LUISS

Corso di laurea in Economia e Management

Cattedra di Markets and Strategies

Volatility and financial bubbles, strategic analysis and use of financial indicators

RELATORE:

Prof. Maria Giovanna Devetag

CANDIDATO:

Lorenzo Tonel Matr. 279771

Anno Accademico 2024/2025

Table of Contents

Introduction:

The purpose of this document is to analyze market volatility and instability, considering these not only as a tactical problem, but also as extreme and strategic phenomena. Moreover, considering the present market, several analysts and experts are taking into account the possibility of a bubble crash: AI and cryptocurrency are the most well-known examples, but we may also look at the long upside run of the U.S. stock market.

The following work is therefore structured in three main parts: an introduction, a detailed exploration of the causes of volatility, and a section on tools used to analyze it. In particular, the paper focuses on extreme causes of instability and, consequently, it provides specific paragraphs about spotting a bubble.

It is ambitious to have a specific tool or a specific early warning about a bubble. Indeed, investors, the public, and financial institutions rarely understand when this phenomenon is actually happening. Frequently, someone declares that there is a bubble, but their warnings remain unheard until it is too late. In fact, the actors of the financial market are implicitly working together to maintain the status quo, trying to carry on as much as possible, while at the same time implementing an exit strategy to avoid losses.

In this document I examine historical bubble cases and show that financial damage is so extensive, so deep and contagious that it is almost impossible to avoid. Another common factor is that this phenomenon often has a phase where it becomes self-propelled and prices skyrocket, supported by favorable financial conditions. Furthermore, no sector is safe: houses, for example, were historically considered a safe place to invest. Usually, there may be a long wave of low prices, but traditionally “staying solid on the brick” meant that there was always light at the end of the tunnel. However, we learned in 2008 that this is no longer true.

We can also understand that those actors have no ethical boundaries and exploit the fragility of the financial system, which is one of the most important causes of volatility in markets and is often associated with crashes and bubbles.

This document also points out that these phenomena generate instability and losses not only for the actors directly involved, but also for the entire global economic system, amplifying, through contagion and a domino effect, the risks for investors, governments, raw materials, inflation, interest rates, and more.

What is interesting is that it can often be observed that a prolonged period of economic strength and a strong trend to take on additional leverage occur just before a bubble bursts. As a result, this is a factor that companies and investors have to deal with through a strategic plan, and they must be able to adapt through a resilience plan.

Therefore, Chapter 1 introduces key business concepts like strategy, tactics, and competitive advantage. The focus is on how the external environment and internal resources at a company's disposal can be crucial for competitiveness.

Chapter 2 is the central part of the document, describing a panel of causes for market instability and a classification into the following categories:

- Political and Social Motivations. A synthetic overview of the USA (Trumpism), Europe (Brexit and Green Deal), Developing Countries, and Authoritarian Regimes.

- Commodity Markets: The central role of commodities, effects, and reasons of price volatility on oil, gas, gold, and rare earths; an overview of how they affect market instability.

- Financial System: Describing the most famous financial crises and bubbles (the dot-com bubble, the U.S. subprime crisis, and the Silicon Valley crisis), tries to point out the factors in common.

- Market Psychology and Unforeseen Events: This section explores market expectations, optimism, and pessimism, and introduces the concept of unforeseen events, discussing how different productive sectors (e.g., technology, energy, healthcare) have varying levels of vulnerability to these shocks.

Finally, Chapter 3 shifts focus to the question: *"How to spot a bubble or a level of instability?"* In this chapter, tools and methods for analyzing market instability and creating early warning signals are explained. It covers several analytical approaches:

- Strategic and Fundamental Analysis: This section discusses tools for strategic analysis, including how to spot financial bubbles and the importance of fundamental analysis (both quantitative and qualitative).

- Technical Analysis: It explains how to use technical analysis tools like trend, moving averages, and support and resistance to understand market movements. It also touches on the role of automated trading and artificial intelligence in these analyses.

- Other Analysis Tools: The chapter introduces sentiment analysis and the PESTEL framework (for analyzing external factors).

- Systemic Risks: Finally, it covers critical concepts like financial contagion, bubbles, and systemic risk, and introduces the idea of a Black Swan event a rare, unpredictable event with severe consequences.

The report tries, in specific paragraphs of this chapter, to apply these tools and assess their predictive ability. Anticipating the conclusion, these tools do not provide the answer; they only describe a potential. Indeed, a reliable financial tool for this kind of phenomenon has not yet been invented. Nevertheless, there is a lot of turmoil in the market nowadays and this work tries to unveil it

Chapter 1: Introduction to crises and volatility

According to Albert Einstein, crises are not an event to be feared, but rather an opportunity for growth and progress. In fact, a crisis is both a destructive force and a driving force that pushes people and nations to overcome their weaknesses and find innovative solutions[1].

In a nutshell, crises are inevitable; however, while on the one hand they can be managed, on the other hand they also offer opportunities. Over the past few years, the economic environment has been marked by a series of singular events that have contributed to increased volatility in financial, production, and distribution markets.

For instance, pandemics, wars, energy crises, political instability, and forms of protectionism have all contributed to making the competitive environment highly volatile and unpredictable. Given this climate of global uncertainty, understanding, analyzing, and interpreting volatility are now key strategic pillars for institutions, companies, and private investors.

Therefore, the implementation of adaptive strategies, financial models, and risk signals has become an essential basis for ensuring business continuity, shock absorption capacity, and yield stability. This work, in turn, aims to provide a theoretical and analytical definition of the concept of strategy, clearly distinguishing it from the notion of tactics.

Subsequently, the main causes of volatility in global markets will be analyzed. Afterwards, the risk of exposure to volatility for different production and commercial sectors will also be examined, thus laying the foundations for a detailed analysis of mitigation strategies.

The historical period we are experiencing has been characterized by extraordinary events that have accentuated market volatility, making it necessary to quickly adapt production and supply chains. Moreover, the causes of volatility are becoming increasingly numerous and are expanding rapidly from one market to another as a consequence of the global approach of the market for goods and services.

1.1 Strategy, tactics and competitive advantage

In the study of business strategy, one of the most significant contributions is given by the economic historian and Harvard University lecturer Alfred D. Chandler Jr., who has been widely praised for

[1] University of Puerto Rico at Mayagüez, "Crisis according to Albert Einstein," June 23, 2010, https://www.uprm.edu/inqu/crisis-according-to-albert-einstein/.

formalizing in a clear and systematic way the essential connection and interdependence that exists between strategy and organizational structure.

Chandler studied in detail the notion of business strategy through historical and empirical research, methodically examining the progress of major corporations in the U.S. industrial sector. In one of his fundamental works, *Strategy and Structure* (1962), he outlined strategy as the process of formulating a company's long-term goals and objectives, and the lines of action and allocation of resources to achieve these goals[2].

This definition includes more than a mere theoretical representation; rather, it results from an in-depth study of the development dynamics adopted by leading companies. Chandler's key thought is therefore contained in the expression *"structure follows strategy."*[3] This highlights that the organizational structure of a company i.e., the way in which it is divided into organizational units, its hierarchy, areas of competence, and communication channels is the result of an evolutionary process that is both deliberate and dynamic. To this end, strategy must be planned and aligned with the company's long-term goals, expected results, and strategic guidelines.

Consequently, the concept emphasizes that strategy is not reduced to a generic approach to action, but rather is a conscious and targeted choice that guides each component of the organization and influences the entire business operation. For example, if a company decides to formulate a new strategic approach such as expanding into new market segments, broadening its product portfolio, differentiating its offer, or focusing on innovation its organizational structure may no longer be suitable. In order to be successful, the company must re-engineer its structure to support and simplify the implementation of the new strategy and thus ensure its success.

Chandler's thinking represented a turning point toward a more proactive and long-term vision of strategy, and is therefore able to drive change. This approach has also laid the foundations for the future development of the strategic discipline, especially with regard to business competence in managing complex contexts, growth processes, and changing competitive logics key elements in today's volatile and unstable market scenario.

In parallel with the historical-structural perspective formulated by Chandler, who conceived strategy as a rational allocation of resources, another orientation was developed that gives greater priority to managerial decisions.

Within the corporate environment, we are also provided with the definition of strategy by Kenneth R. Andrews (1916–2005), a distinguished academic at Harvard Business School and one of the founders of the theoretical construct of corporate strategy. The cornerstone of his theoretical foundation is found in particular in his famous work entitled *The Concept of Corporate Strategy* (1971).

For Andrews, strategy is a model or pattern of long-term objectives, goals, and strategic directions which are aimed at achieving these goals. This is not achieved by the mere completion of actions

[2] Alfred D. Chandler Jr., *Strategy and Structure: Chapters in the History of the American Industrial Enterprise* (Cambridge, MA: MIT Press, 1962).
[3] Ibid.

but rather through a series of decision-making behaviors that are synergistic with the corporate vision and underlying objectives.

Moreover, strategy serves to identify the sector of activity in which the company operates or intends to operate in the future, thereby defining the nature of the current or future enterprise. Andrews attributes particular significance to optimizing the relationship between the unique and distinctive capabilities of the company (which therefore include assets and liabilities, inputs and know-how at the intra-company level, as well as the management value system) and threats of macro-environmental origin (including the economic ecosystem, the competitive arena, and socio-economic dynamics SWOT analysis).

The strategy is therefore based on operational levers and implementable strategic levers. Although Kenneth fully agreed with the theoretical approach according to which strategy should be formulated along a path of deliberate elaboration (which he defines as the "school of design"), he considers the dynamics of strategy essential, as it is subject to continuous evolution in order to incorporate changes in the reference context. Consequently, Kenneth proposes a model that aims at achieving an essential adaptation between external threats and opportunities and internal distinctive competences[4].

Having analyzed the key definitions of strategy developed by Alfred Chandler and Kenneth Andrews—first from a structural point of view and then with a behavioral perspective—it is essential to introduce a related but distinct notion: the definition of tactics. Although the concepts of strategy and tactics are often considered equivalent, they are located on distinct decision-making planes and have dissimilar temporal logics as well as extremely different operating methods.

The distinction between the two concepts dates back to the military tradition, from which both derive, and is also of crucial importance in the business context, particularly in markets characterized by instability and high variability, such as financial markets. The concept of tactics, of military origin, refers to the set of specific actions and methods used to achieve short-term objectives in line with a broader strategy. A well known aphorism of the business world clearly distinguishes between strategy and tactics, stating that *"tactics without strategy is the noise that precedes defeat,"*[5] thus highlighting the futility of tactical actions in the absence of a long-term vision.

Similarly, Carl von Clausewitz, in his treatise *On War*, separates the two concepts by stating that *"tactics is the theory of the use of military forces in combat,"* emphasizing the operational and immediate character of tactics, in contrast to the strategy that guides the overall conduct of the conflict[6].

[4] Kenneth R. Andrews, *The Concept of Corporate Strategy* (Homewood, IL: Dow Jones-Irwin, 1971).
[5]This is an aphorism widely used in the world of strategic business. Although it is erroneously attributed to Sun Tzu in his work "The Art of War".
[6] Carl von Clausewitz, *On War*, ed. and trans. Michael Howard and Peter Paret (Princeton, NJ: Princeton University Press, 1984).

There are also several modern definitions of tactics. For example, Henry Mintzberg describes tactics as a real-time response within strategic planning[7]. Michael Porter defines competitive strategy at the sector level and subsequently identifies operational and short-term decisions (such as pricing, promotion, and distribution)[8]. For Robert M. Grant, tactics are *"the means by which strategy is operationalized*[9]*,"* while for Igor Ansoff, tactics are the sum of actions necessary to implement the strategy[10].

In other words, strategy is the "big picture," while tactics focus on daily management in order to deal with the complexities of the sector in which firms operate. In markets characterized by strong instability, the effectiveness of strategy also depends on the ability of the company to implement flexible tactics consistent with the underlying objective. In this sense, tactics represent a bridge between strategic vision and operational responsiveness.

After distinguishing between strategy and tactics, it is essential to examine the main goal toward which strategic thinking tends: competitive advantage. According to Michael Porter (1985), competitive advantage occurs when a firm adopts a value-creating strategy that is not simultaneously applied by competitors and that competitors are unable to replicate immediately. Porter identifies two main sources of advantage, namely cost leadership and differentiation, both of which must be sustained over time through consistent positioning and alignment of business activities[11].

Instead, the Resource-Based View (RBV) approach (Jay Barney) relies on internal resources and skills and make of them the pillars for market success[12]. However, other authors argue that competitive advantage can also be the result of a coherent series of actions defined as emergent strategy, which may be particularly profitable in unstable sectors.

1.1.1. Role of environmental understanding and resource assessment

After defining the founding elements of competitive advantage, it is essential to highlight the importance of a dual analytical activity that constitutes the prerequisite of strategy: understanding the competitive environment and evaluating internal resources. According to Porter, the analysis of the external environment makes it possible to interpret the structural forces that influence the profitability of the sector. His Five Forces model is a key tool for identifying threats, pressures, and opportunities arising from the market structure[13].

---

[7] Henry Mintzberg, *The Rise and Fall of Strategic Planning* (New York: The Free Press, 1994).
[8] Michael E. Porter, *Competitive Strategy: Techniques for Analyzing Industries and Competitors* (New York: The Free Press, 1980).
[9] Robert M. Grant, *Contemporary Strategy Analysis*, 9th ed. (Chichester, UK: Wiley, 2016).
[10] H. Igor Ansoff, *Corporate Strategy: An Analytic Approach to Business Policy for Growth and Expansion* (New York: McGraw-Hill, 1965).
[11] Michael E. Porter, *Competitive Advantage: Creating and Sustaining Superior Performance* (New York: The Free Press, 1985).
[12] Barney, J. B. (1991). *Resource-based theory: Creating and sustaining competitive advantage* (pp. 99–120). Oxford University Press.
[13] Michael E. Porter, *Competitive Strategy: Techniques for Analyzing Industries and Competitors* (New York: The Free Press, 1980).

At the same time, the company must carry out a critical mapping of its resources and skills to assess which of them can actually generate strategic value. Jay Barney, through the VRIN/VRIO framework[14], don't consider all internal resources as a competitive advantage, but only those that may be considered rare, difficult to copy by competitor and not fungible. It is important that, as Robert M. Grant observes, having the resources is not sufficient: it is the internal "know how" to exploit, combine, reprogram, accordingly to the external instability causes that makes the real difference[15].

Kenneth Andrews (a 1971 forecast) thinks that is the interaction between external opportunities and threats and the management of internal resources triggers a strategic process of decision-making. A solid strategy thus arises from the integration of environmental analysis and internal audit, which are indispensable tools to guide effective choices in a rapidly changing competitive context[16].

Chapter 2: List of destabilizing forces and causes of abnormal volatility

2.1. Volatility related to political and social reasons

Domestic political instability is one of the main sources of systemic volatility in real and financial markets, as it undermines institutional predictability, weakens investor confidence, and generates uncertainty about economic policies. It is very significant and harmful when there are government crises, institutional conflicts, political extremism, or a democratic crisis.

Country risk is the probability that economic, political, or social events within a state will affect companies or investors to operate in normal conditions. According to the World Bank's definition (2021), country risk includes factors related to regulatory uncertainty, the efficiency of institutions, compliance with contracts, and the stability of political leadership[17].

When these conditions deteriorate, there is an increase in perceived volatility, which in turn translates into capital flight, downgrades in creditworthiness, and a reduction in foreign direct investment (FDI). As Acemoglu and Robinson (2012) point out, inclusive political institutions are key to sustainable economic growth. On the contrary, when the democratic system is weakened or there is a decision-making stalemate (ungovernability), companies find themselves operating in a context of high strategic uncertainty[18]. Similarly, Douglass North (1990) stresses that institutional predictability is an economic good in itself: when it collapses, so do the incentives to invest, innovate, and plan for the long term[19].

---

[14] Jay B. Barney, "Looking Inside for Competitive Advantage," *Academy of Management Executive* 9, no. 4 (1995).
[15] Robert M. Grant, *Contemporary Strategy Analysis*, 9th ed. (Chichester, UK: Wiley, 2016).
[16] Kenneth R. Andrews, *The Concept of Corporate Strategy* (Homewood, IL: Dow Jones-Irwin, 1971).
[17] The World Bank, "Worldwide Governance Indicators," 2021, https://info.worldbank.org/governance/wgi/.
[18] Acemoglu, D., & Robinson, J. A. (2012). *Why nations fail: The origins of power, prosperity and poverty*. Crown Publishers.
[19] Douglass C. North, *Institutions, Institutional Change and Economic Performance* (Cambridge: Cambridge University Press, 1990).

Financial risk is becoming as important as political instability when considering volatility in the modern market; it affects investor confidence, access to credit, financial structures, and government macroeconomic stability. The main risk factors include the structural weakness of the banking system, excessive public debt, and uncontrolled price dynamics (whether inflationary or deflationary).

According to Reinhart and Rogoff (2009), excessive levels of sovereign debt expose a country to systemic financial vulnerabilities, increase the interest rates demanded by investors, and reduce the state's ability to react to economic shocks[20]. This was clearly observed during the European sovereign debt crisis, when the widening spread between German government bonds and bunds generated strong waves of volatility in bond markets and related equity markets.

Moreover, the weakness of the banking system, especially in developing countries or in contexts of excessive deregulation, is another critical element. The fragility of financial institutions (low capitalization, non-performing loans, and lack of controls) is the main reason for increasing the risk of systemic instability and the uprising of a domino effect. A factor that deeply affects the dynamic of Investors and the power of cash flows is an inflationary period. The worst combination is a) banking instability, b) barely unsustainable government debt c) inflationary pressures: it is an incredibly explosive mix that can amplify instability in markets, creating depression, and undermine any strategic plan. This is the reason why a preventive analysis and management of these risks becomes a strategic priority for all economic actors.

Political volatility is a structural source of instability not only in modern financial markets but also in productive, industrial, and commercial markets. Indeed, political decisions influence macroeconomic conditions (interest rates, fiscal policies, environmental regulations, foreign trade) and have a deep impact on business expectations and investor confidence. According to Daron Acemoglu and James Robinson (2012), political institutions determine the rules of the economic game, and when these are unstable or subject to ideological oscillations, companies operating in the markets also suffer in terms of planning, investment, and competitiveness—therefore directly on the tactical side[21].

More generally, as Dani Rodrik (2011) points out, there is a growing tension between political sovereignty, economic globalization, and democratic accountability. This tension is reflected in continuous regulatory and political changes, with direct effects on the competitiveness and efficiency of firms[22]. In contemporary democracies, these dynamics can lead to regulatory instability, frequent changes in policy orientation, and reduced institutional predictability, which negatively affect both capital markets and product markets.

---

[20] Carmen M. Reinhart and Kenneth S. Rogoff, *This Time Is Different: Eight Centuries of Financial Folly* (Princeton, NJ: Princeton University Press, 2009).
[21] Daron Acemoglu and James A. Robinson, *Why Nations Fail: The Origins of Power, Prosperity, and Poverty* (New York: Crown Business, 2012).
[22] Dani Rodrik, *The Globalization Paradox: Democracy and the Future of the World Economy* (New York: W. W. Norton & Company, 2011).

2.2 Market volatility within democratic and advanced countries

2.2.1 USA

It is easy to point to Donald Trump's first presidency (2016–2020), which generated strong swings not only in financial markets but also in the global manufacturing and trade sector. This was largely the result of protectionist policies, tariffs, and unilateral revisions of international agreements (Funke et al., 2017)[23]. As a consequence, companies were forced to adapt their logistics and pricing policies in response to regulatory uncertainty and political risk.

In particular, the trade war between the United States and China, which took place between 2018 and 2020, fueled by the protectionist policies of the Trump administration, triggered a reorganization of global value chains in the technology sector. Giants such as Apple, Qualcomm, and Huawei were forced to diversify suppliers and production locations to mitigate risks related to duties, sanctions, and restrictions on software and hardware licenses. This, in turn, led to increasing instability in R&D plans, the renegotiation of international agreements, and a more marked geopolitical fragmentation of high-tech markets.

2.2.2 Trumpism

Trumpism emerged during Trump's 2016 presidential campaign, and its rhetoric has roots in populism. In other words, nationalistic answers are offered to political, economic, and social problems. More specifically, Trumpism is described as right-wing populism. The policies of this political program include immigration restrictionism, trade protectionism, isolationism, and opposition to entitlement reform[24].

Furthermore, the formidable use of media Twitter, Truth Social, and internet influencers has influenced all kinds of markets and spread uncertainty worldwide[25]. It must be admitted that Trumpism changed the rules of political and economic communication, and since its global strategy remains unclear, it continues to generate uncertainty.

2.2.3 Europe

In the European context, the tension between national policies and shared EU objectives such as ecological transition, economic governance, or migration policies represents another source of instability for companies operating in the energy, industrial, and technological sectors.

---

[23] Funke, M., & Trebesch, C. (2017). *Financial Crises and the Populist Right*. https://www.ifo.de/DocDL/dice-report-2017-4-funke-trebesch-december.pdf

[24] Walter Russell Mead, "The Jacksonian Revolt: American Populism and the Liberal Order," *Foreign Affairs* 96, no. 2 (2017).

[25]

2.2.4 Brexit

The United Kingdom's exit from the European Union (Brexit), a highly political event, introduced regulatory and customs risks that heavily impacted automotive value chains. Added to this are the increasingly stringent EU regulations on emissions. Together, these factors created unexpected costs, regulatory uncertainty, and a substantial brake on investment both in the UK and across Europe. According to the European Automobile Manufacturers' Association (ACEA), many automotive companies have restructured their supply chains and revised their production plans due to post-Brexit political uncertainty and divergent environmental policies among member states[26].

2.2.5 Green Deal

The adoption of the Green Deal by the European Commission represented a significant strategic and political change. The quest to achieve climate neutrality by 2050 has introduced new environmental constraints, ESG investment mandates, and increasing pressure on traditionally carbon-intensive sectors such as oil and energy utilities[27]. As a result, companies have been forced to reorganize their corporate strategies, reducing brown assets and diversifying into renewable energy. Nevertheless, this transition has also generated a period of instability due to regulatory adaptation and the strong dependence on variable policy decisions between member states.

2.3 Developing countries

2.3.1 Turkey

A significant example is Turkey, where the increasing centralization of executive power and interference in the management of monetary policy have generated strong macroeconomic imbalances. Repeated replacements of Turkish central bank governors, the adoption of expansionary policies in inflationary environments, and the erosion of institutional independence caused a systemic currency crisis, with the Turkish lira losing more than 70% of its value between 2018 and 2022 (IMF, 2022)[28].

The lack of institutional checks and balances undermines both domestic and international confidence, generating political-financial volatility that affects all sectors of the real economy. In a nation that had applied to join the European Community, this is an extremely significant aspect. In fact, in *Economic Origins of Dictatorship and Democracy*, Acemoglu and Robinson analyze the creation and consolidation of democratic systems. They argue that *"democracy is consolidated when elites do not have a strong desire to overthrow it."* These processes depend on several

[26] European Automobile Manufacturers' Association (ACEA), "Economic and Market Report: EU Automotive Industry Full Year 2021" (Brussels: ACEA, 2022), 15, **https://www.acea.auto/files/ACEA_Report_Full-Year-2021.pdf**.

[27] European Commission, *The European Green Deal*, COM(2019) 640 final (Brussels, December 11, 2019), https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52019DC0640.

[28] International Monetary Fund, *Turkey: 2022 Article IV Consultation-Press Release; Staff Report; and Statement by the Executive Director for Turkey*, IMF Country Report No. 22/359 (Washington, DC: International Monetary Fund, 2022).

factors: (1) the strength of civil society, (2) the structure of political institutions, (3) the nature of political and economic crises, (4) the level of economic inequality, (5) the structure of the economy, and (6) the form and extent of globalization[29].

2.3.2 Venezuela and Zimbabwe

We also see the cases of hyperinflation in Venezuela and Zimbabwe as extreme examples of how the misalignment between monetary policy and economic reality can completely erode confidence in the system. Money printing at an accelerated pace and the loss of international confidence caused hyperinflation, production paralysis, and financial isolation.

2.3.3 Argentina

Argentina has experienced multiple institutional and financial crises, hyperinflation, and sovereign bond defaults. Argentina has long-standing issues with fiscal and monetary policy that have created a fragile economic environment. The government has a tradition of populist approach and inconsistent policies, which have led to huge public debt and to several collapses/defaults of Argentina. The crises of 2001 and 2018 were accompanied by social protests and the erosion of investor confidence. Moreover, these crises deeply affected the banking and industrial sectors.

As a consequence, for several decades Argentina has alternated between military dictatorships and weak democratic governments, which has led to recurring economic problems. During the National Reorganization Process (1976–1983), the military dictatorship accumulated a large foreign debt to finance projects that often remained incomplete.

In 1983, democracy returned with the election of President Raúl Alfonsín. The new government's project envisaged consolidating the Argentine economy by creating a new currency, the *austral*, the first in the country not to be called the peso. However, the birth of the *austral* was also the origin of new loans, and when the state became incapable of paying interest on the debt, trust in the currency collapsed. Inflation, which had been maintained at monthly rates between 10% and 20%, spiraled out of control. According to *The New York Times* (Oct 1989), Argentine inflation in July 1989 reached a monthly rate of 196.6%[30].

In short, the devastation caused by political instability and democratic fragility has had extremely severe repercussions, such as sovereign defaults, which affected savers and investors worldwide.

2.4 Authoritarian regimes

If the triggering factors of crises are immediately evident in democratic countries, the same is not always true in countries with authoritarian regimes. Here, the definition must be understood in a

[29] Acemoglu, D., & Robinson, J. A. (2005). *Economic Origins of Dictatorship and Democracy*. Cambridge University Press.

[30] Peter T. Kilborn, "Inflation Drops in Argentina," *The New York Times*, October 9, 1989, https://www.nytimes.com/1989/10/09/business/inflation-drops-in-argentina.html.

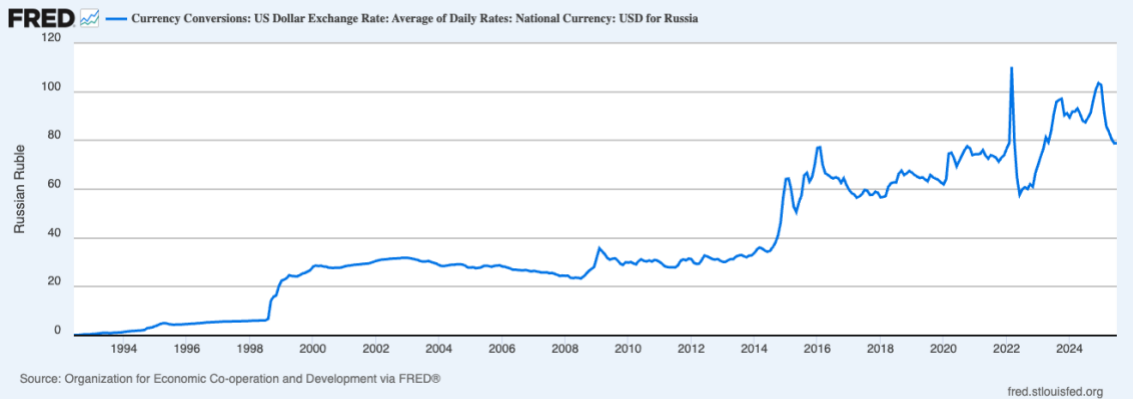
broader sense than usual, as it is intended to include all regimes that, in some way, exercise control over sensitive institutions responsible for financial oversight, statistics, and regulatory checks.

It is certainly not possible to establish a strict rule, since the concealment of data or masking of financial difficulties is also common in democratic countries (as in Greece) and even in large financial institutions subject to strict controls (such as Lehman Brothers). What matters, however, is the ability of authoritarian regimes to manipulate both financial variables and statistical information analyzed by economic operators, thereby shaping overall expectations.

As a result, authoritarian regimes have good control of certain types of volatility, influencing rates, statistics, and economic indicators, controlling expectations of investors and consumers. The conflict between Russia and Ukraine offers a clear example. In fact, it is possible that real volatility is much higher than what emerges from the official information provided by the system.

The exit of many Western companies from Russia has had significant effects on productivity and unemployment rates. Added to this were Western sanctions, which increased the cost of raw materials and intermediate products, particularly in the electronics sector, creating strong inflationary pressures. The ruble has fluctuated sharply; however, data from 2024 indicate GDP growth of +4.4%, up from +3.6% in 2023. In contrast, 2025 data indicate a slowdown in Q1 to +1.4% year-on-year. The exchange rate with the dollar over the last five years reflects the pressures of volatility generated by both the conflict and the sanctions.

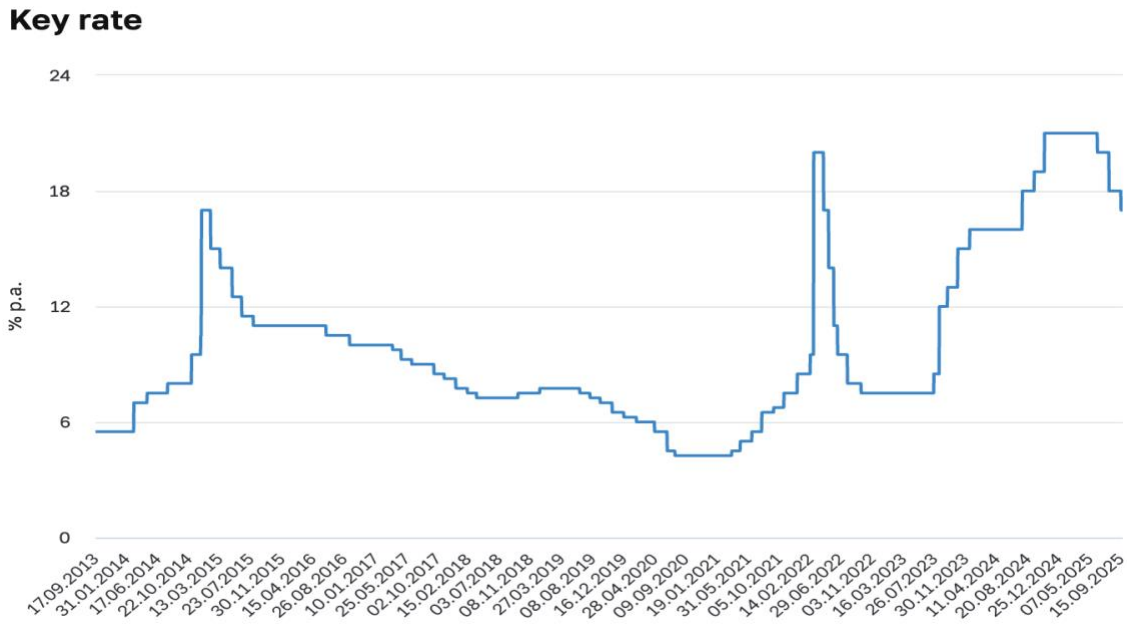
It should be noted that, at the outbreak of the conflict, the ruble briefly reached almost 150 per USD, accompanied by scenes of long queues at banks to withdraw savings. Subsequently, a phase of monetary control began, reinforced by interest rate policy, with rates progressively raised from 6% to 20%, peaking in 2022, and maintaining an overall upward trend[31].



Picture 1: Trend in USD/RUB exchange rate (1992-2025)

Source: https://fred.stlouisfed.org/series/CCUSMA02RUM618N.

[31] Consumer Price Index: All Items for Russia," Federal Reserve Bank of St. Louis, accessed September 7, 2025, https://fred.stlouisfed.org/series/CCUSMA02RUM618N.



Picture 2:

Source: https://www.cbr.ru/eng/hd_base/KeyRate/.

A strong ruble eases inflationary pressures from imports, especially when combined with persistent fiscal stimulus. In fact, the increase in GDP is largely due to the war effort and the consequent rise in public spending, which cannot be considered productive in the medium to long term. Weapons are produced and consumed/destroyed without increasing production capacity or well-being, while expenditures related to health or social security are sacrificed.

It is difficult to determine how this situation has influenced statistics and what weight the government has on the trend of the exchange rate. It should be noted that the Trump administration allowed for a clear recovery, and questions remain about how to evaluate the differential between interest rates (18%) and inflation (about 8%)[32].

Moreover, if we include in the information package the forecast of a poor agricultural harvest and the persistence or worsening of supply interruptions due to the war, there are clear premises for further depreciation. The Russian Central Bank continues to intervene in the currency markets in a non-independent way; however, investor confidence, stagnant growth, and falling oil prices could reverse the current trend.

In a nutshell, it is interesting to note that classical quantitative indicators do not provide definitive information on the state of affairs in Russia. For example, the consumer confidence index, which had fallen below –30% in 2022, has gradually risen to the current –8%. It is based on surveys

[32] Data collected from the official website of the Central Bank of Russia (Bank of Russia), accessed on September 7, 2025. The reference interest rate is available at https://www.cbr.ru/en/hd_base/keyrate/; i dati sull'inflazione sono disponibili su https://www.cbr.ru/en/statistics/ddp/infl/.

conducted on a representative sample of the Russian population, usually interviewing 5,000 people over the age of 16 in different regions[33]. The index is an average of several sub-indices, including changes in consumers' personal financial situation, expectations about the economy, unemployment, and propensity to buy.

As a result, the risk assessment remains uncertain from a quantitative point of view but high from a qualitative point of view; in other words, expectations prevail over the institutional data provided.

2.5 Political and economic tools for extending geopolitical influence

(Ukraine, North Korea, Greenland, Canada, Taiwan, new maritime routes adjacent to the North Pole, supply of raw materials)

Geopolitical volatility represents one of the most critical and pervasive sources of instability in global markets, as it combines military, strategic, economic, and symbolic elements. Wars, regional conflicts, and maneuvers to extend political and territorial influence generate shocks that affect the supply of raw materials, trade routes, infrastructure investments, and overall market stability.

Ambitions to extend political influence, competition for resources, and military threats therefore constitute a form of structural volatility with extensive effects on financial, productive, and commercial markets. To anticipate and prepare a resilient strategy has become, in the modern era, an essential skill for all economic actors.

Geopolitics is a fundamental threat to world stability, with powerful domino effects on finance, production chains, and international cooperation. For example, the Ukraine war has affected multiple economic sectors, including energy, agriculture, and industry. Similarly, the Asia–Pacific region faces the serious risk of war between China and Taiwan, which would represent a major threat to the global semiconductor market (notably Taiwan Semiconductor Manufacturing Company, TSMC). A military crisis in that area would have devastating impacts on multiple industrial sectors, from technology to automotive.

Furthermore, the environmental crisis and uncertainty regarding measures to mitigate global warming create opportunities for new trade routes in the Arctic. This has fueled fierce competition between players such as Canada, Russia, the United States, and China. At the same time, these geopolitical tensions are accelerating the militarization of the Arctic and territorial claims (e.g., Greenland), forcing companies to rethink their logistics and production models.

---

[33] Organisation for Economic Co-operation and Development (OECD), "Consumer Confidence Index (CCI), Russian Federation" (dataset), accessed September 7, 2025, https://data.oecd.org/leadind/consumer-confidence-index-cci.htm.

2.6 Volatility related to commodity markets (gold and oil in particular)

Commodity markets have historically been among the most exposed to structural volatility, due to their sensitivity to geopolitical, macroeconomic, and speculative factors. Among all commodities, oil and gold play a central role because of their direct impact on both real and financial markets.

2.6.1 Oil and gas

Oil is a strategic raw material, not only for industrial production, but also for transport, logistics, and energy pricing. As Hamilton (2009) points out, fluctuations in oil prices have historically been correlated with geopolitical shocks (wars, Middle Eastern crises), supply policies (OPEC), and speculative dynamics in futures markets[34].

High oil prices and spikes in volatility have deep effects on production costs, inflation, and investor confidence. The 2020 shock, caused by COVID-19, is a clear demonstration of oil market vulnerability.

2.6.2 Gold

Gold is a typical investor haven, so it is very sensitive to expectations, and gold demand skyrockets in times of deep uncertainty, high inflation, or international crises.

Together, the oil and gold markets act as two important sensors of volatility in the economic system: oil prices are mainly linked to geopolitical factors, while gold prices are influenced by financial and psychological factors. Therefore, monitoring these two markets is useful for investors, industrial companies, and policymakers when defining their strategies.

The following simple graph, which shows oil prices (blue, decreasing) and gold prices (green, rising rapidly), reveals a wave of uncertainty and tension in the markets.

[34]Hamilton, J. (2009). *Causes and consequences of the oil shock of 2007-08*. https://doi.org/10.3386/w15002

Picture 3: Development of prices compared between oil (blue line) and gold (green line) (2016–2025)
Source: https://tradingeconomics.com/commodity/crude-oil.

2.6.3 Rare earths (are they an element of market volatility?)

Rare earths are a group of 17 chemical elements with unique properties that are essential to modern technology and have become critical for industries linked to electricity and electronics. Demand is mainly driven by the energy transition and digitalization, and therefore, prices for these materials are expected to increase in the future, supported above all by the energy sector.

Neodymium magnets, for instance, are an essential component used in the electric motor vehicle industry, but demand may be partially mitigated by the growing adoption of hybrid vehicles, which require a smaller quantity of rare earth elements. In general, expectations are for an expansion of renewable energy that will continue to support the rare earths market, with a large portion of demand coming from this sector and compensating for the decline in demand in the automotive industry.

The production and consumption of rare earths are dominated by a few key players. China has a big slice of nearly 80% of global production[35], and major economies are depending on it: Japan, Vietnam, Corea N., and the United States are now investing in new mines and refining plants, trying to create a new supply chain. Nevertheless, the rare earth market is subject to significant price volatility, driven by geopolitical tensions and a sort of China monopoly. In addition, growing competition between China and Washington in the rare earth sector could further complicate the situation: if the U.S. and other countries were to produce on a large scale and build up strategic reserves, there would be a general decline in prices.

[35] U.S. Geological Survey, "Rare Earths," in *Mineral Commodity Summaries 2025* (Reston, VA: U.S. Geological Survey, 2025), **https://pubs.usgs.gov/periodicals/mcs2025/mcs2025.pdf**.

2.7 Volatility and instability connected to the financial system

(lack of financial controls, real estate overpricing, financial bubbles, unexpected default)

The fragility of the financial system is a frequent cause of instability and volatility, and is directly correlated to crashes and bubbles. This is an institutional and political issue that can create instability not only for the actors directly involved but also a domino effect for the entire global economic system.

2.7.1 Financial bubble related to the development of the internet

The dot-com bubble of 2000 is a well-known bubble fueled by speculative valuations of internet shares without real economic fundamentals. In 1994, with the listing of Netscape, the company that developed the first commercial browser for the internet, a new economic cycle began, often called the *New Economy*. Within just a few years, there was an astonishing development of companies operating in the Internet sector or, more generally, in the IT sector. This growth was also facilitated by the low cost of capital in a context of low interest rates. As analyzed by Shiller (2005), the irrational enthusiasm of investors and the lack of control mechanisms in stock markets led to a systemic overvaluation of digital startups. When confidence cracked, the Nasdaq index lost more than 75% of its value, dragging funds, companies, and entire industries with it[36].

The general euphoria deriving from the concepts of development, progress, and growth associated with such a cutting-edge sector as the New Economy, fueled hope in the future and, in particular, in the rising value of the securities issued by companies in the sector, regardless of the data expressed by traditional profitability indicators. These expectations became self-fulfilling, as massive purchases of securities pushed share prices toward marked overvaluation of issuing companies.

Surprisingly, in March 2000, the financial reports published by many companies indicated disappointing results, revealing that investments in the sector could turn out to be unprofitable. As a result, prices began to fall, driven by investors who wished to divest before their portfolios lost further value.

By 2004, only 50% of the companies listed in 2000 were still active, and their share prices had collapsed to a fraction of their previous peaks[37]. A few solid firms, however, succeeded in improving in the following years, notably Amazon, eBay, and Apple.

2.7.2 U.S. subprime crisis

[36] Robert J. Shiller, *Irrational Exuberance*, 2nd ed. (Princeton, NJ: Princeton University Press, 2005).
[37] Ľuboš Pástor and Pietro Veronesi, "Technological Revolutions and Stock Prices," *American Economic Review* 99, no. 4 (2009).

The U.S. subprime mortgage financial crisis was one of the most serious and significant bubble crashes, beginning in 2006. The conditions for the crisis were rooted in the disbursement of mortgages linked to the purchase of residential properties. House prices were in a strong uprising trend, and there was a wave of easy financing to customers, without sound screening, justified only by the upward trend.

This dynamic was helped by the Federal Reserve's monetary policy, with a very permissive interest rate policy that originated in response to the previous internet bubble crisis. Once the subprime crisis erupted, it became clear that rating agencies had relied on models based on overly optimistic assumptions and scenarios regarding the evolution of the economy. From this crisis of confidence, a liquidity crisis developed. Banks also experienced severe losses, particularly those holding large amounts of structured securities affected by the crisis.

The crisis had a systemic nature, with unprecedented turmoil extending from the structured products market to stock markets and gradually to the entire financial system, demonstrating a strong contagious power. In a short time, the subprime mortgage crisis spread to the real economy of both the United States and Europe, causing sharp declines in income and employment.

The worsening of the crisis induced the U.S. government to intervene with a rescue plan for the financial system and large American credit institutions. This plan was divided into two strategies: nationalization operations and private bond acquisition programs.

In Europe, the crisis first struck Northern Rock, Britain's fifth-largest lender specializing in real estate mortgages, which experienced a bank run in mid-September 2007[38]. The bank bailouts increased very rapidly as the public debt was used to avoid defaults, laying the seed for future sovereign debt crises.

The subprime crisis emphasized the need for new rules to withstand instability and improve the resilience of the financial system; it opened a season of new capital requirements, accounting standards, etc.

2.7.3 Silicon Valley crisis

Recently (2023), there was the unexpected collapse of Silicon Valley Bank. More attention was directed to the risks associated with sector concentration, superficial management of portfolio duration. The Federal Reserve Board's analysis (2023) demonstrated that even in an apparent stable post-crisis environment, the absence of adequate controls may lead to shock episodes, with significant risks of systemic contagion[39].

---

[38] Financial Crisis Inquiry Commission, *The Financial Crisis Inquiry Report* (Washington, D.C.: U.S. Government Printing Office, 2011).
[39] Board of Governors of the Federal Reserve System, *Review of the Federal Reserve's Supervision and Regulation of Silicon Valley Bank* (Washington, D.C.: Board of Governors of the Federal Reserve System, 2023), https://www.federalreserve.gov/publications/files/svb-review-20230428.pdf.

2.8 Volatility linked to expectations, optimism, and pessimism of the markets

Investor psychology has an important role in investment and divestment decisions, influenced by emotional factors and irrational choices.

In an inverse relationship between cause and effect, it should be noted that market volatility is, in essence, shaped by the subjective expectations of economic operators, often influenced by waves of collective optimism or pessimism. At certain times, the price of an asset becomes detached from fundamental analysis and depends only on the overall expectations of traders. This form of instability is particularly insidious because it does not derive from fundamental data, but from aggregate, emotional, and imitative psychological behaviors.

J. M. Keynes observed that investors act according to "animal spirits," emotionally and irrationally. Using the metaphor of a beauty contest, he explained that investors do not choose what they consider the best value, but what they think others will consider the most attractive[40]. This dynamic contributes to the creation of bubbles and deep market corrections.

More recent studies by Robert Shiller (2000)[41] and by De Bondt and Thaler (1985)[42] confirm that market behavior is often subject to cognitive effects such as overconfidence, herding, and loss aversion. These mechanisms lead to overreaction to positive news, generating speculative rallies, or to crashes and panic selling in response to negative, sometimes marginal signals.

It is fundamental to understand the incredible work done by Daniel Kahneman and Amos Tversky (*Judgment under Uncertainty),* which explains biases and offers the perception of investor psychology. Over-optimistic expectations can lead to persistent overvaluation of assets, while overly pessimistic views can result in excessive write-downs. Investors are guided by rational evaluation until markets become "tough" or uncertain. These behaviors generate irregular fluctuations that are difficult to predict, especially in financial markets, but with direct effects also on real sectors such as manufacturing and real estate[43].

2.9 Volatility linked to unforeseen events (earthquakes, epidemics)

A clear example that demonstrates the transversal nature of volatility between financial and real markets is the COVID-19 crisis. The COVID-19 pandemic was a paradigmatic case of how the

[40] ohn Maynard Keynes, *The General Theory of Employment, Interest and Money* (London: Macmillan, 1936).
[41] Robert J. Shiller, *Irrational Exuberance*, 2nd ed. (Princeton, NJ: Princeton University Press, 2005).
[42] Bondt, W. F. M. D., & Thaler, R. (1985). Does the stock market overreact? *The Journal of Finance*, *40*(3), 793–805. https://doi.org/10.2307/2327804
[43] Amos Tversky and Daniel Kahneman, "Judgment under Uncertainty: Heuristics and Biases," *Science* 185, no. 4157 (1974).

subjective expectations of economic actors can generate not only strong fluctuations in financial markets but also profound and tangible effects on the real economy.

In the early stages of 2020, the collective panic triggered by uncertainty caused a violent collapse of global stock exchanges, with the VIX index surpassing the levels recorded during the 2008 crisis (Baker et al., 2020)[44]. However, beyond the immediate financial reaction, pessimistic expectations acted as a powerful catalyst for instability in the real economic system. The interaction between supply and demand shocks led to an uncontrolled contraction in production, mobility, and consumption.

Uncertainty encouraged precautionary savings and a significant reduction in spending, creating a decline in aggregate demand. The case of COVID-19 therefore, demonstrates how expectations, in the presence of extreme events, can turn into a structural source of volatility in real markets, through strategic behaviors that amplify the effects of uncertainty. As a result, the coordination of economic analysis, risk communication, and public policies is crucial to containing the distortions generated by collective psychological dynamics.

2.9.1 Sectoral resilience

According to Martin and Sunley (2015)[45], economic resilience describes the ability of a sector or territorial system to withstand shocks, adapt to a new context, and subsequently evolve. However, the literature shows that this capacity varies widely between sectors.

Sectors such as food, energy, or healthcare show higher levels of robustness. On the contrary, sectors with greater global exposure and complex supply chains (e.g., automotive, electronics) are weaker.

An emblematic case is the earthquake and tsunami of Tōhoku (2011) in Japan[46], which caused infrastructure damage and massive disruptions in automotive and electronics production. Many Japanese suppliers with high specialization had a fundamental position in the global supply chain, which led to production delays for U.S., European, and Asian companies (Todo et al., 2015)[47].

According to Bruneau et al. (2003)[48], sectoral resilience can be analyzed along four dimensions: structural robustness, speed of recovery, adaptability, and the level of coordination between economic actors. In response to the disaster, many companies reconsidered their procurement strategies, introducing greater geographical diversification, strategic storage, and business continuity plans. More generally, managing

---

[44] Baker, S. R., Bloom, N., Davis, S. J., & Terry, S. J. (2020, April 1). *COVID-induced economic uncertainty*. National Bureau of Economic Research. https://www.nber.org/papers/w26983

[45] Ron Martin and Peter Sunley, "On the Notion of Regional Economic Resilience: Conceptualization and Explanation," *Journal of Economic Geography* 15, no. 1 (2015).

[46] *Open Knowledge Repository*. (2025). Worldbank.org. https://openknowledge.worldbank.org/entities/publication/65acb86d-a37a-519b-b379-8191b25befa3

[47] Yasuyuki Todo, Kentaro Nakajima, and Petr Matous, "How Do Firms Reconstruct Their Supply Chains After Natural Disasters? Evidence from the Great East Japan Earthquake," RIETI Discussion Paper Series 15-E-011 (Tokyo: Research Institute of Economy, Trade and Industry, 2015).

[48] Bruneau, M., Chang, S. E., Eguchi, R. T., Lee, G. C., O'Rourke, T. D., Reinhorn, A. M., Shinozuka, M., Tierney, K., Wallace, W. A., & von Winterfeldt, D. (2003). A Framework to Quantitatively Assess and Enhance the Seismic Resilience of Communities.

volatility related to unforeseen events requires evolving from reactive approaches to proactive and adaptive strategies, in which extreme uncertainty becomes a structural element incorporated into decision-making models. Building resilience is therefore not just a technical requirement but also a competitive lever for sectors exposed to uninsurable risks and systemic interdependence.

2.10 Productive sectors vulnerability

Not all productive sectors react the same way to market volatility. The structural differences between industries, the various business models adopted, and the degree of globalization are some of the main factors that determine a sector's vulnerability to systemic shocks.

In a context of increasing volatility, classifying sectors based on their degree of exposure is strategic for companies (for risk management and planning), investors (for sectoral selection), and public institutions (in terms of industrial and support policies).

The framework and public strategic initiatives have a predominant influence on private choices, especially in sectors where state presence is necessary for social reasons (e.g., healthcare) or security reasons (e.g., defense). In these cases, uneconomic situations may be tolerated and compensatory subsidies distributed. Within this context, a state's capacity to remain independent in crucial sectors for national security is becoming an important variable. The case of Europe's energy dependence on Russia is an emblematic example of how this risk was highly underestimated by the European community, which was ultimately forced to revise its energy and even military programs.

Based on the previous considerations, and relying on both empirical and theoretical evidence, we examine the following sectors:

- Discretionary Consumer Goods
- Technology and ICT
- Energy
- Financial and Insurance Services
- Healthcare and Pharmaceutical Industry
- Raw Materials and Extractive Industry

- Telecommunications

For each sector, we highlight the structural causes of vulnerability, the main effects in shock situations, and the possible strategic measures to contain instability.

2.10.1 Discretionary Consumer Goods

This sector consists of non-essential consumer goods directly related to the level of disposable income. These goods represent expenses not essential for survival, such as clothing, consumer electronics, automotive, leisure, and luxury items. Demand for these goods is highly sensitive to changes in the macroeconomic climate, declining during recessions and rising during expansions. This cyclical characteristic makes this sector particularly vulnerable to exogenous and unforeseen events with shifts in collective confidence.

There are also two structural factors:

1. High demand cyclicality.

2. Complex global supply chains, especially in fashion and electronics (e.g., the Taiwan crisis affecting the chip market).

A relevant empirical example was observed during the 2008–2009 global financial crisis, when sales of durable goods, particularly cars and furniture, collapsed in major Western markets. Similarly, during the COVID-19 pandemic, sectors like clothing and electronics experienced sharply divergent dynamics: an initial collapse in demand, followed by an irregular rebound depending on the level of digitalization in distribution.

The consumer goods sector is exposed to volatility from both demand and supply sides and is one of the most vulnerable. Companies in this sector, therefore adopt strategies such as operational flexibility, portfolio diversification, and dynamic inventory management.

2.10.2 Technology Sector

The technology sector is a benchmark of economic growth and R&D, but it is also highly vulnerable to market shocks. Companies operate with short product cycles, heavy reliance on intangible capital, and strong dependence on critical inputs (such as microchips, software, and digital platforms). Technological uncertainty combines with market uncertainty, making it difficult to predict the acceptance of innovations, competitor reactions, and regulatory evolution.

One of the main vulnerability factors is the concentration of semiconductor production, with strong dependence on a few players located in geopolitically sensitive areas (e.g., Taiwan, South Korea). Military tensions and trade sanctions can compromise the entire supply chain, generating domino effects on a global

scale. This occurred during the chip shortage between 2020 and 2022, which quickly impacted other sectors, such as the automotive industry, slowing production and boosting the used car market.

2.10.3 Energy Sector

The energy sector has a strategic position in the global economy: it is a fundamental input for production and consumption in every industrial activity. It is also at the center of volatility, influenced by geopolitical, environmental, and regulatory factors.

The volatility of oil and natural gas prices has historically been a distinctive feature of the sector. Sudden shocks in supply (wars, sanctions, natural disasters) or demand (global crises, industrial collapses) generate strong fluctuations that propagate at the macroeconomic level. Unlike other sectors, where volatility is primarily financial, in the energy sector, production costs, inflation, and the profitability of energy-intensive companies play a decisive role.

One of the most recent examples is the energy crisis triggered by the war between Russia and Ukraine. Europe's dependence on Russian gas highlighted the vulnerability of infrastructure and procurement policies. According to the International Energy Agency (IEA, 2022), natural gas prices in Europe increased by more than 400% between January and October 2022, creating risks of energy rationing, production shutdowns, and inflationary pressures[49].

In addition, there is the transition toward a sustainable energy model. Energy companies are called to convert business models based on fossil fuels, highly exposed to global market volatility toward renewable energies, whose investments are subject to technological, regulatory, and social acceptance risks.

From a strategic perspective, the resilience of energy companies requires diversification of sources and geographical areas, investment in resilient infrastructure, the use of hedging instruments against price instability, and alignment with ESG standards for access to capital. The energy sector, more than any other, requires a long-term strategic vision to address the challenges of energy security, environmental sustainability, and economic stability.

2.10.4 Banks, Insurance, and Financial Services

The financial sector is a fundamental part of the economy, is a distributor of liquidity, the principal source of financing for companies and consumers, and, in providing these services, acts as a risk manager. This part of the economy has historically been extremely vulnerable due to its poor risk management, abnormal risk concentration, and lack of public regulation.

The power of contagion of this sector is enormous, working through interbank relationships and credit contraction (Gorton & Metrick, 2012). Brokers, funds, and asset management companies have to deal with pure market volatility, which directly affects income flows and portfolio value[50].

---

[49] International Energy Agency, *Gas Market Report, Q4-2022* (Paris: IEA, 2022), XX, https://www.iea.org/reports/gas-market-report-q4-2022.

[50] Gary Gorton and Andrew Metrick, "Getting Up to Speed on the Financial Crisis: A One-Weekend-Reader's Guide," *Journal of Economic Literature* 50, no. 1 (2012), https://doi.org/10.1257/jel.50.1.128.

The insurance sector has a limited liquidity risk, but is affected by the volatility of returns on invested assets and extreme natural or exogenous events (e.g., earthquakes, hurricanes, pandemics). The expansion of the sector to new insurance products and a crossover with finance services exposes the sector to financial risk.

Trust is the foundation of the financial system, and its erosion can generate volatility even in the absence of real shocks, for example, the failure of Silicon Valley Bank (2023)[51].

Actually, the resilience of this sector depends on several factors: sufficient capitalization, controlled cyber-risks, and risk management tools (RWA, diversification, dynamic repricing). However, the complexity of derivatives markets is so high that it can sometimes escape even strict regulatory oversight.

2.10.5 Healthcare and Pharmaceutical Sector

The healthcare and pharmaceutical sector is historically classified as non-cyclical or resilient, thanks to the essential nature of demand: healthcare tends to be a priority for families and governments, even during economic crises. However, the sector is not exempt from specific forms of vulnerability to volatility, particularly in relation to global shocks, supply disruptions, regulatory pressures, and geopolitical dynamics.

One of the main factors of instability is the high complexity of the pharmaceutical supply chain. The production of medicines often depends on active pharmaceutical ingredients (APIs) concentrated in a few areas of the world, especially India and China. Therefore, logistic shocks, trade restrictions, or health lockdowns can quickly generate global shortages of essential medicines, as happened during the COVID-19 pandemic.

The sector needs strong regulation and control, which is directly linked to political and regulatory factors. Approvals, reimbursements, changes in pricing criteria, or *patent cliff* policies can change profitability expectations and market volatility.

Another source of volatility is linked to the financialization of the pharmaceutical sector. Companies are subject to investor expectations and to strong competition in innovation. Uncertainty about the outcome of research and development may cause wide variations in sales. Nevertheless, the sector has shown good resilience thanks to digitalization (telemedicine, diagnostic AI), supply chain adaptation, and public cooperation.

2.10.6 Raw Materials

[51] Board of Governors of the Federal Reserve System, *Review of the Federal Reserve's Supervision and Regulation of Silicon Valley Bank* (Washington, D.C.: Board of Governors of the Federal Reserve System, 2023), https://www.federalreserve.gov/publications/files/svb-review-20230428.pdf.

The raw materials sector begins with the extraction of materials and initial processing, and it represents the basis of the global industry. However, volatility is closely linked to international markets, where prices are quoted, to rigid logistic infrastructures, and to geopolitical problems.

In fact, the volatility of raw material prices is a structural phenomenon, explained by short-term supply rigidity and globalized, cyclical demand. The sector is very sensitive even to small shocks that can cause strong price fluctuations and domino effects across all markets. For example, one of the most recent cases is the lithium and rare metals crisis, accelerated by the energy transition and the growing demand for batteries, electronic components, and green technologies. Studies by the International Energy Agency[52] highlight how the increase in demand, combined with a concentrated supply chain (China, Chile, Democratic Republic of Congo), has caused inflationary pressures, contractual instability, and geopolitical tensions, making downstream sectors like automotive and electronics vulnerable.

Moreover, environmental and regulatory issues are critical. Extraction and processing activities are exposed to environmental restrictions, local protests, climate risks (e.g., drought, floods), and increasingly stringent ESG regulations. The mining industry is also subject to political and operational risks, especially in countries where there is institutional instability.

Therefore, resilience strategies may include:

- financial hedging against volatility (e.g., commodity derivatives);
- diversification (reducing political risk);
- strategic partnerships to divide risks among multiple actors;
- investments in environmental technologies.

2.10.7 Telecommunications and Information Technology

The telecommunications and information technology sector ensures connectivity, data access, and information transmission in the modern economy; it is exposed to specific forms of volatility, tied to its infrastructural, geopolitical, regulatory, and technological factors. For example, a dependence on physical networks (submarine cables, radio towers, satellites) represents a strategic vulnerability (digital blackouts, cyberattacks, large-scale malfunctions) as the market has experienced. 28 April 2025, a major power blackout occurred across the Iberian Peninsula (Portugal and Spain), where electric power was interrupted for about ten hours. The power cut

[52] International Energy Agency, *The Role of Critical Minerals in Clean Energy Transitions* (Paris: IEA, 2021).

caused a lot of problems in telecommunications, transportation systems, and essential sectors (ex emergency services)[53]. On November 2024, two submarine telecommunication optic cables (BCS East-West Interlink, C-Lion1) were disrupted in the Baltic Sea with telecommunications and geopolitical consequences.[54]

In particular, regulatory risk is very significant. The Huawei case and the 5G restrictions imposed by the United States and the European Union between 2018 and 2021[55] represent an emblematic example of how telecommunications are now at the center of strategic tensions related to technological sovereignty, national security, and data control.

In terms of macroeconomic expectations, the sector shows declining profits and deals with significant regulatory barriers. The financial equilibrium is fragile, depending on interest rates, license costs, and competition. In a market with strong competition, small changes in margins may trigger reactions in stock prices, developing high financial volatility.

A weak point, with high evidence in the media, is cyber incidents that impact the reputation, reliability, and market value of companies, especially when breaches involve sensitive data or critical infrastructure. The sector has also demonstrated remarkable resilience, thanks to technological rapid innovation and the presence of global players with strong vertical integration. The COVID-19 pandemic emphasized the central role of telecommunications in ensuring the operational continuity of many sectors.

Summing up, this sector requires a combination of technological resilience, geopolitical foresight, and regulatory adaptability.

[53] "Outage Leaves Spaniards, Portuguese Trapped, Unable to Pay and Feeling Powerless," Reuters, April 29, 2025, https://www.reuters.com/world/europe/outage-leaves-spaniards-portuguese-trapped-unable-pay-feeling-powerless-2025-04-29/.

[54] "Explainer: Baltic Sea Undersea Cable Cuts Stoke Geopolitical Tensions," CNBC, November 28, 2024, https://www.cnbc.com/2024/11/28/explainer-baltic-sea-undersea-cable-cuts-stoke-geopolitical-tensions.html.

[55] European Commission, "Secure 5G Deployment in the EU: Commission Endorses Member States' Toolbox and Sets Out Next Steps" (press release), January 29, 2020, https://ec.europa.eu/commission/presscorner/detail/en/ip_20_123.

Chapter 3: Analysis Tools and Sectorial Vulnerability

Introduction:

A key aspect of analyzing market variability is to define where it occurs and when it becomes critical for investors or governments. In fact, the bankruptcy of a single company does not represent a collective phenomenon and appears to be of little importance for the community. However, if it affects an entire sector or the economy of a nation, the implications are very different.

It can also be observed that some of the effects seen at the individual company level may resemble those seen on a larger scale, and that the causes of failure or the bursting of a bubble may also share common factors. One of the most relevant aspect to consider is financial debt, which is crucial in both stock and bond markets, while it plays a smaller role in raw materials, where sharp price increases are less common and generally justified by the law of supply and demand.

In addition, the real estate market lends itself perfectly to the creation of financial bubbles, as history has shown repeatedly across the world. Another useful reflection concerns the investor's objective. For instance, during the Dutch Tulip Mania (1634–1637)[56] the first recorded speculative bubble, rare tulip bulbs were sold for more than the price of a house before the market collapsed, causing widespread panic and financial ruin for many investors.

If we are honest, the object of speculation here was not an essential good. Yet, with a little imagination, we can identify similar examples in today's markets. At present, a Chinese toy called *Labubu*, created by Hong Kong artist Kasing Lung, has become a global phenomenon. Labubu figures are highly sought after and can reach resale prices up by ten times retail or even more[57]. Just to focus on the volatility, a rare Labubu, originally retailed for about $85, was sold on eBay for more than $10,500[58].

This success can be explained by commercial and marketing factors:

- The "Blind Box" concept: consumers do not know which character they will buy until opening the box, so the purchase becomes exciting and addictive.

- Social virality: international popularity skyrocketed after many celebrities' exposure.

[56] Mike Dash, *Tulipomania: The Story of the World's Most Coveted Flower and the Extraordinary Passions It Aroused* (New York: Crown Publishers, 1999).
[57] Joan Verdon, "Labubus Remain King Of The Collectibles, StockX Reports," *Forbes*, 13 agosto 2025, https://www.forbes.com/sites/joanverdon/2025/08/13/labubus-remain-king-of-the-collectibles-stockx-reports/.
[58] Adriana Diaz, "This Is the Most Expensive Labubu on eBay," *New York Post*, August 2, 2025, https://nypost.com/2025/08/02/us-news/this-is-the-most-expensive-labubu-on-ebay/.

A collector’s must: Labubu becomes not just a toy for children but is an adult item.

- A unique aesthetic: Labubu combines cute and grotesque features, appealing to a wide and diverse audience worldwide.

Are there similarities between tulips and Labubu? I believe there are many. Above all, we could extend the list to other goods that attract mass passion. The key difference, however, is that the toy market is spontaneous and limited, whereas stock exchanges act as amplifiers of supply, offer stronger regulatory guarantees, and function as vehicles for accumulating savings. Moreover, financial markets allow leverage, which fuels development and magnifies both gains and losses.

In short, in a year or two no one will buy a Labubu for $100,000, and many may not even remember it. By contrast, tulips are permanently recorded in economic history books.

It is possible to list main forces involved in a financial bubble:

- Structural factors: prosperity (as opposed to depression), increasing purchasing power, expansionary monetary policy, and big data (providing far more investment possibilities and statistical sources than in 1920).

- Cultural factors: media and internet influence (analysts, influencers, trading platforms), optimism or exuberance, and the emergence of new sectors, products, or services.

- Psychological factors: overconfidence, emotional attachment (investors tend to feel affection for their financial assets, seeing them as a projection of their success in life).

Amplification factors include:

- Emulation: investors tend to follow high-earning sectors regardless of fundamentals.

- Contagion, which will be discussed later.

-

- Manipulation and fraud: to reach economic results, financial institutions tend to offer instruments favorable to the institution, both economically and in terms of risk.

A national example is the Parmalat fraud, a well-known and significant financial scandal, with devastating consequences for investors, particularly bondholders. The core of the fraud involved hiding financial debt and falsifying statements to show the company as solid and profitable.

Bonds were a principal tool in what became a Ponzi financial structure, used to finalize acquisitions and cover real economic losses; these elements misled investors and markets. Fundamental analysis on fake data proved useless (financial statements were inflated and debts hidden).

The fraud was revealed in December 2003, when Parmalat defaulted on a €150 million bond. Investigations showed that a subsidiary cash (€4 billion) was entirely fictitious[59]. As a result, bondholders (many small Italian savers) lost the entire amount of the bond. The case led to years of legal proceedings against Parmalat executives, auditors (Grant Thornton and Deloitte), and investment banks accused of easing the fraud. The Parmalat case is a classic example of bad corporate governance and a lack of transparency.

Another very famous case is the collapse of Lehman Brothers in 2008: a historical event in the global financial crisis. Triggered by a huge exposure to subprime securities, the bankruptcy revealed accounting fraud that had been hidden for years (the so-called *Repo 105* transactions[60]).

It is crucial to understand that there is a self-reinforcing loop even in committing fraud: shareholders demand earnings; their financial support depends on share performance; administrators strive to satisfy these demands while earning bonuses. Once this loop begins, it creates the conditions for a hidden bubble.

3.1 Tools for a Strategic Analysis of Volatility/Instability

One of the fundamental tasks of strategic planning is to diagnose the position of the company in its competitive context through consolidated and systematic methodologies. Therefore, for an effective understanding of the strategic economic situation and to identify situations of potential structural stress both in the global economy and within a specific sector, it is important that the company allocates resources to strategic positioning.

This involves comparing its parameters with market benchmarks and, at the same time, framing the overall situation of the national and international markets, while focusing on foreign markets of interest both from a production and commercial perspective.

Moreover, economic and financial analysis tools available to support risk diagnosis are quite diversified. They often focus on trading aspects (buy/sell decisions, timing) or portfolio

[59] *EconCrises*. "Parmalat - Financial Scandals, Scoundrels & Crises." *EconCrises.org*, November 29, 2016. https://www.econcrises.org/2016/11/29/parmalat/.

[60] Rosalind Z. Wiggins and Andrew Metrick, "The Lehman Brothers Bankruptcy C: Managing the Balance Sheet Through the Use of Repo 105," *Journal of Financial Crises* 1, no. 1 (2019), https://elischolar.library.yale.edu/journal-of-financial-crises/vol1/iss1/4/.

composition, but they can also provide signals that are useful for shaping production or commercial resilience strategies.

In particular, fundamental analysis remains the most reliable method for pricing an asset, since accounting standards help prevent overvaluation. However, history shows that in parallel with financial bubbles, there has often been a story of fraudulent accounting even on a national scale, as in the case of Greece[61], as well as persistent difficulties in assessing the real impact of certain financial derivatives.

The general picture provided by statistical and financial analysis tools is also examined on the basis of their predictive capacity, and their limitations are highlighted. In addition, the examination takes into account psychological aspects, in particular the results derived from the work of Daniel Kahneman and Amos Tversky[62] which, in summary, lead us to consider that speculative market situations must be analyzed from multiple perspectives: economic, psychological, and political.

It is also important to distinguish between volatility, understood as a measure of price fluctuations or extraordinary fluctuations (a symptom), and instability, understood as a state of potential fragility that can lead to a financial crisis capable of undermining an entire financial system.

As V. Mansharamani argues in *Boombustology*[63], we are currently experiencing an "accelerating sequence of boom and bust cycles, and despite these developments, no organized, multidisciplinary framework exists for thinking about them. Lacking such a framework, we are destined to a world of massive unintended consequences and the continual escalation of extremes."

3.1.1 Spotting the Bubbles

Financial bubbles, while varying in detail such as size, the asset involved, or the way they manifest, are far more similar than they are different. Therefore, we can assume that they are the result of logical cause-and-effect dynamics that can be identified.

The most important characteristics of bubbles are:

1. Prices are high relative to traditional measures and discounting future appreciation.

2. There is broad bullish sentiment.

[61] Jill Treanor, "EU Knew Greece's Figures Were Fiddled," *The Guardian*, December 5, 2012, https://www.theguardian.com/business/2012/dec/05/eu-knew-greece-figures-fiddled.
[62] Daniel Kahneman and Amos Tversky, "Judgment under Uncertainty: Heuristics and Biases," *Science* 185, no. 4157 (1974), https://doi.org/10.1126/science.185.4157.1124.
[63] Vikram Mansharamani, *Boombustology: Spotting Financial Bubbles before They Burst*, 2nd ed. (Hoboken, NJ: Wiley, 2019), 7.

3. Purchases and/or investments are financed by high leverage.

4. Stimulative monetary or political policy is inflating the economy.

3.1.2 Financial Instability (H. Minsky)

The hypothesis of financial instability was developed by economist Hyman Minsky[64]. He argued that financial crises are endemic in capitalism because periods of economic prosperity encourage borrowers and lenders to become progressively reckless. In this sense, excess optimism creates financial bubbles and, later, busts.

Minsky's hypothesis divides financial positions into three categories:

- Hedge finance: a position in which all debts can be paid off easily using only cash flows.

- Speculative finance: a position in which cash flows can cover interest payments but not the repayment of principal. Unable to repay principal as it comes due, the borrower must continuously roll over debt.

- Ponzi finance: a position in which cash flows cannot cover even interest payments. To continue operating, such entities must sell assets or borrow additional funds to meet both interest and principal obligations.

Consequently, both Ponzi and speculative finance imply that lenders are in a precarious situation as well, since repayment depends either on collateral guarantees (e.g., housing bubbles) or the borrower's ability to roll over debt.

Therefore, when the number of economic entities in a speculative posture increases, financial instability rises correspondingly. In most bubbles, we observe a prolonged period of economic strength and a strong tendency to take on additional leverage. Investors, however, often fail to recognize when this process is unfolding.

A list of objectives or phenomena that can be examined to intercept market bubbles includes:

1. Searching for evidence of a debt overhang.

[64] Hyman P. Minsky, *Stabilizing an Unstable Economy* (New Haven, CT: Yale University Press, 1986).

2. Identifying trend elements that denote excessive prolongation of bullish situations.

3. Observing signs of the Keynesian multiplier unraveling when financial elements are no longer supporting production dynamics but instead create purely financial value based on sentiment, or when they support non-usable production elements (e.g., war material, luxury intangibles).

3.1.3 Irrational Exuberance (R. J. Shiller)

Nobel Prize winning economist Robert Shiller warned of both the tech and housing bubbles. According to him, signs of irrational exuberance among investors have only increased since the 2008–2009 financial crisis. With high stock and bond prices and rising housing costs, the post-subprime boom may well be another illustration of Shiller's influential argument: psychologically driven volatility is an inherent characteristic of all asset markets[65].

3.1.4 Rational Bubbles (in brief)

Supporters of the efficient market hypothesis have attempted to explain bubbles in rational terms. Accordingly, several mathematical models have sought to formalize bubbles, defining their main characteristics and testing their possible existence.

Rational bubble modeling aims to make plausible a structure of perceived price with rational expectations, composed of a fundamental component and a bubble component. This bubble component should, in theory, also be discounted in the present value of a stock, and it reacts according to different theoretical approaches to certain conditions.

Since the early 1980s, many scholars such as Blanchard and Watson (1982)[66], Flood and Garber (1980)[67], and Hamilton and Whiteman (1985)[68] have attempted to explain bubbles in ways that remain as consistent as possible with efficiency theory.

---

[65] Robert J. Shiller, *Irrational Exuberance*, 2nd ed. (Princeton, NJ: Princeton University Press, 2005).

[66] Olivier J. Blanchard and Mark W. Watson, "Bubbles, Rational Expectations, and Financial Markets," in *Crises in the Economic and Financial Structure*, ed. Paul Wachtel (Lexington, MA: Lexington Books, 1982).

[67] Flood, R. P., & Garber, P. M. (1980). Market Fundamentals versus Price-Level Bubbles: The First Tests. *Journal of Political Economy*, *88*(4), 745–770. https://doi.org/10.1086/260900

[68] James D. Hamilton and Charles H. Whiteman, "The Observable Implications of Self-Fulfilling Expectations," *Journal of Monetary Economics* 16, no. 3 (1985): 353–373, https://doi.org/10.1016/0304-3932(85)90041-8.

3.2 Fundamental Analysis

Fundamental analysis involves examining a company's financial statements and economic indicators to determine the intrinsic value of a security. Ideally, the result of such an analysis should reveal the true worth of an investment based on the company's financial health, market conditions, and the broader economy.

In practice, investors perform fundamental analysis to identify the best investment opportunities. This involves analyzing the company's income statement, balance sheet, and statement of cash flows. Analysts then use reports, financial research, platforms like Bloomberg, budgets, and forecasts to elaborate key metrics such as assets, debt, revenue, and margins, and to compare them with competitors in the same sector.

Moreover, fundamental analysis takes into account macroeconomic factors, news, opinions, and organizational characteristics to form a complete picture. It is necessary to consider both domestic and international production and sales, inflation, interest rates, sectoral trends, and managerial expertise, as these can make a decisive difference.

Nowadays, there are multiple sources of information:

- Companies are required to publish reports and financial statements.

- Medium and large companies have investor relations departments to present relevant news or data to shareholders, investors, suppliers, and clients.

- Financial platforms such as Yahoo! Finance, Google Finance, and MarketWatch automatically update numbers and news, provide a wide range of financial data, and allow discussions on various topics.

- Research and rating reports: financial institutions conduct fundamental analysis and provide investment recommendations. Rating reports are especially important for risk calculation and capital adequacy.

- Subscription-based financial data providers such as Bloomberg, FactSet, and Morningstar offer extensive datasets and analyses, typically used by professional investors due to their cost.

- Publications on specific sectors or companies provide valuable documentation to complement fundamental analysis.

In addition to quantitative measures, certain qualitative fundamentals must always be considered, including:

- The business model.
- Competitive advantage.
- Management team.
- Corporate governance.
- Industry trend.
- Stakeholder satisfaction.

3.2.1 Quantitative Fundamentals

Specifically, quantitative fundamental analysis often focuses on the Multiples Method of Valuation. For listed companies, several indices can be calculated and used both for general comparison and for sector-specific evaluation. It is a simple method used to establish the potential price of companies operating in the same sector.

- P/E ratio compares stock market price to net earnings.
  The importance of this measure lies in the concept of investment: the shareholder invests money and expects the investment to be repaid over time through dividends. Once the investment has been recovered, profits should continue, providing remuneration for the risk assumed. Therefore, it does not seem rational to invest in a company with a P/E ratio of 200, since it would take 200 years to recoup the investment.
- P/BV ratio compares market capitalization to equity.
- Debt/EBITDA ratio indicates the degree of debt of the company in terms of the years needed to repay outstanding debt.

Taken together, very high P/E and Debt/EBITDA values may describe either a startup company or a distressed company[69]. At a systemic level, a generalized increase in these values implies a market trend favorable to development, with strong reliance on debt. Eventually, however, expectations may be disappointed, and the bubble will become evident.

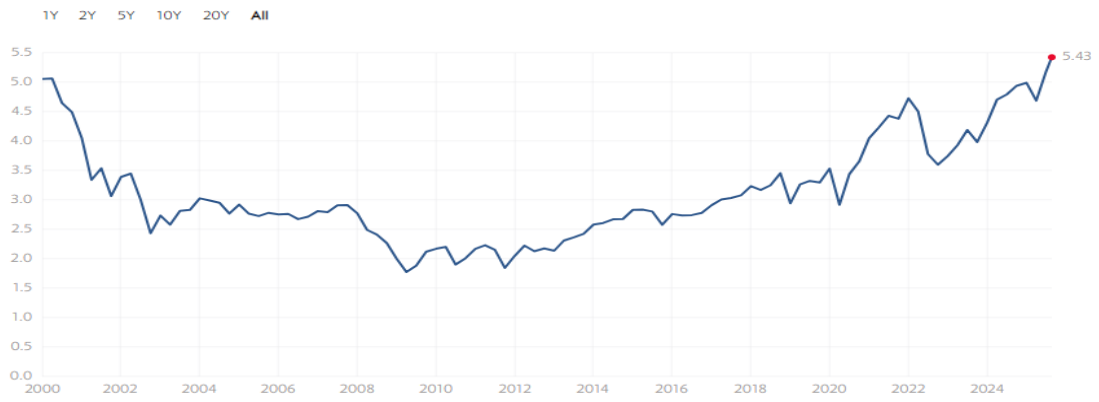
Picture 4: S&P 500 P/E RATIO (1880-2025)

Source: https://www.multpl.com/s-p-500-pe-ratio.

Picture 5: Shiller P/E ratio (cyclically adjusted) (1880-2025)

Source: https://www.multpl.com/shiller-pe.

[69] "Price-to-Earnings (P/E) Ratio: Definition, Formula, and Examples," *Investopedia*, consultato il 20 settembre 2025, https://www.investopedia.com/terms/p/price-earningsratio.asp.



Picture 6: S&P 500 Price to book value (2000-2025)

Source: https://www.multpl.com/s-p-500-price-to-book.

The average net debt to EBITDA ratio for S&P 500 companies is 1.3. However, it's more meaningful to consider industry-specific benchmarks that can provide a more precise guideline for evaluating a company's net debt / EBITDA. The tables below show selected sectors with the highest and lowest net debt / EBITDA ratios as of June 2024. Note the analysis excludes financials (banks, asset management, insurance, REITs, and other real estate).

Industry	Average Net Debt/ Ebitda	Number of companies
Utilities	4.5	90
Hospitality and leisure	3.7	90
Packaging and contaniers	3.4	22
Airlines	2.9	13
Retail	2.0	96

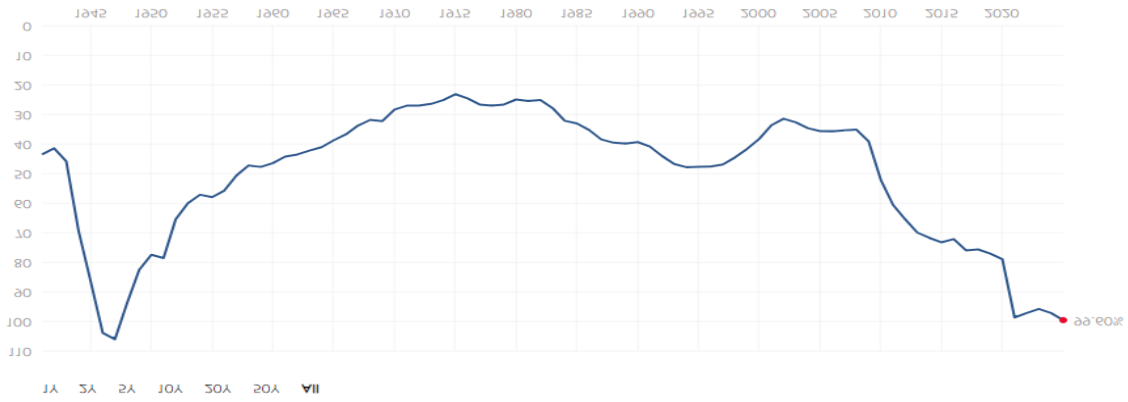
Picture 7: Selected industries with highest NET DEBT/ EBITDA (2024)

Source: Re-elaboration of a Finamize analysis (n.d.). *Highest net debt to EBITDA ratio*. Collected from https://finimize.com/glossary/net-debt-to-ebitda-ratio

Industry	Average Net Debt/ Ebitda	Number of companies
Speciality drug manufactures	-0.1	47
Metals and mining	0.2	27
Software	0.3	277
Semiconductors	0.4	90
Biotechnology	0.5	493

Picture 8: Selected industries with lowest NET DEBT/ EBITDA (2024)

Source: Re-elaboration of a Finamize analysis (n.d.). Lowest net debt to EBITDA ratio. Collected from https://finimize.com/glossary/net-debt-to-ebitda-ratio



Picture 9: US Federal Debt as Percentage of GDP (1945-2025)

Source: https://www.multpl.com/u-s-federal-debt-percent (chart); https://www.whitehouse.gov/omb/information-resources/budget/historical-tables/ (data).

General government debt	
% of GDP, 2024	
Category	Government gross debt
Greece	169.257
Italy	148.41
United States	122.865
France	116.457
Spain	108.48
Canada	107.301
Belgium	103.954
Portugal	100.563
United Kingdom	93.004
Austria	85.392
Finland	85.28
Hungary	81.867
Slovenia	69.736
Poland	67.194
Slovak Rep.	66.227
Germany	63.288
Norway	61.297
Latvia	58.363
Australia	55.758
Czechia	49.411
Netherlands	47.483
Chile	45.832
Sweden	45.587
Ireland	41.111
Lithuania	40.299
Switzerland	39.771
Denmark	36.071
Estonia	33.349
Luxembourg	31.892

Picture 10: General government debt as a percentage of GDP (2024)

Source: Re-elaboration of OECD analysis. *General government debt*.
from https://www.oecd.org/en/data/indicators/general-government-debt.html

We consider the debt of a single company/group, but is important to consider the national debt as part of the analysis, as it determines rates and liquidity of the capital market:

Consequences:

- Reduce private investment and slow economic growth.
- Increase interest payments to foreign holders, thereby potentially reducing national income.

- Elevate the risk of a fiscal crisis.
- Lead to higher interest rates.
- Constrain lawmakers from implementing policies to respond to crises or invest in the future.
- Create problems of intergenerational equity by shifting debt to future generations.

In addition, we must also consider global debt to assess the real risks faced by companies in specific countries. At present, U.S. debt, given its central role in driving the world economy, is rising at a concerning pace.

What matters about government debt and financial bubbles is that they are interconnected in several ways. When a government runs large deficits and accumulates debt, it often requires expansive monetary policy from its central bank (e.g., the Federal Reserve) that may influence excessive borrowing and abnormal risk-taking above all, in the private sector. Easy credit conditions can fuel asset price increases, leading to speculative bubbles, especially in real estate.

A particularly relevant scenario arises when banks hold a large share of their own government's debt (e.g., Italy). If fiscal revenues deteriorate and bond values fall, the financial system is weakened, and the solvency of banks may require public intervention. This, in turn, forces the government to increase its debt, creating a feedback loop where a sovereign debt crisis can trigger a banking crisis and expose overvalued assets.

3.2.2 Spotting the Bubbles

Fundamental analysis provides tools to identify when an asset's price has become disconnected from its real value and to issue strong alerts about potential bubbles. For example, a general increase in P/E, Debt/EBITDA, and P/BV ratios may signal good performance, but during euphoric phases, many investors abandon fundamental analysis altogether.

In this context, the psychological aspects outlined by Kahneman and Tversky are, in my opinion, more important than any other factor. The fear of missing out (FOMO) and the belief that prices will continue to rise indefinitely often become the primary drivers of valuation, while data-driven reasoning from fundamental analysis is dismissed as irrelevant or outdated.

It is a fact that a bubble bursts when the flow of optimistic investors is over and the first symptom of reality appears. On this basis, prices cannot be sustained by speculation, and the consequence is a sudden decline. At this point, the intrinsic value as identified by fundamental analysis once again becomes the anchor for asset prices.

Looking at the charts, it is clear that there is something wrong with multiples and debt. Companies, often backed by overestimated leaders, keep promising clear future gains. Sometimes they even convince investors to subscribe to new share issues, thereby reducing financial debt. However,

when corporate governance is weak and companies are treated merely as objects of ownership, the risk of a bubble increases, as fundamental analysis can no longer be trusted.

An interesting example is OpenAI. If an investor wishes to buy shares, they must be an accredited investor (i.e., with high net worth and/or income), and purchases are possible only on private secondary markets. As a private company, OpenAI does not release a public balance sheet or formal financial statements. We only know that its valuation has grown dramatically, but it is not yet profitable.

At the same time, the rise in government debt raises serious questions about whether spending is genuinely productive for the country. Will it generate positive cash flows, or will it destroy value? Building a hospital or a bridge may create lasting benefits, while massive investment in armaments as in Russia raises doubts about long-term economic impact. Debt is rising, companies are trying to cover difficulties, and fundamentals may diverge sharply from market valuations.

3.3 Technical Analysis

Technical analysis[70] involves studying historical price charts to anticipate price movements in financial assets. It relies on past market data and can be applied to any market. Unlike fundamental analysis, technical analysis does not apply a scientific model, nor does it evaluate whether market movements are rational. Instead, it embraces chart analysis, attempting to identify patterns or repetitions to determine entry (buy) and exit (sell) points and to time market operations.

In practice, technical analysts are often in conflict with fundamental analysts. However, the two approaches can complement each other, particularly in identifying stress situations.

The three theoretical assumptions of technical analysis are:
A) The market discounts everything
– All information is reflected in the price.
– Rational and irrational thoughts of participants are included in the security's price.

B) Price moves in trends
– Once a trend is established, prices are more likely to continue in that direction than to reverse.

C) History tends to repeat itself
– Price movements tend to reappear in the same graphical shapes, or at least in similar forms.

Consequently, past behavior can provide useful indications for the future. By analyzing time-series charts, analysts identify patterns that tend to resolve in specific directions, allowing them to formulate statistically grounded predictions.

[70] John J. Murphy, *Technical Analysis of the Financial Markets: A Comprehensive Guide to Trading Methods and Applications* (New York: New York Institute of Finance, 1999).

The main graphical representations are:

- Line chart: shows only closing prices over a set period.
- Bar chart: uses rectangular bars with lengths proportional to values.
- Candlestick chart: similar to a bar chart, but with a wide vertical body illustrating the difference between open and close prices.

3.3.1 Trend

One of the pillars of technical analysis is the idea that markets do not move in a completely erratic way (the "random walk" theory), but follow identifiable trends.

- An uptrend is a series of higher highs and higher lows.
- A downtrend is a series of lower highs and lows.
- A sideways or horizontal trend occurs when there is little upward or downward movement.

3.3.2 Moving Averages

To identify trends, technical analysis often uses moving averages across different intervals. Because they are tied to the chosen time frame, these averages provide important signals about recurring levels, which, combined with price action, generate buy or sell indicators.

For example, when the price line exceeds the moving average, a buy signal occurs, and vice versa. However, this system works reliably only in well-in sideways markets; the frequent intersections between averages and prices may lead to excessive transaction costs.

Analysts use filtering tools such as moving averages with different time frames: shorter ranges are useful in horizontal markets, while longer ranges are better for vigorous trends. The broader the range, the smoother but more delayed the line, which becomes informative when compared to the price line.

Although the Simple Moving Average is widely used, it has been supplemented by the Weighted Average and the Exponential Average.

3.3.3 Support and Resistance

- Support: the price level below which a stock or market rarely falls.

- Resistance: the price level above which a stock or market rarely rises.

3.3.4 Strategies

- Trend-following strategies: the assumption is a lasting trend, using moving averages and indicators like MACD.

- Mean reversion strategies: the assumption is that prices tend to their average after deviations; analysts use Bollinger Bands and RSI to identify overbought or oversold conditions.

- Breakout strategies: forecast price movements when support or resistance levels are broken.

- Swing trading strategies: focus on short-term variability, seeking small gains (e.g., scalping) with short-term tools such as moving averages and charts.

Summing up, the strategy depends on market conditions, trading style, and risk tolerance. The main objective is to maximize profitability.

3.3.5 Picking Some Reports from the Web

Dow and Elliott theories[71] analyze price patterns and waves using Gann angles, Fibonacci retracements, etc. However, whether technical analysis "works" remains a matter of debate. Methods can vary, different analysts can show opposite conclusions from the same data.

It is very easy to find technical reports online, mostly generated automatically or through AI.

At first glance, many suggest that everything is fine and that trends remain positive in the short, medium, and long term.

Picture 11: An example of technical analysis with Trends, Supports, Resistances (2019-2025)

Source: https://www.investtech.com/main/market.php?CompanyID=10400521&product=6

3.3.6 Mean Reversion and Stability

The resilience of a nation's financial system, markets, institutions, and infrastructure to withstand shocks and prevent crises is supported by the Mean Reversion theory[72], which states that prices have the capacity to correct and return to their long-term average. This is particularly important after important deviations, since the concept is opposite to the strong growth of a financial bubble.

When the bubble is growing, there is a tension between the upside of prices and the attraction to a fundamental value. The collapse of a bubble should make the prices return to the asset's fundamentals toward a long-term mean.

The problem with this approach is determining which is the real mean value and how long the deviation may last. The mean-reversion process is well-suited for commodities; their physical nature and their production and consumption cycles make their prices tend toward a long-term equilibrium value.

[71] Murphy, *Technical Analysis of the Financial Markets*.
[72] James M. Poterba e Lawrence H. Summers, "Mean Reversion in Stock Prices: Evidence and Implications," *Journal of Financial Economics* 22, n. 1 (1988): 27–59, https://doi.org/10.1016/0304-405X(88)90021-9.

3.3.7 Role of Automated Trading

Automated trading, or algorithmic trading, is a software capable of executing trades on predefined parameters, with no human approval. The trader sets the rules and the software follows them, buying and selling automatically when the corresponding market conditions are met. These are the analyst or trader inputs:

1. Defines the strategy, specifying rules that the software must follow (based on indicators, fundamental analysis, etc).

2. Selection of Platforms.

3. Monitoring and management of the software as it is essential to check the system and adapt it to market trends and conditions.

Positive factors include:

- Efficiency

- Emotionless operation

- Broad access to multiple markets (it is possible to operate simultaneously across markets and instruments)

- Backtesting (elaborating a strategy and testing it on historical data to judge its effectiveness before committing real capital)

Negative factors include:

- Complexity, particularly for advanced strategies (a simple one may lead to losses)

- Dependency on third-party software, which may prove a poor choice

- No guarantee of gains

The use of algorithms and technical analysis lies at the core of automated trading systems. By applying historical data, the software identifies trends and price patterns and executes trades automatically.

Moreover, these systems are gradually evolving and can execute multiple strategies at the same time across multiple trading accounts and markets. They have become a fundamental tool for financial markets, combining increasing efficiency with tighter risk control. Their ability to execute trades in milliseconds also allows them to exit a bubble with limited financial damage.

By reducing emotions that often distort decisions and by strictly following predefined strategies, investors and traders may rely on their long-term plans and avoid irrational behavior. Furthermore, back testing helps test strategies on historical market data, identifying strengths and weaknesses, and enables optimization and adjustment[73].

3.3.8 Artificial Intelligence

Artificial intelligence (AI) and machine learning (ML) algorithms are expected to play an increasingly relevant role in automated trading systems. These technologies will be able to identify more complex market patterns and make more precise trading decisions. In particular, self-learning systems that can adapt to changing market conditions are gaining popularity[74].

3.3.9 Spotting the Bubble (AI, Cryptocurrency, Carbon Credits)

Technical analysis is essentially empirical, and the bursting of bubbles is evidence of its limits and limited predictive capacity. It is also necessary to focus on psychological and emotional factors that explain certain price behaviors.

Even if technical analysis lacks a solid scientific foundation, it is easy to imagine that when a large number of market participants rely on it, the phenomenon may become a self-fulfilling prophecy. Historically, the bigger the idea, the more it tends to attract excessive short-term attention, which

[73] James Chen, "Algorithmic Trading Explained: Methods, Benefits, and Drawbacks," *Investopedia*, last updated July 29, 2024, https://www.investopedia.com/terms/a/algorithmictrading.asp.

[74] Dixon, M. F., Halperin, I., & Bilokon, P. (2020). *Machine learning in finance*. Springer International Publishing. https://doi.org/10.1007/978-3-030-41068-1

is then followed by a crash; yet sectors such as railroads, the internet, AI, and cryptocurrency still went on to transform the world.

AI Market

Is it possible to link AI companies with the dot-com companies of the late 1990s? The internet bubble and the current AI bubble show clear similarities. A recent MIT report[75] revealed that 95% of companies investing in generative AI have yet to see financial returns much like internet firms during the dot-com bubble. Meanwhile, the media are strongly promoting AI, and people are intensifying its use across many domains, from leisure to culture, photography, gaming, books, and painting.

Sam Altman, CEO of OpenAI, warned that some companies' valuations are overestimated and that there could indeed be an AI bubble[76]. Analysts are divided: some, such as Ipek Ozkardeskaya (Swissquote), warn that we are living inside a bubble, viewing it as a warning to investors[77]. Altman himself even compared the AI bubble to the dot-com bubble[78].

Tech expert Erik Gordon (University of Michigan, Ross School of Business) explained that investors may suffer more from the AI boom than from the dot-com crash, pointing to examples such as Pets.com (internet era) and CoreWeave (AI infrastructure startup)[79]. On the other hand, Kevin O'Leary (Shark Tank investor) expressed the opposite view, influencing a wide audience through his media presence[80].

Ray Dalio (Bridgewater Associates founder) described AI as one of the greatest inventions in history, with vast potential to revolutionize productivity and decision-making[81], while also warning of risks such as societal disruption, job displacement, and growing inequality. He, too, has warned of a potential AI-driven bubble[82]. Despite these contrasting opinions, the market is

[75] MIT Sloan Management Review and Boston Consulting Group, *The GenAI Divide: State of AI in Business 2025*(Cambridge, MA: MIT SMR Connections, 2025), 3.
[76] Sherin Shibu, "OpenAI CEO Sam Altman Thinks We're in an AI Bubble Because Investors Are 'Overexcited' About Artificial Intelligence," *Entrepreneur*, August 19, 2025, https://www.entrepreneur.com/business-news/openais-sam-altman-warns-overexcited-investors-ai-bubble/496081.
[77] Ipek Ozkardeskaya, "Ipek Ozkardeskaya: 'You are Living in a Kind of Bubble With This Job,'" *Finews*, September-10 2025, https://www.finews.com/news/english-news/51080-swissquote-ipek-ozkardeskaya-research-youtube-zinswende-2.
[78] Shibu, "OpenAI CEO Sam Altman Thinks We're in an AI Bubble."
[79] *"Tech guru Erik Gordon says investors will 'suffer' far more from the AI boom than the dot-com crash," Business Insider*, 15 August 2025, https://www.businessinsider.com/erik-gordon-ai-stocks-dot-com-bubble-crash-tech-market-2025-8.
[80] Áine Cain, *"Shark Tank's Kevin O'Leary Says AI Boom Is Different from Dot-com Bubble and Will Help Beat Inflation,"Business Insider*, August 12, 2025, https://www.businessinsider.com/shark-tank-kevin-oleary-ai-dotcom-bubble-tariffs-inflation-recession-2025-8.
[81] *The National*, "AI Could Be World's Greatest Invention and Most Complex Challenge, Says Ray Dalio," December 13, 2024, https://www.thenationalnews.com/business/markets/2024/12/13/ai-could-be-worlds-greatest-invention-and-most-complex-challenge-says-ray-dalio/.
[82] George Glover, "Ray Dalio Says AI Comes with a Big Downside: Creating a 'Bunch of Losers,'" *Business Insider*, September 16, 2025, https://www.businessinsider.com/ray-dalio-ai-downside-society-inequality-ubi-universal-basic-income-2025-9.

already testing AI companies. Rumors and speculation swirl around firms such as Palantir (spyware, U.S. government contracts), Nvidia (AI chips), Oracle, and AMD. Yet investors have not panicked at least not yet. The real question is: will a bubble emerge when major institutional investors, such as pension funds invested in Amazon, Microsoft, Alphabet, and Meta, begin selling their assets?

A closer look at AI shares can be made through the Price/Sales ratio, an indirect way of valuing the sustainability of a business alongside its infrastructure and software. For example, Amazon trades at 3.6x[83], Google (Alphabet) at 5.8x[84], Nvidia at 29.2x[85], and Palantir at 100x[86] (August 2025 data). These companies clearly show different growth rates, slower for Amazon and Google, and extraordinary for Nvidia.

Thus, psychological factors and media influence currently dominate the game. Analyst and expert opinions play a decisive role, and the ongoing debate among them is shaping the market as a form of "Investor Community Intelligence."

Cryptocurrency Market

Bitcoin, like other cryptocurrencies, is based on blockchain technology, which allows information to be recorded securely, immutably, and transparently through cryptography. Each block contains a set of transactions and a hash an alphanumeric string that distinguishes it from other blocks and links it to the preceding ones (IBM)[87].

Many investors, such as Warren Buffett, argue that cryptocurrencies are worthless. In theory, the same could be said of fiat currencies, which have long been detached from gold[88]; however, digital currencies differ in certain respects. Therefore, it is useful to recall the three main functions of money:

1. Medium of exchange

2. Unit of account (numerical valuation)

[83] Macrotrends, *Amazon Price to Sales Ratio 2010–2025*, accessed September 7, 2025, https://www.macrotrends.net/stocks/charts/AMZN/amazon/price-sales.
[84] GuruFocus, *Alphabet (GOOGL) PS Ratio*, updated August 31, 2025, https://www.gurufocus.com/term/ps-ratio/GOOGL/Alphabet-Inc.
[85] Macrotrends, *Nvidia Price to Sales Ratio 2010–2025*, accessed September 7 2025, https://www.macrotrends.net/stocks/charts/NVDA/nvidia/price-sales.
[86] Macrotrends, *Palantir Technologies Price to Sales Ratio 2019–2025*, accessed September 7, 2025, https://www.macrotrends.net/stocks/charts/PLTR/palantir-technologies/price-sales.
[87] IBM, "What Is Blockchain Technology?," IBM, accessed September 19, 2025, https://www.ibm.com/topics/what-is-blockchain.
[88] Maggie Fitzgerald, "Warren Buffett Says Bitcoin Is 'Probably Rat Poison Squared'," CNBC, May 5, 2018, https://www.cnbc.com/2018/05/05/warren-buffett-says-bitcoin-is-probably-rat-poison-squared.html.

3. Store of value

The entire cryptocurrency market is potentially a speculative bubble: it has no GDP backing, no state support, and exists as a software idea fueled by fashion and media hype.

Several economists and investors share this view:

- Warren Buffett (former CEO of Berkshire Hathaway) has defined Bitcoin as *"probably rat poison squared"*, stressing that its value depends solely on investors' belief that prices will keep rising (CNBC)[89].

- Paul Krugman (Nobel 2008) has described cryptocurrency as a Ponzi scheme, attracting investors with volatility rather than fundamentals (The New York Times)[90].

- Joseph Stiglitz (Nobel 2001) argues that cryptocurrencies serve no socially useful function and represent a growing bubble (Bloomberg)[91].

- Robert Shiller (Yale, expert on speculative bubbles) considers cryptocurrencies a modern example of a speculative bubble, driven by investor enthusiasm without intrinsic value (Yale Insights)[92].

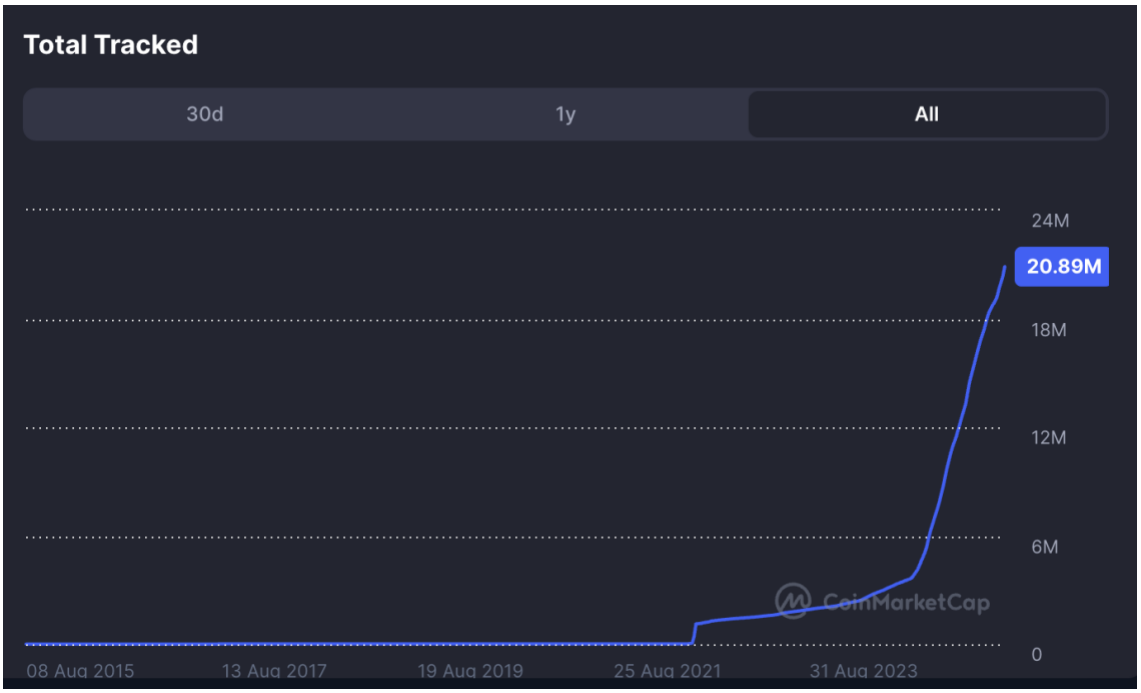
Indeed, the history of cryptocurrency crashes is already long, offering solid ground for speculation. Just as AI and internet companies proliferated rapidly, cryptocurrencies have multiplied to over a hundred tokens with market capitalizations exceeding $1 billion each[93].

[89] Ibid.
[90] Paul Krugman, "Technobabble, Libertarian Derp and Bitcoin," *The New York Times*, May 7, 2021, https://www.nytimes.com/2021/05/20/opinion/cryptocurrency-bitcoin.html.
[91] Enda Curran, "Bitcoin Ought to Be Outlawed, Nobel Prize Winner Stiglitz Says," *Bloomberg*, November 29, 2017, https://www.bloomberg.com/news/articles/2017-11-29/bitcoin-ought-to-be-outlawed-nobel-prize-winner-stiglitz-says-jal10hxd.
[92] "Three Questions for Robert Shiller on Bitcoin," Yale Insights, accessed September 7, 2025, https://insights.som.yale.edu/insights/three-questions-prof-robert-shiller-on-bitcoin.
[93] "Top Cryptocurrency Prices and Charts," CoinMarketCap, accessed September 7, 2025, https://coinmarketcap.com/.

#	Name	Price	Market Cap	Volume (24h)
1	Bitcoin	$111,041.10	$2.21T	$24,377,422,326.00
2	Etherum	$4,280.82	$516.72B	$17,969,670,587.00
3	XRP	$2.86	$170.65B	$3,401,485,558.00
4	Tether	$1.00	$168.88B	$68,383,193,905.00
5	BNB	$874.40	$121.71B	$1,888,626,629.00
6	Solana	$202.11	$109.53B	$3,233,183,089.00
7	USDC	$0.9999	$72.54B	$6,229,167,351.00
8	Dogecoin	$0.2217	$33.45B	$1,684,787,765.00
9	TRON	$0.3299	$31.23B	$2,310,634,456.00
10	Cardano	$0.8277	$29.61B	$664,838,435.00

Picture 12: Cryptocurrency market expansion (September 7, 2025)

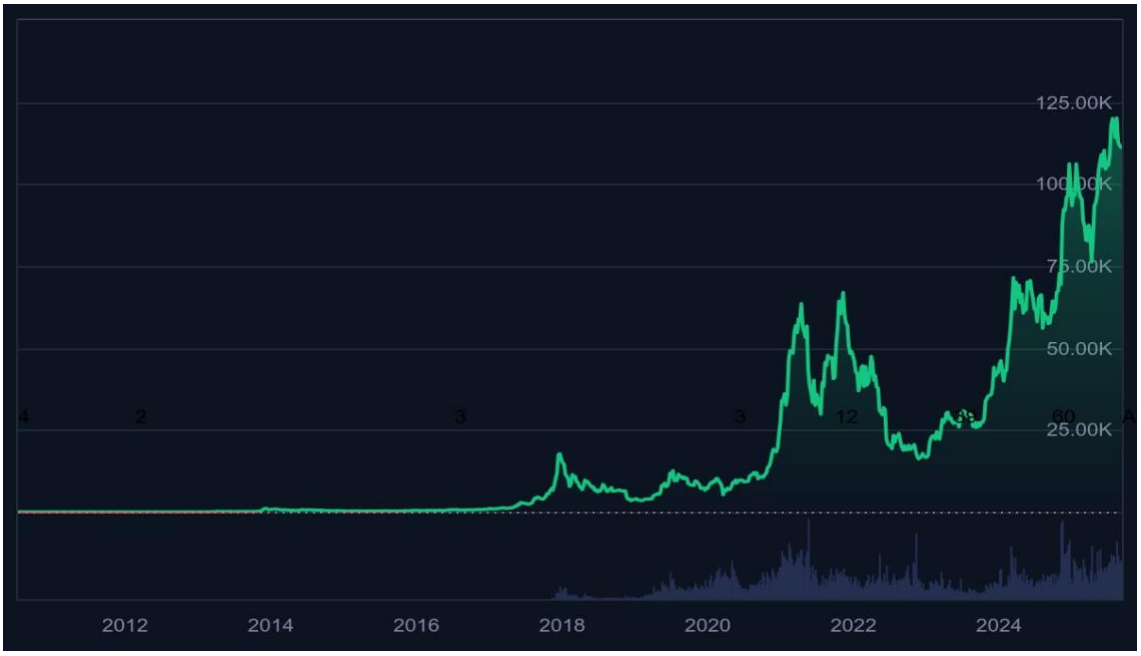
Source: https://coinmarketcap.com/.



Picture 13: Total number of cryptos tracked (2015-2025)

Source:https://coinmarketcap.com/charts/number-of-cryptocurrencies-tracked/.

Following the graphic of Bitcoin from its origin:



Picture 14: Bitcoin chart from its origin to today expressed in dollars (2009-2025)

Source: https://coinmarketcap.com/currencies/bitcoin/.

And this is the graph of market capitalization:

Picture 15: Crypto Market Cap (2022-2025)

Source: https://coinmarketcap.com/charts/.

This following chart is very interesting, as it shows that, in some way, expectations are much worse than reality, even for cryptocurrencies. In fact, I sincerely doubt that most investors truly understand what they are trading. This seems to represent the very essence of expectation.

Therefore, while all the ingredients for a bubble are present, it appears as though the market is, for the time being, capable of self-sustaining.

Picture 16: Fear and greed index chart for sentiment analysis (2022-2025)

Source: https://coinmarketcap.com/charts/fear-and-greed-index/.

Carbon Credits

The attention to environmental factors is a deontological issue for many companies and financial institutions, and it has generated a phenomenon called ESG/greenwashing. This is a practice used to attract investors and customers without making genuine changes in the production process. In this way, companies can monetize a rate discount on bonds and dedicated financing, and also obtain significant public support. At the same time, this market is growing rapidly and has a solid underlying issue: combating climate change. Nevertheless, the fear is that it may become over-inflated due to a lack of regulation, concerns over fraudulent offsets, and a supply-demand imbalance that could create a bubble.

3.4 Sentiment Analysis

Traditional finance is still unable to fully understand market sentiment, that is, the collective psychology, attitude, or mood of investors toward an asset. In contrast, sentiment analysis rationalizes the emotional tone of the press, online posts, and public opinion. This information is

valuable because it helps to truly understand emotions, fears, and greed in relation to any asset or market trend.

Sentiment, in its most basic form, is the positive or negative strength of the market in a chosen trading session. It is similar to fundamentals, except it lasts for much shorter periods of time. Indeed, sentiment can be in line with fundamentals, but it can also move prices in the opposite direction. What makes sentiment particularly interesting is that it can last from a few seconds to many weeks, depending on its strength.

The most favorable situations occur when the current sentiment aligns with fundamentals, since longer-term investors using fundamentals and shorter-term traders using sentiment are all pushing in the same direction. In this sense, sentiment can be seen as a form of fundamental analysis, but oriented toward the short term rather than the longer-term picture. The golden rule of sentiment analysis is that the more something is already known to the market, the less impact it will generally have.

The Behavioral Finance Theory, laid out by Kahneman and Tversky (prospect theory)[94], demonstrates investor irrationality. In fact, there is evidence that investors are not completely rational: their decisions are often not based on fundamental rules but guided by their own perceptions or the opinions of others. Investors tend to be overconfident in their ability to forecast, and they are often reluctant to amend their views.

Keynes's *Animal Spirits Theory*[95] assumed that individuals are dictated by their sentiment. When the market is surging, investors flood in, buying any share and expecting unrealistic gains. However, when the inevitable downturn follows, they turn increasingly pessimistic, yet surprisingly hold on to their risky portfolios to avoid capitalizing losses. Herd behavior is thus inevitably linked to market sentiment and may allow for irrational enthusiasm, which often manifests in inefficient prices and bubbles.

What happens if sentiment trades against fundamental analysis? The answer is simple: sentiment often proves more powerful than reality. The market reaction to a certain event may be strong at first, but a few weeks later the exact same scenario may produce little to no movement. The market reacts most strongly to information that is new or unexpected; once information becomes known, price swings decrease because the market has already attempted to price it in. Sometimes the market focuses heavily on one issue, only to instantly forget it when a new one arises. There is the possibility that this sentiment may last longer, especially if the market is working on important news or information.

Algorithmic trading has revolutionized traders' work, and sentiment analysis has a strategic role in its evolution. Integrating sentiment data into the algorithm, analysts can significantly enhance decision-making processes. Sentiment-driven software can react to market news in real time, making trades based also on the emotional tone of news. Evolution in natural language processing (NLP) and machine learning has made real-time sentiment analysis highly possible. Analysts can

[94] Amos Tversky and Daniel Kahneman, "Judgment under Uncertainty: Heuristics and Biases," *Science* 185, no. 4157 (1974)
[95] Keynes, *The General Theory*

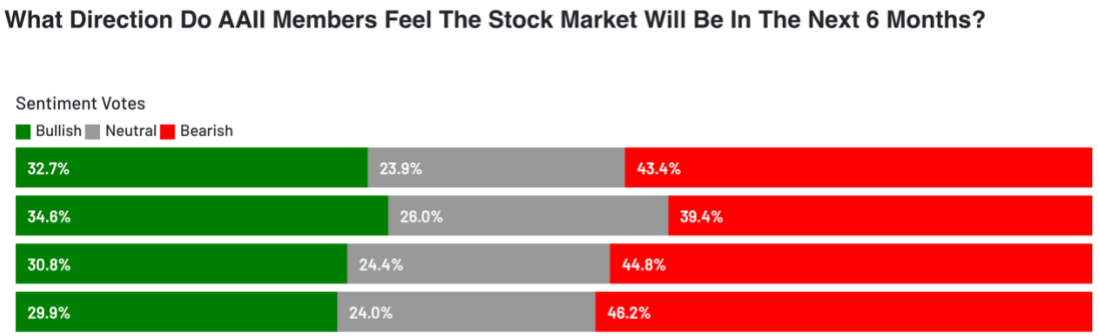
process large amounts of textual data, allowing them to react swiftly to breaking news and market developments. In the trading environment, this real-time capability offers a significant advantage.

Incorporating news feeds and sentiment analysis into quantitative finance is no longer optional; rather, it has become a necessity, as it is increasingly efficient thanks to technological progress.

There are also many websites that allow investors to gain a better perception of sentiment. For example:

1. AAII (American Association of Individual Investors):

This organization provides the opinions of individual investors by asking them about their outlook for the market over the next six months (a survey conducted since 1987). Investor sentiment is measured through weekly surveys, with the objective of working out a forward-looking perspective of the market.[96]



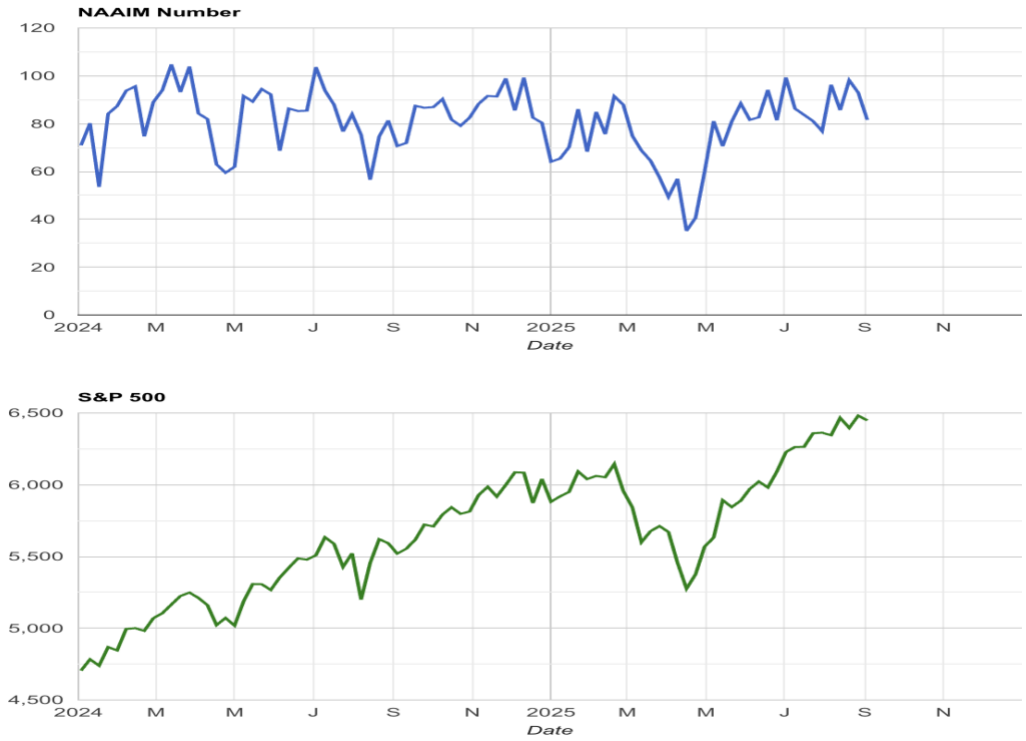
Picture 17: AAII members' sentiment towards the stock market for the next 6 to six months (extraction date September 2025)

Source: https://www.aaii.com/sentimentsurvey.

2. NAAIM (National Association of Active Investment Managers):

The NAAIM Exposure Index represents the average exposure to U.S. equity markets reported by its members. The blue line depicts a two-week moving average of the NAAIM managers' responses, while the green line shows the closing level of the S&P 500 Total Return Index on the survey date[97].

[96] "AAII Investor Sentiment Survey," American Association of Individual Investors, accessed September 20, 2025, https://www.aaii.com/sentimentsurvey.
[97] "NAAIM Exposure Index," National Association of Active Investment Managers (NAAIM), accessed September 20, 2025, https://www.naaim.org/programs/naaim-exposure-index/.



Picture 18: NAAIM Exposure Index (2024-2025)

Source: https://naaim.org/programs/naaim-exposure-index/.

It is important to recognize that the NAAIM Exposure Index does not have a predictive nature. Its primary goal is to allow active managers to stay in tune with what the market is doing at any given time. In our context, however, it provides a clear signal of over-optimism.

3. CNN Business Fear & Greed Index

The Fear & Greed Index is a tool used to gauge stock market movements and assess whether stocks are fairly priced. The theory is based on the logic that excessive fear tends to drive share prices down, while too much greed tends to push them up. The index is a compilation of seven different indicators that each measure a specific aspect of stock market behavior: market momentum, stock price strength, stock price breadth, put and call options, junk bond demand, market volatility, and safe-haven demand[98].

Each indicator receives equal weighting in the calculation of a score from 0 to 100, where 100 represents maximum greed and 0 indicates maximum fear. When combined with fundamentals and other analytical tools, the index becomes a useful way to assess market sentiment.

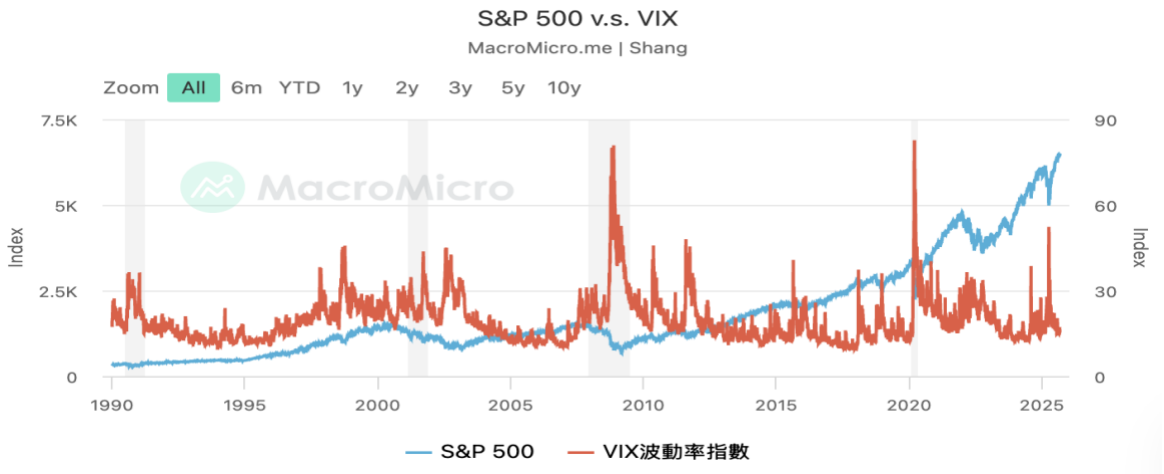
[98] "Fear & Greed Index," CNN Business, accessed September 7, 2025, https://www.cnn.com/markets/fear-and-greed.

4. VIX

The CBOE Volatility Index (VIX), also known as the *Fear Index*, measures expected market volatility using a portfolio of options on the S&P 500[99]. It is a real-time market index used by investors and analysts to have a perception of market sentiment and relative risk. It shows the expected volatility of the S&P 500 over the next 30 days, is a sort of barometer of investor fear and uncertainty.

The index (ticker symbol "VIX") was created by the CBOE Options Exchange and is maintained by CBOE Global Markets. It is calculated from options prices whose prices depend on the probability of the underlying stock moving enough to reach a specific strike price. Since this probability is closely tied to volatility, option pricing models such as Black-Scholes treat volatility as a key input. Because option prices are publicly available, they can be used to derive forward-looking implied volatility (IV).

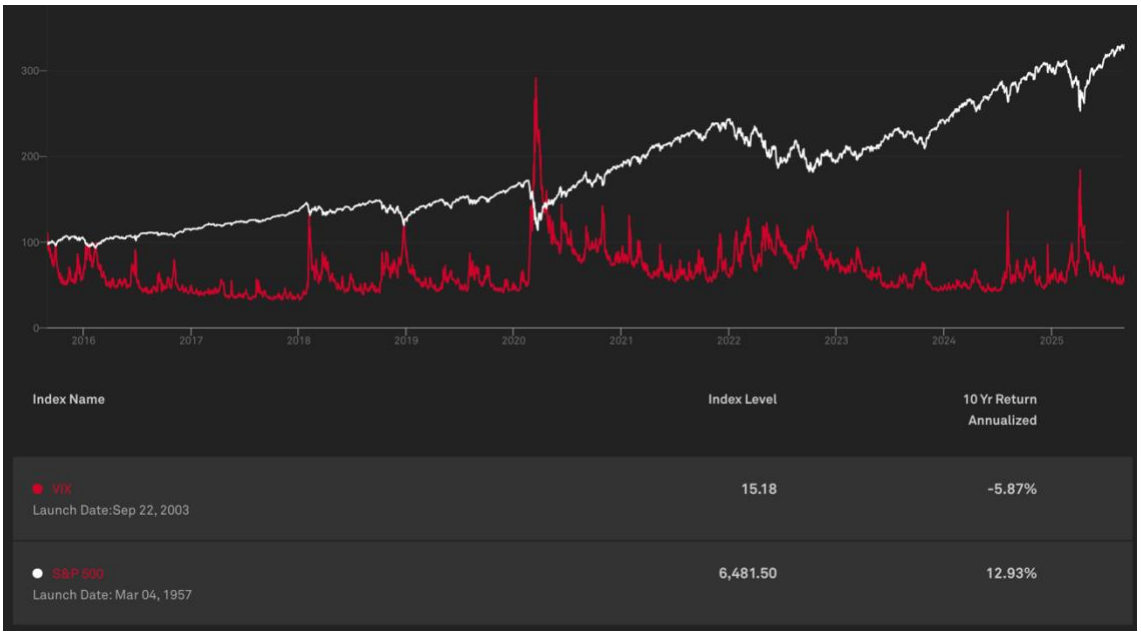
Therefore, when the VIX rises, it signals increased market fear and potentially a falling S&P 500, as option prices increase. Conversely, when the VIX falls, it suggests reduced fear and potentially a rising S&P 500.



Picture 19: S&P 500 v.s. VIX (1990-2025)

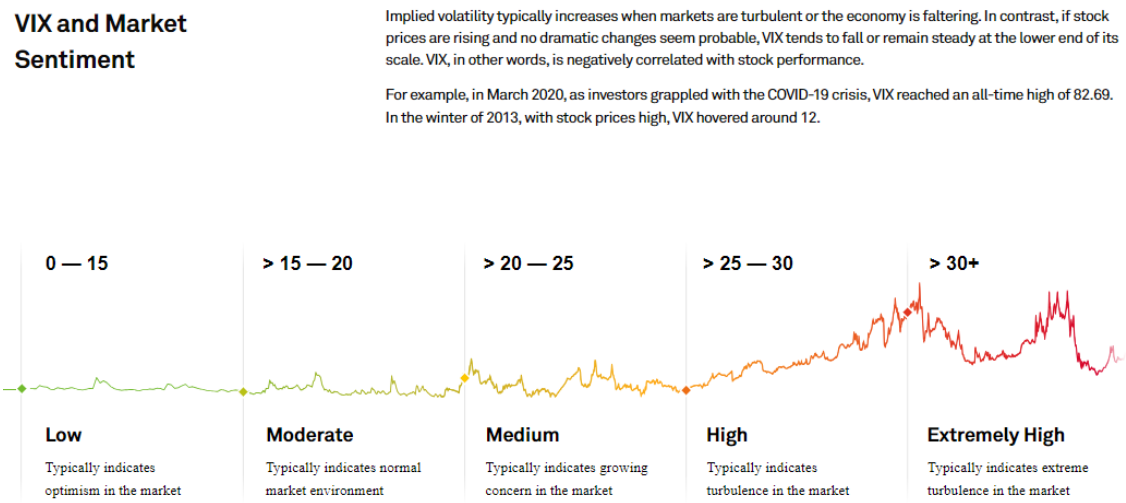
Source: https://en.macromicro.me/charts/2362/S-P-500-v-s-VIX (chart); https://www.spglobal.com/spdji/en/ (data) https://www.cboe.com/ (data).

[99] "VIX Introduction," S&P Dow Jones Indices, accessed September 20, 2025, https://www.spglobal.com/spdji/en/vix-intro/.



Picture 20: Trend of the S & P 500 Index compared to the VIX Index (2016-2025)

Source: https://www.spglobal.com/spdji/en/vix-intro/.



Picture 21: VIX and Market Sentiment

Source: https://www.spglobal.com/spdji/en/vix-intro/.

3.5. The PESTEL Analysis

PESTEL analysis is a strategic framework used to evaluate the external macro-environmental factors that affect an organization. These external forces can be significant drivers and contributing factors in the formation and bursting of a market bubble.

PESTEL is an acronym for six categories of external factors:

- Political: Government policies, political stability.
- Economic: Interest rates, exchange rates, inflation.
- Social: Cultural trends, demographics.
- Technological: Automation, R&D.
- Environmental: Climate change, environmental regulations, sustainability.
- Legal: Employment law, consumer protection.

The factors used in a PESTEL analysis are able to influence and directly cause preparatory euphoria stages for a market bubble.

- Political & Legal: deregulation is fuel for a bubble formation (e.g., relaxed banking regulations and the 2008 U.S. housing bubble).
- Economic: expansive financial strategy, as low interest rates, will fuel asset purchases and create excess liquidity, encouraging speculation.
- Social: Mass psychology and a sufficient period of easy earnings can accelerate the euphoria stage.
- Technological: New technologies (e.g., the Internet in the 1990s, cryptocurrency, AI) generate optimism in new sectors regardless of fundamentals.

In short, PESTEL provides a multidisciplinary summary, synthesizing many of the arguments and tools we have seen before. It can guide deeper analysis and highlight critical weak points.

3.6. Financial Contagion, Bubbles, and Systemic Risk

We have acknowledged that when there is a divergence between fundamental analysis and prices, a potential problem arises. This aspect may affect other assets as a result of mass psychology. This is merely the ignition; however, media amplification, algorithmic trading, and panic selling can spread and magnify the phenomenon.

Financial contagion is a domino effect caused by the spread of a financial shock from one market or institution to others. Contagion often triggers crises even in sectors where fundamentals are reliable, leading to irrational behavior and even difficulties in financing sound projects.

The 2008 Global Financial Crisis is a perfect example:

- The initial crash: The U.S. housing market bubble burst, the value of subprime mortgage-backed securities collapsed, creating a lot of toxic assets.

The contagion: Financial institutions and sovereign entities have a portfolio of toxic assets, but there is no clear information on the extent of the problem. Uncertainty and fear spread, leading to a stop in interbank markets, a credit crunch, and a domino collapse in world stock markets.

3.7. Black Swan Events

It's a theory by author and statistician Nassim Nicholas Taleb describing an unpredictable event that has severe, widespread consequences for financial markets.
According to the author, a black swan event must possess three key attributes:

- Rarity and Unpredictability
- Extreme Impact, with massive and unforeseen consequences.
- Hindsight Bias: After the event, people tend to rationalize and find explanations for it, making it seem predictable in retrospect.

A financial bubble is an internal market flaw fueled by human psychology, whereas a black swan is an external, unforeseeable shock. The bubble's bust is an inevitable conclusion to its unsustainable growth, while the black swan's occurrence is a complete surprise.
Historical events often cited as black swans include:

- The September 11 attacks: An act of terrorism that was not widely anticipated and had an immediate, devastating impact on global markets.
- The 2008 Financial Crisis: While some warned of a housing bubble, the speed and scale of the global financial system's collapse, particularly the bankruptcy of Lehman Brothers, caught most experts by surprise.
- The COVID-19 Pandemic: Although pandemics were a known risk, the rapid, global economic and social shutdown was largely unprecedented and unpredictable[100].

[100] Taleb, *The Black Swan.*

It is difficult to clarify the differences between a financial bubble and a black swan; a Black Swan's effect on financial markets is not a result of the event itself. In my opinion, the financial effect is a consequence of system fragility, and it exposes existing vulnerabilities with a chain reaction. The main lesson is that we need to build systems that are robust and resilient.

3.8. AI Bubble: An Interpretation of Data Based on Fundamental, Graphic, and Sentiment Analysis

We have already explained the possibility of a financial bubble concerning the AI market. Several companies are engaged in this sector in different ways:

- NVIDIA provides GPU technology with wide applications in gaming, visualization, big data, and defense.

- Oracle supports AI infrastructure with major contracts (e.g., OpenAI, Meta, NVIDIA).

- Palantir focuses on AI products for defense, civilian and government departments.

Firstly, it is fundamental to understand whether these companies have the revenue base necessary to support their business and fund ongoing R&D. At present, they appear to have the financial strength to operate on solid foundations[101].

ORACLE						
USD bln	2023	2024	2025	2026E	2027E	2028E
Revenues	36.39	37.82	57.40	67.09	81.62	99.30
Net income	8.50	10.47	12.44	14.54	17.69	21.53
USD						
EPS	3.07	3.71	4.34	5.91	6.93	7.97
PRICE						
MAX	126.00	190.00	313.00	366.12	374.84	360.40
MIN	85.00	110.00	130.00			
P/E						
MAX	41.04	61.89	101.95			
MIN	27.69	35.83	42.35			
expected				61.95	54.09	45.22

[101] NVIDIA Corporation, Form 10-K for the fiscal year ended January 2025; Oracle Corporation, Form 10-K for the fiscal year ended May 31, 2025; and Palantir Technologies Inc., Form 10-K for the fiscal year ended December 31, 2024.

Picture 22: Oracle's Financial Analysis (2023–2028)
Sources: Historical data from; re-elaboration of data based on Yahoo Finance data. Retrieved September 7, 2025[102].

Key Points: Oracle projects a $455 billion backlog in cloud infrastructure, with major contracts with OpenAI, and NVIDIA. Despite a recent earnings and revenue shortfall (Sept 2025), the company unveiled substantial growth in AI, driving a nearly 40% share price upside[103].

NVIDIA

USD bln	2023	2024	2025	2026E	2027E	2028E
Revenues	26.97	60.92	130.50	206.43	273.41	362.12
Net income	4.37	29.76	72.88	108.06	143.13	189.57
USD						
EPS	0.08	1.19	2.94	4.33	6.4	7.98
PRICE						
MAX	48.50	149.50	183.40	182.73	193.02	204.77
MIN	14.00	48.30	94.70			
P/E						
MAX	606.25	125.63	62.38			
MIN	175.00	40.59	32.21			
expected				42.20	30.16	25.66

Picture 23: NVIDIA's Financial Analysis (2023–2028)
Sources: Historical data from; re-elaboration of data based on Yahoo Finance data. Retrieved September 7, 2025[104]

Key Points: NVIDIA is the GPU leader, with horizontal expansion potential across gaming, design, science, big data, military, and finance[105].

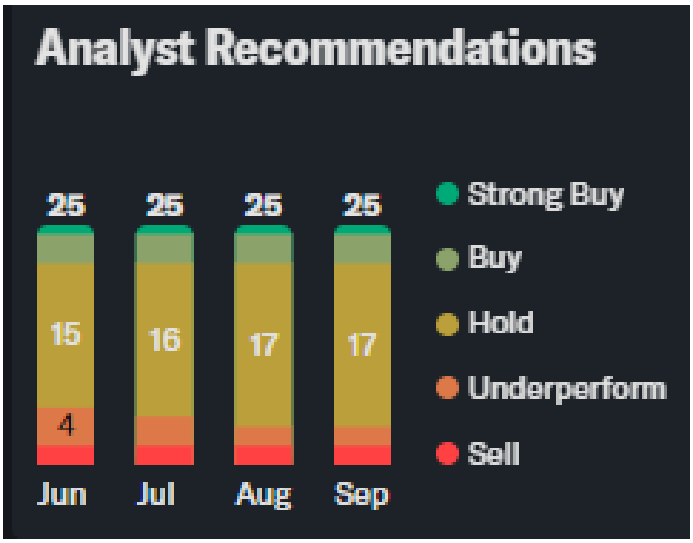
[102] Historical data has been recovered from NASDAQ, "Oracle Corporation (ORCL) Financial Statements," accessed September 7, 2025, https://www.nasdaq.com/market-activity/stocks/orcl/financials. Forecast data were retrieved from Yahoo Finance, "Oracle Corporation (ORCL) Analysis," accessed September 7, 2025, https://finance.yahoo.com/quote/ORCL/analysis/.
[103] Investopedia, "AI Stocks Soar on Oracle's 'Truly Historic' Quarter," June 12, 2024, https://www.investopedia.com/ai-stocks-soar-on-oracle-truly-historic-quarter-11807386.
[104]Historical data has been recovered from NASDAQ, "NVIDIA Corporation (NVDA) Financial Statements," accessed September 7, 2025 https://www.nasdaq.com/market-activity/stocks/nvda/financials; Forecast data were retrieved from Yahoo Finance, "NVIDIA Corporation (NVDA) Analysis," https://finance.yahoo.com/quote/NVDA/analysis/
[105] NVIDIA Corporation, *Form 10-K for the fiscal year ended January 2025*, 2025

PALANTIR *USD bln*	2022	2023	2024	2025E	2026E	2027E
Revenues	1.91	2.23	2.87	4.16	5.61	7.57
Net income	-0.37	0.21	0.46	0.55	0.80	1.08
USD						
EPS	-0.18	0.09	0.19	0.51	0.70	1.06
PRICE						
MAX	13.50	20.90	83.30	186.00	201.24	184.11
MIN	4.30	6.50	16.30	76.70		
P/E						
MAX	NS	232.22	438.42	364.71		
MIN	NS	72.22	85.79	150.39		
expected				378.90	287.48	173.69

Picture 24: Palantir's Financial Analysis (2023–2028)
Sources: Historical data from; re-elaboration of data based on Yahoo Finance data. Retrieved September 7, 2025[106]

Key Points: Palantir's AI products operate in defense and civilian agencies across the U.S. government, private clients, and potentially international governments[107].

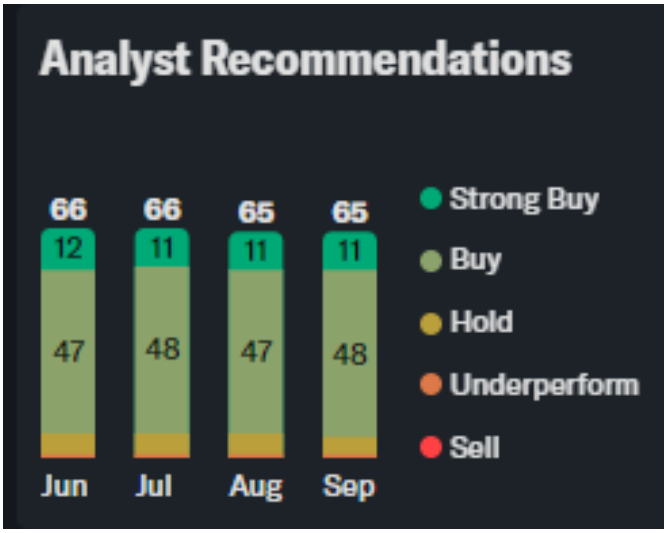
In terms of analyst opinion, average convergence does not suggest strong appeal, as upside appears limited relative to risk. Palantir, for example, has 25 analyst recommendations, with divergent views: some are negative, while the top target price ($200) aligns with the broader market trend[108].



[106]Historical data has been recovered from NASDAQ, "Palantir Technologies Inc. (PLTR) Financial Statements," accessed September 7, 2025, https://www.nasdaq.com/market-activity/stocks/pltr/financials; Forecast data were retrieved from Yahoo Finance, "Palantir Technologies Inc. (PLTR) Analysis," accessed September 7, 2025,https://finance.yahoo.com/quote/PLTR/analysis/.
[107] Palantir Technologies Inc., *Form 10-K for the fiscal year ended December 31, 2024*, 2025
[108] Yahoo Finance, "Palantir Technologies Inc. (PLTR) Analyst Estimates," September 7, 2025, https://finance.yahoo.com/quote/PLTR/analysis/.

Picture 25: Palantir's Analyst Recommendations (September 2025)
Source: https://finance.yahoo.com/quote/PLTR/analysis/.

Sentiment analysis does not provide strong support for the company, as a significant number of analysts remain doubtful about Palantir's future performance. If we give weight to the independence of analyst reports based on reputation, firms such as Goldman Sachs, Citigroup, and Morgan Stanley converge toward a *Neutral/Underperform* outlook. In contrast, Mizuho (a private firm) appears overly optimistic, rating the stock as *Outperform*[109].



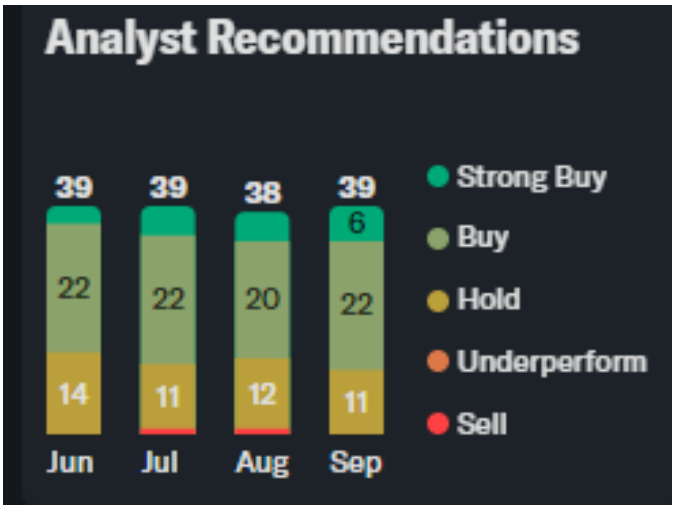
Picture 26: NVIDIA's Analyst Recommendations (September 2025)
Source: https://finance.yahoo.com/quote/NVDA/analysis/

NVIDIA shows a much stronger consensus, with over sixty analysts covering the company. Among them, 59 rate it as *Strong Buy* or *Buy.* The top price target comes from Cantor Fitzgerald at $240, while Mizuho, Citigroup, and Goldman Sachs generally converge around $200 with a *Buy* outlook[110].

---

[109] Ibem.

[110] Yahoo Finance. "NVIDIA Corporation (NVDA) Analyst Estimates." September 7, 2025. https://finance.yahoo.com/quote/NVDA/analysis/.



Picture 27: Oracle's Analyst Recommendations (September 2025)
Source: https://finance.yahoo.com/quote/ORCL/analysis/

Oracle, on the other hand, occupies a middle ground in this competitive race. The company is followed by 39 analysts, but the overall sentiment appears weaker compared to NVIDIA[111].

It is therefore important to visualize these numbers through a three-year graphical representation of share price evolution, in order to better appreciate long-term trends and formulate a concise opinion.

[111] Yahoo Finance. "Oracle Corporation (ORCL) Analyst Estimates." Accessed September 21, 2025. https://finance.yahoo.com/quote/ORCL/analysis/.

Picture 28: Oracle's Stock Performance Graph (2022–2025)
Source: https://finance.yahoo.com/quote/ORCL/chart/

Oracle, after a long period of uncertain growth, now appears to have broken through all previous support levels. The very high trading volumes suggest a phase of strong investor exuberance.

Picture 29: NVIDIA's Stock Performance Graph (2022–2025)
Source: https://finance.yahoo.com/quote/NVDA/chart/

NVIDIA shows an even stronger upward trend, which in some ways resembles Oracle's trajectory but rests on much stronger fundamentals.

Picture 30: Palantir's Stock Performance Graph (2022–2025)
Source: https://finance.yahoo.com/quote/PLTR/chart/

Palantir's growth is mostly concentrated in 2025, with a very sharp rise following a relatively horizontal trend until mid-2024. In this case, expansion depends heavily on federal contracts, and the political context particularly the rise of Trumpism has significantly supported the company's performance.

Following the three companies on the same graph (Yahoo Finance elaboration), starting in 2023 with the same price and then developing on a percentage basis, the focus shifts away from quantity.

The green line represents Oracle, which shows the lowest overall gain, ending with a final jump that is less significant than expected. The blue line corresponds to NVIDIA, which reflects solid and progressive growth. Finally, the yellow line shows Palantir, which appears to be the most exciting trajectory of the three[112].

Picture 31: Graph of the Comparative Performance of Oracle, NVIDIA, and Palantir Stocks (2023–2025)
Source: https://tinyurl.com/4bzzahhu

Key Takeaways

- Palantir does not display regular growth compared to Oracle and NVIDIA.

112

- Palantir's business model is heavily concentrated on federal backlogs.
- NVIDIA has the strongest fundamentals, best technology, and broadest customer market.
- Analyst estimates for the future are less useful than sentiment analysis would be.
- Analysts may inadvertently fuel a bubble, since their opinions often converge.
- Irrational exuberance seems particularly evident in Oracle and Palantir.
- Fundamentals remain the best evidence, though a solid backlog can also be a relevant indicator.

Final Conclusions

The world has experienced a long sequence of bubbles, crashes, and negative cycles with profound consequences. Looking backward, these events may appear clear and predictable, yet in reality they were sudden, unexpected, and devastating. This makes it extremely challenging to establish a truly multidisciplinary predictive framework.

At present, a wide range of data and news suggest that the world is entering a future of massive escalation of extremes. Instability is no longer a secondary issue in corporate strategy: it is essential to identify weak points that may be exposed to extreme shocks and to design resilience strategies.

The first section of this document has examined strategic foundations, while the second has shown how different types of economic model analysis, fundamental valuation, and market indicators can guide diagnosis. Nevertheless, macroeconomics, psychology, politics, and human unpredictability play an outsized role, often sustaining markets in a desperate attempt to avoid losses.

Is a soft landing possible? This paper argues that financial markets resemble a "multiverse" with very few chances of gradually controlling or deflating a bubble. The only viable conclusion is that we must anticipate the effects, not in their entirety (which is impossible), but by developing strategies that take into account potential instabilities or bubbles.

In practical terms, the potential AI bubble could affect not only companies but also our personal lives. If a business relies entirely on a single AI provider and that company defaults (perhaps due

to a domino effect, rather than a weakness in its services), the consequences would be highly unpredictable impacting investors, companies, governments, public institutions, banks, and even security.

This document shares the opinion of several cited authors that financial debt is one of the main drivers of instability, together with irrational exuberance.

Undoubtedly, experts and analysts currently see several potential bubbles or sources of extreme instability:

- International conflicts, such as the wars in Ukraine and Gaza, and potential wars (e.g., Taiwan).
- Uncertainty surrounding the results of Trump's economic policies.
- China's economic and industrial trajectory.
- Political instability within Europe.
- AI effectiveness and its impact on the labor market.
- Cryptocurrencies, given the massive amounts of money invested.
- Leverage, as share trading financed with debt or options increases systemic risk.
- The possibility of the U.S. stock market reaching the end of its current cycle.

The contagion effect will inevitably expand from the U.S. to Europe, revealing overestimated assets through a domino process and forcing companies to rethink their business models.

Against this process stands the rationale of maintaining a solid, well-controlled financial structure at least for the world's major economies.

Bibliography (APA 7)

- References
- Acemoglu, D., & Robinson, J. A. (2005). *Economic Origins of Dictatorship and Democracy*. Cambridge University Press.
- Acemoglu, D., & Robinson, J. A. (2012). *Why nations fail: The origins of power, prosperity and poverty*. Crown Publishers.
- Alfred Dupont Chandler. (1962). *Strategy and Structure Chapters in the History of the Industrial enterprise.* (p. 13). Cambridge, Mass. [U.A.] Mit Pr.
- Andrews, K. R. (1971). *The concept of corporate strategy*. Irwin Professional Publishing.
- Baker, S. R., Bloom, N., Davis, S. J., & Terry, S. J. (2020, April 1). *COVID-induced economic uncertainty*. National Bureau of Economic Research. https://www.nber.org/papers/w26983
- Barney, J. B. (1991). *Resource-based theory: Creating and sustaining competitive advantage* (pp. 99–120). Oxford University Press.
- Barney, J. B. (1995). Looking inside for competitive advantage. *Academy of Management Perspectives*, *9*(4), 49–61. https://doi.org/10.5465/ame.1995.9512032192
- Blanchard , O., & Watson, Mark. W. (1982). Bubbles, rational expectations, and financial markets. In *Crises in the economic and financial structure* (pp. 295–315). Lexington Books.
- Bondt, W. F. M. D., & Thaler, R. (1985). Does the stock market overreact? *The Journal of Finance*, *40*(3), 793–805. https://doi.org/10.2307/2327804

- Bruneau, M., Chang, S. E., Eguchi, R. T., Lee, G. C., O'Rourke, T. D., Reinhorn, A. M., Shinozuka, M., Tierney, K., Wallace, W. A., & von Winterfeldt, D. (2003). A Framework to Quantitatively Assess and Enhance the Seismic Resilience of Communities. *Earthquake Spectra*, *19*(4), 733–752. https://doi.org/10.1193/1.1623497
- Dash, M. (1999). *Tulipomania*. Crown.
- Dixon, M. F., Halperin, I., & Bilokon, P. (2020). *Machine learning in finance*. Springer International Publishing. https://doi.org/10.1007/978-3-030-41068-1
- Flood, R. P., & Garber, P. M. (1980). Market Fundamentals versus Price-Level Bubbles: The First Tests. *Journal of Political Economy*, *88*(4), 745–770. https://doi.org/10.1086/260900
- *Full Text Archive On War by Carl von Clausewitz*. (1984). https://icct.nl/sites/default/files/import/publication/On-War.pdf
- Funke, M., Moritz Schularick, & Trebesch, C. (2023). Populist Leaders and the Economy. *The American Economic Review*, *113*(12), 3249–3288. https://doi.org/10.1257/aer.20202045
- Funke, M., & Trebesch, C. (2017). *Financial Crises and the Populist Right*. https://www.ifo.de/DocDL/dice-report-2017-4-funke-trebesch-december.pdf
- Gorton, G., & Metrick, A. (2012). Securitized banking and the run on repo. *Journal of Financial Economics*, *104*(3), 425–451. https://doi.org/10.1016/j.jfineco.2011.03.016
- Grant, R. M. (2016). *Contemporary strategy analysis : Text and cases edition* (9th ed.). Wiley Textbooks.
- Grant, R. M., & Jordan, J. (2015). *Foundations of strategy* (2nd ed.). John Wiley & Sons.
- H. Igor Ansoff. (1965). *Corporate strategy*. McGraw-Hill Companies.

- H. Igor Ansoff. (1979). *Strategic management*. Macmillan.
- Hamilton, J. (2009). *Causes and consequences of the oil shock of 2007-08*. https://doi.org/10.3386/w15002
- Hamilton, J. D., & Whiteman, C. H. (1985). The observable implications of self-fulfilling expectations. *Journal of Monetary Economics*, *16*(3), 353–373. https://doi.org/10.1016/0304-3932(85)90041-8
- Kahneman, D., & Tversky, A. (1974). *Judgment under Uncertainty : Heuristics and Biases* (pp. 1124–1131). Cambridge University Press.
- Keynes, J. M. (1936). *The general theory of employment, interest, and money*. Cham Springer International Publishing Palgrave Macmillan. (Original work published 1936)
- Koren, M., & Tenreyro, S. (2007). Volatility and development. *The Quarterly Journal of Economics*, *122*(1), 243–287. https://doi.org/10.1162/qjec.122.1.243
- Martin, R., & Sunley, P. (2015). On the notion of regional economic resilience: conceptualization and explanation. *Journal of Economic Geography*, *15*(1), 1–42. https://doi.org/10.1093/jeg/lbu015
- Mead, W. R. (2017, January 20). *The Jacksonian Revolt*. Foreign Affairs. https://www.foreignaffairs.com/north-america/jacksonian-revolt
- Minsky, H. P. (2011). *Stabilizing an unstable economy*. New York Mcgraw Hill Professional.
- Mintzberg, H. (1994). *Rise and fall of strategic planning.* Free Press.
- Murphy, J. J. (1999). *Technical Analysis of the Financial Markets*. Penguin.
- Nassim Nicholas Taleb. (2010). *The black swan : the impact of the highly improbable*. Random House Trade Paperbacks.

- North, D. C. (1990). *Institutions, institutional change and economic perfomance*. Cambridge University Press.
- NVIDIA. (2025). *NVIDIA Corporation - Financial Info - SEC Filings*. Investor.nvidia.com. https://investor.nvidia.com/financial-info/sec-filings/default.aspx
- *Open Knowledge Repository*. (2025). Worldbank.org. https://openknowledge.worldbank.org/entities/publication/65acb86d-a37a-519b-b379-8191b25befa3
- *Oracle - Investor Relations - SEC Filings*. (2025). Investor.oracle.com. https://investor.oracle.com/sec-filings/default.aspx
- Pástor, Ľ., & Veronesi, P. (2009). Technological Revolutions and Stock Prices. *American Economic Review*, *99*(4), 1451–1483. https://doi.org/10.1257/aer.99.4.1451
- Porter, M. E. (1980). *Competitive Strategy*. New York : Free Press ; Toronto : Maxwell Macmillan Canada.
- Porter, M. E. (1985). *Competitive Advantage*. Free Press.
- Poterba, J. M., & Summers, L. H. (1988). Mean reversion in stock prices. *Journal of Financial Economics*, *22*(1), 27–59. https://doi.org/10.1016/0304-405x(88)90021-9
- Reinhart, C. M., & Rogoff, K. S. (2009). *This Time Is Different : Eight Centuries of Financial Folly*. Princeton University Press.
- Rodrik, D. (2010). *The Globalization Paradox : Democracy and the Future of the World Economy*. W.W. Norton & Co.
- Sachs, J., Kroll, C., Lafortune, G., Fuller, G., & Finn Woelm. (2022). *Sustainable Development Report 2022*. Cambridge University Press.

- Shiller, R. J. (2005). Irrational Exuberance: (Second Edition). In *JSTOR*. Princeton University Press. https://www.jstor.org/stable/j.ctt7st4s
- Todo, Y., Nakajima, K., & Matous, P. (2014). HOW DO SUPPLY CHAIN NETWORKS AFFECT THE RESILIENCE OF FIRMS TO NATURAL DISASTERS? EVIDENCE FROM THE GREAT EAST JAPAN EARTHQUAKE. *Journal of Regional Science*, *55*(2), 209–229. https://doi.org/10.1111/jors.12119
- *Transcript: General Theory of Reflexivity*. (2009). https://www.opensocietyfoundations.org/uploads/9ae17912-2262-4646-8ffc-d01afc934c36/george-soros-general-theory-of-reflexivity-transcript.pdf
- *Turkey: 2021 article IV consultation-press release; staff report; and statement by the executive director for Turkey*. (2021). International Monetary Fund.
- Tversky, A., & Kahneman, D. (1974). Judgment under uncertainty: Heuristics and Biases. *Science*, *185*(4157), 1124–1131.
- *UNITED STATES SECURITIES AND EXCHANGE COMMISSION WASHINGTON, DC 20549 FORM 10-K (Mark One) ☒ ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934*. (2025). https://investors.palantir.com/files/2024%20FY%20PLTR%2010-K.pdf
- United States. Financial Crisis Inquiry Commission. (2011). *The financial crisis inquiry report : final report of the National Commission on the Causes of the Financial and Economic Crisis in the United States, including dissenting vies*. Cosimo Reports.
- Vikram Mansharamani. (2019). *BOOMBUSTOLOGY : Spotting financial bubbles before they burst.* Wiley.

- Wiggins, R., & Metrick, A. (2019). The Lehman Brothers Bankruptcy C: Managing the Balance Sheet Through the Use of Repo 105. *Journal of Financial Crises*, *1*(1), 80–99. https://elischolar.library.yale.edu/journal-of-financial-crises/vol1/iss1/4/

Sitography (APA 7)

- American Association of Individual Investors. (n.d.). *AAII investor sentiment survey*. Retrieved September 7, 2025, from https://www.aaii.com/sentimentsurvey
- Bank of Russia. (n.d.). *Inflation in the consumer market*. Retrieved September 7, 2025, from https://www.cbr.ru/en/statistics/ddp/infl/
- Bank of Russia. (n.d.). *Key rate*. Retrieved September 7, 2025, from https://www.cbr.ru/en/hd_base/keyrate/
- Bitbo. (n.d.). *Bitcoin charts*. Retrieved September 7, 2025, from https://charts.bitbo.io/price/
- Bloomberg. (2017, November 29). *Bitcoin ought to be outlawed, Nobel prize winner Stiglitz says*. https://www.bloomberg.com/news/articles/2017-11-29/bitcoin-ought-to-be-outlawed-nobel-prize-winner-stiglitz-says-jal10hxd
- Board of Governors of the Federal Reserve System. (2023). *Review of the Federal Reserve's supervision and regulation of Silicon Valley Bank*. https://www.federalreserve.gov/publications/files/svb-review-20230428.pdf
- Cain, Á. (2025, August 12). Shark Tank's Kevin O'Leary says AI boom is different from dot-com bubble and will help beat inflation. *Business Insider*. https://www.businessinsider.com/shark-tank-kevin-oleary-ai-dotcom-bubble-tariffs-inflation-recession-2025-8

- Cboe Global Markets. (n.d.). *Cboe Volatility Index (VIX)*. Retrieved September 7, 2025, from https://www.cboe.com/tradable_products/vix/
- Chen, J. (2024, July 29). *Algorithmic trading explained: Methods, benefits, and drawbacks*. Investopedia. https://www.investopedia.com/terms/a/algorithmictrading.asp
- CNN Business. (n.d.). *Fear & greed index*. Retrieved September 7, 2025, from https://edition.cnn.com/markets/fear-and-greed
- CoinMarketCap. (n.d.). *Crypto fear & greed index*. Retrieved September 7, 2025, from https://coinmarketcap.com/charts/fear-and-greed-index/
- CoinMarketCap. (n.d.). *Top cryptocurrency prices and charts*. Retrieved September 7, 2025, from https://coinmarketcap.com/
- Corporate Finance Institute. (n.d.). *Market sentiment*. Retrieved September 7, 2025, from https://corporatefinanceinstitute.com/resources/career-map/sell-side/capital-markets/market-sentiment/
- Cryptobubbles. (n.d.). *Crypto bubbles*. Retrieved September 7, 2025, from https://cryptobubbles.net/
- Diaz, A. (2025, August 2). This is the most expensive Labubu on eBay. *New York Post*. https://nypost.com/2025/08/02/us-news/this-is-the-most-expensive-labubu-on-ebay/
- EconCrises. (2016, November 29). *Parmalat - Financial scandals, scoundrels & crises*. EconCrises.org. https://www.econcrises.org/2016/11/29/parmalat/
- European Automobile Manufacturers' Association. (2022). *Economic and market report: EU automotive industry full year 2021*. https://www.acea.auto/files/ACEA_Report_Full-Year-2021.pdf

- European Commission. (2019). *The European Green Deal* (Communication COM/2019/640 final). https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52019DC0640
- European Commission. (2020, January 29). *Secure 5G deployment in the EU: Commission endorses Member States' toolbox and sets out next steps* [Press release]. https://ec.europa.eu/commission/presscorner/detail/en/ip_20_123
- Fernando, J. (2025, August 28). *Price-to-earnings (P/E) ratio: Definition, formula, and examples*. Investopedia. https://www.investopedia.com/terms/p/price-earningsratio.asp
- Finimize. (n.d.). Net debt to EBITDA ratio. In *Finimize glossary*. Retrieved September 7, 2025, from https://finimize.com/glossary/net-debt-to-ebitda-ratio
- Fullratio. (n.d.). *Net debt to EBITDA by industry*. Retrieved September 7, 2025, from https://fullratio.com/net-debt-to-ebitda-by-industry
- Glover, G. (2025, September 16). Ray Dalio says AI comes with a big downside: Creating a 'bunch of losers'. *Business Insider*. https://www.businessinsider.com/ray-dalio-ai-downside-society-inequality-ubi-universal-basic-income-2025-9
- GuruFocus. (n.d.). *Alphabet (GOOGL) PS ratio*. Retrieved September 7, 2025, from https://www.gurufocus.com/term/ps-ratio/GOOGL/Alphabet-Inc
- Hayes, A. (2024, May 31). *CBOE Volatility Index (VIX) definition, how it's calculated, and how to trade it*. Investopedia. https://www.investopedia.com/terms/v/vix.asp
- IBM. (n.d.). *What is blockchain technology?* Retrieved September 7, 2025, from https://www.ibm.com/topics/what-is-blockchain

- International Energy Agency. (2021). *The role of critical minerals in clean energy transitions*. https://www.iea.org/reports/the-role-of-critical-minerals-in-clean-energy-transitions
- International Energy Agency. (2022, October). *Gas market report, Q4-2022*. https://www.iea.org/reports/gas-market-report-q4-2022
- Investtech. (n.d.). *Technical analysis chart for S&P 500*. Retrieved September 7, 2025, from https://www.investtech.com/main/market.php?CompanyID=10400521&product=6
- Khalip, A., & Demony, C. (2025, April 29). *Outage leaves Spaniards, Portuguese trapped, unable to pay and feeling powerless*. Reuters. https://www.reuters.com/world/europe/outage-leaves-spaniards-portuguese-trapped-unable-pay-feeling-powerless-2025-04-29/
- Kilborn, P. T. (1989, October 9). Inflation drops in Argentina. *The New York Times*. https://www.nytimes.com/1989/10/09/business/inflation-drops-in-argentina.html
- Kim, T. (2018, May 5). *Warren Buffett says bitcoin is 'probably rat poison squared'*. CNBC. https://www.cnbc.com/2018/05/05/warren-buffett-says-bitcoin-is-probably-rat-poison-squared.html
- Krugman, P. (2021, May 20). Technobabble, libertarian derp and Bitcoin. *The New York Times*. https://www.nytimes.com/2021/05/20/opinion/cryptocurrency-bitcoin.html
- Lombard Odier. (2025, August). *Why rare earths are fundamental to invest in transition materials*. https://www.lombardodier.com/it/insights/2025/august/why-rare-earths.html
- MacroMicro. (n.d.). *S&P 500 vs. VIX*. Retrieved September 7, 2025, from https://en.macromicro.me/charts/2362/S-P-500-v-s-VIX

- Macrotrends. (n.d.). *Amazon price to sales ratio 2010–2025*. Retrieved September 7, 2025, from https://www.macrotrends.net/stocks/charts/AMZN/amazon/price-sales
- Macrotrends. (n.d.). *Nvidia price to sales ratio 2010–2025*. Retrieved September 7, 2025, from https://www.macrotrends.net/stocks/charts/NVDA/nvidia/price-sales
- Macrotrends. (n.d.). *Palantir Technologies price to sales ratio 2019–2025*. Retrieved September 7, 2025, from https://www.macrotrends.net/stocks/charts/PLTR/palantir-technologies/price-sales
- Multpl. (n.d.). *S&P 500 P/E ratio*. Retrieved September 7, 2025, from https://www.multpl.com/s-p-500-pe-ratio
- Multpl. (n.d.). *S&P 500 price to book ratio*. Retrieved September 7, 2025, from https://www.multpl.com/s-p-500-price-to-book
- Multpl. (n.d.). *Shiller PE ratio*. Retrieved September 7, 2025, from https://www.multpl.com/shiller-pe
- Multpl. (n.d.). *U.S. federal debt as a percent of GDP*. Retrieved September 7, 2025, from https://www.multpl.com/u-s-federal-debt-percent
- NASDAQ. (n.d.). *NVIDIA Corporation (NVDA) financial statements*. Retrieved September 7, 2025, from https://www.nasdaq.com/market-activity/stocks/nvda/financials
- NASDAQ. (n.d.). *Oracle Corporation (ORCL) financial statements*. Retrieved September 7, 2025, from https://www.nasdaq.com/market-activity/stocks/orcl/financials
- NASDAQ. (n.d.). *Palantir Technologies Inc. (PLTR) financial statements*. Retrieved September 7, 2025, from https://www.nasdaq.com/market-activity/stocks/pltr/financials

- National Association of Active Investment Managers. (n.d.). *NAAIM exposure index*. Retrieved September 7, 2025, from https://www.naaim.org/programs/naaim-exposure-index/
- The National. (2024, December 13). *AI could be world's greatest invention and most complex challenge, says Ray Dalio*. https://www.thenationalnews.com/business/markets/2024/12/13/ai-could-be-worlds-greatest-invention-and-most-complex-challenge-says-ray-dalio/
- Nishimura, Y. (2024). Impacts of Donald Trump's tweets on volatilities in the European stock markets. *Journal of Behavioral and Experimental Finance*, *43*, 100998. https://doi.org/10.1016/j.jbef.2024.100998
- Organisation for Economic Co-operation and Development. (n.d.). *Consumer confidence index (CCI)* [Data set]. Retrieved September 7, 2025, from https://data.oecd.org/leadind/consumer-confidence-index-cci.htm
- Organisation for Economic Co-operation and Development. (2025). *Consumer Price Index: All items for Russia* [Data set]. FRED, Federal Reserve Bank of St. Louis. Retrieved September 7, 2025, from https://fred.stlouisfed.org/series/CCUSMA02RUM618N
- Organisation for Economic Co-operation and Development. (n.d.). *General government debt*. Retrieved September 7, 2025, from https://data.oecd.org/gga/general-government-debt.htm
- Ozkardeskaya, I. (2025, September 10). Ipek Ozkardeskaya: "You are living in a kind of bubble with this job." *Finews*. https://www.finews.com/news/english-news/51080-swissquote-ipek-ozkardeskaya-research-youtube-zinswende-2

- PerformanceTrading. (n.d.). *Analisi serie storiche*. Retrieved September 7, 2025, from https://www.performancetrading.it/Documents/MpMercati/MpM_cSerie.htm
- PerformanceTrading. (n.d.). *Bolle razionali*. Retrieved September 7, 2025, from https://www.performancetrading.it/Documents/MpMercati/MpM_cBolle1.htm
- PerformanceTrading. (n.d.). *Mercati efficienti e bolle speculative*. Retrieved September 7, 2025, from https://www.performancetrading.it/Documents/MpMercati/MpM_Index.htm
- Peter G. Peterson Foundation. (n.d.). *U.S. national debt clock*. Retrieved September 7, 2025, from https://www.pgpf.org/national-debt-clock
- Reiff, N. (2024, June 12). *AI stocks soar on Oracle's 'truly historic' quarter*. Investopedia. https://www.investopedia.com/ai-stocks-soar-on-oracle-truly-historic-quarter-11807386
- Reuters. (2024, November 28). *Explainer: Baltic Sea undersea cable cuts stoke geopolitical tensions*. CNBC. https://www.cnbc.com/2024/11/28/explainer-baltic-sea-undersea-cable-cuts-stoke-geopolitical-tensions.html
- Rosen, P. (2025, August 15). Tech guru Erik Gordon says investors will ‘suffer’ far more from the AI boom than the dot-com crash. *Business Insider*. https://www.businessinsider.com/erik-gordon-ai-stocks-dot-com-bubble-crash-tech-market-2025-8
- S&P Dow Jones Indices. (n.d.). *S&P 500*. Retrieved September 7, 2025, from https://www.spglobal.com/spdji/en/indices/equity/sp-500/
- S&P Dow Jones Indices. (2025). *S&P/Case-Shiller U.S. National Home Price Index* [Data set]. FRED, Federal Reserve Bank of St. Louis. Retrieved September 7, 2025, from https://fred.stlouisfed.org/series/CSUSHPINSA

- S&P Dow Jones Indices. (n.d.). *VIX introduction*. Retrieved September 7, 2025, from https://www.spglobal.com/spdji/en/vix-intro/
- S&P Global. (2024, December). *Total debt for rated US companies reaches new high*. https://www.spglobal.com/market-intelligence/en/news-insights/articles/2024/12/total-debt-for-rated-us-companies-reaches-new-high-86683893
- Shibu, S. (2025, August 19). OpenAI CEO Sam Altman thinks we're in an AI bubble because investors are 'overexcited' about artificial intelligence. *Entrepreneur*. https://www.entrepreneur.com/business-news/openais-sam-altman-warns-overexcited-investors-ai-bubble/496081
- TradingEconomics. (n.d.). *Crude oil*. Retrieved September 7, 2025, from https://tradingeconomics.com/commodity/crude-oil
- TradingEconomics. (n.d.). *United States – Private debt to GDP*. Retrieved September 21, 2025, from https://tradingeconomics.com/united-states/private-debt-to-gdp
- Treanor, J. (2012, December 5). EU knew Greece's figures were fiddled. *The Guardian*. https://www.theguardian.com/business/2012/dec/05/eu-knew-greece-figures-fiddled
- University of Puerto Rico at Mayagüez. (2010, June 23). *Crisis according to Albert Einstein*. https://www.uprm.edu/inqu/crisis-according-to-albert-einstein/
- U.S. Department of the Treasury, FiscalData. (n.d.). *America's finance guide: National debt*. Retrieved September 7, 2025, from https://fiscaldata.treasury.gov/americas-finance-guide/national-debt/
- U.S. Geological Survey. (2025). *Mineral commodity summaries 2025*. https://pubs.usgs.gov/periodicals/mcs2025/mcs2025.pdf

- Verdon, J. (2025, August 13). Labubus remain king of the collectibles, StockX reports. *Forbes*. https://www.forbes.com/sites/joanverdon/2025/08/13/labubus-remain-king-of-the-collectibles-stockx-reports/
- Volatility.red. (n.d.). *Sentiment analysis*. Retrieved September 7, 2025, from https://volatility.red/Sentiment_Analysis
- The White House, Office of Management and Budget. (2024). *Historical tables: Budget of the U.S. government, fiscal year 2025*. https://www.whitehouse.gov/omb/historical-tables/
- The World Bank. (2021). *Worldwide governance indicators* [Data set]. https://info.worldbank.org/governance/wgi/
- Yahoo Finance. (n.d.). *Comparative performance of NVDA, ORCL, PLTR*. Retrieved September 7, 2025, from https://tinyurl.com/4bzzahhu
- Yahoo Finance. (n.d.). *NVIDIA Corporation (NVDA) analyst estimates*. Retrieved September 7, 2025, from https://finance.yahoo.com/quote/NVDA/analysis/
- Yahoo Finance. (n.d.). *NVIDIA Corporation (NVDA) historical chart*. Retrieved September 21, 2025, from https://finance.yahoo.com/quote/NVDA/chart/
- Yahoo Finance. (n.d.). *Oracle Corporation (ORCL) analysis*. Retrieved September 21, 2025, from https://finance.yahoo.com/quote/ORCL/analysis/
- Yahoo Finance. (n.d.). *Oracle Corporation (ORCL) historical chart*. Retrieved September 7, 2025, from https://finance.yahoo.com/quote/ORCL/chart/
- Yahoo Finance. (n.d.). *Palantir Technologies Inc. (PLTR) analyst estimates*. Retrieved September 7, 2025, from https://finance.yahoo.com/quote/PLTR/analysis/

- Yahoo Finance. (n.d.). *Palantir Technologies Inc. (PLTR) historical chart*. Retrieved September 7, 2025, from https://finance.yahoo.com/quote/PLTR/chart/
- Yale Insights. (n.d.). *Three questions for Robert Shiller on Bitcoin*. Retrieved September 7, 2025, from https://insights.som.yale.edu/insights/three-questions-prof-robert-shiller-on-bitcoin