“The 2000 high-tech stocks crisis: a rational bubble?”

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1. Introduction

1.1. Financial bubble: definition

Before going deep into the chosen topic, it is important to clarify what a bubble is, and which are the factors that will lead to it.

A financial bubble is an economic cycle characterized by the act of change in prices which is not supported by analysis of the fundamentals of the asset.

It is marked by rapid escalation in asset prices, due to speculative behaviours, followed by a rapid sharp contraction, with strong effects on the economy.

This is since the price change is not rationally justified.

Some economists created connections with behaviour and investors' psychology, while others argue that it neither exists because economy only acts in accordance with the real information already available on the market.

One of the most famous economists, R. Shiller, gave his definition of bubble from a psychological perspective:

"A situation in which news of price increases spurs investor enthusiasm which spreads by psychological contagion from person to person, in the process amplifying stories that might justify the price increases and bringing in a larger and larger class of investors, who, despite doubts about the real value of an investment, are drawn to it partly through envy of others' successes and partly through a gambler's excitement".

From an economic perspective, a bubble occurs any time that the price of an asset rises above its real (fundamental) value, defined as the discounted sum of conditional expected future payoffs.

Hyman P. Minsky's research identifies five bubble phases: displacement, boom, euphoria, profit-taking, and panic, explaining the progression from excitement to market collapse.

Displacement: investors notice a new trend, such as a new product, technology, or very low interest rates.

Boom: price begins to rise and gain momentum as more investors enter the market, because of the fear of missing out. This sets the stage for a boom.

Euphoria: asset prices soar, and investors largely abandon caution

Profit-taking: predicting a bubble is difficult, but once it happens it won't be back, so the ones who invested earlier will have the greatest advantage, by selling their positions and gaining large profits.

Panic: asset prices fall, usually at the same speed they went up, and investors want to liquidate them at any price.

1.2. Rational vs Irrational bubbles

There are two types of bubbles: rational and irrational.

During an irrational bubble, price deviates from fundamental value because of behavioural biases and limits to arbitrage, which prevents new information from being fully incorporated into prices.

Irrational bubbles represent an arbitrage opportunity and a failure of market efficiency.

In this case, price rise because people believe they'll keep rising, but this is not justified by real, intrinsic and fundamental data, so it is related to psychological momentum.

Agents aren't rational, they misinterpret data, information and extrapolate recent trends and are influenced by bias. There is unconscious behaviour.

The collapse happens when collective sentiment changes and/or reality contradicts the narrative.

Rational bubbles, instead, happens when investors are conscious of the fact that price is not backed by its fundamentals, but they rationally expect they'll be able to sell at a higher price.

So, all agents are fully rational and have correct expectations, but the asset price has a self-fulfilling component that grows simply because everyone is continuing to buy.

A rational bubble is like a currency peg that all investors know will eventually break but expect to survive for long enough to profit in the meantime.

No single investor wants to exit early because doing so is costly while the bubble lasts.

2. The Dot-com bubble: historical and economic context

2.1. Macroeconomic background

The high- tech stock crisis, also known as "Dotcom bubble", or Internet bubble, fuelled in the late 1990s and the beginning of 2000s, because of the growing tendency to trust and massively buy internet-base companies, in particular startups with very little or no profits.

This was incentivized by the promise and hope of huge profitability rather than actual earnings, leading investors not to put enough attention also to fundamental and intrinsic features of the stocks.

Between 1995 and 2000s, the USA experienced one of the largest economic and technological developments in modern history; the real GDP growth averaged 4.1% per year, inflation was low and stable, between 1.6% and 3.3%, and unemployment generally declined, from 5.6% to 4%, also thanks to the technological development.

Index Level - comparison				
Year	NASDAQ Level	S&P500 Level	GDP Growth %	CPI Inflation
1995	802.31	491.88	2.7	2.8
1996	1080.5	640.02	3.8	2.9
1997	1322.72	813.65	4.4	2.3
1998	1748.51	1064.25	4.5	1.6
1999	2406	1286.84	4.8	2.2
2000	5048.62	1395.07	4.1	3.4

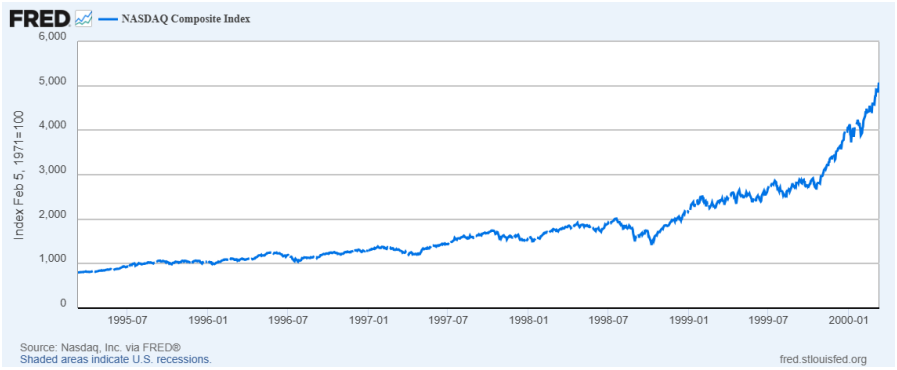
During those years there was a real technological revolution, leading to the internet commercialization, indeed, the World Wide Web and the browsers made it accessible to the public, and U.S. Internet users grew from 16 million in 1995 to over 300 million during 2000s; in addition, firms invested more and more in software and VC investments rose to over 100$ billion, and the number of IPOs, especially tech-related, reached record numbers.

Looking at some numbers in the stock market, it is possible to see that:

NASDAQ Composite Index: 1000 points in Jan,1995, reached 5048 points on the 10th of March 2000 (the peak, nearly +400%), and went back to 1114 points in 2002.

S&P500 Index: it went from 460 points in January 1995 to 1520 in March 2000 (+230%).

It is possible to notice how its growth was less than the one of NASDAQ Composite, because it includes traditional sectors, and not only technology.



In 1990s, tech represented 6% of U.S. equity market cap, while in 2000, it became nearly one third of the total market capitalization.

2.2. Technological innovation: the explosion of startups and IPOs

The tech startups, because of capital markets throwing money at the sector, were in a race to quickly become big.

Records amount of capital started to flow into the Nasdaq in 1997.

In 1999, most of the IPOs (457) were related to Internet companies, and the high-water mark was the AOL Time Warner megamerger in January 2000, which became the biggest merger failure in the history.

The dotcom bubble lasted about two years between 1998 and 2000. The time between 1995 and 1997 is the pre-bubble period when things started to heat up in the industry.

The bubble was characterized by cheap money, easy capital, market overconfidence and speculation, and in addition venture capitalists tried to find the next big company, invested in almost all the "dot.com" startups, influenced by all the factors mentioned above.

Among the most famous ones were Pets.com, Webvan, eToys, TheGlobe.com, Excite@Home, and InfoSpace, firms that promised to revolutionize retail, communication, and content delivery.

Despite limited revenues and persistent losses, investors rushed to participate in their IPOs, often driving prices to several multiples of their offer levels within days.

The average first-day return of internet IPOs exceeded 60% in 1999, a figure that reflected not business success but market euphoria.

2.3. The role of "Tech Giants"

At the same time, a group of larger and more established technology companies became the giants of the new digital economy.

Firms such as Microsoft, Intel, Cisco Systems, Oracle, Qualcomm, and Apple were already profitable and benefited from the infrastructure boom supporting the internet.

Their strong fundamentals, however, were rapidly overshadowed by speculative enthusiasm, pushing valuations far beyond realistic expectations.

One of the most important traits to consider is that valuations were based on earnings and profits that would not occur for several years if the business model worked, and investors were all too willing to overlook traditional fundamentals.

Companies that had yet to generate revenue, profits, and, in some cases, a finished product, went to market with IPOs that saw their stock prices triple and quadruple in one day, creating a feeding frenzy for investors. They were able to raise enough money to go public without a business plan, product, or track record of profits.

Amazon.com, founded in 1994 and listed on Nasdaq in 1997, symbolized the transition between these two worlds: a startup with little profit but immense promise.

Its share price increased more than tenfold between 1998 and 1999, turning the company into a cultural and financial icon of the "new economy."

The critical point arrived when the Nasdaq index peaked on March 10, 2000, at 5,048, nearly double over the prior year and several of the leading high-tech companies, such as Dell and Cisco, placed huge sell orders on their stocks when the market peaked, sparking panic selling among investors.

Within a few weeks, the stock market lost 10% of its value.

Consequently, investment capital started to decrease and dotcom companies that reached market capitalizations in the hundreds of millions of dollars and that went public, became worthless within a matter of months and folded.

As a result, by the end of 2001, a majority of publicly traded dotcom companies folded, and trillions of dollars of investment capital evaporated.

3. Analytical Interpretation: theory and evidence

3.1. Market rationality and the EMH

According to the EMH, asset prices fully reflect all available information (Fama E.).

So, publicly available data, like earnings and revenue, should me immediately reported into stock prices, without letting mispricing opportunities.

By this way, if investors think and move rationally, companies' prices with persistent losses must not receive an increase in valuation.

It is possible to notice from the data, instead, that in 1999, Amazon reported a net loss of 700M$ and negative EPS (-1.39), nevertheless its stock traded at 321$, a price comparable to very stable and profitable firms, such as Intel (EPS 1.09, Net Income $7.3 billion).

The Nasdaq Composite, dominated by such technology firms, rose over 80 % in 1999 alone, far above the S&P 500's 20 % increase.

These patterns highlight how market prices in the late 1990s did not accurately reflect the information available in financial statements (publicly).

Investors continued to bid up the shares of loss-making firms and to overvalue profitable ones by historical standards.

If EMH was respected, new information about declining earnings should have been incorporated into price changes immediately, that instead didn't happen.

This proves that semi strong and strong forms of market efficiency were violated during this period, as stock prices reflected investor sentiment and growth expectations rather than fundamentals.

3.2. Fundamental analysis

Fundamental analysis is based on the concept that the intrinsic value of a company must depend upon its capacity to generate profits and cashflows.

The indicators used by investors to evaluate it are usually P/E, Earnings, Net Income, Revenues and growth rates, which together reflect the company's long-term economic potential.

Looking at the reported data, especially of the successful companies, it is possible to notice how, even if most of them were profitable, prices rose up more than their effective earnings and net incomes, leading to their overvaluation.

For example, Amazon recorded revenues of $1.6 billion but a net loss of $0.7 billion, while its share price exceeded $320.

Cisco, Microsoft, and Intel reported solid profits, $2.5 billion, $7.8 billion, and $7.3 billion respectively, however their stock prices grew much faster than their earnings.

This mixture of optimism, high revenue growth and limited or negative profitability highlights the misalignment between intrinsic value and stock prices, reflected on the market.

Investors focused on potential rather than realized results and valuation metrics, such as profits margins and return on equity.

The market focus shifted from fundamentals to speculative expectations about future rise of the internet and technology sectors.

This was inconsistent with fundamental analysis and value investing, because prices were strongly influenced by sentiment and "trust" in the future, instead of real and concrete data, letting firms with little profit put on the same level of profitable ones.

So, to better understand how investors collectively ignored fundamental signals, it is essential to refer to behavioural explanations that influenced financial decisions, during the late 1990s.

3.3. Behavioural finance

Behavioural finance challenges the assumption of fully rational investors, assuming that cognitive biases, emotional reactions and social dynamics, also called "sentiment", influence financial decisions.

During the late 90s, the diffusion of internet technology created the conditions for psychological factors to win over real, intrinsic data, leading to an "unjustified" and extremely high price setting.

As technology stocks soared, investors increasingly followed market trends rather than individual analysis.

Mutual funds, retail traders, and institutions all chased "dotcom" names, reinforcing a feedback loop: rising prices attracted new investors, which in turn pushed prices higher.

This behaviour explains the uniform overvaluation observed across both profitable and loss-making firms in your dataset.

There was a real overconfidence towards the "New Economy" scenario, so that many investors believed that traditional valuations models were obsolete in the internet era.

Analysts started to speak about a new paradigm, where the potential growth was more important than real data, such as earnings, influencing expectations about future profits.

Overconfidence caused market participants to underestimate risk and overreact to positive news, especially the ones regarding internet and web.

This can be observed in the comparison between NASDAQ Composite and S&P500 Indexes levels in those years, where the former grew a lot faster than the latter, showing as the majority of the positive expectations was towards the technological companies, and its growth was a long way exaggerated in comparison to the values referred to the U.S. economy, reported in the table.

In addition, financial media companies and analysts highlighted success stories, like Oracle and Intel, while ignored the early failures, such as Webvan and Pets.com.

This inevitably led to reinforcement of collective optimism towards this specific sector.

These behavioural mechanisms explain why markets failed subsequently to misprice.

Investors, influenced by social validation and cognitive biases, prioritized participation over evaluation, leading to what Robert Shiller later called “irrational exuberance.”

The bubble thus persisted not because fundamentals justified it, but because psychological dynamics maintained a sense of legitimacy among investors.

3.4. Technical analysis and momentum driven forces

Technical analysis and behavioural finance are strictly related each other; indeed, the latter explains how psychological factors influence investors thoughts and decisions, even without concrete and intrinsic data in favour of it, and the former shows how, after those decisions, prices change in the future and are influenced by them, reciprocally.

They, in fact will rise, and investors will be surer and more confident of their actions seeing that market prices reflected their thoughts, without understanding the real reasons behind it and that the price growth isn’t justified by real and fundamental metrics but by them.

In efficient markets, technical signals shouldn’t carry predictive power because prices already incorporate all available information.

Yet during the late-1990s, many investors didn’t follow fundamental metrics and relied instead on momentum indicators, moving averages, and breakout patterns, reinforcing self-fulfilling price movements.

As it is possible to see in the excel document, between 1998 and 2000, the NASDAQ Composite more than tripled, while the S&P500 increased by only about 40%; this is strictly related to the record trading volumes in technology stocks and dot com companies boom.

The main element towards which it is necessary to put more attention is the fact that prices of both successful companies and failing ones, and at the same time of profitable companies, like Intel, Microsoft and Cisco, and unprofitable, like Amazon, in the first category, grew at the same time, only because all having in common one thing: the technological industry.

The late-1990s market behaved less as a mechanism for valuing companies and more as a momentum-driven system fuelled by liquidity, enforced by banks and optimism.

The constant reinforcement between rising prices and investor inflows created a self-sustaining feedback loop, delaying any correction until the eventual exhaustion of new buyers.

When sentiment shifted in 2000, the same dynamics worked in reverse, producing one of the sharpest collapses in market history.

3.5. The rational bubble hypothesis

The rational bubble hypothesis sustains that asset prices can deviate from intrinsic value even when investors are totally rational, and this can happen because they expect the deviation will persist long enough to profit before the bubble explodes.

So, on this basis, investors may knowingly buy overvalued assets if they believe that other market participants will continue to buy, making prices higher.

In the late 1990s, some firms, like Microsoft, Intel, and Cisco were really profitable and technologically dominant, providing a rational basis for optimism; even Amazon, despite losses in 1999, demonstrated rapid revenue growth and an innovative e-commerce model that gave credit to long-term expectations.

But, a great part of the technological companies, like Pets.com, eToys, TheGlobe.com were a failure and without real data proving their stability and profitability.

These facts let understand how the bubble was therefore not purely irrational.

Investors correctly identified the direction of technological change but misjudged its timing, magnitude, and diffusion speed.

Rational optimism turned into speculative excess once short-term profit expectations replaced long-term value assessment.

The dot-com episode illustrates a hybrid dynamic: rational foundations distorted by psychological and momentum-driven amplification.

So, in one event is possible to recognize a dual nature, the rationality in the causes, but irrationality in the scale, leading also to the lessons for modern markets.

4. Conclusions and lessons for the future

The 2000 crisis was neither purely rational nor purely irrational.

It originated from rational and legitimate expectations about technological progress, consistent with rational-bubble theory, but was amplified and scaled by behavioural and technical dynamics that inflated valuations beyond sustainable levels.

In essence, it was a rational bubble in origin, irrational in magnitude and scale, a market driven by rational excitement that evolved into speculative euphoria.

The crisis challenges the Efficient Market Hypothesis and shows the complementary role of behavioural finance in explaining real-world market dynamics.

It also highlights that rational-bubble models can coexist with psychological biases; markets can misprice innovation even when investors act logically within uncertain environments.

In addition, another important lesson is to distinguish the technological potential from economic fundamentals.

Investors should temper optimism with financial discipline, while regulators must monitor speculative dynamics fuelled by new technologies.

Similar patterns have reemerged in later episodes, both in the housing bubble and cryptocurrency booms, suggesting that collective exuberance remains an enduring feature of financial markets.

In conclusion, the 2000 high-tech crisis proves how rational expectations, behavioural biases, and speculative feedback loops can influence each other to create extraordinary and unsustainable valuations.

The dot-com bubble was not a failure of logic, but a failure of measure and scale: an overextension of rational optimism into irrational exuberance.

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