POLITECNICO DI TORINO

College of Management Engineering

Master's Thesis: *Market Bubbles*

Professor:
Anna D'Ambrosio

Student:
Luca Baldini

Contents

Prologue

I have been personally interested in the study of the financial sector for several years now. The idea for this thesis was born during the 2021 lockdown, in which together with a team I participated in cryptocurrency investments with remarkable returns that exceeded 2000% in a short period of time. How are these returns possible when the historical average of the S&P500, the main stock market index, is about 9% per year? Simple, because of speculation in certain types of markets.

What I was mainly concerned with was presell buying in private auctions of tokens, so digital coins, created daily on the various trading platforms. These coins, referred to as 'shitcoins', a name already a guarantee of their product quality, had no utility except that of speculation, driven by a mass euphoria convinced that the cryptocurrency market was the future going to even replace the fiat currency market issued by central banks.

This was the pinnacle of speculation given by the spread of beliefs, news, monetary stimulus, and entry into the investment world of individuals with no expertise whatsoever.

Personally involved in this process, and experiencing all the emotions related to it, I decided to publish this thesis, because what occurred was an event, but not the only one in history that led to a process of extreme speculation.

The disincentive occurred in May 2021, when the cryptocurrency market collapsed sharply, and of 'shitcoins', all that was left was a market of scams by developers, and loss of investment by new entrants. Managing to retain some of my lucidity, I managed to get out of the market in time bringing back the previously mentioned profits, which would have been even greater had I not been so greedy.

Thus, the summer of 2021 the thought of the master's thesis on bubbles in markets came to fruition.

Introduction

The basis of this thesis work is the in-depth study, of market bubbles, a phenomenon that from extreme, and unwarranted, euphoria has led to the destruction of wealth and well-being throughout history.

The following thesis is structured in six chapters. In the first, the concept of a bubble is explained, and the emotional phases of investors/speculators. The second chapter then analyses the psychological aspects that lead to a bubble phenomenon, through behavioural finance, a branch of finance that studies the psychological aspect of the investor, an inefficient individual unlike how standard finance assumes. The third chapter is devoted to the analysis of two major macro investment strategies, firm foundation theory and the castle in the sky theory, the latter being responsible for the major financial economic bubbles. The fourth chapter is divided into three subchapters dedicated to the study of the most famous historical bubbles, from the tulip bulb bubble in Holland, to the current cryptocurrencies.

The fifth chapter analyses bubble indicators, the latter, an unpredictable phenomenon, which, however, thanks to the use of indicators can be identified with greater probability. Finally, the last chapter studies and analyses the current situation of investment macro classes, thus bonds, stocks, real estate market, and cryptocurrencies, to assess and look for bubble presences created by different factors, and speculative phenomena of different nature.

Disclaimer

This paragraph has been included within the thesis to clarify the approach that has been used in writing this one and to emphasize what the approach should be in investing, regarding news and general market sentiment.

To do this, the table issued in late 2020 for the growth outlook of the S&P 500, the main U.S. stock index, for 2021 is shown here Figure 1. This index quoted a value of 3700 at the end of 2020. (Pecorari G. , 2022)

All these multinational financial services companies were providing an estimate, with a percentage change in the S&P500 between about 2% and 20%; estimates therefore not unambiguous and with great variability. Thus, useless estimates, which when averaged give a return of about 10% in line with historical averages. (Thune, 2022)

S&P 500 Year-end 2021 Analyst Targets

AFFILIATION	TARGET 2021
JPMorgan Chase	4,400
Invesco	4,350
Goldman Sachs	4,300
Oppenheimer	4,300
Piper Sandler Companies	4,225
BMO	4,200
UBS	4,100
Barclays	4,000
BTIG	4,000
CFRA	4,080
Deutsche Bank	3,950
Morgan Stanley	3,900
Wells Fargo Investment Institute	3,900
Citigroup	3,800
BofA	3,800

Figure 1 Show the S&P500 closing forecast 2021 (Marketwatch, 2020).

The year 2021 ended with a value of the S&P 500 of about 4700.

Why was the following table shown?

This table was shown, demonstrating that predictions cannot be made, so one cannot take a certain position on the future, what one can do is to put the present in context based on the past and update expectations about the future. Everyone looks for forecasts in the markets, among them even the big investment companies publish them to give credibility.

One cannot underestimate the complexity of the market, in which there are infinite variables, because it is composed of billions of people, with different investment goals, different risk profiles, and distributed in different geographic areas.

The only thing that can be done is to invest, based on future return expectations applied to different scenarios, and to reason about medium/long-term expected returns, so a minimum of 10 years, on the various asset classes such as U.S. equity, bond, emerging market equity etc.

Because as Benjamin Graham quotes in the short run, the market is a voting machine but in the long run, it is a weighing machine. (Malkiel, 2020)

Therefore, the strategy for achieving future returns with a high degree of certainty is to adopt a value investing approach, as described by Graham. This means purchasing financial assets at a lower price than their intrinsic value, as opposed to engaging in speculation and trying to profit from market fluctuation. (Malkiel, 2020)

In addition, one must pay attention to the financial situation one is in and not be subject to recency bias, so that the recent future will be the same as the recent past. Demonstrating this fact is the following graph.

The chart below represents the Sentiment Trader Panic/Euphoria Model Figure 2, a sentiment indicator. It is interesting to note that according to the study of historical values for the past 45 years, if the value of this indicator was above 1, thus high optimism, the S&P500's return in the following year on average was -2.1%, if between 0 and 1, thus in a neutral situation 8.9%, while if it is below 0, thus in a situation of extreme pessimism, the S&P500's average hoped-for return was 20.3% for the following year. (Kaeppel, 2022) (Pecorari G. , 2022)

The value of 1 in the model serves as a baseline, representing euphoria market sentiment. The exact method used to measure euphoria can vary, but it typically involves a combination of quantitative and qualitative analysis of market data and sentiment indicators. Some common indicators that might be used to measure euphoria include stock market valuation such as price to earnings ratio, price to book ratio, and dividend yield among others, surveys of investor sentiment, media coverage and market volatility. These

and other indicators are analysed and used to assign a score above or below 1, which represents the level of euphoria in the market.

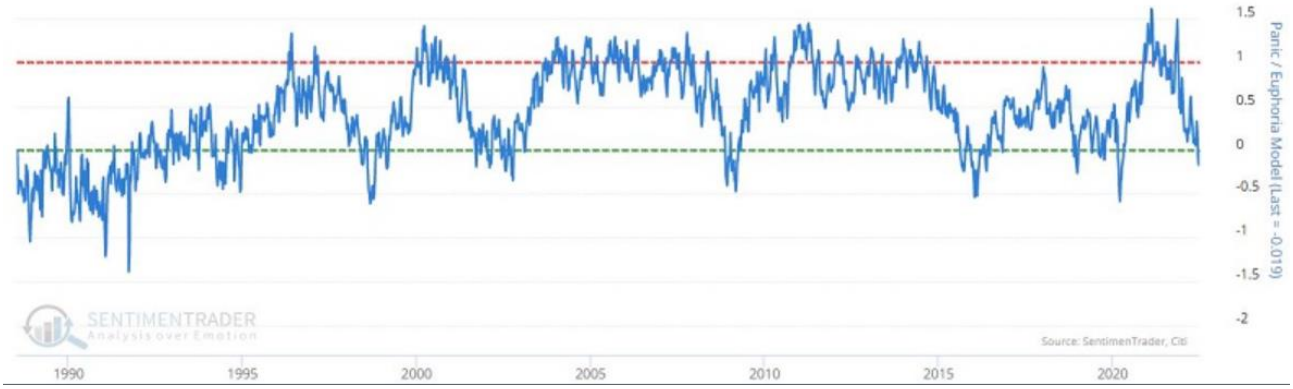

Figure 2 Show the Sentiment Trader Panic/Euphoria over the past 30 years. (Kaeppel, 2022)

As Warren Buffet, an investment guru, mentions, 'Be afraid when others are greedy and be greedy when others are afraid', and again as Franklin Templeton, founder of a famous investment fund, reports, 'Bull markets are born on pessimism, grow on scepticism, mature on optimism, and die on euphoria'. (Buffett) (Templeton)

Cap 1. What are bubbles

An economic cycle must be defined before introducing the concept of a bubble. An economic cycle refers to a perpetuals pattern of growth, decline, and recovery in an economy. The latter is characterized by periods of expansion, where usually unemployment is low and the economic growth is strong, alternating with periods of contraction, where unemployment increases, and economic growth slows down. This cycle is influenced by several factors, including changes in government policies, consumer spending, investment, and global economic conditions. (TEAM, 2022)

A bubble is an economic cycle usually marked by a rapid increase in the price of a specific asset. The price inflation caused is followed an undefined time frame by a rapid decline in prices or a sharp contraction, referred to as a crash or bursting of the bubble. (Kenton, 2022)

The sudden rise in prices occurs in an exuberant and euphoric market in which the price of assets deviates greatly from the intrinsic value of the asset itself due to a transfer of economic resources to areas with high growth prospects. Examples of these are the Japan bubble of the 1980s that deregulation by banks, caused a surge in the price of real estate and stocks, or the Dot Com bubble that occurred at the turn of the millennium, in which equities saw a sudden rise given by speculation in technology stocks.

The mechanism that triggers bubbles, is the buying by the public of financial assets, with the idea of being able to sell them again at a higher price to subsequent buyers.

American researcher and economist Hyman P. Minsky identifies five stages in the development and collapse of bubbles. (Segal, 2022)

Displacement

This first phase is marked by a channelling of savings by investors to a certain asset class because of a new paradigm, such as a specific product or technology or low interest rates.

Boom

Prices begin to rise; investors then seek easy enrichment. An illusion occurs in which investors project the rising prices in the future thereby creating excessive optimism, through a psychological mechanism called recency bias, in which the individual creates prospects based on the recent past. The rise in prices causes media coverage, and with it therefore the increase in the supply of information with respect to this topic through articles, interviews, and reports. The rise in prices, through the effect of feedback curves, so that prior growth pushes subsequent growth and so on, leads to further price increases.

Euphoria

At this stage the bubble reaches its peak, and prices rise to a point where they no longer have any correspondence with fundamental value. Investors through the psychological process called confirmation bias, will look for and consider only positive news, while negative news will be ignored. At this stage the market starts to correct, but it will be interpreted as a normal fall, resulting in the entry of new buyers fuelling the boom.

Taking profits

This short-lived phase anticipates the big crash, in which some careful investors begin to liquidate positions, observing the market's warning signs.

Panic

A loss of confidence in the market or the underlying assets being traded usually caused the start of a panic phase that leads to the burst of a market bubble.

This phases is usually triggered by various factors, such as:
-overvaluation: investors may become concerned that the market is becoming overheated when prices in the market become overvalued and start selling their stocks.

-economic news: investors may lose confidence if the economy is performing poorly

-Political or geopolitical events: This types of events can increase uncertainty can create uncertainty and cause investors to become more risk-averse.

-Fraud or corruption: These types of events make people lose confidence in the market and the possibility of investment

-interest rate hikes: when interest rate rise, borrow money become more expensive, which can lead to a decrease in demand for the various assets.

There and other factors can create a panic phase in the market. Supply exceeds demand, prices correct. Thus, the market enters at the end of the speculative bubble. Disillusionment arises among investors, who find that there is no more upward demand. There then follows selling, the speed of which is usually proportional to that of the previous rise, resulting in a fall in prices below fundamental levels, defined overshooting.

Healthy growth and growth by bubble

The price increase of an asset can occur due a financial bubble or healthy economic growth. The first one is a temporary and artificial increase in the price of an asset not supported by fundamentals, whereas a price increase due to healthy economic growth is supported by fundamental values. So, it is relevant to analyse how monetary policies can influence the performance of financial markets and the relationship between stock performance and economic growth.

Stock trends and economic growth

Between stock trends and economic growth there is a close relationship. Usually, a stable and solid economic growth is associated with an increase in stocks value, as companies benefit of the economic growth through growth in profits and revenues. This can lead to an increase in stock price. (Goel, 2023)

At the same time, an increase in stocks can also help stimulate economic growth, in fact investors because of the wealth effect see their portfolios increase in value, leading them to spend more, thereby stimulating economic growth.

However, it can happen that the various asset prices rise a lot, moving away from their fundamental values. In such cases, the rise in stocks may be followed by a fall.

In summary, economic growth and stock trends are interconnected and have a reciprocal effect on each other.

Monetary policies and financial market trends

Monetary policies have a close correlation on financial market developments. Monetary policies are techniques used by central banks to influence different facts such as the interest rates, inflation, and amount of money in circulation. These variables have an impact on investor confidence and investment decisions. (Hildebrand, 2006)

If the central bank raises interest rates, as has been the case over the past year, riskier investments become less attractive because of loans becoming more expensive. This can lead falling share price making more attractive safer investments, such as Treasury bonds.

Differently if the central bank, lowers interest rates, borrowing become cheaper increasing investor confidence in the stock market, pushing stock prices up.

If the central bank decides to expand the amount of money in circulation, this may increase inflation and make safe bonds (like Treasury) less attractive to investors. This can lead to higher stock prices and a greater attraction for riskier investments.

Cap 2. Psychology of asset bubbles

Behavioural Finance

(Marca, 2021)

Behavioural finance is a branch of behavioural economics that deals with how the analysis of financial choices are determined by psychological aspects and how these choices affect financial markets. Interest in this discipline saw a steady increase in recent years, whose founders are Daniel Kahneman and Amos Tversky. It is based primarily on cognitive psychology, that is, the mental processes that govern human behaviours, and focuses on examining how different investors undertake calculations to maximize their wealth. Behavioural finance also deals with the emotional aspects of investors and thus how a decision-making process is more than a calculation, a process indeed, and lastly on social psychology, thus the interaction of an individual and society in a decision making.

Behavioural finance incorporates psychological elements to standard finance, seeking to bridge its gaps and improve its theories. It thus aims to bridge the gap between standard finance and financial reality. Behavioural finance thus deals with why certain decisions are made, and unlike standard finance, which is based on the concept of perfect rationality, behavioural finance uses the more realistic concept of bounded rationality because everyone is not perfectly informed and driven by purely economic reasons.

Normal investors are characterized by cognitive imperfections that result in irrationality in financial decision making.

Cognitive bias

In real-life situations, decisions are made based on subjective preferences, evaluations, and biases that often do not reflect real-world facts. Answers to questions depend on the way they are asked. Information asymmetry and limited capacity of decision makers, lead to the occurrence of behavioural errors that can adversely affect decision making.

Behavioural finance thus seeks to explain the reasons behind irrational investor behaviours and give answers that standard finance cannot provide. The behavioural finance literature examines the following behavioural biases:

Biases of overconfidence

People tend to overestimate their skills and knowledge and are therefore generally optimistic. Overoptimism and overconfidence are two similar phenomena, but optimism refers to an overestimation of the mean value, while overconfidence refers to underestimating the standard deviation of an outcome. Prominent among the factors that support overconfidence are the illusion of knowledge and the illusion of control bias. The former is the false belief that a greater amount of information necessarily means a greater level of knowledge, while the latter refers to the illusion people have about control over an event and its outcome. The growth of wealth and power intensifies overconfidence, but the growth of overconfidence due to excessive trading often reduces the investor's wealth.

Framing bias

The Framing Bias refers to the influence that the way a problem or situation is framed has on an individual's or organization's decision-making related to economic matters. This bias occurs because the way information is presented can affect perception of the problem or situation and the options available to decide.

For example, in a study on saving behaviour, participants were asked to choose between two options: saving or losing 100$. The result showed that individuals were more likely to choose to save 100$ when it was framed as a gain rather than a loss. This highlights the power of framing in shaping economic decision and outcomes. (Lancaster, 2022)

The framing bias can have significant implication for economic decision-making, including investment decision, a biased framing of information can lead to individuals investing in suboptimal option, missing out on better opportunities, or taking unnecessary risks.

Bias heuristics

Heuristics are defined as simplified strategies for solving problems of varying complexity. The main benefits are savings in financial resources, time, and energy. Investors often apply the heuristic that past performance is the best indicator for future performance, and then invest in the best stocks that have led to higher returns in the past, resulting in poor financial decisions and systematic errors.

Mind accounting distortion

According to this principle, individuals evaluate and categorize financial assets by linking them to separate mental accounts. These bias leads investors to prefer an increase in dividends, for example, over the same increase in capital value.

Representativeness bias

This bias refers to the fact that individuals predate financial decisions based on available and easily accessible information that is not fully representative.

The representativeness bias thus leads to the overpricing of well-known large-cap stocks, however, the high demand toward these types of stocks implies a high stock price, and thus relatively low returns. It therefore leads investors to concentrate their investments in stocks that have experienced strong growth in the recent period. The following bias also explains people's investments in the sector they are familiar with or confined to the country in which they live.

Conservative Bias

Conservatism bias involves resistance to change and exaggerated reliance on long-term trends. Individuals tend to become sentimentally attached to their resources, leading them to overvalue them and thus be unable to sell them at a fair price or otherwise.

Loss Aversion Bias

It refers to the fact that investors perceives gains and losses differently, placing greater emphasis on potential losses. According to research, the dissatisfaction of individuals generated by losses is more than twice as great as the satisfaction achieved by an equal percentage of gains. This type of bias thus implies selling securities that brought capital gains, while holding devalued securities for a longer time.

Bias of regret

It occurs when people realize that different choices would have led to better outcomes, thus connected to responsibility for the choice made. Regret arises from wrong actions, or lack of action. Following bias results in an excessive tendency to avoid change, thus excessive conservatism by avoiding new investment activities.

The herd effects

It refers to the behaviours of investors who, instead of evaluating individually and making their own estimates, make investment decisions by following the crowd, thinking that the majority opinion is always right. This type of behaviours mainly emerges under conditions of uncertainty, lack of information and limited personal knowledge. Copying the movements of the crowd brings on the one hand social acceptance, and on the other hand the potential regret that would occur in case of wrong personal decisions, because a bad collective decision, is perceived by the individual investor with less suffering than if it had been made individually.

Human beings, by nature feel the need to belong to a community, and often through the phenomenon of the herd effect it leads to buying securities at the peak of the market rally or selling them after a sharp drop in their value.

The mechanism created by the herd effect is the basis of speculative bubbles, which led in the most resounding and significant examples of the Dotcom bubbles and the '29 Wall Street bubble, to the purchase of securities that generated neither revenue nor profit.

Confirmation Bias

Confirmation bias refers to the gathering of information for the purpose of confirming one's own ideas or thesis, instead of gaining new knowledge and thus changing one's beliefs. Information that casts doubt on a person's thesis is through this bias ignored. By not managing the full spectrum of information, the investor is inclined to make unilateral, and therefore often bad financial decisions.

Hindsight bias

According to this bias, past events, after one's outcome is known, always seem easily predictable. This bias leads to not gaining new knowledge because investors are unsurprised by the realization of events in unexpected ways. The fictitious long-sightedness that individuals think they possess leads them to expose themselves to excessive investment risks.

Cognitive dissonance distortion

It refers to the psychological distress of investors that occurs when their opinions and ideas are inconsistent with their behaviours. This brain mechanism brings to not sell securities at a loss, and to further purchase them as a prior justification for their purchase, irrational in economic terms.

The winner's curse

According to standard finance theory, real and financial assets will never be purchased with excess value, but at a price concordant with their intrinsic value. (Winner's Curse: Definition, 2021) This from the theoretical point of view, however, is not reflected, in which the number of bidders and aggressive competition limit the rationality of supply. As the number of bidders in an auction increase, the competition becomes more aggressive, and the rationality of the bidders is limited. This leads to more overpriced bids, which contributes to the winner’s curse. This phenomenon takes its name from the fact that if multiple bidders compete for the purchase of a firm, the winner is likely to overpay for it.

The theory of efficient markets

According to the theory of efficient markets, the prices of an investment reflect all the information available from investors. The theory therefore assumes that investors having availability of the same information, it is impossible for them to 'beat the market' consistently, because basically the markets have already discounted all the information considered. (Markes, 2018)

The theory of efficient markets assumes certain premises:

- There are many investors

- That they are intelligent, diligent, objective, motivated and financially savvy

- All parties have equal access to all the information available in the market

- All the people are ready to buy, sell and short the various asset classes

The premises, it is difficult for all of them to be fulfilled, particularly one of those listed is difficult to occur, so objectivity, because human beings are not machines. Operators are driven by emotionality, fear, envy, and other emotions that make it difficult to be objective, and this allows and justifies great errors in valuation. So, this assumption does not correspond to the reality. People are influenced by behavioural and psychological factors that can lead to biases and irrational decision. Some of these factors like the popular herding behaviour in which people are influenced by the decisions and opinions of others, leading them to make similar decision. Another widespread phenomenon among people is confirmation bias in which people tend to seek information to support their beliefs, ignoring contrary information.

Other traits of humans that lead markets to be less than perfect are anchoring and overconfidence explained in more detail above.

The most relevant trait for the human being, and the one that distinguishes him from software, are the emotions that are masters of the markets, much more so than rationality.

Prices are often deviated from their fundamental values because access to information and analysis is very often imperfect, valuations are therefore often far above or far below the intrinsic value of a given investment.

Many investors can 'beat the market' because they can benefit from these mispricing, which the market is making on a single security, or a basket of securities. They can benefit investors in terms of skills, vision about the future, access to information, and psychological tightness, which lead to valuation errors then difference between price and value.

Future chapters deal with the largest speculative bubbles in the markets, and the examples of the Dotcom bubble or the U.S. housing market are inconsistent with the idea that financial and housing markets are rational and efficient. So given irrationality, one should not abandon the theory of fundamentals, but rely on it because in all cases the market has always automatically corrected itself from irrationalities in a calm and inexorable manner, because the market always recognizes true value, because there is no person or institution that knows the market better than the market itself. The financial market tends to self-adjust and return to its fundamental value because market participants and supply and demand forces act with the goal of realizing profits based on available information about the economic and financial condition of the companies the invested in. Financial market participants continuously evaluate financial assets based on fundaments such as earning, cash flows, growth, and price to earnings ratio, to determine their intrinsic value. In addition, the financial market is driven by information that is continuously reads by companies and rating agencies. Market participants use this information to evaluate investment opportunities and make informed decisions, and finally is the price of a financial asset deviates from its fundamental value, market participants can intervene by buying or selling to realize profits. This feedback can correct market inefficiencies and help the price return toward its fundamental value. (Charles Schwab, 2022)

Mentioning an example of irrationality, and subsequent correction the performance of the S&P500 as an example, the market in 2021 experiences a growth until December, when inflation rate had already reached thresholds of 6 percent (Ricciardi, 2021). However in the

following year the market underwent correction as market questioned the ability of central banks to maintain inflation at the target level of 2 percent (The ECB's monetary policy) . The lack of confidence towards central banking system resulted in a significant correction in 2022, as the trust in this system shifted rapidly in a matter of weeks.

Markets are thus efficient over medium/long time periods, but in the short run they can be extremely inefficient, and thus lack the ability to evaluate all the information they have. The difficulty of evaluation, of course, increases as the current environment increases. Since 2018 there have been three market crashes (late 2018, March 2020, and 2022), a pandemic, Russia-Ukraine conflict, and tensions between China and the United States.

Examples of mispricing in the short term, is the chart shown that shows the percentages in companies that are traded at less than liquidity and short-term investments (readily liquidable) Figure 3. Currently 12 percent of U.S. companies are listing below this threshold. This means that excluding investments, factories, brands, ability to produce profits, 12 percent of them are worth less than ready liquidity, a proof of the current inefficiency of the markets. (Cembalest, 2022)

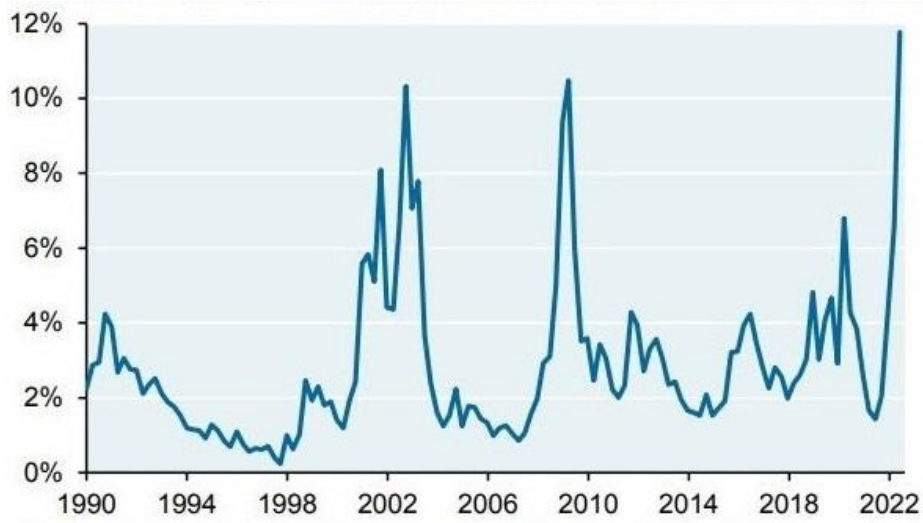

Figure 3 Show the percent of companies trading below cash and short-term investment (Cembalest, 2022).

Cap 3. Macro investment strategies

All investment returns, depend to varying degrees on future events. This is what makes investing fascinating: it is a bet whose success depends on the predictive ability of the future. Traditionally, experts in the investment community, have used two approaches to value assets: 'Firm foundation theory' and 'The castle in the sky theory'. Investments made according to the two different approaches have made and lost billions, and the theories are mutually exclusive. As will emerge from this chapter it is the theory of air castles that is responsible for the creation of financial bubbles. (Malkiel, 2020)

Firm foundation theory

Firm foundation theory states that all investment instruments, whether stocks or real estate, have a close connection to what their intrinsic value is, determined by their current conditions, and prospects for the future. When investment prices reach a price lower than one's intrinsic value, one has a good opportunity to buy, vice versa in the case that the price is above the intrinsic value. The theory is based on the fact that over time, the price fluctuation will stabilize toward the intrinsic value. So, the value of a stock should be based on the flow of benefits that a company is able to distribute the form of dividends or with buy backs of its shares. The theory is based, then on the fact that the higher its dividends and its rate of growth, the higher its value will be. So, it is based on the expectations of growth, but also and especially to the time in which it will maintain this growth. The difficulty with this methodology lies in identifying the time frame to be considered for discounting cash flows. Generally, forecasts are made on the future three to five years, because a time period after that becomes insignificant for studying the price.

Great promoter and user of this theory, is Warren Buffet, referred to as the ‘Oracle of Omaha'.

The castle in the sky theory

'The castle in the sky theory' unlike the preceding theory is based on psychological values. The theory is enunciated by economist and investor John Keynes, who states that an investor should devote his or her efforts not to calculating, by uncertain methods, the intrinsic value of a stock, but to anticipate the market by analysing investment situations that are most likely to convert into castles in the air for the public and buy stocks before the masses do. Keynes thus criticized the theory of value investing, in that one cannot possibly know what the future returns and dividends of a stock will be, and therefore contrasts the valuations obtained by a thorough study of the stock market with a psychological analysis.

The economist Keynes himself explains his strategy to his colleagues by offering an as an example a beauty contest in which there will be five winners out of a hundred participants. Keynes reports that in the stock market as in this example, it would not be intelligent to choose the five that the observer thinks are most beautiful, because the criteria of personal beauty are irrelevant; but neither to choose those that the other players might like, but to predict those that the average opinion will prefer as the average opinion. By doing so, one does not choose the winner by being influenced by personal preferences, but neither by the personal preferences of the other judges. Therefore, it will be the media's decision to decide the winner.

The theory then is based on the fact that any price, is a good price, in the manner that there are others to pay more. There is no explanation, only the psychology of the masses. The investor's job is to anticipate the market and enter when the process begins.

So that, Res tantum valet quantum vendi potest, in other words that the value of an object is what the other person is willing to pay.

Cap 4. The history of financial bubbles

Ancient bubbles

In historical boom periods, greed has been a distinguishing and key characteristic. In the euphoria many of the investors abandoned Firm foundation theory, to also join the masses and build castles in the air together with them. The psychology behind the creation of bubbles is a theatre of absurdity, in which some people have managed to get out unscathed by bringing back gains, but most have suffered great losses, because trying to predict the reactions of the masses is a very dangerous game. As Gustave le Bon quotes in his work on the psychology of the masses, 'In crowds what accumulates is stupidity, and not common sense.' Indeed, markets in a state of excitement, which saw perishing increases in the short term, ended up succumbing to the law of financial gravity, and the greater the increase, the greater the subsequent reversal. (Malkiel, 2020)

The tulip bubble

The rush to buy tulip bulbs, was the first bubble in the history of markets, and one of the greatest mirages to obtain wealth.

The story begins in 1593, when a botany professor brought the Dutch city of Leiden a collection of tulips from his trip to Turkey. In the following years this flower became very popular in the nation, mainly because these were affected by a nonfatal disease called mosaic, which gave the flower colourful streaks that caused a visual contrast that was much appreciated by the public; this was the trigger for the bubble. The flower's popularity began to make inroads into the country, to the point that merchants would stock up the previous year based on the tastes and preferences they would expect from the market for the following year, just as today's stores try to predict the taste of clothes for the next season. Prices thus began to rise, and from merchants, even individuals began to buy them as an investment, imagining that the passion for tulips would last forever.

The euphoria of the moment led more and more people to enter the market, who to buy the bulbs began to sell their possessions, such as jewellery, land, or furniture.

Also, in the past, as in the present, financial markets respond to all market needs, and in this case, they introduced the call option, which as is the case in markets today gave the right to buy bulbs by paying an option premium. So, if hypothetically the price of a bulb, had been 100 at that time in the market, paying an option premium 20 percent, so 20, the moment the bulb increased in price to 200, the call option investor, could buy it at 100, and then in the case of selling it would have a profit of 80, thus multiplying by 4 times the money spent on the investment. This led to a further expansion of the market.

The tulip bubble culminated in the famous auction in Alkmaar on February 5, 1637, in which hundreds of lots of bulbs were sold for a monetary amount of 90,000 guilders (the equivalent of about 5 million dollars), i.e., each bulb sold for the average price equal to the income of more than a year and a half of a bricklayer at the time. (Cazzaniga, 2021)

In the days that immediately followed, tulip fever suddenly turned into panic: it was enough for a bulb auction in Haarlem to go unsuccessful to cause uncontrolled so-called panic selling and cause market prices to plummet across the country. As happens in all bubbles others followed suit and the price went from about 200 Dutch guilders to 25 within three months Figure 4. Prices continued to fall over the following months until they reached the price of an ordinary onion.

Figure 4 show the tulip price index during 1636-37. (Southwood, 2016)

The South Seas bubble

At the time of the South Seas bubble, the Britain owned large amounts of savings and few investments. The ability to hold shares was a great privilege in fact in 1693 only 499 people owned shares of the East India Company. The South Sea Company, created in 1711, was also created to meet the need for investment means. The English government granted the monopoly of trade throughout the South Seas in exchange for 10 million pounds. The attraction to the company began early on in fact the company's debt holdings changed it sold at £55 with shares in the company worth £100 at the time of its creation. No director was experienced in the South Seas trade, but that did not stop them, to create a fleet of ships for the slave trade between Africa and South America. The operation did not prove to be profitable, however, due to excessive mortality rates in the ships. The company's managers, however, were able to make good impressions on buyers who were welcomed in luxurious English palaces. At the same time a cargo of wool transported to Cartagena rotted for lack of buyers and the war against Spain began leading to a consequent decrease in trade. Stocks despite these negative events at the same time resisted and even rose.

At the same time in France, John Law, an English exile founded a company with the goal of replacing metal currency, such as paper currency (the promoters of Bitcoin continued this long tradition). To achieve his goals Law purchased an abandoned enterprise called The Mississippi Company, proceeding to create, and bringing it and be one of the most capitalized companies in history, including for current times. This company was very successful to the point that in 2 years, the share price went from £100 to £2000, corresponding to 80 times the value of all French gold and silver.

The English answer to the French company, was the South Seas Company, as the war against Spain ended and strong interest was created in Mexico for the wool carried by the English company. In 1720 the national councillors decided to consolidate the country's debt, and when the law was passed the company's shares increased from £130 to £300, in no time at all. Five days after the law was passed additional shares were sold issued for a price of £300, of which purchase could be made with a down payment of £60 and eight more instalments. Because of the voracity of insatiable purchasers' additional shares were issued for £400 and the following month for £500, with increasingly subsidized purchases requiring a 10 percent down payment and the further instalments to be paid in subsequent years. The price in a very short time reached £1000.

Economic conditions were favourable for the creation of new companies, and there were many opportunities to buy shares in trading companies with the opportunity to generate large profits. This situation creates a climate of hype and euphoria around trading companies, this leads many people to often risky investments.

Due to the distance in time and the consequent loss of information, it is not possible to give an exact number of the number of companies created, but with a large threshold of probability it can be said that hundreds of companies were created during this period of pure euphoria. A climate was created in which, people were looking for new companies, entrepreneurs going against the needs of the market and thus led the issuance of shares in companies from the most ingenious to the most absurd, among them importing donkeys from Spain (although there were a large number of them in England), salt water purification, building ships against pirates, trading in human hair, building hospitals for orphaned children, companies extracting silver from lead and even creating the wheel from

perpetual motion. All these companies offered extremely high returns, and in a short time they received the name bubble, and as such, often burst within a few weeks.

The investors themselves did not believe in the companies but bought them with the hope that prices would rise to sell them to subsequent buyers.

The meltdown of this situation occurred in August of the same year, 1720, when the directors and managers of the South Sea company liquidated their shares due to the mismatch between the price and the actual value of them. The news leaked out and the stock price collapsed in no time Figure 5. Similarly, the shares of the Mississippi Company collapsed to the point of worthlessness as the public realized that an excess of paper money has the sole effect of creating inflation.

The government to prevent a recurrence of this phenomenon, enacted the 'Bubble Act' in which shares in the companies were banned, and until 1825 when this law was revoked there were very few shares in the English market.

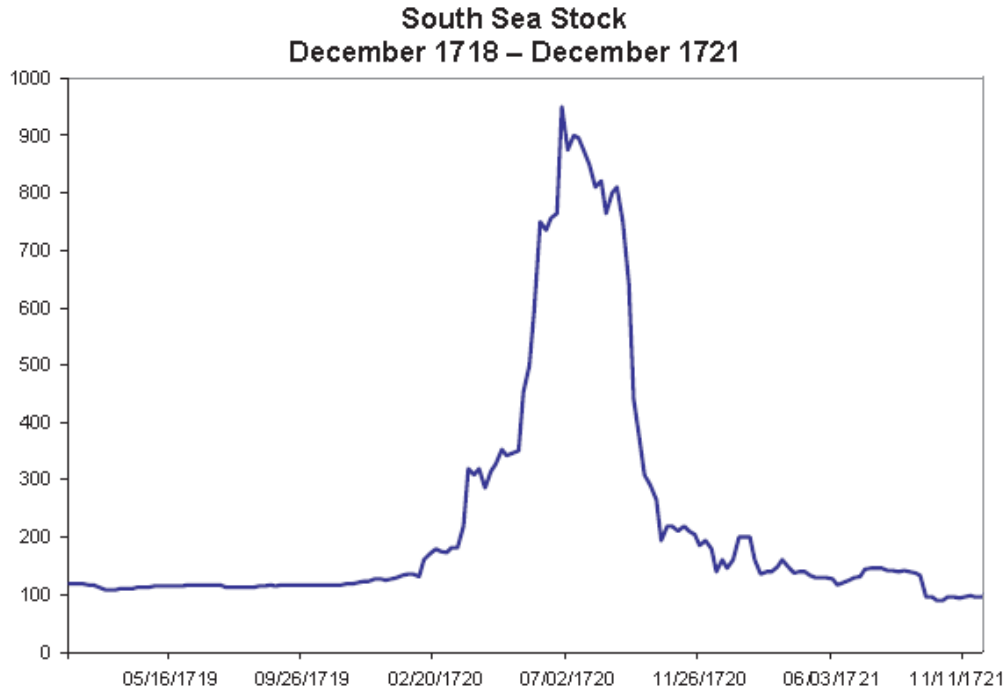

Figure 5 show the value of South Sea Companies stocks. (The South Sea Bubble)

Modern bubbles

Wall street bubble

Bubble phenomena like the ancient ones still occurred in more modern times. The turn for the U.S., land of opportunity occurred in the 1920s, in which there was one of the greatest expansions, and one of the greatest collapses known in history.

The conditions for this financial cataclysm to occur, could only be so favourable as the country enjoyed unparalleled prosperity.

In 1928, investing in the stock market became in the country a popular activity extended to the general mass and are no longer reserved for a niche of people , and between '28 and '29 there were percentage increases (by approximately 90%) that equated those achieved between '23 and the beginning of '27, with increases reaching 10 to 15 percentage increases per day. (Webster)

Speculation in the markets reached new highs. Common manipulation techniques were based on consortia, in which members sold shares to each other in such a way as to create volume, and thus subsequent interest from the public, who at the time they bought, suffered an immediate depreciation by the consortium members who proceeded with the sale instead. (Malkiel, 2020)

Often, consortia were not even needed to defraud the public, as was the case with Albert Wigging, head of Chase, the second largest national bank at the time. In July 1929, frightened by the high prices of the unstoppable bull run of the time he “shorted” 42.000 shares of the company's stock, achieving a gain of different millions of dollars. Short selling is a trading strategy which consists in making profit from declining prices of securities. In this trading technique an investor borrows shares and sell them, hoping to buy the shares back at a lower price. The potential profit for the investor is represented by the difference between the selling price and the purchase price. Citing an example of an investor thinks that the price of some shares will fall he can borrow shares sell them at the current market price, and then purchase the shares back. If the stock’s price decreases, the investor makes a profit, but if the price increases, the investor incurs a loss. (Hayes, Short Selling:

Definition, Pros, Cons, and Examples, 2022) This of the Chase case, a situation that thanks to the laws account conflict of interest could no longer happen.

The stock market began to gouge on September 5, 1929, a day referred to as 'The Babson Breakdown,' after Roger Babson, an economist who had long predicted the collapse, due to the unsustainability of prices. On this day the largest companies in the market lost several percentage points. There was no specific reason why evaluation began to collapse this specific day. Rather, it was the result of a combination of negative factors that had accumulated over time, such as excessive financial speculation, poor income distribution, and a weaking economy. These factors made financial markets unstable and led to a cascade of stock sales that caused prices to collapse. From this event, the market lost the confidence and euphoria it had enjoyed in previous months, and the month of September had more bad days than good. On October 21, the collapse caused increased demand for collateral from clients who bought on margin, and unable to meet the demands they had to sell their holdings. The purchase of shares on margin consists of the purchase of shares through a loan taken out with a brokerage firm. This technique leads to possible profits, greater than those they could obtain with only their own finances due to increased purchasing power. In the opposite case, i.e. a fall in prices, the hypothetical investor will not only be subject to a fall in the value of his shares, but also responsible for the cost of his loan. He will in this case be forced to sell his shares, or to bring in additional collateral. (Chen, Buying on Margin: How It's Done, Risks and Rewards, 2021). As prices fell, brokers concerned about insolvency increased loan guarantees. Sales volume on the same day increased to 6 million. The great meltdown occurred on the famous 'Black Thursday' October 24 when volumes reached 13 million shares, in which there was a huge percentage drop in equities in the space of a few hours. Great collapses occurred in the following days, particularly on October 29 in which the sales volume was 16 million, corresponding to thousands of millions in today's days due to the significant increase in the number of shares on the market. The decline continued in the following period until 1932, when the lows were recorded. Most of the blue-chip stocks (as in Poker the chip blue has the highest value), thus the major U.S. companies, had fallen by 95 percent or more Table 1.

This caused a devastating effect to the real economy.

Among the causes of the crash and subsequent depression highly restrictive monetary policies, and a sudden rise in interest rates to limit and punish speculators are strongly blamed by economists such as Harold Bierman.

Among the elements of irrationality that contributed to the rise in prices were investment funds such as Goldman Sachs Trading Corporation and Tri-continental Corporation, which sold the value of stocks at 2 or 3 times the market price, compared to if they had bought out of the fund, leading the value of these funds to have unreal valuations. People were buying inflated stocks values through investment funds because a widespread feeling of optimism. In those days stock market was experiencing a period of rapid growth. Among the causes studied afterwards the lack of regulation, was one of the distinguishing elements. The investment fund industry was largely unregulated compare to today, allowing fund managers to make misleading claims engage in speculative practices. In addition, this period was also marked by a major advertising campaign by investment fund companies, making them seem like a certainty for investors. Finally, many investors were unaware of the risks involved in investing in equity funds.

Table 1 Show the Price changes of major U.S. giants before and after the bursting of the 1928-29 bubble. (Malkiel, 2020)

Stocks	Opening Price 3/03/1928	Max price 03/09/1929	Min price 13/09/1929	Min price 1932
American Telephone & Telegraph	179 1/2	304	197 1/4	70 1/4
Bethlehem Steel	56 7/8	140 3/8	78 1/4	7 1/4
General Electric	128 3/4	396 1/4	168 1/8	8 1/2
Montgomery Ward	132 3/4	137 7/8	49 1/4	3 1/2
National Cash Register	50 3/4	127 1/2	59	6 1/4
Radio Corporation of America	94 1/2	101	28	2 1/2

Institutional bubbles

Poor personal wealth management skills, but more importantly, various controversial speculations led investors over the years to rely on professionals, to manage pension plans and mutual funds. By the late 1990s they accounted for 90 percent of the trading volume on the Wall Street exchange. Despite this, professional investors participated in different speculations between the 1960s and 1990s, in which they did not rely on the principle of value investing, but on that in which they put the hope of buying from investors to create the, trivially called, castles in the air.

Growth stocks and tronics boom

The 1960s were marked by generalized economic and social growth, especially in the western part of the world. The diffusion of television, the beginning of the use of computers, the expedition to the moon, and a generalized enrichment of the population with an expansion of the middle class, however with an excitement and a situation of euphoria regarding the future. Investors were confident about prospects of economy and were eager to invest in stocks. Consequently, stock prices rose and the growth of the stock market propelled growth to overall economic growth during this decade. Broad-based growth driven by several factors, including technological improvements, vertical growth in consumer demand for electronic products, and favourable real economic conditions such as low unemployment and rising wages contributed to the growth of the electronic boom. During this period the value of electronics companies became even far removed from their real value and were sold for as much as 80 times its multiples. This period was characterized by strong demand for stock, resulting in heavy issuance by companies comparable to that of the South Sea Company bubble, not only in intensity but also in fraudulent practices.

The 1960s was the 'Electronics Boom' because stock offerings always included a version of the word electronics in their names, even if the companies did not work in the electronics industry. The name conversion led the value of the company to increase for no reason.

By 1962, most of these companies went bankrupt. Market saturation was the main cause of the crash, as the number of electronic products produced exceeded their demand. Since they were relatively new products, they were also subject to high production costs. Finally, the competition from foreign producers who added to the market led to a sharp reduction in profits.

The conglomerates

In the mid-1960s, growth was associated with another concept, synergy. The latter is the ability to give five from the sum of two plus two, the basis of this concept being the conglomerates.

Although the antitrust laws of the time prohibited companies from acquiring other companies in the same industry, for a limited period, although there is no specific date, but different laws were enacted in the following years for different sectors, it was possible to acquire companies in other industries without legal consequences. Through this process companies could be merged resulting in increased profits.

For illustration, consider two hypothetical companies: 'Able Circuit Smasher Company,' an electronics company, and 'Baker Candy Company,' a chocolate bar manufacturer, each with 200,000 shares outstanding. In 1965 both produced profits of $1,000,000, thus EPS of $5. The EPS stands for ‘Earning per share’ which is a financial metric used to measure a company profitability. It represents the amount of net income earned by a company per share of its stock outstanding. EPS is calculated by dividing a company’s net income by its outstanding shares of stocks. The two companies operating in two different markets enjoy two different multiples. In fact, the first working in the electronics field, the PE ratio, will be, again assuming 20, while the second operating in a less attractive sector only a PE of 10; this leads to a price per share of $100 for the former and $50 for the latter. The PE ratio stands for ‘Price to Earnings ratio’, which is a financial metric used to evaluate the value of a company’s stock. It is calculated by dividing a company’s current stock price by its earning per share (EPS). The PE ratio provide a measure of how much investors are willing to pay for each dollar of the company’s earning. At this point, the management of the electronics

company wants to acquire the second company and offers a stock swap of two shares of Able Circuit Smasher Company' for three of 'Baker Candy Company.' This given the convenience of the deal leads the chocolate company to accept because two shares of the electronic company are worth $200, because the value of each is $100, while of the second $150, because the value of each is $50. This creates a conglomerate renamed 'Synergon Inc.' with 333.333 shares outstanding, given by 200000 from the first company plus two thirds of 200.000, so 133.333, which gives a total of 333,3333, and a profit of $2'000'000, sum of profits, or an EPS of $6. Thus, upon completion of the merger the profits will have increased by 20 percent (EPS from 5 to 6), and the shares then go from $100 to $120, based on the multiple of 20.

Suppose further that the new company 'Synergon Inc.' wants to merge with the company 'Charlie Company,' which has an EPS of $10, or 1.000.000 profit with 100.000 shares outstanding, and the company working in a risky market enjoys a PE of 10, upon Synergon's offer to exchange shares, with a one-to-one exchange , the shareholders of the second one will not refuse because they exchange $100 shares of the actual Charlie company for $120 of the conglomerates. The new company, after the second acquisition will have 433.333 shares, profits of $3.000.000 and EPS of $6,92 Table 2.

Table 2 show the example of conglomerates operation. (Malkiel, 2020)

	Firm	Earning ($)	Number of stocks	EPS ($)	P/E	Price
Before the merger	Able	1.000.000	200.000	**5.00**	20	100
Before the merger	Baker	1.000.000	200.000	5.00	10	50
After the first merger	Synergon 1	2.000.000	333.333	**6.00**	20	120
Before the merger	Charlie	1.000.000	100.000	10.00	10	100
After the second merger	Synergon 2	3.000.000	433.333	**6.92**	20	138.4

This illustrative example (Malkiel, 2020), explains the conglomerates process that took place in the 1960s, based on acquisition of companies with low multiples, by companies with high multiples instead. Actual examples of this process were the Automatic Sprinkler Corporation (later named ATO Inc and then Figgie International) in which between 1963 and 1968 they increased sales volume by 1400%, thanks solely to successive acquisitions. In mid-1967 alone, there were four mergers, in a period of twenty-five days. These acquisitions led to an increase in profits, and an increase in PE to above 50, the price went from $8, in 1963 to over $73 in 1967 Table 3.

The turnaround occurred in January 1968, when one of the largest conglomerates, after 20% YOY growth in the previous decade, admitted a possible decline in yields. This leads to an immediate 40 percent decline in the company's price. The situation continued to worsen, especially when in the second half of that year when the Federal Trade Commission, initiated a policy of reviewing acquisitions that had taken place in previous years, resulting in a consequent further decline in prices, and correction of multiples.

Table 3 show the price before and after shares of major conglomerates. (Malkiel, 2020)

	1967		1969	
Stocks	Max value	PE	Min value	PE
Automatic Sprinkler	73 5/8	51	10 7/8	13.4
Litton Industries	120 1/2	44.1	55	14.4
Teledyne Inc.	71 1/2	55.8	28 1/4	14.2

The concept stock bubble

At the same time as the collapse of conglomerates, another type of investment funds emerged, with an attractive concept and a compelling story, hence the name 'concept stocks.' These funds constituted a portfolio composed of dynamic stocks, which were changed if new and better opportunities were discovered. These funds were very successful, albeit briefly, such as Fred Carr's Enterprise Fund, which achieved returns of 117 percent and 44 percent in the years 1967 and 1968, with the S&P giving returns of 25 percent and 11 percent over the same period.

To these in this case, due to macroeconomic difficulties in the late 1960s, inflated stock multiples, and operational management difficulties due to over-expansion, high debt, loss of management control and fraudulent practices, the concept stocks collapsed bringing multiples back into disfavour with substantial losses.

Nifty fifty

After the 1960s and all the reported speculative phenomenon, the 1970s were marked by a return to integral principles, and a return to investing in solid companies. There were

about fifty blue chip growth stocks, such as IBM, Xerox, Kodak, Polaroid, McDonald's, and Disney. Because they were solid, there was no real right time to buy, and a purchase by a fund did not cause a net market upheaval given the large capitalization. Moreover, they were considered 'one decision stocks' because they were bought to have them for a long time in the portfolio. Also being so solid and reputable the purchase by the funds did not encounter opposition, from the fund partners.

The story for the 'Nifty Fifty' like all speculative fevers ended, when the fund managers themselves upon seeing the values of them overvalued decided to sell them, resulting in the fall of these growth stocks Table 4 (Malkiel, 2020).

Table 4 show the PE Ratio of main value companies during the 1970s. (Malkiel, 2020)

Company	PE in 1972	PE in 1980
Sony	92	17
Polaroid	90	16
McDonald’s	83	9
International Flavor	81	12
Walt Disney	76	11
Hewlett-Packard	65	18

Japanese real estate bubble

In the period between 1955 and 1990, the value of Japanese real estate increased by 75 times due to rapid economic growth, low interest rates, and favourable government policies; urbanization and land scarcity in cities like Tokyo also contributed to rise in real estate prices. In the year before the collapse, the total value of real estate was estimated at approximately $20 trillion, accounting for more than 20 percent of the world's wealth, and roughly double the total stock markets. The U.S. being 25 times larger than Japan's

territory, Japanese properties were 5 times more valuable than U.S. properties. Parallel to the real estate market, the Japanese stock market increased 100-fold in the period between 1955 and 1990 thanks to low interest rates, strong Yen, governmental policies and increasing speculative investing reaching at its peak a value of 1.5 times the entire U.S. stock market, constituting 45 percent of the world's stock value. Stocks were selling at PE values of 60, nearly 5 times their intrinsic value, compared to U.S. and London stocks selling at PE values of 15 and 12, respectively. Japanese telephone giant NTT Corporation was worth more than AT&T, IBM, Exxon, General Electric and General Motors combined.

The bubble burst in 1990, when because of rising inflation in the country due to increased lending and credit purchases, the central bank decided to raise interest rates, to cool the overheated economy. The market did not slow down, however, but collapsed. The value of the Nikkei, Japan's market index went from 40.000 points that year to about 14.000 in the following two years, a percentage drop of 63 percent Figure 6.

The Nikkei, to the present day has not recovered its previous values, being at about two-thirds of its peak value in the late 1980s.

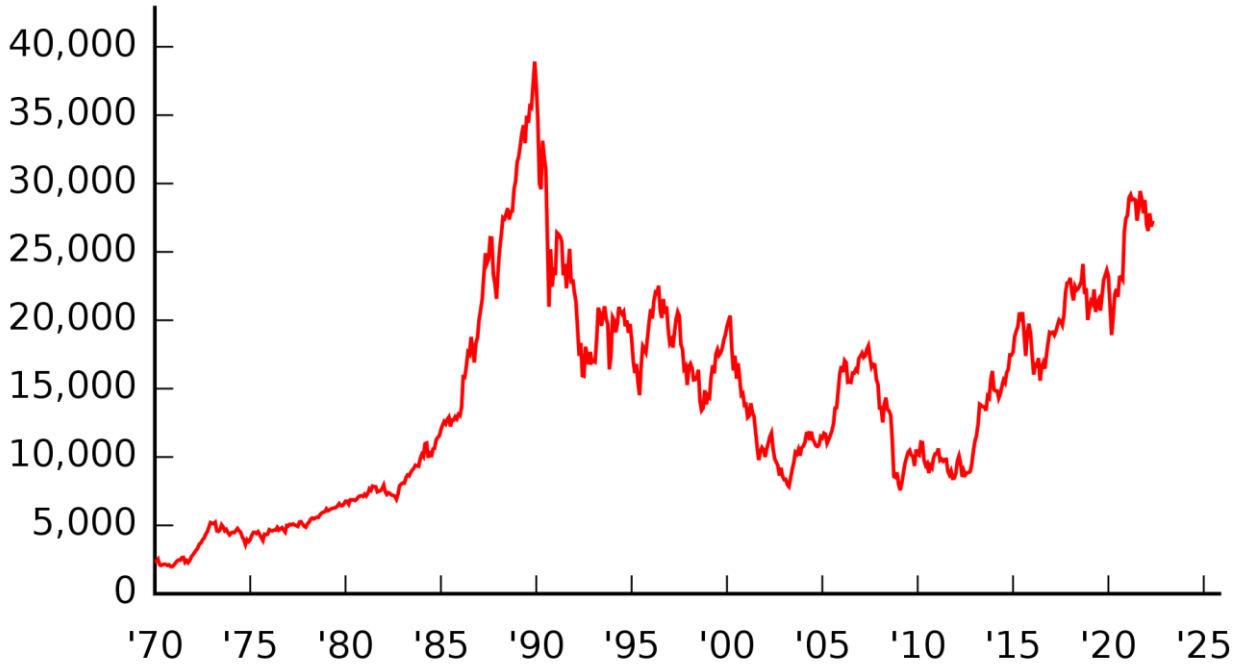

Figure 6 show the evolution of last fifty years Japanese stock index. (Nikkei 225)

Bubbles of the XXI century

Dot com bubble

Most bubbles are related to the spread of a new technology, such as the electronic bubble of the mid-twentieth century, or to new business opportunities, such as the South Sea bubble. The Internet was linked to both, as it represented a new technology that could offer new business opportunities, revolutionizing the obtaining of information and the purchase of products and services.

Robert Shiller, renowned American economist, describes bubbles as 'positive feedback loops.' A bubble starts when a group of stocks, in this case those linked by Internet excitement, begin to rise. The rise in prices encourages more and more people to buy stocks, which in turn, causes news to spread on TV, online and in newspapers. This process leads to further price increases, and thus large profits for early investors. This will lead the latter, to spread the myth of the ease of getting rich, attracting additional buyers.

The effects that occurred from the exuberance of the moment were a tripling of the value of the NASDAQ, a stock index that includes more than 3.300 companies in the U.S. technology sector. The PE ratio of stocks in the index exceeded values of 100. The values were inflated and extremely optimistic, demonstrating an investment study released in the year 2000, indicated expectations of 15 percent year-over-year growth in returns. For companies such as Cisco, the backbone of Dot com, which was selling its shares at multiples more than three digits, a hypothetical 15% growth for the next 25 years, counting a national growth of 5%, starting from the 600 billion capitalizations, would, over the time frame considered, have been worth more than the entire economy. Of course, there was no connection between company valuations and growth estimates; showing that a company like Cisco, suffered a loss of more than 90 percent of its value when the bubble burst Table 5.

What happened in the tronics boom, in which companies added, this suffix to appeal, the same happened during the Internet bubble. A multitude of companies aggregated words such as: 'dot.com', 'dot.net' or 'internet' to the name. The average increase in the ten days

after the name change was 125 percent compared to companies that did not, even if the company's core business was not connected with the net (Malkiel, 2020). There were however other, more substantial reasons for the increase in the share price. The main factor was widespread optimism for the Internet and the entire economic sector connected to it. There was a widespread idea that the Internet would lead to a labour revolution, leading to increased profits in the shares involved in this sector. In addition, the shortage of technology stocks available in the sector led to soaring prices. The growth of online trading platforms made investing in tech stocks easier, fueling the bubble. Finally, many of the Internet-based companies were start-ups with limited revenues and uncertainty about future profits Despite this, their share prices were highly valued based on their growth potential and perceived alignment with the growing digital economy. When the market in the following years changed trend, all companies lost all their accumulated value, with disastrous results for shareholders (Hayes, Dotcom Bubble, 2019).

Table 5 show the evaluations before and after the burst Dot com bubble. (Malkiel, 2020)

Company name	Max quotation 2000	Min quotation 2001/2002	% loss
Amazon.com	75.25	5.51	98.7
Cisco System	82	11.04	86.5
Corning	113.33	2.8	99.0
JDS Uniphase	297.34	2.24	99.5
Lucent Technologies	74.93	1.36	98.3
Nortel Networks	143.62	0.76	99.7
Priceline.com	165	1.8	99.4
Yahoo.com	238	8.02	96.4

An example of the irrationality and speculation of the moment is the PalmPilot case, manufacturer of PDAs (personal digital assistants). Palm was owned by 3Com, which decided to turn it into a subsidiary. Given the historical moment, PDAs, were considered

the *sin qua non* of the digital revolution, so a very attractive value for PalmPilot was on the horizon. Early 2000, 3Com sells, through a public offering 5% of Palm's shares. The latter company's shares took off at twice the value of 3Com's, however, the latter owned the remaining 95 percent of the company, so it was as if 3Com was worth $25 billion in negative equity.

In the first quarter of 2000, nearly a thousand venture capital firms invested 15.7 billion in 1009 start-ups. And as was the case in the days of the South Sea Company, many of these innovative companies proposed technologies that bordered on the absurd. Here are some examples:

Digiscent was a company that proposed a device that could be connected to the computer in such a way that when using internet or games, it would emit smell. The company spent millions of dollars, with the useless attempt to develop the product.

Flooz, proposed an alternative currency that could be sent through one's email contacts. The meltdown occurred when various global mafias, purchased large quantities of the currency, which was sold $1000 for only $800 to sponsor themselves.

Pets.com company that had become popular in many U.S. television commercials, did not compensate for the popularity with the difficulty of producing profits by selling pet food bags.

Globe.com company that sold advertising space, in the IPO, which were usually only allowed to companies with revenue and profits, elements that this company did not have, the share price went from $9 to $97, giving the company the value of 1 billion in a single day. This event triggered a pathological phase of the Internet bubble, which led to a breakdown in the relationship between prices and profits. The company closed in 2001.

To provide a justification for the rising prices, stock analysts and internet companies used new measures of stock valuations. Indeed, the same metrics of the 'old economy' could not be used, so sales, revenue and profits had marginal, if any, relevance. Analysts used page visits, and 'formal buyers' so visitors that spent more than three minutes on a site or on the web page. Or they used the 'same opinion' method, so whether a particular product or service was searched for on one specific site over another. An example of the latter methodology was Homestore.com, an Internet home seller, which according to statistics

72% of users searching for homes on the Internet used this site. By 2001 Homestore.com lost 99% of its value.

Parallel to the growth of valuations, there was a glut of fibres optics placed by telecommunication companies (the total length of cables reached the value of 1500 times the earth's circumference), resulting in their indebtedness, and bankruptcy.

A key role in moment was played by the media, which helped prices to inflate, turning countries to become stock market investors. Like the economy, journalism is also subject to the phenomenon of supply and demand. Because of investors increasingly eager for more information about investment opportunities, magazine offerings increased to meet demand, and because readers were not interested in sceptical news about the inflating bubble, magazines became filled with news promising easy paths to riches. This was a hallmark of a speculative bubble.

Along with the magazines and the various periodicals, TV networks such as CNBC and Bloomberg became cultural phenomena, and they were being shown on the screens of any venue, and most of the hosts were bullish, going to the needs of the listeners.

Adding to this widespread excitement were scams by large companies, such as Enron and WorldCom. The former, at the time the seventh largest company in the United States, was a participant in a major financial scam, for the company entered a partnership with Blockbuster, and at the same time secretly borrowed $115 million from a Canadian bank in exchange for the company's future profits. Enron accounted for the loan as the company's profit, however, Blockbuster went bankrupt in the following months, not yielding the hoped-for profits. The second, on the other hand, inflated profits and thus cash flow by $7 billion, which was recorded on the balance sheet in current expenses instead of capital investments.

The bursting of the bubble, led to new realizations, and the consolidation of past ones. The moment of collapse cannot be predicted, but the key to investing is not how a particular sector will affect society, or how much it will grow, but whether it will be able to generate lasting profits over time, because all over-exuberant markets always succumb to the laws of gravity.

The U.S. housing bubble

(Malkiel, 2020)

Although the Dotcom bubble was the largest bubble in the U.S. stock market, the housing bubble that swelled and then burst in the first decade of the new millennium was the largest housing bubble in history. In particular, the collapse of house prices had a greater magnitude because houses are the largest asset in the portfolio for most U.S. citizens, a deterioration in value led to an immediate impact on household wealth and well-being. The bursting of this bubble almost led to the collapse of the U.S. financial system, and a global recession.

The causes of this phenomenon must first be found in a radical change in the U.S. banking system. In fact, in the previous financial system, banks made mortgage loans, and they became part of the assets until they were repaid. So great care was taken with the loans made. Large deposits and documentation were also required as proof of the borrower's creditworthiness.

The system changed in the early 2000s, when banks, or large corporations specializing in mortgages, continued to make them however, the loans were held by the parent company for only a few days and then sold to investment banks, which were responsible for pooling them and issuing mortgage-backed securities, obligations collateralized with the underlying mortgages. These securities relied on the interest and principal payments of the underlying mortgages to cover the interest payments on the new mortgage-backed bond issue. The bonds also were divided into tranches with different priority based on the payment of the underlying mortgage and different bond ratings. Although the underlying mortgages were of poor quality, the rating agencies assigned them the rating of AAA. These derivative bonds were sold to the whole world. The derivatives chain, however, were not limited to the first order, as second-order derivatives were sold on the mortgage-backed derivative bonds. So, the market saw two players who could bet on the performance of the mortgage bonds or the bonds of any other issuer. So, if a person held bonds of a company, and was concerned about the solvency of the company, they could buy an insurance policy, credit default swap, that would pay out in the event of bankruptcy. The trading of credit

default swaps, grew to ten times the value of the underlying bonds, leading the financial market to be much riskier and interconnected.

In addition, structured investment vehicles, SIVs, have been created. The latter were complex financial instruments created as a way for banks and other financial institutions to earn income from mortgage-backed securities (MBS) without having to hold them on their balance sheets. An SIV would buy a large pool of MBS and other mortgage-related assets, then issue short-term debt to raise funds. These debt securities are then used to purchase additional MBS, creating a self-perpetuating cycle. The SIV would generate profits from the difference between the interest rate received on MBS and the rate paid on short-term debt securities. (Hayes, Structured Investment Vehicle (SIV), 2022)

SIVs became very popular with investors because they offered higher returns than traditional investment options and possessed a low risk rating due to the safety of the underlying mortgage assets. Compared then to the past the regulator could have seen excessive leverage and the risks involved, however with the new system this situation did not appear. Limits and rules for mortgage lending were deteriorated. Another tool introduced during these years was NINJA credits. NINJA loans stand for "No Income, No Job, No Assets". These were subprime mortgage loans that were given to people without assets or a stable income, thus going against the principles for granting a debt. These loans were made widely, often with little or no verification. NINJA and other risky types of subprime mortgage lending led to foreclosures of family properties, causing large-scale financial instability and a decline in the housing market. (Kagan, 2022)

The change in the financial system, and thus the ease of obtaining loans, had the effect of increasing the demand for the latter and thus increasing the value of houses. The protagonist and culprit in this event was the government, which pressured the Federal Housing Administration because it granted mortgages to those who could not afford them.

The new financial system combined with government policy produced an increase in demand for housing, and thus a very rapid rise in prices. The initial rise in prices brought new buyers into the market, encouraged by the appearance of little risk since prices were rising.

The graph shown shows the magnitude of the speculative bubble Figure 7. Indeed, house values since 1950 are shown, adjusted for inflation, because the only way to see the real price of the property. The price, barring fluctuations, always remains stable, while since the year 2000, it undergoes a significant climb.

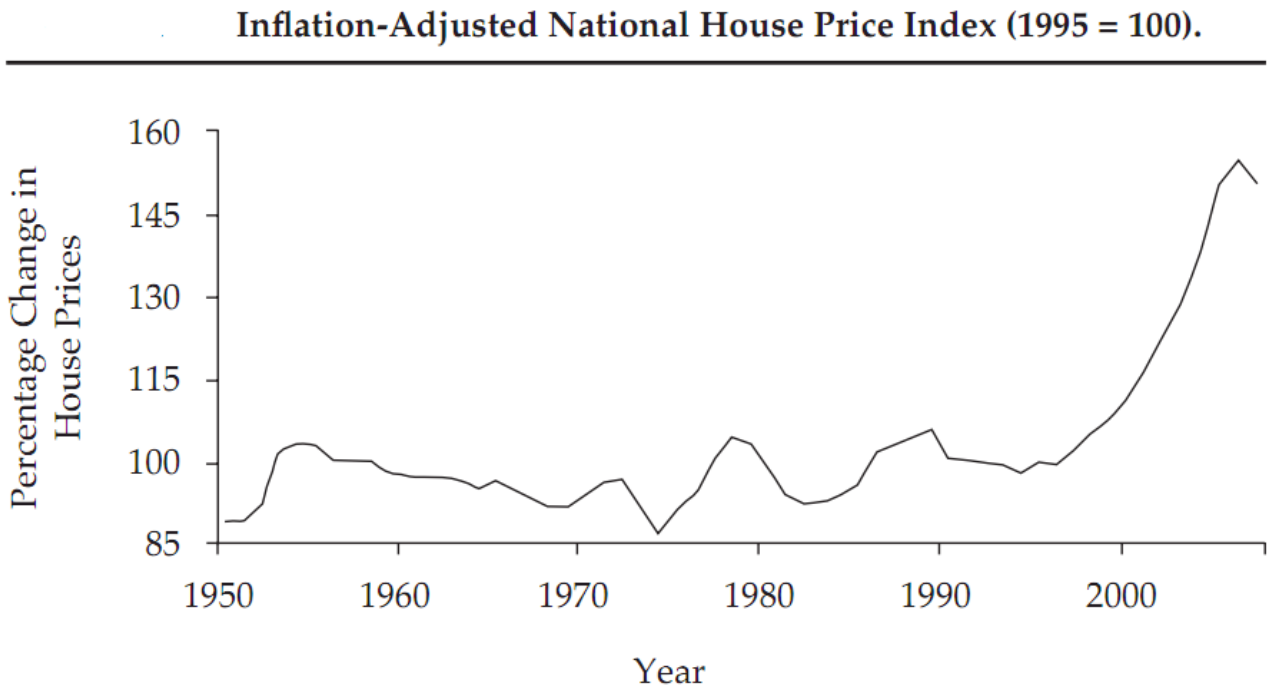

Figure 7 show the US inflation adjusted National Home price index. (Grusky, Western, & Wimer, 2009)

Due to a combination of factors, including the overdevelopment of the housing market, the proliferation of high-risk subprime loans, and real estate speculation the bubble bursting phase arrives and many homeowners ended up with a mortgage amount greater than the value of the house. More and more people returned their keys. (Edelman, 2017)

Falling house prices led to the destruction of mortgage-backed securities, and many financial institutions went into deep crisis, and the government intervened by bailing out the largest ones. The most striking case of the crisis due to the bursting of the subprime mortgage bubble was Lehman Brother, one of the largest investment banks in the US. The cause of the bank's collapse in September 2008 was excessive high-risk real estate investment when in that year, the investment bank found itself with many insolvent clients. The Lehman Brother case led to radical changes in lending. The U.S. crisis went out of state leading to a generalized global recession comparable to that of the 1930s. (Liodis, 2021)

The cryptocurrencies bubble

(Malkiel, 2020)

The different bubbles created by cryptocurrencies in the 21st century, are relatively less important because this market is small compared to other asset markets or compared to global economic activity. The importance has been increasing progressively over the years, to date the cryptocurrency market capitalizes just over $800 billion (CoinGeko). The increase this market has seen in recent years, however, is more impressive than any other speculative bubble, including the tulip bubble. The dynamics, the ability to capture a wide audience is like what the Dotcom bubble was.

The price of Bitcoin, the most famous cryptocurrency because the first and the one that nowadays enjoys the largest capitalization, fluctuated from a few cents to more than $69,000 in recent years. The fluctuations were as much as 50 percent daily, and even greater were the fluctuations of altcoins, i.e., all cryptocurrencies excluding Bitcoin.

Bitcoin, the mother of all cryptos, was created in 2008 by a person or persons by the name of Satoshi Nakamoto with the goal of creating a peer-to-peer version of electronic cash using blockchain. The blockchain is a digital ledger that permanently and immutably records transactions where each transaction is placed in a block that is subsequently encrypted and linked to a subsequent block in the chain, thus forming the blockchain. Each block is protected from the previous blocks making this technology very secure. Each transaction is verified by a decentralized network of computers, thus the public ledger that provides proof of ownership of the coins.

This technology has the potential to reduce transaction costs and increase transaction speed. Transparency, security, and decentralization are some of the main advantages of cryptocurrencies. Great interest arose from the potential possibility of revolutionizing traditional financial systems and offering new opportunities for investment and peer-to-peer transactions.

Accessibility, reduced transaction cost, and the elimination of intermediaries are the basis of decentralization.

Cryptocurrencies offer the opportunity to be able to purchase goods and services or traded on platforms or held as an investment. Some cryptocurrencies have specific uses, such as the ability to make verifications of contracts. The fact that the phenomenon is real does not mean that it is not susceptible to the bubble phenomenon. The promise of the Internet was also real in the late 1990s, however, this did not prevent a company like Cisco System, the backbone of the Internet, from losing 90 percent of its value when the bubble burst.

Indicative of the speculative bubble is the extent to which the price fluctuated over a little more than a decade. The price in just a few years went from a few cents, to a high of $69,000, to correct to currently $16,000. More precisely in 2010, a Bitcoin could be purchased for less than a penny, the highest price the same year was $0.39. The following year the price touched $31 to return to value $2. Price fluctuations characterized the following years, but the trend was generally bullish. In 2017 a BTC was worth $750, and closed the same year with value of $14,000, after touching a high of $20,000. The ATH (all time high) occurred in 2021, when BTC reached $69,000 valuation to correct and return to $16,000 Figure 8.

The volatility and inflation experienced by Bitcoin, but also by Altcoins, is unprecedented in history.

Bubbles spread with interesting stories that become part of popular culture, and Bitcoin, but especially the thousands of tokens, that have followed, are an example of how a meme has sparked particular interest especially among the younger generation. Crypto coins are often talked about in newspapers, on television, or in movies, proving that news about this world is not limited to financial publications.

The phenomenon, in the addition of suffix o such as '.com' or '.net,' of the Internet bubble at the beginning of the millennium, was repeated almost the same. An example of this is the 289% increase in the shares of Island Iced Tea Corp when it changed its name to Long Blockchain Corp (Shapira, 2017). Every day, following this phenomenon, usually low-capitalization companies changed the number of their companies, with reference to the blockchain system or the crypto world, achieving significant increases in the value of their quotations.

Bitcoin investors justify the currency's meaningfulness, often associating it with gold, by emphasizing the total market size limited to 21 million tokens. But this argument does not stand as there is no limit to the creation of crypto coins. To cite a few examples Ethereum, the second largest crypto by capitalization is technologically superior to Bitcoin in terms of greater functionality and flexibility. XRP, then Ripple, was created to improve international transactions by reducing costs and accelerating transaction times. There are currently more than 2,000 medium/large-capitalization crypto coins, and a difficult-to-estimate number of small-capitalization coins.

The tulip bubble, burst when speculators decided to cash in their profits. Holders of large amounts of Bitcoin are called whales, and they could bring about a noticeable change in prices, and thus manipulate the market. It is estimated that half of the Bitcoins in circulation are held by about fifty owners.

The phenomenon intensified over time, and reached its peak during the global pandemic, when speculation of this phenomenon peaked. Since it is more of a historical fact, a current one, the topic of cryptocurrencies will be explored in subsequent chapters.

Decentralization is the main motivation for interest in this asset, this nature of it implies not being controlled by banks or institutions. Cryptocurrencies are also protected by cryptographic algorithms itself making it a higher security tool than traditional systems. The blockchain also allows for rapid transactions without the need for intermediaries. Finally, they have the potential to completely revolutionize the financial sector, granting those without large financial resources the opportunity to enter the world of investment. But the lessons that history provides are immutable. There will continue to be speculative bubbles that will lead most participants to financial ruin. Even true technological revolutions do not guarantee returns to investors.

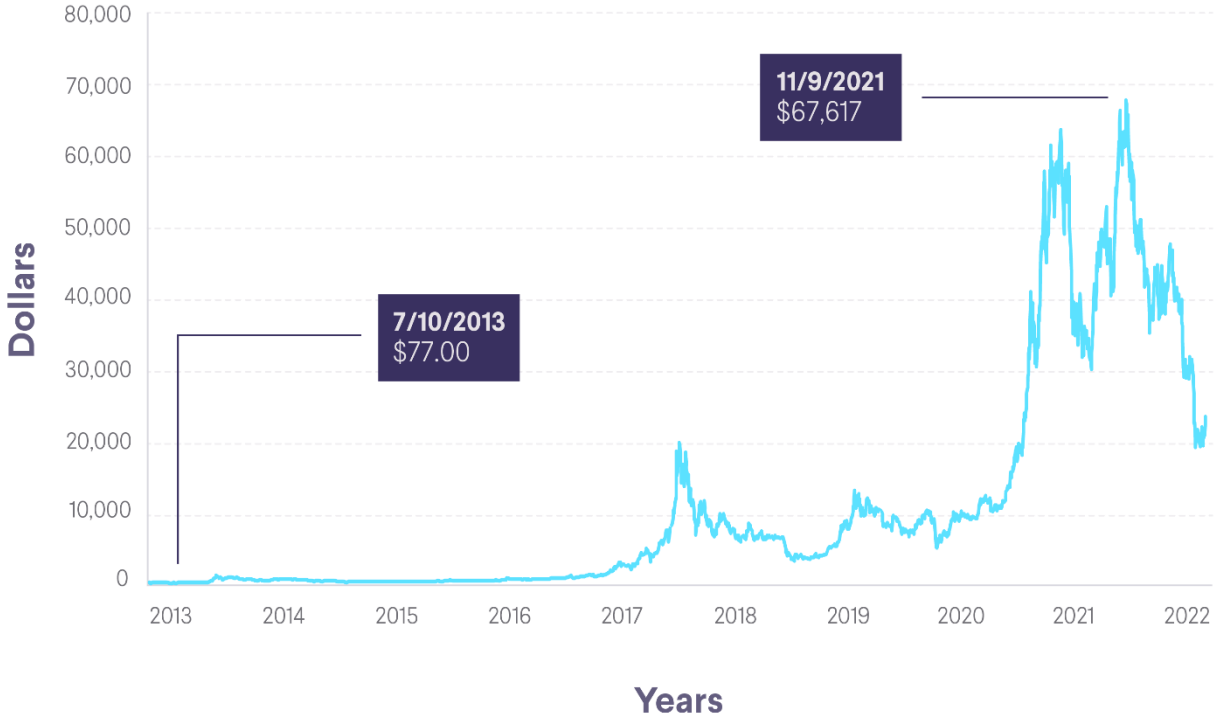

Figure 8 show Bitcoin price evolution over time. (Nibley, 2022)

Cap 5. Bubble indicators

Indicators, in the broad sense of the term, are tools used to measure the trend of a phenomenon for later analysis. They are used to monitor and evaluate the performance of a specific activity.

The following chapter will present some common indicators for identifying a bubble, then the indicators proposed by Ray Dalio, and two indicators, the Buffet Indicator and the PE Shiller ratio used in the world of finance for the study and assessment of bubble risks.

Main indicators for overvaluation and undervaluation

Trailing P/E

(Chen, 2020)

Trailing P/E ratio or P/E ratio. This indicator relates, the stock price of a particular company to its earnings per share (or the ratio of market cap to company earnings). The indicator is then used by investors and analysts to determine the relative value of a company's stock in a direct comparison. It can also be used to compare a company with its historical data or to compare markets aggregated with each other or over time. The largest U.S. index the S&P500 has had average P/E values of 16. It currently has a value of about 20.5 Figure 9, thus overvalued according to historical averages.

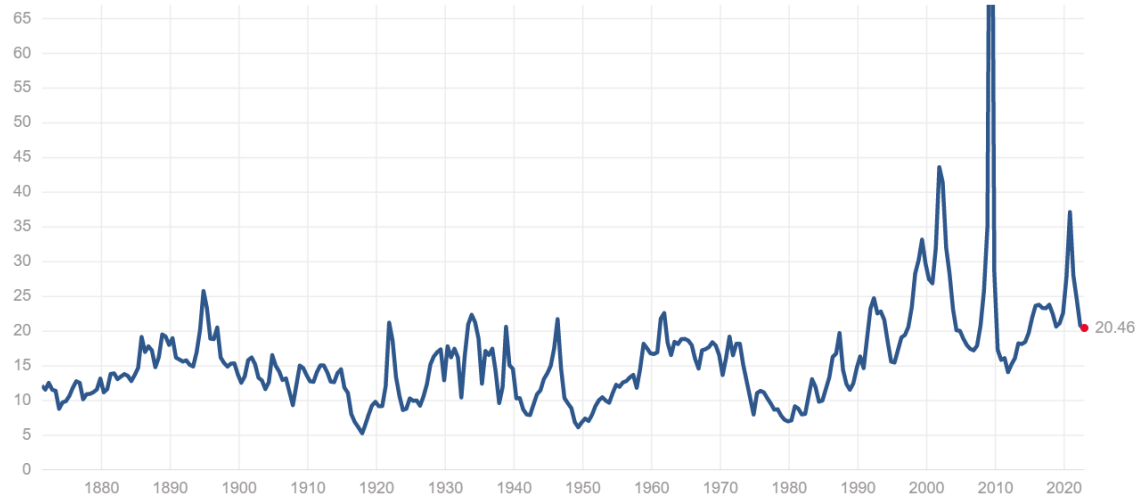

Figure 9 show Trailing PE ratio US stock market. (Howell--Jolly, 2022)

The forward P/E Ratio

(team, 2022)

The forward P/E Ratio uses future earnings, then ratios the current stock price to the estimated earnings per share for the next 12 months. The earnings estimate increases the uncertainty of the index's reliability, however, it offsets the weaknesses of trailing, because past returns are not a reliable metric for giving future estimates.

The rule of 20

(Trust, 2020)

The rule of 20 is a rule is based on the sum of P/E and inflation, if the sum is above 20 according to this indicator the market is overvalued, if it is below this value it is undervalued. The value 20 results from the sum of the historical average P/E which was 16 and the average inflation of 4%. In low inflation environments, the price goes up, which has been the case in recent years.

Currently, the value of the P/E ratio of the S&P500 is roughly 20.5, while inflation is almost at 8 percent considering the CPI (Consumer price index) US Figure 10. The sum of these value above 28, results in an overvalued stock segment value.

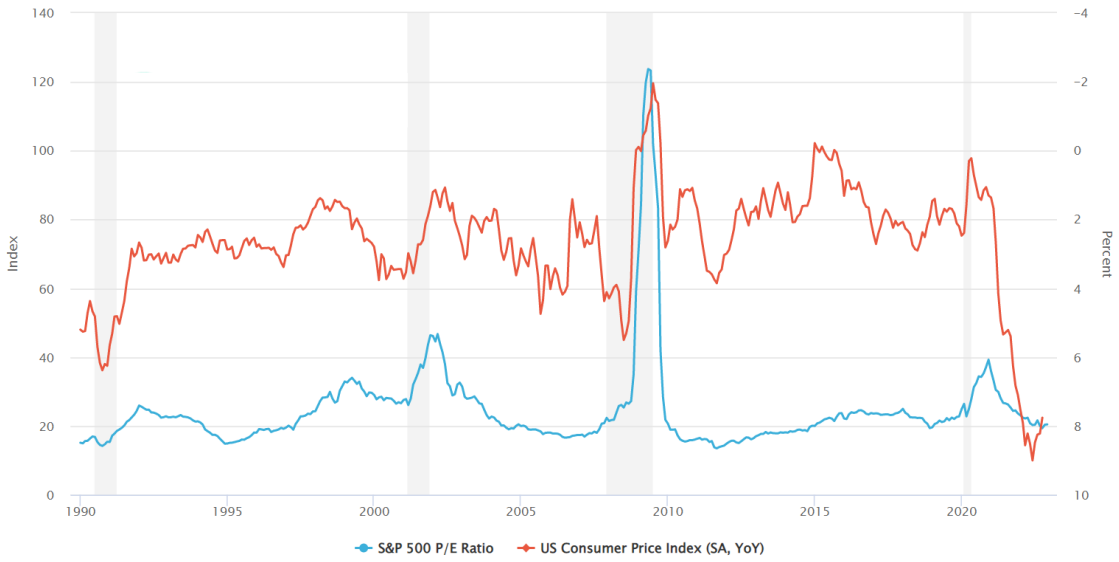

Figure 10 show the combination of the Trailing PE ratio and CPI US over last 30 years. (US CPI vs. S&P 500 P/E, 2023)

However, great care must be put into the study of these indexes, which see with indicator the relationship between the price of stocks and their earnings, compared with historical data. However, P/Es are now incomparable with past ones because of the role of intangibles, then all assets without physical nature, such as goodwill, brand recognition and intellectual property. Intangibles in businesses have led to an increase in marginality over time and thus in the ratio of share price to its earnings.

Ray Dalio's bubble indicators

(Dalio, 2022)

Ray Dalio, U.S. entrepreneur and founder of Bridgewater Association, the world's largest hedge fund, releases a paper in 2021, which he will later update by 2022, in which he analyses, according to certain indicators, the presence or absence of a bubble in the current market. It defines the market in a bubble condition when a high combination of six elements is present within them, namely: high prices relative to traditional metrics, unsustainable conditions (e.g., growth that is no longer sustainable), entry of new players into the market, broad bullish sentiment, high percentage of debt-financed purchases, and

amount of speculative buying as a bet to higher prices. Unfortunately, the exact calculation, and thus the variables for each indicator used by the economist are unknown as they were kept secret by him.

By 2021, the U.S. stock market was showing itself on the edge of a bubble, while other more specific markets, such as emerging technology companies like Tesla and Roku, were in an extreme bubble. Other phenomena characterized 2021, such as the growth of SPACs, the boom in IPOs, and the great upswing in options activity, financed mainly by liquidity issued for post-COVID policies.

The year 2022, was characterized by the other elements, as the financial situation changed considerably, in fact the bursting of technology bubbles, and a generalized retracement of stocks, led according to Ray Dalio's indicators, to no longer being in a bubble, however according to the economist there was no substantial swing in the opposite direction. Bubbles in fact historically take time to exhaust themselves, then hit new lows, examples are the two years after the 1929 bubble or the year after the Dotcom bubble. According to historical precedents, prices following a bubble burst fall in a lower range than 'normal' prices.

High prices relative to traditional metrics

The first indicator, as mentioned above, is how high the companies' prices are compared to traditional metrics Figure 11.

According to the chart, prices are in the fortieth percentile, so far from bubble danger. By contrast, 2021 closed prices in the eighty-second percentile, not far from what the values of the Wall Street crash in '29 or the tech stock bubble at the beginning of the millennium.

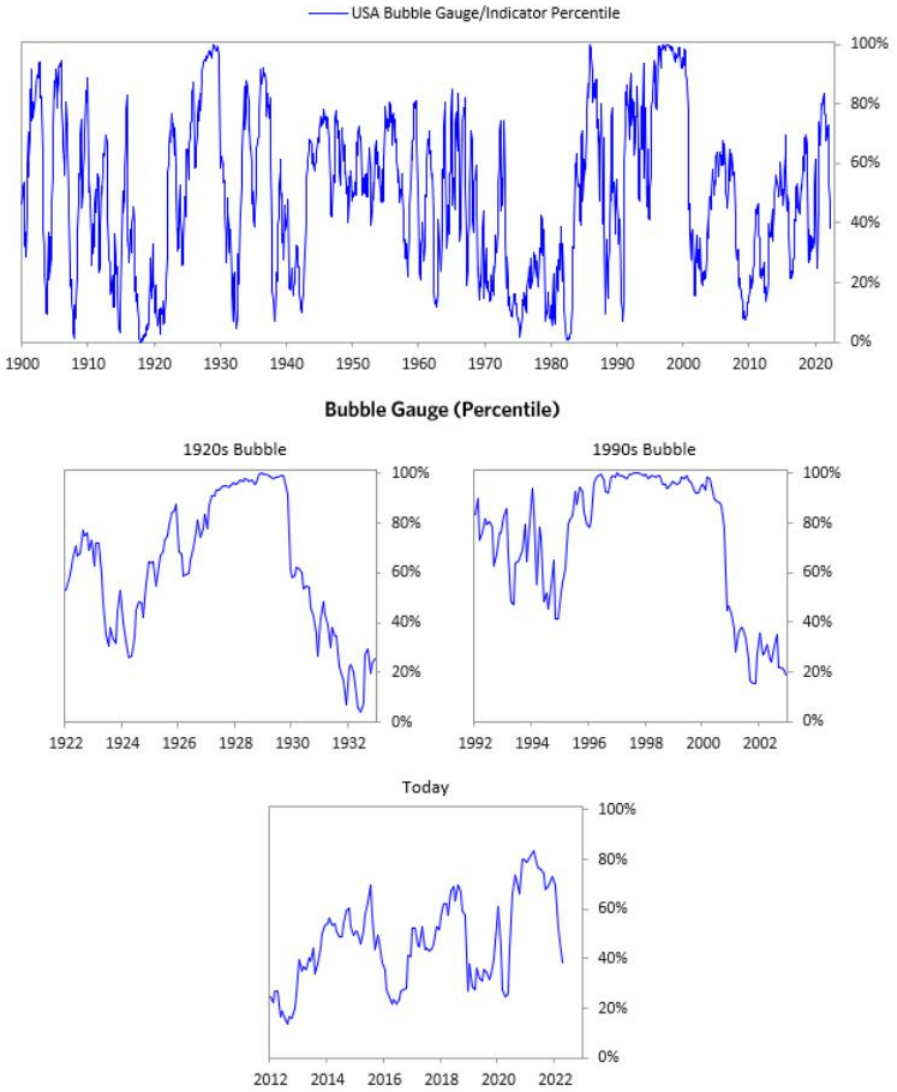

Figure 11 show the first Ray Dalio gauge: High prices relative to traditional metrics. (Dalio, 2022)

Unsustainable conditions

The second indicator analyses whether prices are discounting unsustainable market conditions. It is calculated by measuring the rate of earnings growth required to maintain stock market returns relative to bond market returns. Currently, for the aggregate market is in the 60th percentile, compared to 2021, a correction occurred, but values are still in a high range Figure 12. Technology stocks have seen a decrease in recent months, but also high compared to historical values Figure 13.

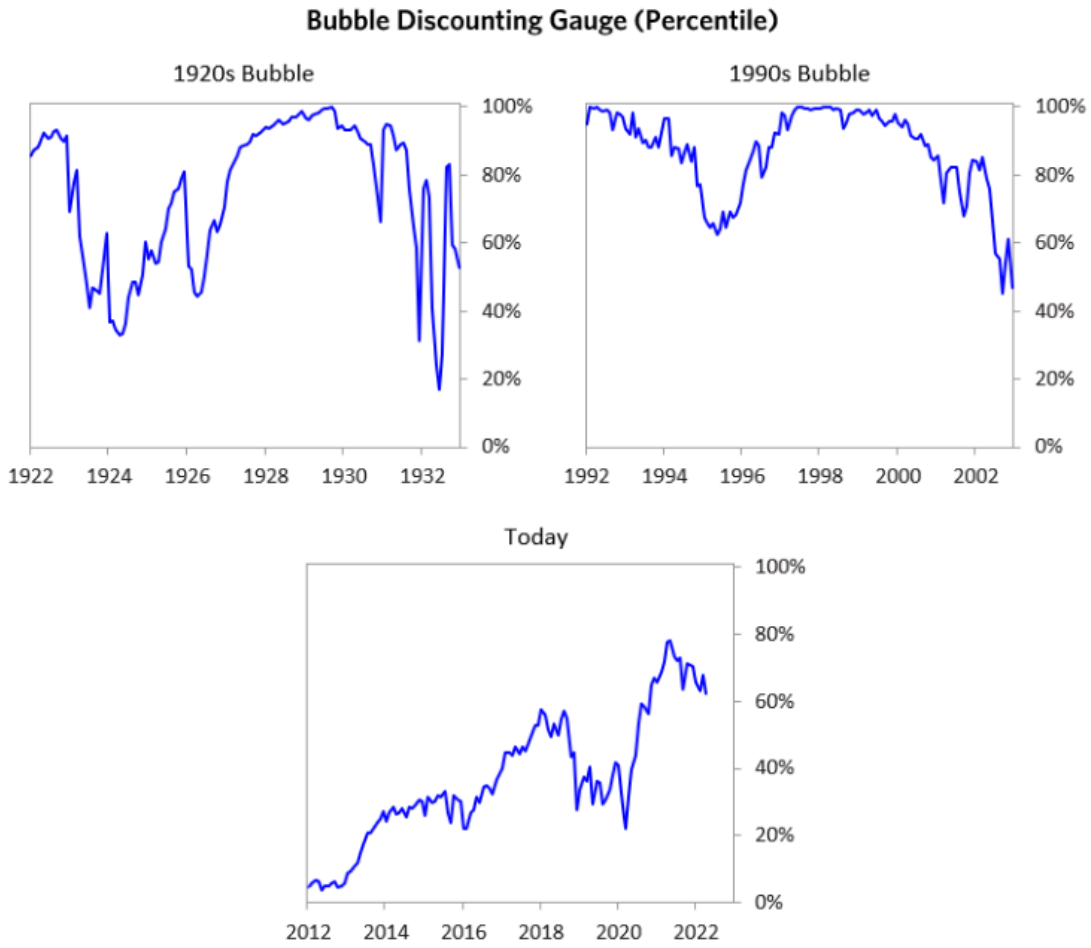

Figure 12 show the second Ray Dalio gauge: Unsustainable condition. (Dalio, 2022)

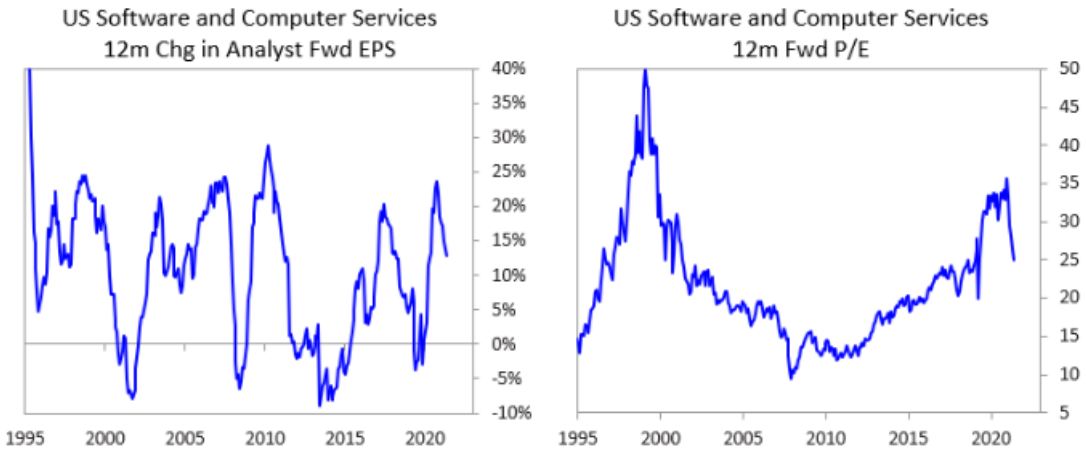

Figure 13 show the second Ray Dalio gauge: Unsustainable condition tech sector. (Dalio, 2022)

Entry of new players into the market

The third metric measures the number of new buyers that have entered the market Figure 14. The presence of new entrants into the market is often a bubble indication. This indicator reached the 90th percentile at the time of COVID, when advertisements, word of mouth, and the creation of multiple platforms led to the entry into the market of a multitude of entities, principally strangers to the industry. The value now quotes at pre-COVID levels.

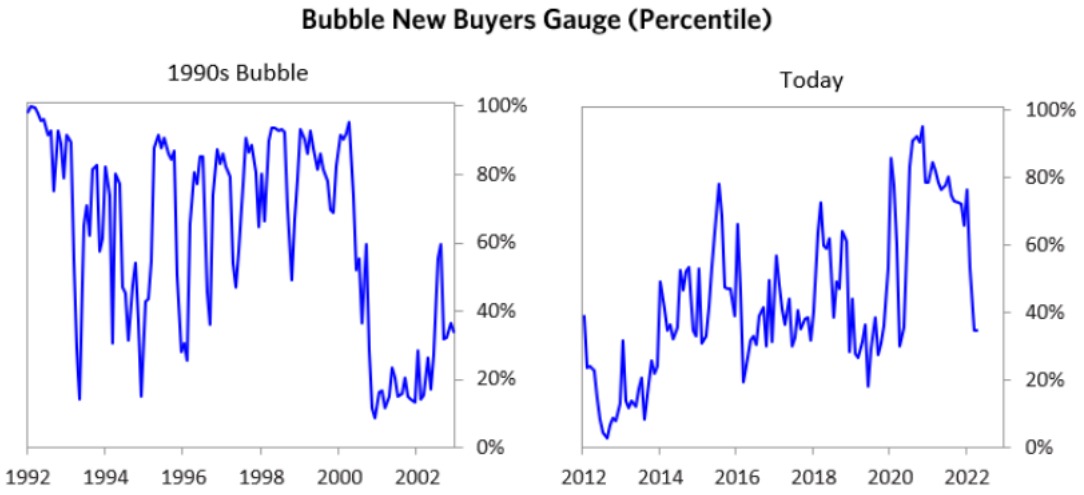

Figure 14 show the Third Ray Dalio gauge: Entry of new players into the market. (Dalio, 2022)

Broad bullish sentiment

The fourth indicator refers to the extent of bullish sentiment Figure 15. Unfortunately, the exact variables used for bullish sentiment are not known, but there are several ways to measure bullish market sentiment. Some common methods include surveys of market participants such as financial advisors and investors, analysis of media coverage, market indicators, sentiment analysis on social media and analysts' recommendations. In fact, the more bullish the sentiment, the more people mean that they have invested, so they are just as likely to have fewer resources to continue doing so, and instead disinvest more easily. Market sentiment currently is deeply negative in sharp contrast to the previous year.

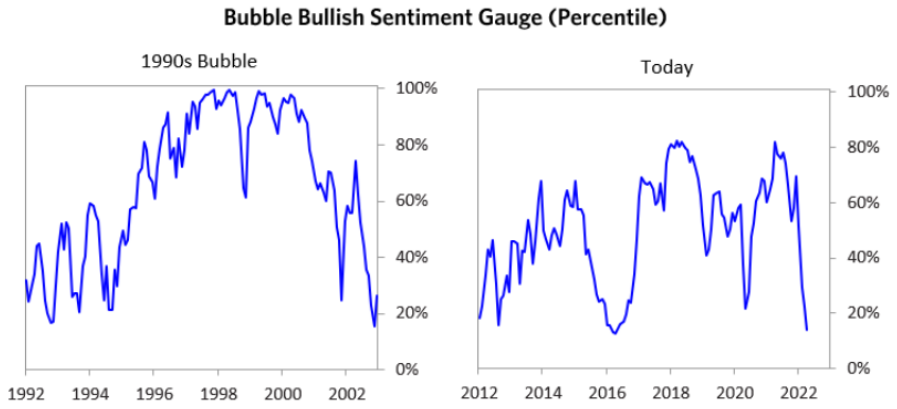

Figure 15 show the Fourth Ray Dalio gauge: Broad bullish sentiment. (Dalio, 2022)

High percentage of debt-financed purchases

The fifth indicator measures the use and intensity of leverage Figure 16. This is calculated by dividing the total amount of debt by the total amount of assets. Leveraged purchases make the fundamentals of buying weaker and selling more vulnerable, often forced downturns. Currently the value is around the fiftieth percentile.

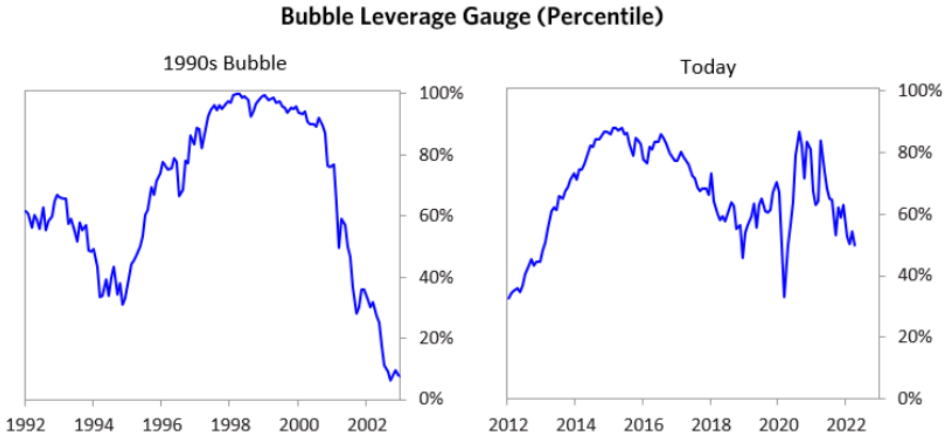

Figure 16 show the fifth Ray Dalio gauge: High percentage of debt financed purchases. (Dalio, 2022)

Amount of speculative buying as a bet to higher prices

The last indicator measures how optimistic buyers and companies are about proceeding with investments Figure 17. For the analysis of this indicator, forward purchases are studied, useful this last factor in the commodities and real estate markets. For the stock markets, on the other hand, CAPEX is taken into consideration, i.e., companies' investments in infrastructure, factories etc. This indicator is placed on the fortieth percentile.

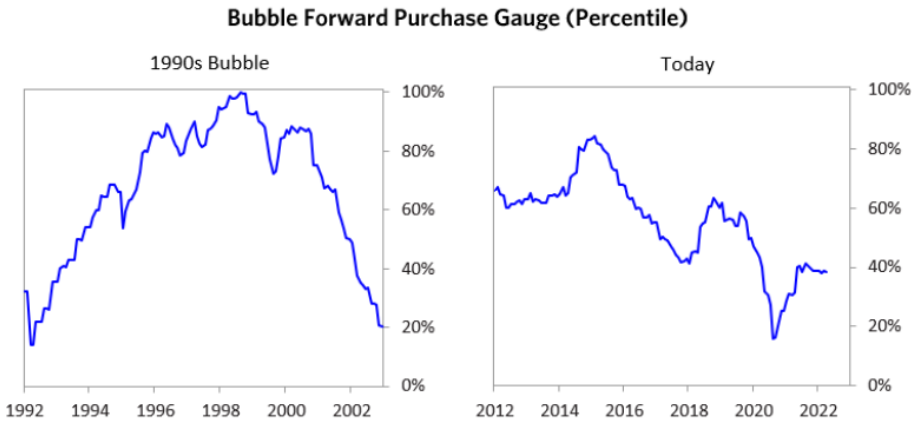

Figure 17 show the sixth Ray Dalio gauge: Amount of speculative buying as a bet to higher prices. (Dalio, 2022)

The following table summarizes the six indicators used by Ray Dalio, comparing the values of the indicators at different points in time Figure 18. In particular, the table shows that in recent months, due to falling prices in the various markets, situation is far from the present bubble respect to 2021, in which the stocks of technology companies had very high values of all indicators. Indeed, a decline in share prices may indicate an exit from a speculative bubble as it could indicate a loss of investor confidence in the future growth and profitability prospects of companies. When this situation changes and investor confidence wanes, share prices may fall, signalling the beginning of the end of the speculative bubble.

Current Conditions Compared to Previous Bubbles

		Roaring 1920s	Dot-Com Bubble	2007	Jan 22: Total Mkt	Jan 22: Emerging Tech	Today: Total Mkt	Today: Emerging Tech
1	Prices Are High Relative to Traditional Measures	Bubble	Bubble	No Bubble	Somewhat Frothy	Frothy	Deflating	Deflating
2	Prices Are Discounting Unsustainable Conditions	Bubble	Bubble	No Bubble	No Bubble	Frothy	Deflating	Somewhat Frothy
3	New Buyers Have Entered the Market	Bubble	Bubble	Frothy	Frothy	Bubble	Deflating	Deflating
4	There Is Broad Bullish Sentiment	Bubble	Bubble	Frothy	No Bubble	Frothy	Deflating	Deflating
5	Purchases Are Being Financed by High Leverage	Bubble	Bubble	Bubble	Somewhat Frothy	Bubble	Deflating	Deflating
6	Buyers/ Businesses Have Made Extended Forward Purchases	Frothy	Bubble	Bubble	No Bubble	Somewhat Frothy	Deflating	Deflating

Figure 18 show the current gauges conditions respect previous bubbles and how the situation over the past year has improved. (Antonelli, 2022)

Buffet indicator

(Gramalam, 2022)

The Buffet Indicator is named after Warren Buffet, an investment guru. The Buffet Indicator is the ratio of the total value of the U.S. stock market to GDP. The most common measure for the aggregate value of the U.S. stock market is the Wilshire 5000. This indicator is calculated such that a $1 billion increase in the U.S. market corresponds to a 1 percent increase in the index. The denominator of the ratio is GDP, then the total annual output of the U.S. economy; it is a static measure in that it considers previous economic activity and not future expectations.

The ratio of these two values being the former the value of expected future economic activity, and the latter the measure of recent economic activity, the indicator gives a view of expected future returns, compared to current performance. The indicator by its nature has an upward bias as new technologies create more efficient returns than labour and capital.

In the graph shown, an exponential linear regression line illustrates the trend of the buffet indicator Figure 19. Because of the high volatility to which the stock market is subject, the index tends to deviate for substantial time arcs from the trend line. Standard deviations, on the other hand, indicate how high or low the values are relative to the trend.

Currently the Buffet Indicator has a value of 166%, and a standard deviation value 0.9 above the trend line. This indicates that the values are relatively high, but contained, so prices are fair.

The Buffet indicator like all other indicators has limitations, so it cannot be used individually for market health analysis. This indicator does not consider interest rates, so it does not take into account the valuation of stocks compared to alternative investments such as bonds. In fact, when interest rates are high, bonds pay high relative returns for investors, thus lowering demand for stocks. In addition, high interest rates result in higher borrowing costs from companies, thus limited liquidity and low growth rates, lower earnings, and thus a depreciation of equities.

The second criticism and weakness of the indicator is that the numerator of the ratio, thus the stock market valuation reflects international activity, while GDP does not. GDP, in fact includes U.S. exports, however, it does not incorporate sales of U.S. companies with plants located in foreign countries.

This last factor, together with the previous mentioned technological advances, leads the Buffet indicator value to increasing values over time, because the value of stocks increases more proportionally than GDP, due to the increase in international sales.

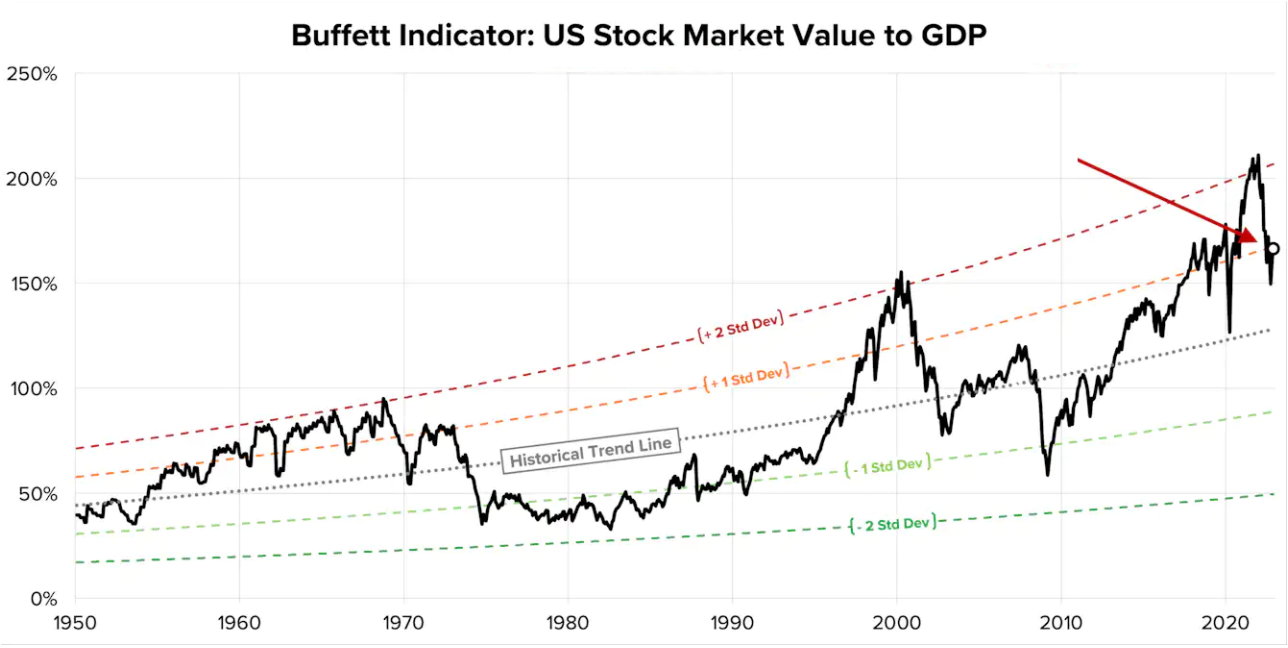

Figure 19 show the value of Buffet indicator over time and how the value of equities is still overvalued. (Gramalam, 2022)

Shiller PE ratio

(Giacomo, 2017)

Another famous indicator used to study stock price valuations is the Shiller PE ratio, created by the anonymous American economist in 1996. It is calculated using the earnings of the S&P 500, which are adjusted for inflation using the CPI, then past earnings are adjusted to the current value of the dollar, and then of the earnings of the past ten years is averaged. The PE Shiller is then equal to the price ratio of the S&P 500 and the average of the last ten years' inflation-adjusted earnings of the same index. Through then comparing the value of the current index and past indexes, it can be determined whether the market is overvalued, undervalued, or has a fair value. According to the theory in the long run deviations from the mean value, 17, undergo corrections with subsequent returns to the mean. A value above 17, represents an overvalued market, and vice versa.

Like all indicators it has limitations, in that the Shiller PE ratio is retrospective, so it considers historical data, and not the possible economic and political evolution of a country.

As shown in the graph below, the value of the current index is about 30, representing an overvalued market value Figure 20.

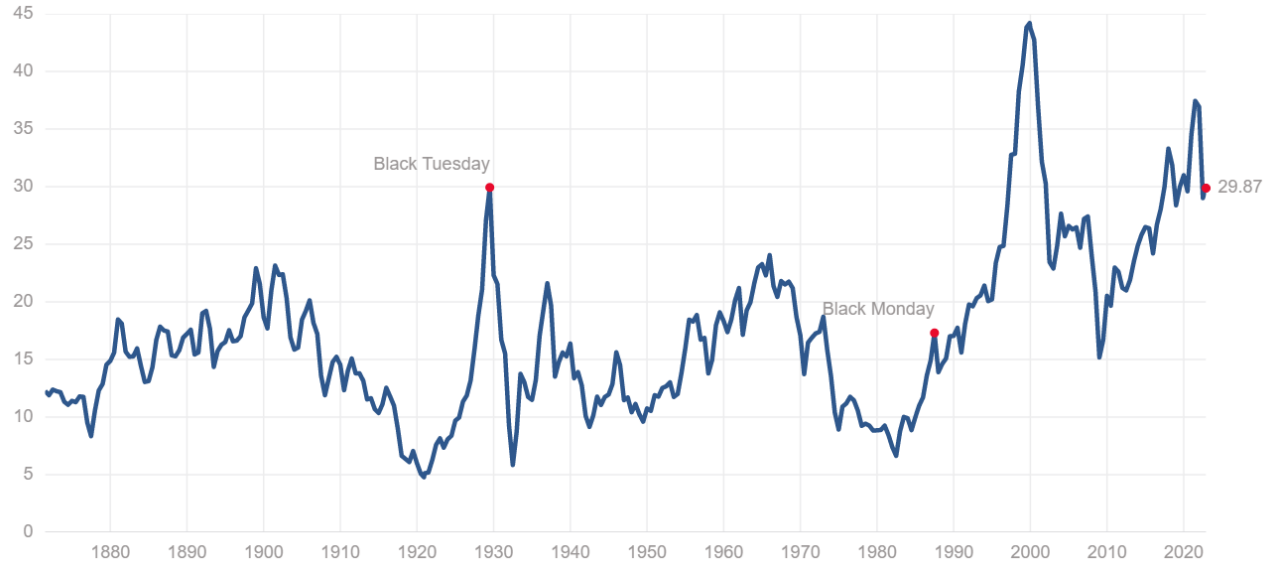

Figure 20 show the value of Shiller PE ratio over time and how the value of equities is still overvalued. (Giacomo, 2017)

The buffet indicator and the PE Shiller are two different indicators, and as such measure different things, but with the same purpose, to determine whether there is a bubble situation, hence an overvaluation of the market. Using different variables, they provide different information, and are subject to different limitations mentioned above. However, a historical study of the two indicators has shown that both are accurate, but both are not short-term indicators.

Cap 6. Analysis of macro classes of investments

Current economic situation: monetary policies and black swans

Before analysing and studying the current situation of the various investment macro classes, and then evaluating financial situations and looking for speculative bubbles, it is necessary to understand the economic/financial environment of recent years, the monetary policies used, the presence of black swans, and the response of central banks to economic problems of different magnitudes.

The world's monetary policies in recent years, have undergone remarkable changes, in fact these have increasingly supported the economy with large inflows of money. The monetary policy adopted by the FED and then later in 2015 by the BCE is called quantitative easing (Introzzi). It is based on issuing new money to buy bonds, thereby raising bond prices, and lowering interest rates, in a way that stimulates the economy. Economic support also translates into psychological, through the wealth effect mechanism, in fact an increase in the prices of various asset classes such as stocks and bonds, in a context where the real economy is in crisis leads to a decrease in the level of concern, not affecting consumer spending. This phenomenon was easily recognized in 2020, in which the first black swan, the COVID, severely affected the world economic system. The real economy due to the pandemic situation came to a standstill, the stock markets and various asset classes were not impacted, however, because after an initial slump, thanks to indirect monetary stimulus (QE) and direct with direct household support (ex. Stimulus check) then drove spending by citizens. QE policies, stimulate the economy, but on the other hand creates inflation. The latter became more pronounced in 2021 and saw no immediate response from central Banks. Since inflation is a very complex phenomenon, central bank intervention was delayed because at first inflationary increases were considered a transitory phenomenon, a thesis that was later denied. (Curry, 2022). When inflation reached very high levels, tapering policy began, hence reduction of monetary stimulus and the subsequent raising of interest rates.

The economy has thus moved from a phase of stimulation and excitement, but as a result of a severe pandemic, from which it benefited its citizens, who saw an increase in their wealth (in the U.S. of $25 trillion) during the COVID to a completely different phase. Indeed, 2022 opens differently than the previous year because of the second black swan, the Russian-Ukrainian war. To limit the war, and weaken Russia, the states have objected to sanctions toward this country. However, the sanctions had a bilateral impact, going to attack the sanctioning countries as well. At the beginning of the war, the world's dependence with respect to Russian raw materials was considerable, as Russia has 32 percent of the world's gas, as well as large quantities of oil, and together with Ukraine, large quantities of wheat. Rising prices of the latter due to the supply shortages caused by the war led to intense inflation. The latter has different characteristics. The chart shows and compares the factors of inflation in the U.S. and Europe. In the U.S. it is still driven by strong demand, while in Europe by commodities, and then energy Figure 21. (Koester, 2022)

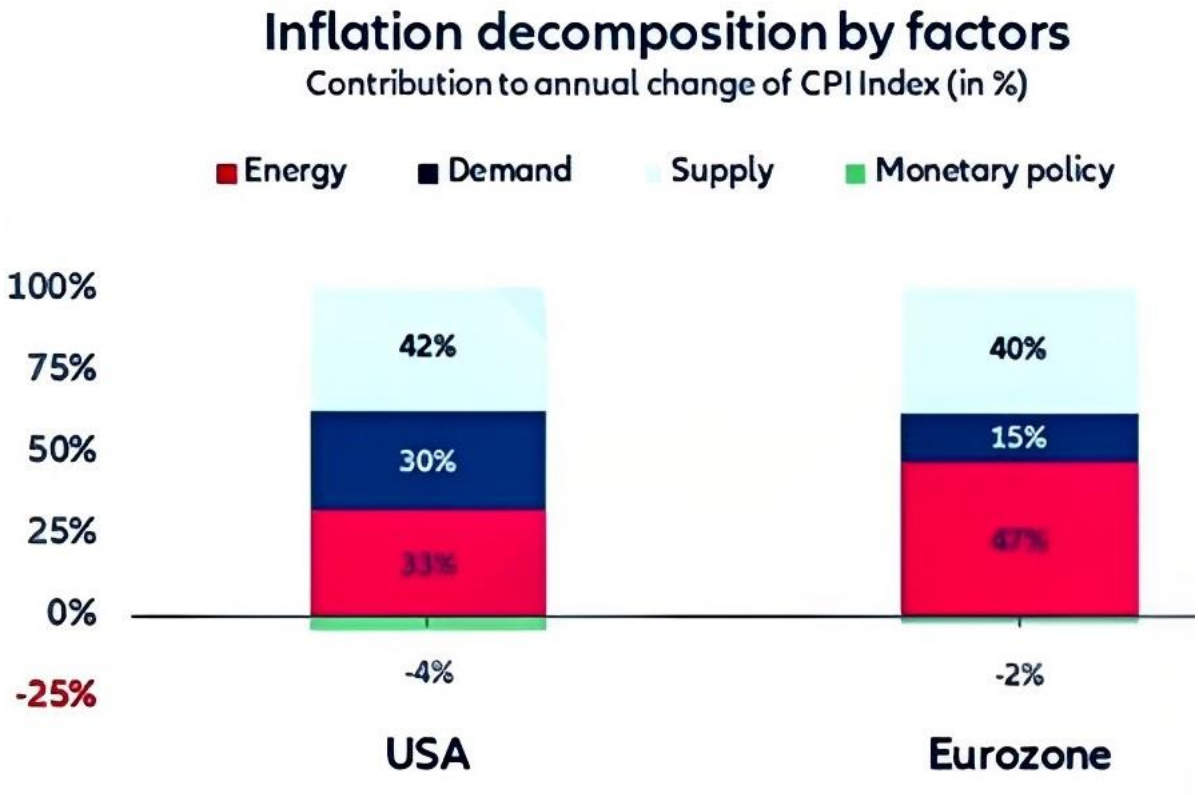

Figure 21 show Inflation decomposed in USA vs Eurozone (teller, 2022).

What distinguishes this period from previous ones is a sudden increase in interest rates in a current bear market. A bear market is defined by a prolonged decline in investment prices typically, a bear market occurs when a broad market index falls 20% or more from its most recent high (Gallagher, 2023). In fact, the FED in previous bear markets, has almost always lowered rates, to provide stimulus to the economy. This time it was not possible because of low rates, and high inflation. The effects of these policy choices are impacting different types of markets, but have yet to show their effects, which some analysts predict may be very impactful.

Bond market

Current bond market

As repeatedly mentioned in the thesis a bubble is created when an asset, is traded for a price far above its value over a period. What was witnessed in 2022 was the bursting of the bond sector bubble. (invest, 2022)

The current situation in the bond market is one of the worst in the recent history. Since the beginning of the year (2022), one of the most widely used bond indices in the bond markets, the 'Global Aggregate total return index' has lost more than 20 percent, the largest descent since the index's creation.

The cause of the current global bond crisis can be attributed to the response of countries' central banks to their respective economic situations. The policies began more than a decade ago because the last few years have been marked by a series of crises, such as 2008, followed by the sovereign debt crisis (Italy, Spain, Portugal, Greece, and Ireland), and lastly the COVID crisis the policies led to little more than positive returns, and in many cases even negative returns. About a year ago more than 50 percent of government bonds, offered negative yields.

The balance, however, was broken in the post-pandemic period, in which there was, and continues to be, a shift in interest rates. The trigger for the rise in rates was the rise in

inflation, which after years of values around 1 or 2 percent annually rose to almost double-digit values.

The global bond index is losing a 13% since the beginning of the year, with a high of 17%. From the chart shown, this is the largest retracement in 50 years Figure 22.

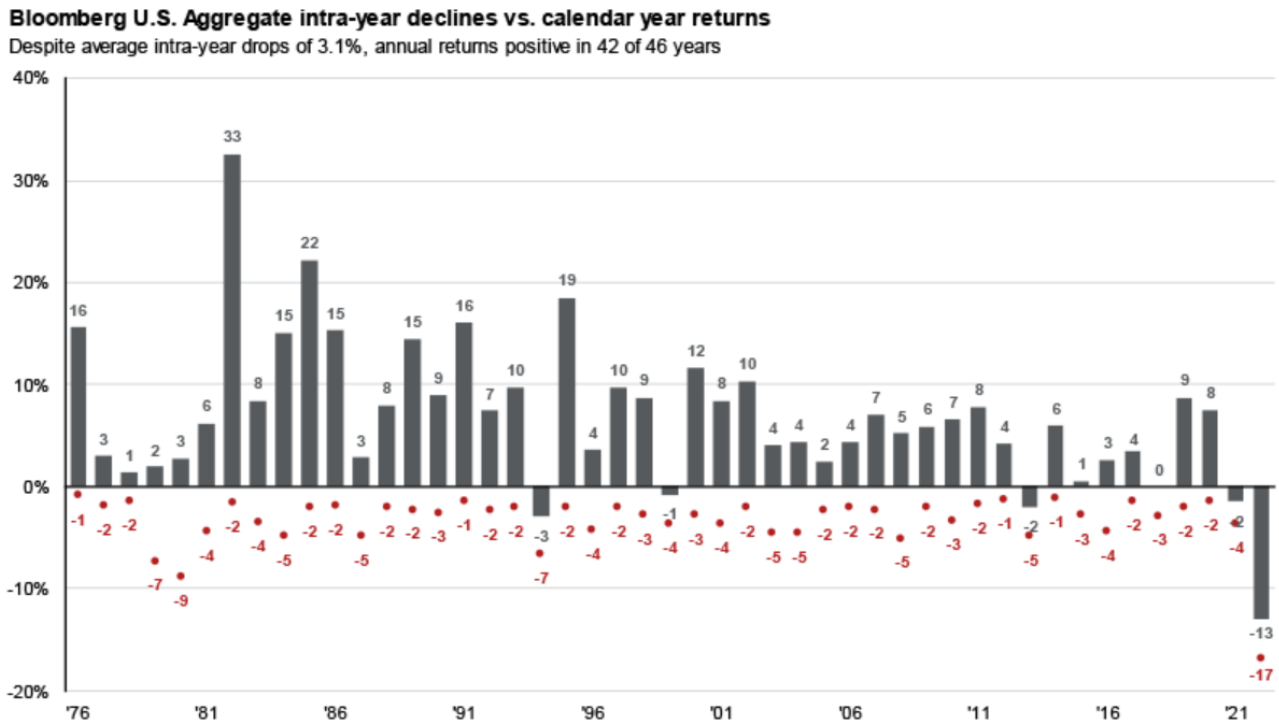

Figure 22 Show the Global bond index highlighting the percentage drop in the last year. (J.P. Morgan , 2022)

This graph shows the trend of interest rates since the beginning of the millennium Figure 23. One can see the sudden rise in rates since the beginning of the year. The rise in rates is not definite, in fact according to statements by central bankers John Powell for the FED and Christin Lagarde for the BCE, there will be further increases for rates. (Smith, 2023)

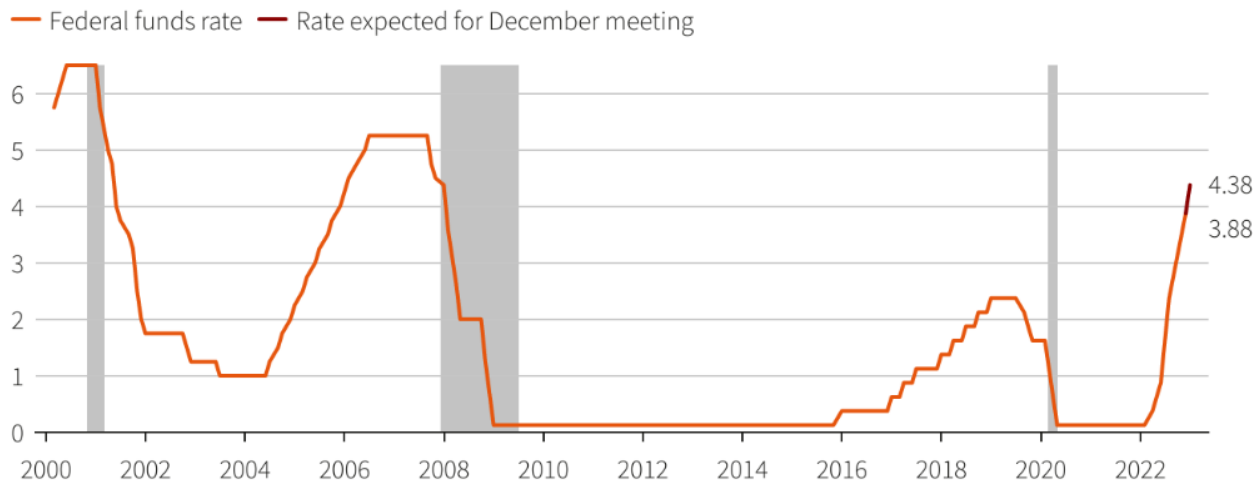

Figure 23 show the US free interest rate, the vertical increase over the last year can be observed. (Schneider, 2022)

Theoretically, however, the increase in rates will not be long-lasting; in fact, rates will subsequently be lowered if inflation returns to acceptable values, thus around 2 percent, or in the most extreme case of an extreme recession, to provide stimulus to the economy. A downward correction in interest rates would lead to an increase in bond prices. Under current conditions a one percentage point decrease in U.S. bond free rates, then at 10 years, would lead to a yield of 12.6 percent. (invest, 2022)

Yield curve and central bank reaction

The yield curve expresses the relationship between the yield of bonds and their maturity, based on a comparison of identical bonds, which differ precisely only in duration.

The yield curve usually has a positive trend, so short-dated bonds have lower yields than longer-dated ones. This characteristic is because of the different remuneration the investor is subject to for tying up his or her money for a longer period, and because of the intrinsic risk that increases as time increases.

As reported, in normal situations, the yield curve has a positive trend, reflecting the positivity of investors, while at this time the curve has a partially negative trend due to investors selling bonds because of the outlook for rising interest rates.

Curve inversions usually anticipate a recessionary phenomenon. Usually the 2/10 spread, then the difference in the yields of 2-year and 10-year bonds is considered for the study of curve inversion. This is a necessary condition, however, not sufficient for the prediction of a recession.

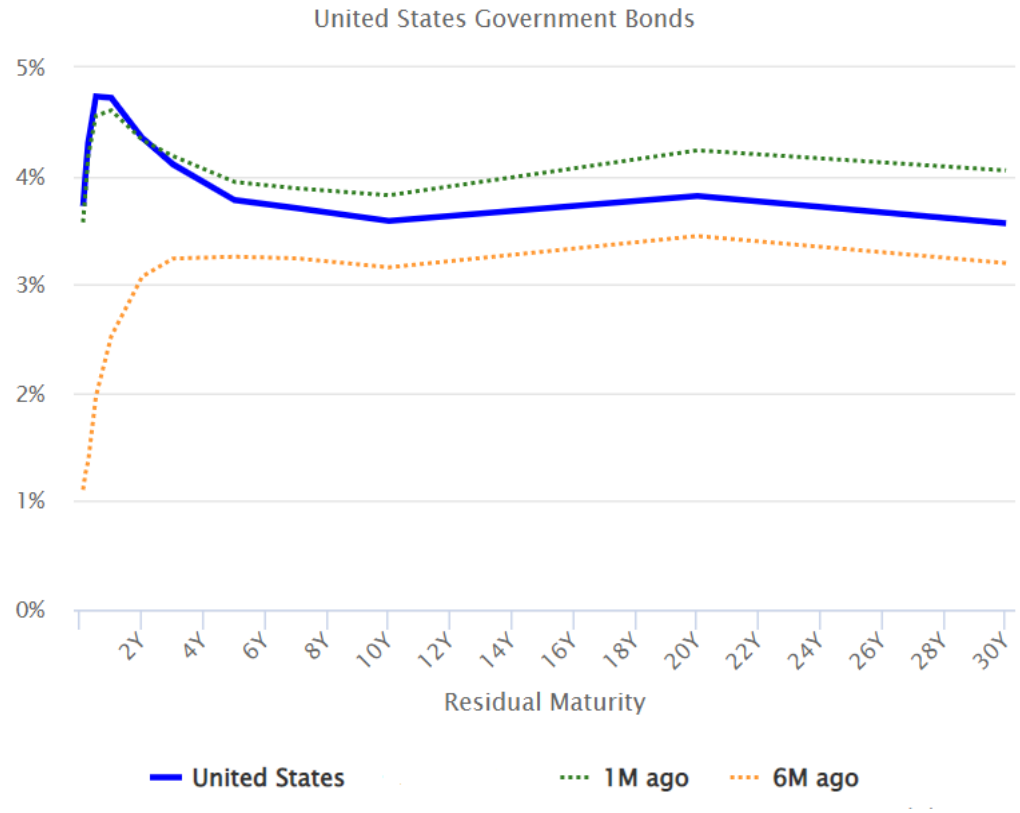

Figure 24 show bond yield curve in which an inversion can be observed. (EBITs And Pieces, 2022)

The current inversion Figure 24 of the yield curve is due to the lack of buyers, in fact central banks are stopping buying bonds due to the policy of quantitative tightening. In addition to the countries' respective central banks, foreign countries, due to the global crisis environment are decreasing their bond buying. The liquidity problem that government bonds are subject to, is not in isolation, because it is precisely on these that there is a repricing of the equity segment, and on the 10-year government bond, mortgages are priced. So central banks are intervening, not by buying them as before, because that would mean going back to a policy of quantitative easing, but with the 'operation twist policy'. Buyers of government bonds are different parties according to duration, in fact, bonds with a maturity of two years are mainly bought by mutual funds, and on the other hand those

with a long maturity by investors interested in coupons. Since there is strong demand on the first part of the yield curve, because it provides high yields, central banks through operation twist sell short-dated bonds, and buy long-dated bonds, keeping liquidity in the system unchanged.

Stock market

Current stock market

In the following analysis of the current situation of the stock market segment, the American S&P500 index, an index that includes the top five hundred U.S. companies by capitalization, will be taken into consideration primarily. This index is used because it is not only representative of the U.S. market, but of the entire world market, since more than 50 percent of transactions take place in dollars. Since it is the world's largest stock market, it is globally representative.

The following is a graph of the S&P500 Figure 25.

Figure 25 show the S&P500 over the last 20 years from which a huge increase can be observed. (S&P 500 INDEX)

As the index study shows, over the past 10 years the index has led to higher returns of 14 percent year on year, significantly higher than historical returns of 10 percent (J.B.Maverick, 2022). In recent years, after only a 'V' correction during the COVID19 pandemic crisis, the market rebounded vigorously touched highs at the end of the year 2021. In 2022, the market opens in a totally different way, losing roughly 15 percentage points from the highs.

Thus, it cannot be said that a bubble has burst, because it cannot be said that the market is in a bubble, and just as an analysis of different macro classes of investments, can state the thesis or not, an analysis of different classes of equity investments can determine whether one class is in a bubble, or another is not.

However, it can be argued that the overpricing, inflated by the euphoria of investments in technology stocks in lockdown periods has corrected.

Larger capitalization technology stocks: MAMAA

The acronym MAMAA refers to the world's largest big tech companies, thus Microsoft, Amazon, Meta, Alphabet, and Apple. They are of considerable significance, and have come to weigh in at the highest, about 25 percent of the S&P500. They have lost since the highs of 2021, between $4 and $5 trillion in capitalization. (Belchman, 2022)

The phenomenon of the correction of MAMAA quotations, occurred because after COVID 19, the services offered does these multinationals were less attractive, and thus with it the exponential earnings growths of these companies were reduced.

Most affected by the changes in trends are Amazon, which loses the outperformance of the last 5 years, and Facebook, which loses by almost the performance of the last entire decade. This meant that the hype of the public during the covid and the shift of life in the digital sphere was partially unjustified. People imagined that the technological trends of Covid could follow at the same growth rate afterwards, a thesis that proved to be false, as people for the time being do not use the metaverse, still buy from physical stores, and still live a 'real' life, and this led to the partial disillusionment with these projects and companies that spilled over into share valuations. In this case one cannot define this of a bubble, but of a simple fall in prices. (moadel, 2022)

Explosion of innovative stocks: Ark Innovation the fund of Cathie Wood

If a bubble situation cannot be identified in the equity department, a partially bubble in the innovative tech stocks of the Ark invest fund, an active ETF managed by Cathie Wood, can be identified. It being an active ETF, encapsulates within it various stocks, chosen and weighted according to the choices of the fund managers Figure 27. The investment strategy that unites the portfolio, is innovation. The common feature of picking innovative stocks is the characteristic that led the price to a surge in 2020 and 2021 and a significant drop, then a bursting of the bubble of innovative stocks Figure 27. The cause behind the bursting of the bubble, which for simplicity's sake is summarized by Cathie Wood's fund, is that innovative companies are usually companies that make large investments but do not see returns in profits in the short term. A company that does not produce profits, does not distribute dividends either. Innovative companies are therefore a bet on a hypothetical future in which the company can provide positive cash flow and possibly dividends. The euphoria of growth in these stocks, however, has broken down in a financial environment of rising interest rates and high inflation. In such environment investors are no longer willing to wait for future dividends, however, instead they prefer stocks or financial instruments that can provide returns consistently in the short term.

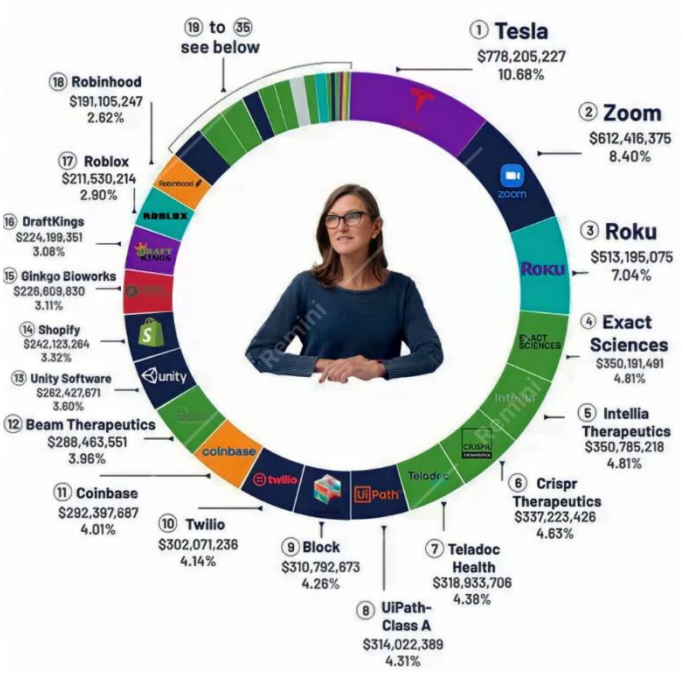

Figure 26 show the share of stocks of Ark Innovation. (marketGOATS, 2022)

In view of the data, it can be said that multiple companies contained in the Ark Innovation ETF were in a bubble situation, but that this characteristic cannot be generalized to all

companies within the ETF. In fact, recalling the definition of a bubble, so a temporary and artificial increase in the value of a company that is not justified by its profits and its fundamental values. This is what happened to many companies within the ETF, whose intrinsic value was overvalued only because the world had shifted in many sectors to digital, forgetting that this was a transitory situation before the arrival of the pandemic. When the pandemic ended, the ability to generate profits also deteriorated accordingly.

Figure 27 show Ark innovation trend from which an abrupt increase during the Covid and a sharp decrease at the end of the pandemic can be observed. (ARK INNOVATION ETF)

Conclusion and perspective of stock market

As mentioned about multiple times in the following thesis, the bursting of a bubble is very difficult to predict, and of a bubble can be spoken of at the end of the burst.

Despite the growth that the major U.S. indexes have had over the past decade, and the partial correction they have undergone, the latest retracement cannot be considered the bursting of a bubble. On the other hand, some equity segments have seen further growth and repricing, particularly the Value segment, at the expense of the growth segment, which as indicated representatively by the ETF 'Ark innovation' has suffered a major collapse, due to the speculation of the innovation/technology part of the COVID period, which by

providing a push toward innovation, led to rising prices of these asset classes considerably, and then corrected in the last year.

Many economists, and famous investors, like Michael Burry (Enomoto, 2022) say that the correction in the indexes has occurred only partially because significant inflation accompanied by rising interest rates could bring great effects on the world economy, which would be seen reflected and anticipated in the financial markets. In fact, as the collapse of innovative stocks has occurred, because investors are unlikely in such uncertain and crisis environments to hold stocks that do not provide dividends, a further worsening of economic/financial conditions may lead to lower profits by firms. Fewer profits from companies, translates on equities, into lower dividends, making equities less attractive. A further rise in interest rates, on the other hand, would lead the bond sector to be more attractive, causing equity prices to fall because the higher risk in this sector would not be repaid by returns.

Real Estate Market

Characteristic of real Estate Market

The housing market deals with the construction and buying and selling of real estate. It is together with the bond and stock market, one of the macro classes of investment, as housing share of GDP is 16.4%. (Han, 2021)

The U.S. real estate market will be examined in depth here, as the latter is the largest real estate market in the world. The real estate market is by its nature anticipatory with respect to the economy, and the U.S. being the world's leading economic power, also anticipatory at the world level.

Unlike the financial instruments listed on the markets, which are more homogeneous, so there is close correlation with respect to stock changes, the situation of real estate investments is different varying from area to area, so in the same country there could be diametrically opposite situations with respect to different cities. The gap is even more pronounced if you go to analyse one country versus from another.

Real estate differs from other macro classes of investment because it is not as easily liquidated as financial instruments listed on the markets, and unlike bonds and stocks, housing is not replicable, and real estate investment is not fractionable and not easy to access because it requires a larger amount of money, thus more expensive, and this implies difficulty in diversification. In addition, the costs of managing the investment (registration taxes, notary fees) are higher. It is also characterized by less transparency that this investment does not enjoy compared to others, of which reports are issued on the stock market and last, but not least on average a lower average return compared to the stock sector.

Real estate market cycles

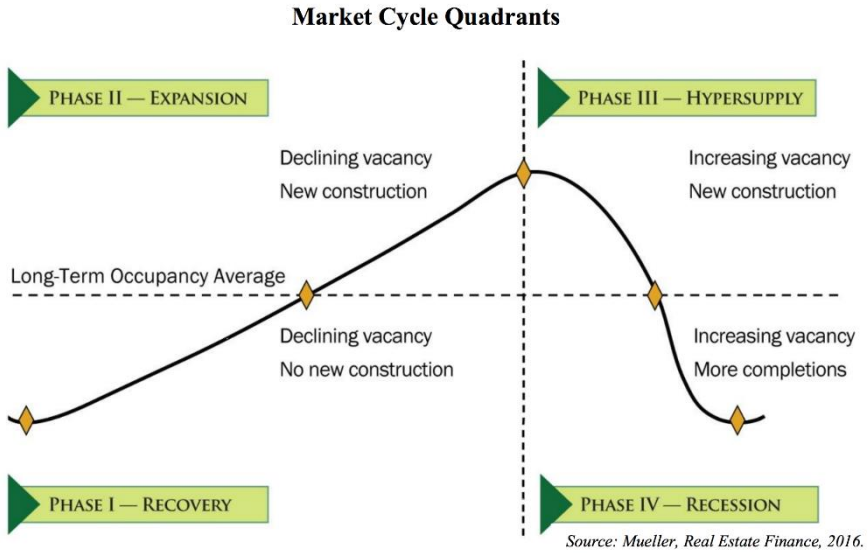

Figure 28 show the real estate market cycles according to Robert Kiyosaki. (Formigle, 2016)

(Team, 2022)

The real estate market just like that listed financial instruments enjoys cycles that repeat over time. Robert Kiyosaki (American author and businessman) identifies 4 distinct phases Figure 28. Phase 1 is an early growth phase characterized by high demand but low supply, a phase where real estate investment is viewed positively because this phase will be followed

by market growth. In phase 2, which is also a growth phase, there is high demand, but in this case, supply also increases due to increased buying and prices. In phase 3, on the other hand, the trend begins to reverse, as this phase characterized by high supply, as house sales became attractive, inflating prices, and thus leading to a decrease in demand. In the last phase, prices fall, there will be a lot of supply and little demand. Cycles are also decades long.

Current analysis of the US housing market

The U.S. housing situation has undergone a marked change in the past year from the previous one, which has been accentuated in recent months.

The graph below shows the 'National home price index' a measure the changes in the sale prices of single-family homes across the U.S Figure 29. From the study of the latter, the price of homes has drastically increased in the year 2020/21 distancing itself from the averages of the last 10 years, but more importantly distancing itself considerably from the historical averages. (Routley, 2021) The derivative of the price, thus the latter's growth, recorded a value for 2021 of 18 percent, with the average U.S. home growing by $50,000. (Bahney, 2022)

The growth, of course, was uneven, and cities such as Miami, Tampa, Dallas had experienced an increase of more than 30 percent by 2021, more than 100 percent over the 10 years.

The last year, 2022, due to the hard lending policy implemented by the FED, house prices fell sharply. (J.Brooks, 2022)

Figure 29 show the National home price index in which the vertical fall of prices can be observed. (Case Shiller Home Price Index. EPB Research, 2022)

Another indicator of how bubbly, thus extremely overvalued the housing market was given by the 'affordability index' Figure 30. This index relates the price of houses, and average salaries, thus giving a measure of the affordability of buying a house relative to one's income. The lower the value the more difficult it is for a U.S. citizen to buy a home; one can see how it is at a lower level than it has been for the past 30 years. This indicator is the parallel of the PE ratio used for equity compartment, where however for the housing market the price, is that of houses, and the second factor is the average American salary. (National association of realtors)

Figure 30 show the Housing affordability index the graph shows that affordability is among the lowest levels in recent years. (Durden, 2022)

A second notable indicator in the real estate sector is 'Homebuilding confidence,' which rates builders' perceptions of current single-family home sales and sales expectations for the next six months as good, fair, or poor Figure 31. Reporting a value below 50 means that construction industry orders are declining. This, too, like the affordability index, the HAI, and the parallel of the PMI used in the equity sector. (Mortage daily news, 2022)

Figure 31 show the Homebuilding confidence and the sharp vertical drop in recent months. (Mortage daily news, 2022)

The bubble this year 2022 burst, and house prices have significantly retraced.

Sales have retraced from the last year as can be seen in the graph Figure 32. Equally interesting is to analyse the retracement that occurred differently by price ranges. The increase in interest rates, and thus in the payments to be made on the home mortgage, have increased significantly, and this has had a major impact on the slice of the market for cheaper homes; the same effect has not been seen in the more expensive range of homes, due to more affluent buyers with less economic hardship.

Figure 32 show the percent change in sales from a year ago by price range from which it can be seen that the lowest value categories have been hit hardest. (Mish Talk, 2022)

Parallel to the sharp decline in home buying, we see a contraction in mortgages, which have now become unaffordable for a good portion of households Figure 33.

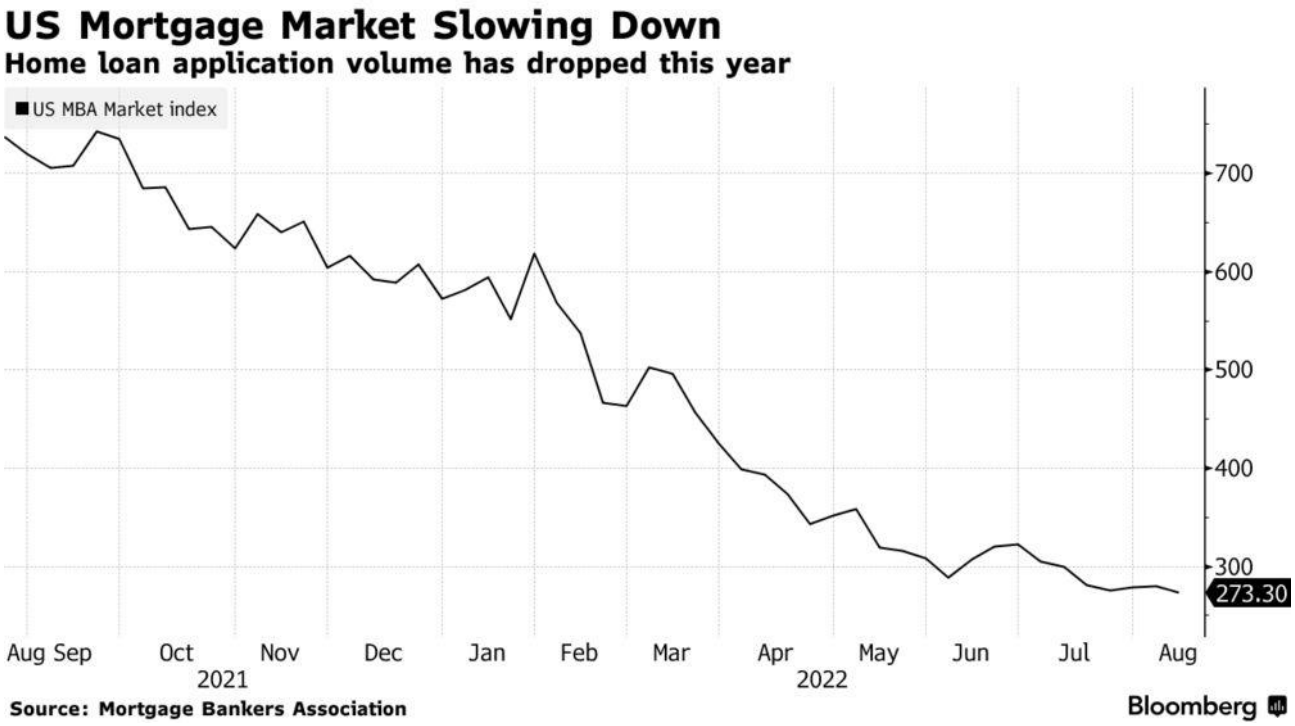

Figure 33 show the mortgage contraction during the last two years. (Arroyo, 2022)

The housing market is not like the stock market, which sees rapid adjustments, but it is generally a very slow market, because there is little liquidity and strong emotional component. So the effects that can be observed are a collapse of transactions, and in fact 18 million possible buyers have disappeared, because in the U.S. unlike other countries chose in most cases to a 30-year mortgage. Following the first phase there is a collapse in prices. It has then entered the second phase still, however, in stages of correction, as shown by the study of the 'Months supply of new houses'. This indicator is the ratio of new houses for sale to new houses sold, thus providing an indication of the size of new inventory for sale in relation to the number of new houses currently for sale. The monthly supply indicates how long the current new inventory for sale would last, given the current rate of sales, if no new houses were built. This is found to be disallianeated with the price of houses, confirming that the price of houses could undergo subsequent decreases to go against market needs. (Economic research, 2022)

The effect of the change in prices and the bursting of the bubble is due to the increase in interest rates that is transferred to the economy by bringing increase in mortgage

payments. One can see the effect that changing interest rates causes, relative to the instalment that a household can afford, thus relating the final price of a house on a 30-year mortgage Figure 34.

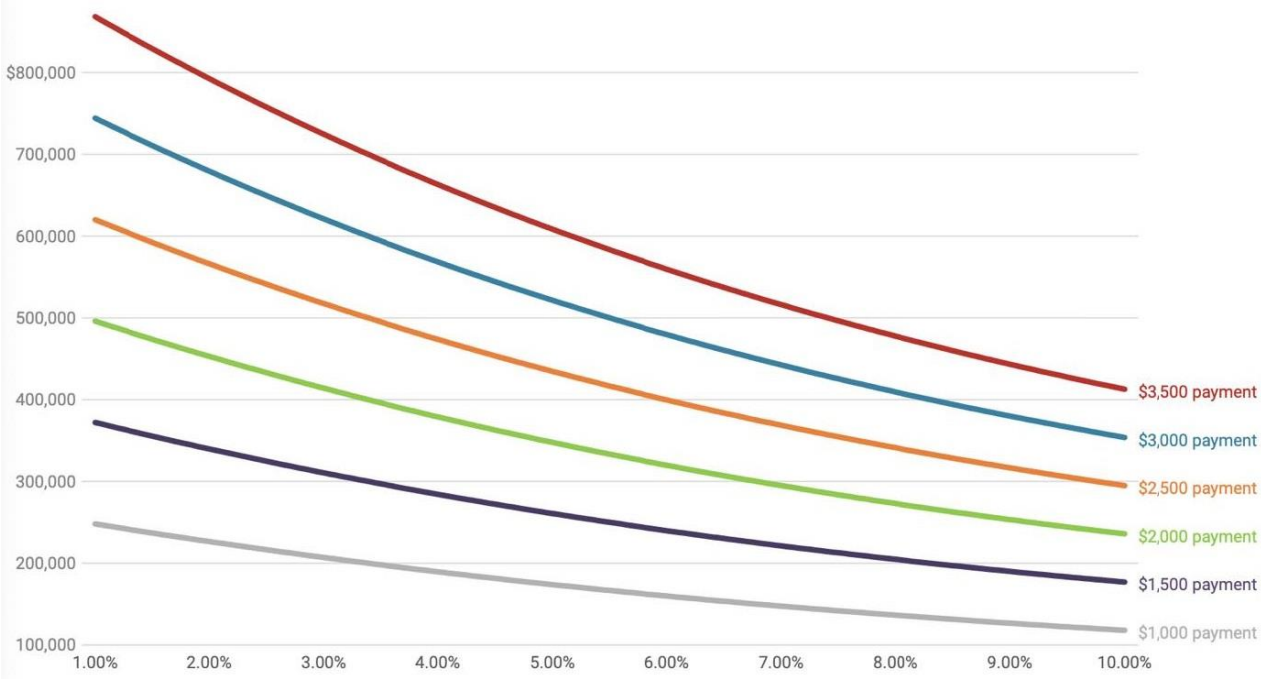

Figure 34 show the relationship between interest rates, instalment, and house value in the US housing market. (DeVon)

Description and comparison of the current bubble

The bursting of the current bubble, for the time being, is not comparable to that of 2008 as, at the time, there was a 30% retracement within 2 to 3 years. Current household finances are much stronger with lower level of debt, although the household savings rate in recent months is deteriorating from previous values because monetary stimulus is no longer present, however, the individual tries to maintain their previous standard of living.

But the current situation is completely different from that of the past housing bubble because the causes are different, in this case due to hard lending, thus a sudden increase in rates, while in the past it was due to excessive housing supply. (Strowzesky, 2022)

Among the additional causes of further stagnation and collapse of the real estate market always connected to the increase in interest rates, there is little incentive on the part of people who have taken out a mortgage in the past, not to sell their current home, to open

an additional mortgage at a higher rate. It also adds up to little incentive to make real estate investments in an environment where the spread between the cap rate, hence annual profitability of the property, and interest rates on 10-year bonds, hence free rate for U.S. AAA bonds, is narrowing considerably. This spread must exist, and it must be wide enough to repay all the limitations of a real estate investment, at the beginning of the chapter described, and the personal work for the investment. (Abraham, 2022)

Possible evolution US housing market

The current house price is still too much higher than what wages are, so in the short term it will most likely have to retrace again. In a recessionary environment, so declines in corporate profits, further declines could occur, because currently the U.S. unemployment rate is below 4 percent, so in line with natural unemployment rates. The loss of jobs, and thus average decrease in profitability, would lead to a further disproportion between house prices and wages, with further depreciation in property values. (Amadeo, 2022)

In addition, if interest rates, the main cause of the bursting of the bubble, were to rise further with a continuation of hard lending policy, it will lead to further increases in mortgage prices, and thus further decrease in real estate prices to be able to be bought.

Major real estate bubbles in the world

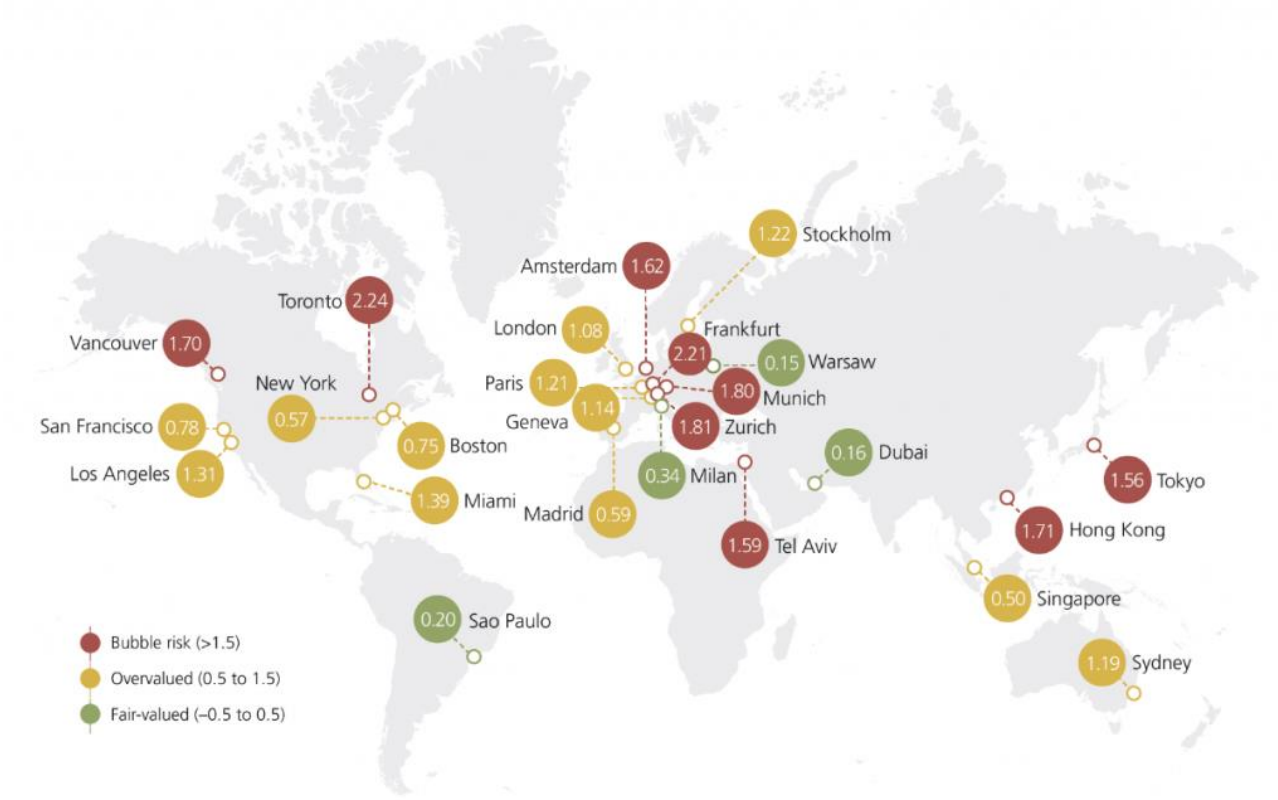

Figure 35 show the world map housing bubbles in which, according to colour and value, the bubbles magnitude can be observed. (BLOOMBERG , 2022)

Much could be said about the world situation of real estate bubbles. In this analysis only a description of the major cities in the world will be given, as for the causes of this process one can rely on the causes that triggered the American one previously described, they recall a different situation from the bubble of 2008, because in this situation the cause is not oversupply, but a policy of hard lending proposed by the respective central banks.

The global real estate scenario of major global metropolitan centres presents an imbalance between what are prices, related to the rising interest rates of individual states or supra-state organizations.

Main real estate bubbles occur in Canada where Toronto and Vancouver present very high prices, leading these two cities to be among the first cities likely to burst bubble in the following period, in fact prices of home values has tripled in the last 25 years. In Europe, the leading players in this phenomenon are the cities of Frankfurt, Zurich, Munich, and Amsterdam. In the east are Tel Aviv, Tokyo, and Hong Kong Figure 35. (BLOOMBERG , 2022)

Cryptocurrency market

Current cryptocurrency market

In the chapter on the history of bubbles, particularly in the part on modern bubbles, Bitcoin has already been covered, but since this is a current, rather than a historical, phenomenon, it will be discussed in more detail below.

Bitcoin, like other cryptocurrencies are based on blockchain technology. Blockchain technology allows information to be recorded in a completely secure, immutable and transparent manner, thanks to cryptography. In fact, each block of which the network is made up continues a specific number of transactions and a hash, then an alphanumeric string that distinguishes it from other blocks and allows it to be linked to the preceding blocks. (IBM)

Many investors like Warren Buffet, say that cryptocurrencies are not something real and are worthless, but in theory the same thing could be said of fiat currencies, which have long since been untied from gold, and thus it could be said that they, like cryptocurrencies are worthless. However, digital currencies have some differences. Thus, it is necessary to define what a currency is. The latter in fact has three specific functions. The first function that a currency performs is to be a medium of exchange. Second, it is a means of giving a numerical valuation that is reflected in the price. And last, it is a store of value, thus being able to be accumulated to buy goods or services in the hypothetical future. (Potter, 2022)

Taking Bitcoin as a reference, it meets the first requirement to a certain extent. Indeed, Bitcoin is a decentralised digital currency that can be used as a medium of exchange for various goods and services. Some of these transactions include buying products from online shops that accept Bitcoin, trading on cryptocurrency exchanges, paying for services such as web hosting or mobile apps, donating to charities, using Bitcoin ATMs, and paying for travel expenses such as flights and hotels. While it does not meet the second and third requirements because of the extreme volatility to which this currency is subject. A currency that loses or gains substantial percentages every day cannot serve as a yardstick for price comparison and especially not as a store of wealth. Unlike the currencies used by the world community (dollar, euro, sterling etc.) there is no central bank whose purpose is to maintain its stability. (Bowler, 2022)

The growing popularity and spread of cryptocurrencies are justified by countless potential benefits. Perhaps the main advantage, or at least the one that has made it most popular, is decentralization, thus allowing peer-to-peer transaction, without intermediaries able to obtain the information. This thus improves privacy and user possession of information. A second advantage is the borderless transactions, which the system allows as opposed to the current banking system, thus faster and cheaper transactions. Financial freedom and autonomous management of one's assets, is another key feature compared to current financial systems. In addition, accessibility is a relevant advantage, for by having an Internet connection they can be used by any individual in the world in the same way. Lastly, cryptocurrencies represent, thanks to and because of their volatility, possible high returns, as happened with Bitcoin that allowed early adopters to profit.

These factors have generated a lot excitement and hype around cryptocurrencies, leading to increased investment and adoption.

Just because a phenomenon is real does not mean that it is not subject to the phenomenon of bubbles, just as it was in the early days of the Internet. Even more pronounced is the phenomenon of bubbles for altcoins, then cryptocurrencies excluding Bitcoin, which have exploded in recent years and then subsequently collapsed and in most cases disappeared.

Following is some of the most significant recent bubbles related to the crypto ecosystem, and the bursting of them due to natural reasons or the discovery of underlying scams. The rise in popularity of cryptocurrencies increased the amount of liquidity in them, and with that the extent of the underlying collapses and speculation.

"Shitcoin" phenomenon

The year 2021 was marked by the emergence of thousands of new cryptocurrencies. Leaving aside the scams, which were widespread among them, most were projects with no purpose other than speculation. Speculation was not limited to individual projects, but spread to the entire 'shitcoin' ecosystem, in which tokens without any value, reached capitalization of millions of dollars at the launch of these, only to collapse later, in most cases within minutes Figure 36.

Figure 36 show a general shitcoin chart in which one can observe the typical initial pump, and the subsequent inexorable descent. (Woo, 2016)

NFT

NFTs that stands for 'Non-Fungible Token' are systems for certifying the digital rarity of an asset, such as a work of art, a video, and even a tweet. The system is also based on the blockchain. An owner of an NFT, does not own the artwork itself, but a certificate, then a document issued by the creator of the work, thus making accessibility to it private.

The NTF phenomenon, and its hype, has led to the sale of thousands of artworks worth more than a million dollars. The record for the most expensive NFT must be attributed to the artwork 'Everyday: the first 5000 days' by digital artist Mike Winkelmann Figure 37. However, this is just one of the examples irrational prices in this world of the new frontier of digital arts. (Winkelmann)

NFT volumes collapsed by 97 percent in 2022 alone. The phenomenon of the bubble of NFTs, can only be evaluated as price rise, and deflation of the latter, and not as intrinsic value. (Shukla, 2022)

Figure 37 show 'Everyday: the first 5000 days' by Mike Winkelmann, the most expensive NFT ever sold. (Winkelmann)

Luna

Regarding the current situation of cryptocurrencies that lost billions in capitalization, reaching a fractional value compared to ATHs, various factors can be found and studied that led to the collapse, and to disillusionment for millions of investors in digital coins. Among the causes, it is necessary to mention the crypto coin Luna, which went from being

among the top 10 cryptocurrencies by capitalization, to having a derisory value with a loss of almost 100% of its value. (Forbes, 2022)

Luna, like other digital coins is connected to a Stable coin, then a coin that maintains stable value against the dollar. The process occurs through an algorithm, between the Luna coin and the stable coin, in occurs a purchase of one when the price of the other rises, and vice versa. The Stable coin also provided investors with annual interest of 20 percent, a feature that led many investors to enter this system. The algorithm that worked in theory collapsed in 2022, when some investors began to short the coin, the algorithm could no longer compensate for the collapse by investors shorting and selling. Luna's developers had to sell the BTC reserves they held to try to maintain the price, however, in vain. The cryptocurrency lost almost its full value, driving many investors into ruin, and the capitalization fell within 24 hours from 40 billion to 500 million.

Investor disillusionment related to the Luna phenomenon, along with many other smaller bubbles that burst, led to a significant downsizing of cryptocurrencies capitalization.

FTX

FTX is the second largest cryptocurrencies exchange in the world, after Binance. CEO and founder of this fund is Sam Bankman Fried, a guy who, thanks to intense marketing, has managed to create a strong image of himself, being praised by the 'mainstream media, and of whom the American Forbes magazine compared to Warren Buffet. Sam also ran an investment fund, Alamida Research, which with a connection to FTX gives value to the tokens, then the coins of the exchange. FTX reached its peak of popularity in 2021, reaching a market capitalization of $32 billion. Initially promoted as a champion, and revolutionary it allocates funds to help other exchanges in times of trouble, such as BlockFi and Voyager. However, due to the study, and some anomalies of the exchange, many investors beginning to liquidate their tokens tied to FTX, and Binance, as previously mentioned the world's first cryptocurrencies exchange, being an investor in FTX liquidates its tokens causing the value of the tokens to drop from $25 to $3. The big crash came upon discovering that FTX was sending money to Alamida Research, an entity hoped to it to invest the money with risky

financial instruments and using leverage. It then began a bank run, and within 5 days investors withdrew more than $1 billion.

On November 11, 2022, FTX declares bankruptcy. It is also discovered that the exchange, had an internal facility, referred to as a backdoor, by which it could withdraw funds without giving the opportunity to have it disclosed. On the same day of the bankruptcy through the backdoor, $1.7 billion is withdrawn, and a billion leaves the exchange for an alleged hack.

The FTX phenomenon is not limited to itself, however, because numerous financial institutions had invested money in the exchange. This is a phenomenon that in regulated finance could not have happened, thus adding a deficiency of the crypto world.

FTX's is one of, if not the biggest scam in the history of finance. (Reiff, 2022)

Conclusion

In conclusion, the aim of this thesis work was to examine the phenomenon of bubbles in financial markets. The work began with a definition of financial bubbles, followed by an analysis of the psychology behind their formation and their relationship to investors' unrealistic expectations. Next, the different macro categories of investment strategies were explored and how these can influence the formation of bubbles.

The history of financial bubbles then provided an important perspective on their origin and consequences from the short to the medium/long term. Have been analysed some of the most well-known financial bubble episodes in history, beginning with the 17th century tulip bubble, up to the bubbles of the last century, then the dot com bubble and U.S. real estate up to the most recent cryptocurrency bubbles, to understand how these events affected the global economy.

From the analysis of bubble indicators, some tools were analysed to identify the signs of a bubble in formation or already present. Finally, the paper concluded with current analysis of the different investment macro categories to determine the risk of bubbles at this point in history.

However, despite the devastating effects examined in the following thesis, bubbles continue to occur due to human nature, which in certain contexts gives rise to euphoria, and unrealistic expectations often fuelled by greed. Future bubbles cannot be avoided, but it would certainly be important for the hypothetical investor to be aware of the associated risks and market dynamics.

Institutions on their side could instead prevent and manage potential bubble situations through more careful supervision and regulation of financial markets.

Since the origin of bubbles is at the root of human nature, only through a collaboration between governments and financial institutions can a stable economic future be progressed by attempting to marginalize the repeated creation of speculative bubbles.

The purpose of this thesis work was therefore to provide a solid basis for understanding this phenomenon, to anticipate and manage it if necessary.

Bibliography

Abraham, N. (2022). Cap Rates and 10 Year Treasury Bonds. Retrieved from https://www.qccapitalgroup.com/post/cap-rates-and-10-year-treasury-bonds#:~:text=Over%20the%20last%2010%20years,bond%20yields%20has%20been%202.7%25.

Amadeo, K. (2022). What Is the Current US Unemployment Rate? Retrieved from https://www.thebalancemoney.com/current-u-s-unemployment-rate-statistics-and-news-3305733#:~:text=The%20unemployment%20rate%20was%203.7%25%20in%20November%202022&text=The%20current%20unemployment%20rate%2C%20which,to%20rebound%20from%20COVID%2D19.

Antonelli, L. N. (2022). *Azioni bolla esplose, è l'ora dei buy? L'attenti di Ray Dalio: ricordate cosa avvenne post bolle '29 e dot-com.* Retrieved from https://www.finanzaonline.com/notizie/azioni-bolla-esplose-e-lora-dei-buy-lattenti-di-ray-dalio-ricordate-cosa-avvenne-post-bolle-29-e-dot-com

(n.d.). *ARK INNOVATION ETF.* Retrieved from https://www.tradingview.com/symbols/AMEX-ARKK/

Arroyo, C. (2022). *US Mortgage Lenders Are Starting to Go Broke.* Retrieved from https://www.bloomberg.com/news/articles/2022-08-19/mortgage-lenders-are-starting-to-go-broke-as-loan-volumes-plunge

Bahney, A. (2022). Home prices skyrocketed last year. Two regions saw the biggest increases. Retrieved from https://edition.cnn.com/2022/02/22/homes/us-home-prices-case-shiller-december-2021/index.html#:~:text=Home%20prices%20rose%2018.8%25%20in,ahead%20of%202020's%2010.4%25%20gain.

Belchman, J. (2022). How to 'De-FAANG' and lower your S&P500 P/E ratio. Retrieved from https://seekingalpha.com/article/4159229-how-to-de-faang-and-lower-your-s-and-p-500-p-e-ratio

BLOOMBERG . (2022). *Biggest housing bubbles? See Europe, Canada, Hong Kong — not US, by this math.* Retrieved from https://www.ocregister.com/2021/10/13/housing-bubble-risks-are-accelerating-across-europe-hong-kong/

Bowler, D. (2022). Bitcoin Is Not Currency. Retrieved from https://seekingalpha.com/article/4549095-bitcoin-is-not-currency

Buffett, W. (n.d.). Retrieved from https://www.goodreads.com/quotes/29255-be-fearful-when-others-are-greedy-and-greedy-when-others

(2022). *Case Shiller Home Price Index. EPB Research.*

Cazzaniga, M. (2021). *Why if you had been a 17th-century Dutch florist in the "Tulip Bubble" would you have had to sell the roses?* Retrieved from https://vehnta.com/en/why-if-you-had-been-a-17th-century-dutch-florist-in-the-tulip-bubble-would-you-have-had-to-sell-the-roses/

Cembalest, M. (2022). *Independence Days.* Retrieved from https://am.jpmorgan.com/it/en/asset-management/institutional/insights/market-insights/eye-on-the-market/independence-days/

Charles Schwab. (2022). *Market Correction: What Does It Mean?* Retrieved from https://www.schwab.com/learn/story/market-correction-what-does-it-mean

Chen, J. (2020). *Trailing Price-To-Earnings (Trailing P/E): Definition and Example*. Retrieved from https://www.investopedia.com/terms/t/trailingpe.asp

Chen, J. (2021). *Buying on Margin: How It's Done, Risks and Rewards*. Retrieved from https://www.investopedia.com/terms/b/buying-on-margin.asp#:~:text=Technician%20(CMT).-,What%20Is%20Buying%20on%20Margin%3F,%25%20down%20and%2090%25%20financed.

Chen, J. (n.d.). *Buying on Margin: How It's Done, Risks and Rewards*. Retrieved from https://www.investopedia.com/terms/b/buying-on-margin.asp#:~:text=Technician%20(CMT).-,What%20Is%20Buying%20on%20Margin%3F,%25%20down%20and%2090%25%20financed.

CoinGeko. (n.d.). *Global Cryptocurrency Market Cap Charts*. Retrieved from https://www.coingecko.com/en/global-charts

Curry, B. (2022). *Transitory Inflation: A Short History*. Retrieved from https://www.forbes.com/advisor/investing/transitory-inflation/#:~:text=%E2%80%9C%5BT%5Dhese%20one%2D,most%20economists%20at%20the%20time.

Dalio, R. (2022). *The Popping of the Bubble Stocks: An Update*. Retrieved from https://www.linkedin.com/pulse/popping-bubble-stocks-update-ray-dalio/

DeVon, C. (n.d.). *Want to buy a home? Use this mortgage calculator to determine your monthly payment*. Retrieved from https://www.cnbc.com/2022/08/13/mortgage-calculator.html

Durden, T. (2022). *Newsfeed: Housing Crisis Worsens As Affordability Reaches Record Low.* Retrieved from https://realestateguysradio.com/newsfeed-housing-crisis-worsens-as-affordability-reaches-record-low/

EBITs And Pieces. (2022). *Ranking Recession Readiness: Is Amazon Prepared For A Recession?* Retrieved from https://seekingalpha.com/article/4523688-ranking-recession-readiness-is-amazon-prepared-for-recession

Economic research. (2022). Retrieved from https://fred.stlouisfed.org/series/MSACSR

Edelman, S. (2017). *The 2008 Housing Crisis*. Retrieved from https://www.americanprogress.org/article/2008-housing-crisis/#:~:text=The%20real%20causes%20of%20the,excessively%20risky%20and%20predatory%20products.

Enomoto, J. (2022). Michael Burry Sounds Market Crash Warning. What Is Multiple Compression? Retrieved from https://investorplace.com/2022/07/michael-burry-sounds-market-crash-warning-what-is-multiple-compression/

Forbes. (2022). What Really Happened To LUNA Crypto? Retrieved from https://www.forbes.com/sites/qai/2022/09/20/what-really-happened-to-luna-crypto/

Formigle, I. (2016). *The Four Phases of the Real Estate Cycle.* Retrieved from https://www.crowdstreet.com/resources/topics/investing/real-estate-cycle

Gallagher, G. (2023). *Worried About a Recession? Heed the Lessons from the Bulls and Bears*. Retrieved from https://www.citizensbank.com/learning/bull-market-vs-bear-market.aspx#:~:text=While%20bull%20markets%20are%20fueled,economic%20slowdown%20and%20higher%20unemployment.

Giacomo. (2017). *Shiller PE (CAPE) Ratio: Limiti e Vantaggi di questo indicatore*. Retrieved from https://diventeromilionario.it/shiller-pe-cape-ratio/

Goel, A. (2023). *The relationship between economy & stock market*. Retrieved from https://economictimes.indiatimes.com/markets/stocks/news/the-relationship-between-economy-stock-market/articleshow/96878611.cms

Gramalam. (2022). *The Buffett Indicator*. Retrieved from https://www.currentmarketvaluation.com/models/buffett-indicator.php

Grusky, D. B., Western, B., & Wimer, C. (2009). *The Great Recession.*

Han, B. (2021). Real estate industry accounted for 16.9% of GDP in 2021. Retrieved from https://www.realtrends.com/articles/real-estate-industry-accounted-for-16-9-of-gdp-in-2021/#:~:text=The%20real%20estate%20industry%20was,Association%20of%20Realtors%20on%20Thursday.

Hayes, A. (2019). *Dotcom Bubble*. Retrieved from https://www.investopedia.com/terms/d/dotcom-bubble.asp

Hayes, A. (2022). *Short Selling: Definition, Pros, Cons, and Examples*. Retrieved from https://www.investopedia.com/terms/s/shortselling.asp

Hayes, A. (2022). *Structured Investment Vehicle (SIV)*. Retrieved from https://www.investopedia.com/terms/s/structured-investment-vehicle.asp

Hildebrand, P. (2006). *Monetary policies and financial markets*. Retrieved from https://www.bis.org/review/r060418d.pdf

Howell--Jolly. (2022). *S&P500 PE ratio is below its 1990-2022 average. Is it the time to buy-the-dip now?* Retrieved from Reddit: https://www.reddit.com/r/StockMarket/comments/vau47m/sp500_pe_ratio_is_below_its_19902022_average_is/

IBM. (n.d.). Cos'è la tecnologia blockchain? . Retrieved from https://www.ibm.com/it-it/topics/what-is-blockchain

Introzzi, M. (n.d.). *Quantitative Easing: cos'è e come funziona*. Retrieved from https://www.soldionline.it/guide/mercati-finanziari/quantitative-easing

invest, I. (Director). (2022). *Crollo Obbligazioni | Ecco il motivo e un strategia per investire* [Motion Picture]. Retrieved from https://www.youtube.com/watch?v=CubqqP4bPQs&t=653s

J.B.Maverick. (2022). *S&P 500 Average Return*. Retrieved from https://www.investopedia.com/ask/answers/042415/what-average-annual-return-sp-500.asp

J.Brooks, K. (2022). Home prices have jumped 19% across the U.S., and far more in some markets. Retrieved from https://www.cbsnews.com/news/home-price-miami-tampa-spglobal-phoenix/

J.P. Morgan . (2022). *Bloomberg U.S. Agrregate intra-year declines vs calendar year returns.* Retrieved from https://am.jpmorgan.com/us/en/asset-management/adv/insights/market-insights/guide-to-the-markets/guide-to-the-markets-slides-us/fixed-income/gtm-blusanualreturns/

Kaeppel, J. (2022). Panic/Euphoria Model is an indicator worth watching. *sentimentrader*.

Kagan, J. (2022). *NINJA Loan: Definition, History, Current Availability*. Retrieved from https://www.investopedia.com/terms/n/ninja-loan.asp

Kenton, W. (2022). *What Is an Economic Bubble and How Does It Work, With Examples*. Retrieved from https://www.investopedia.com/terms/b/bubble.asp

Koester, G. (2022). *Inflation developments in the euro area and the United States*. Retrieved from https://www.ecb.europa.eu/pub/economic-bulletin/focus/2023/html/ecb.ebbox202208_01~c11d09d5fd.en.html

Lancaster, A. (2022). *10 Examples of Framing Bias*. Retrieved from https://www.psychreg.org/examples-framing-bias/

Liodis, N. (2021). *The Collapse of Lehman Brothers: A Case Study.* Retrieved from https://www.investopedia.com/articles/economics/09/lehman-brothers-collapse.asp

Malkiel, B. G. (2020). *Un paseo aleatorio por Wall Street.*

Marca, A. M. (2021). *Finanza comportamentale: un analisi delle bolle bolle finanziarie*. Retrieved from http://tesi.luiss.it/30808/1/250511_LA%20MARCA_ALFREDO%20MARIA.pdf

Markes, H. (2018). *The most important think illuminated.*

marketGOATS. (2022). *Cathie Wood's ARK Portfolio - ARKK down 65% YTD but attracted $320 million in net inflows in Sep 2022!* Retrieved from https://www.reddit.com/r/ETFs/comments/y5l8g3/cathie_woods_ark_portfolio_arkk_down_65_ytd_but/

Marketwatch. (2020).

Mish Talk. (2022). *Percent change in sales from a year ago by price range.*

moadel, D. (2022). Net Worth Wipeout: Massive Value Destruction in Tesla, Meta Platforms, and Amazon. Retrieved from https://www.tiprank.com/news/article/net-worth-wipeout-massive-value-destruction-in-tesla-meta-platforms-and-amazon

Mortage daily news. (2022). *NAHB Builder Confidence.* Retrieved from https://www.mortgagenewsdaily.com/data/builder-confidence

National association of realtors. (n.d.). *Methodology: Housing Affordability Index.* Retrieved from https://www.nar.realtor/research-and-statistics/housing-statistics/housing-affordability-

index/methodology#:~:text=Formula%3A%20((PMT*12)%2FMEDINC)*100&text=Specifically%2C%20median%20family%20income%20estimates,last%20year's%20actual%20income%20growth.&t

Nibley, B. (2022). Bitcoin Price History: 2009 - 2023. Retrieved from https://www.sofi.com/learn/content/bitcoin-price-history/

Nikkei 225. (n.d.). Retrieved from wikipedia: https://en.wikipedia.org/wiki/Nikkei_225

Pecorari, G. (Director). (2022). *I MERCATI ANDRANNO PEGGIO PRIMA DI ANDARE MEGLIO* [Motion Picture]. Retrieved from https://www.youtube.com/watch?v=Gdp6xEomqV0

Pecorari, G. (Director). (2022). *Le azioni cresceranno anche nel 2022* [Motion Picture]. Retrieved from https://www.youtube.com/watch?v=enpWiA2GL8g&t=157s

Potter, C. (2022). Understanding Money: Its Properties, Types, and Uses. Retrieved from https://www.investopedia.com/terms/m/money.asp

Reiff, N. (2022). The Collapse of FTX: What Went Wrong With the Crypto Exchange?

Ricciardi, R. (2021). *Le Borse di oggi, 10 dicembre 2021. L'inflazione Usa al 6,8%, record dal 1982. Chiusura debole sui listini Ue.* Retrieved from https://www.repubblica.it/economia/2021/12/10/news/le_borse_di_oggi_10_dicembre_2021_mercati_deboli_in_attesa_dell_inflazione_usa_e_delle_mosse_fed-329629865/

Routley, N. (2021). REAL ESTATECharting 20 Years of Home Price Changes in Every U.S. City. Retrieved from https://www.visualcapitalist.com/20-years-of-home-price-changes-in-every-u-s-city/

S&P 500 INDEX. (n.d.). Retrieved from Trading view: https://www.tradingview.com/symbols/SPX/

Schneider, H. (2022). *As the Fed plans to 'raise and hold,' new projections may show the cost.* Retrieved from https://www.reuters.com/markets/rates-bonds/fed-plans-raise-hold-new-projections-may-show-cost-2022-12-02/

Segal, T. (2022). *5 Stages of A Bubble*. Retrieved from https://www.investopedia.com/articles/stocks/10/5-steps-of-a-bubble.asp#:~:text=The%20five%20steps%20in%20the,profit%2Dtaking%2C%20and%20panic.

Shapira, A. (2017). *Long Island Iced Tea Soars After Changing Its Name to Long Blockchain*. Retrieved from https://www.bloomberg.com/news/articles/2017-12-21/crypto-craze-sees-long-island-iced-tea-rename-as-long-blockchain#xj4y7vzkg

Shukla, S. (2022). NFT Trading Volumes Collapse 97% From January Peak. Retrieved from https://www.bloomberg.com/news/articles/2022-09-28/nft-volumes-tumble-97-from-2022-highs-as-frenzy-fades-chart

Smith, C. (2023). Central bankers pledge to ‘stay the course’ on high interest rates. Retrieved from https://www.ft.com/content/cf43669d-95b7-4b69-8ed2-c4b683eb7e94

Southwood, B. (2016). WAS THE TULIP BUBBLE REALLY A BUBBLE? Retrieved from https://www.adamsmith.org/blog/was-the-tulip-bubble-really-a-bubble

Strowzesky, Z. (2022). Key Differences Between Housing Market Now and 2008 Crash. Retrieved from https://www.newsweek.com/key-differences-between-housing-market-now-2008-crash-1768848

team, C. (2022). *Forward P/E Ratio*. Retrieved from https://corporatefinanceinstitute.com/resources/valuation/forward-pe-ratio/

Team, R. D. (2022). The Right Real Estate Moves at The Right Time. Retrieved from https://www.richdad.com/right-real-estate-moves

TEAM, T. I. (2022). *Economic Cycle: What It Means and 4 Phases of Business Cycles*. Retrieved from https://www.investopedia.com/terms/e/economic-cycle.asp

teller, T. f. (2022). TIP, STIP And VTIP: TIP Not Included In The Bill/Portfolio. Retrieved from https://seekingalpha.com/article/4561510-tip-stip-vtip-tip-not-included-in-portfolio

Templeton, J. (n.d.). Retrieved from https://www.philanthropyroundtable.org/hall-of-fame/john-templeton/#:~:text=Templeton%20studied%20at%20Yale%20and,on%20euphoria%2C%E2%80%9D%20he%20said.

(n.d.). *The ECB's monetary policy.* Retrieved from https://www.dnb.nl/en/the-euro-and-europe/the-ecb-s-monetary-policy/#:~:text=The%20ECB's%20monetary%20policy,-Read%20aloud&text=The%20European%20Central%20Bank%20(ECB,important%20means%20of%20achieving%20this.

The South Sea Bubble. (n.d.). Retrieved from https://victorian-era.org/the-south-sea-bubble.html

Thune, K. (2022). What Is The Average Return Of The Stock Market? Retrieved from https://seekingalpha.com/article/4502739-average-stock-market-return

Trust, W. (2020). *Stock Valuations and the "Rule of 20"*. Retrieved from https://www.familybusinessmagazine.com/stock-valuations-and-%E2%80%9Crule-20%E2%80%9D#:~:text=In%20other%20words%2C%20the%20Rule,the%20inflation%20rate%20equals%2020.&text=The%20stock%20market%20is%20deemed,the%20sum%20is%20above%2020.

(2023). *US CPI vs. S&P 500 P/E.* Retrieved from https://en.macromicro.me/collections/34/us-stock-relative/49738/us-sp500-pe-cpi-yoy

Webster, I. (n.d.). *S&P 500 Data*. Retrieved from https://www.officialdata.org/us/stocks/s-p-500/1900

Winkelmann, M. (n.d.). *Everyday: first 5000 days*. Retrieved from Wikipedia: https://en.wikipedia.org/wiki/Everydays:_the_First_5000_Days

Winner's Curse: Definition, H. I. (2021). *Adam Hayes*. Retrieved from https://www.investopedia.com/terms/w/winnerscurse.asp#:~:text=The%20winner's%20curse%20is%20a,factors%20that%20may%20influence%20bidders.

Woo, W. (2016). *The Shitcoin Pattern.* Retrieved from https://woobull.com/the-shitcoin-pattern/