declines of varying magnitudes.

From a policymaker's perspective, a balance between fostering innovation and implementing safeguards to curtail excessive speculation to maintain financial and economic stability is required. For the equity analysts who follow these firms, the findings argue for separating two things that are easily conflated: the part of a price move that reflects improving fundamentals and the part that

reflects speculative fever. Our framework does exactly this, and it cautions against extrapolating Nvidia's recent trajectory indefinitely or without caution. A valuation that already assumes flawless execution is fragile, and analysts who flag that fragility early serve their clients better than those who simply follow the momentum. The same caution applies to index traders. Because the major Nasdaq and broad market indices are weighted by market value, the rise of the Magnificent Seven has turned these supposedly diversified products into a concentrated bet on a handful of AI names, the very stocks our analysis flags as the most speculative. Investors who think they are spread across hundreds of companies may be heavily exposed to Nvidia and its peers, so a sharp correction would feed straight through to portfolios chosen for safety; equal weight or capped versions of the same indices are one way to limit that hidden concentration.

As in the earlier internet boom of the late 1990s and Solow's prudent reflection on the computer age, evidence of a major AI impact on economic fundamentals is yet to emerge in the data, particularly at the macro level. But its impact at the micro level on work practices is already widespread through AI automation and AI assistance that aids, accelerates, informs and improves workflow through easily accessible apps, programming and co-pilot facilities. In education its impact is evident at every level and across most disciplines in college and graduate teaching, assessment, learning and research. The rapid advances in generative AI (e.g., ChatGPT, Claude, and Gemini) capabilities and accuracy over the last two years, for example, are remarkable in themselves, exceed well-informed expectations, and are now indicative of major potential in workplace functions. Against this background of rapid, widespread development of AI coupled with ease of access, it is reasonable to expect multiple diversified impacts on human performance and hiring requirements in the labour market. Macro level effects seem inevitable in such a highly transformative environment.

This piece draws on our published article: Basele, R. B., Phillips, P. C. B., and Shi, S. 2025. "Speculative Bubbles in the Recent AI Boom: Nasdaq and the Magnificent Seven." Journal of Time Series Analysis 46 (5): 814–828.