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The cryptocurrency fever and the bubble risk

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Alla mia mamma e al mio papà. Incondizionatamente presenti.

Ai miei amici,
che hanno saputo rispettare il mio silenzio e riempirlo con tanto chiasso.

Alle cose che mi hanno portato qui e a quelle che verranno.

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1. From the "money formula" to cryptocurrency

To comprehensively appreciate cryptocurrency features, both in terms of intents as well as weaknesses, it makes sense to have a quick dive on the general concept of currency itself: why money were created? How money moves between people? And between a state and another? What are the basic assumptions and functions that allow mentioned movements? In order to understand money and underlying value, some basic assumptions on which we, as a world community, base our daily financial transaction must be made.

1.1 Money as a collective agreement based on supervised trust

Money is as an answer to a clear need, an artificially created mean for a specific purpose: its creation can be conceived as the result of a formula mixing a collective agreement and a supervised trust to support the final intent of facilitating the goods exchange.

To better appreciate what behind a such statement it is useful to share the triggering events that happened thousands of years ago on a tiny island in the Pacific Oceans called Yap. While scanning natural goods, explorers from Yap came across some valuable limestones and, for reasons not specifically linked to currency purposes, got started carving it into huge stone disks. Leveraging on the mentioned value of such kind of stones they got started to use such limestone disks for good exchange purposes, freeing up themselves from the bartering heavily boring constraints. A such utilization of the valuable stone disks matched with the need that occurs in every society, at some point, to have a single valuable and recognizable object as a metric of exchange.

Worth to stress that what happened in terms of "currency" in that island is also important under a "value" of money perspective, meant as the link between the currency and the underlying assets of such currency. A further historical event at Yap, then, comes in our support: once a ship of sailors from Yap, traveling with the intent of trading, found itself in the middle of a storm; even though the ship shipwrecked, sailors were able to safe themselves swimming to the shore but unfortunately everything on the boat, including the money stones, got lost in the oceans. This is where the story turns out to be interesting in the purpose of this analysis: the habitants of Yap decided that, even though the stones got lost, the sailors were able to maintain the value of the lost stones and to get new ones to properly be able to get back to exchange goods.

The Yap event is a first brick of the “money as a collective agreement” wall that has been constantly built year over year, a wall, by the wat, every so often drifted toward a kind of “collective illusion” in setting values and price.
A kind of practical example of a such collectively agreed illusion about price vs value can be find in luxury goods. In 2019 I had the opportunity to work to a startup producing luxury bags. The average total cost of bag production, summed up with all related fixed and variable costs, was about 70 euros. Each bag was sold at an average price of 700 euros. Each bag was made with the idea of being “special”, properly tailored to a fashionable woman and made with the most luxurious hides (and that was absolutely true, as we used the highest quality products to produce the bags). What was able to inflate bags average value of the 900%, then? It was the collective idea the society made up about luxury, the “collective illusion” build upon the idea of exclusiveness and the related ability of its owner to show richness.

Following on the idea that value of money, and somehow, money itself, is based on a collective agreement, is fundamental to understand the relevant role that trust plays in this game, both on a local basis, in a closed and known reality, as well as in a wide and uncontrolled unknown market as it is used to happen in global economic transactions.

Starting from the medieval age, trading was mostly based on face to face direct agreements: trust was the mandatory pre-requirement to complete daily goods transactions, trust addressed through physical persons and at a local level. In the modern age a such trust has been naturally shifted toward institutionalized levels: financial institutions, supervisory body, governments, have been ones of the few bodies people started to direct their trust to.

Now, the attention seems shifting again.

As OECD (Organization for Economic Co-operation and Development) has analyzed in the studies on trust in government, only 43% of the population in OECD countries trust their governments. And as trust in government is a mandatory vehicle to both allow and simplify economic activities and to take on successfully public policies, loss of trust may result in risky economic scenarios and social pitfalls.
Assuming, then, that citizens are losing trust in their government (not only as banks advisor/financial institutions but as social institutions too), as financial markets are still going on there has to be something towards which people are addressing their trust: if a part loses another one has to gain. Economic literature somehow agrees that expectation in terms of economic and social return from good exchange and financial transactions seem playing such trustee role.

All in all, trust is a fundamental enabler underlying every transaction people make every day, from buying on a site online to buy vegetables at the store: all movements of capital processed on a daily basis are heavily based on a good amount of trust.

1.2 Cryptocurrency Overview

The idea of a cryptocurrency comes as a consequence of the transformation of the internet utilization. The main intent of internet was, at first along the nineteenth, to share information and communications, but nowadays things has sharply changed: the advent of the internet of everything, enabled by huge Telecommunication and IT technology innovation, has pushed an internet step up to play the role of a global cohesive system, especially in the market and financial transactions space.

In a such everything – everywhere – anytime context, the need of decoupling financial and economic transactions from the issues created by institutions become urgent. As moving money between two international bank accounts, in different currencies, can last days and costs lot of money, something able to allow faster, cheaper while concurrently safe transactions that could keep up with the speed of the network was heavily required. Today citizens are witness of a fast, ever going, digital revolution that is requiring ability from people to move themselves, their connections, their money faster and faster and in a cheaper and cheaper way

Bitcoins and consequently blockchain were born answering to such clear need: a fast, cheap, secure and counterchecked system to manage financial transactions.

For many years, since 2008, bitcoin, cryptocurrency and blockchain, the underlying enabling technology, have somehow been synonymous: to better appreciate what about Bitcoin, then, it is useful to quickly summarize what about the Blockchain.

Blockchain technology is most simply defined as a decentralized, distributed ledger that records the provenance of a digital asset. As a distributed ledger, then, the Blockchain main feature is its ability to indelibly log any transaction concurrent to its capability to certify the reliability of involved parts thanks to a component called “identity management” *(Neha Narula, Ted at BCG Paris, May 2016).* Thanks to its decentralization and identity management features it helps reduce risk, stamps out fraud and brings transparency in a scalable way for myriad uses. For the purpose of our analysis, the use of Blockchain as a Technology backbone for the cryptocurrency engine is the use we’re focusing on.

Everything starts on October 31st, 2008, when Satoshi Nakamoto published the white paper called "Bitcoin: A Peer-to-Peer Electronic Cash System" introducing and describing, for the first time ever, the functionality of the underlying Bitcoin-blockchain network. Before that event, cryptocurrency was only an idea, something that few people involved in marketplaces and in IT were thinking and dreaming about, and maybe, were working on, but before that date it was just a concept in the air. On January the 3rd 2010, the first brick, the first "genesis block" of the Bitcoins wall, was created by Nakamoto itself through a standardized process called "mining", the only process, by the way still available, to create blocks and Bitcoins. It works like this: in order to be entitled, and rewarded in bitcoins, to add a new block to a chain (alias, to add a new consistent transaction to an already logged transactions chain) a "miner" has to:

1) validate the consistency of the new transaction vs. the related previous transaction history
2) pass the so-called "proof of work", meant as to be the fastest miner solving a computational problem aimed at finding out the specific key to be THE "block creator"

Two months later, on March 2010, the first bitcoin transaction was recorded marking the born of the market of cryptocurrency; on the same year "Mt. Gox", a bitcoin exchange system that between 2010 and 2014 handled over 70% of all bitcoins transaction, was created[1]

In July 2015 Ethereum network was born, an online platform with the intent of creation and publishing of peer-to-peer intelligent contracts. The main difference between Bitcoin and Ethereum, sometimes wrongly called the "new bitcoin", is that the latter one has as a main intent of creation of Smart Contracts able, on the one hand, to facilitate the negotiation between the two parts and, on the other hand, to create binding agreements to secure that both parties respect the agreed execution. (Nik Szabo, 1997). On top, and worth to stress, while Bitcoin was vertically founded to substitute the ordinary money, Ethereum network gave the possibility to everyone to create their own digital money (thanks to the new birth fundraising tool named Initial Coin Offering (ICO)).

1.3 Adapting the money formula to cryptocurrencies

[1] When Bitcoin price plummet down by 50% Mt. Gox and other cryptocurrency exchange hacks loss their power over Bitcoins.

As a main finding from previous sections, money, despite whether physical, virtual, or digital, has to perform three basic functions:

1. unit of account, meant as conventional numerical representation of the value of a good/service
2. medium of exchange, that is, an instrument through which we exchange goods and services
3. reserve of value, a way to accumulate and maintain the ability to purchase goods / services over time.

When one of these three functions fails we cannot speak of money. On top, the currency was born and still lives with a "collateral" next to it, something that "guarantees" its value, a kind of supervised trust. While it seems that cryptocurrency fits quite well the three mentioned money pillars, a special focus on such “supervised trust” layer is needed.

Differently from what happen to a national currency, seen as “safe” thanks to the guarantor role played by government, cryptocurrency safety fully relies on technology and related operations. What is tricky and affecting cryptocurrency reliability is that even though cryptocurrency safety is naturally secured by the underlying blockchain technology playing the role of trustee, the increasing improper use of cryptocurrency as a speculative investment is heavily containing the authoritativeness of the mentioned blockchain role of trustee. The technical security of the transaction, then, is not 100% securing the value underlying the transaction once completed, a risk that is more and more threatening cryptocurrency original purpose of overcoming ordinary currency constraints in money transfer.

To be more specific, let’s consider a hypothetical financial transaction where two parties, named A and B, on 13th of May, 2020, are involved in a money transfer of 35.000 euros (5 bitcoins, based on euro/bitcoin currency change on March 13th). Usually, the transaction would have taken about one hour to get from part A to part B. The point of choosing this specific date is that bitcoin, on the 13th of May 2020, experienced one of its highest fluctuation of its life, losing almost 41% of its value going form 7.000 euros to 4.031 euros. All in all, then, there is almost a 100% probability that part B would safely earns its 5 bitcoins but the main question is: what is the worth of those 5 bitcoins? Well, probably would depend on how lucky part B is: if B is collecting his money in euros, on March 16th, he is going to lose up to the 41% of the value he was expecting to get. And looking at Bitcoin value trend along recent years, cryptocurrency value seems broadly marked by the irrationalism of consumers, by their irrational trading that gives cryptocurrency the chance to lose or gain huge amount of value in a very short timeframe.

And it is worth to stress that the concerns about cryptocurrency fluctuation is not, at least, not only, about the magnitude of such fluctuation while it is driven by the short timeframe to experience a such price variance and by the high frequency of such heavy fluctuations too.

To better appreciate such statement let's focus on gold price; also gold is subject to fluctuation between extremely low and extremely high values (see for example August 2011when it was 1.800 $ an ounce (source: trading economics), and December 2016 when it was 1.150 $ for an ounce. But a such fluctuation happened very few times and took 5 years of heavily capped rollercoaster to happen. The reason? Gold value is eventually based on a real, solid, asset. Bitcoin value, for the time being, is broadly based on trading.

Even though the underlying blockchain technology is not misleadingly believed as the safest "logging & storing" system ever created, it is actually no more than that. It is probable, and widely shared, that blockchain would never fail in recognizing and recording any transaction but, unfortunately the infallibility of the system doesn't secure the value of cryptocurrency and transactions on the market.

All in all, even though ordinary money, as national currency, is based on a "collective agreement" being "the shared and agreed value that it is given to it", digital money and cryptocurrency fail to fit a such scheme. Despite the increasing volumes of financial transaction processed in digital currency, cryptocurrencies still look more like a speculative vehicle that a financial model aimed at facilitating money transactions in a digital, everything-everywhere world.

1.4 The Cryptocurrency speculative risk – The 2016 Nigerian case study

Now that we see how cryptocurrency fits quite well the three money pillars mentioned at the beginning of previous paragraph to act as an ordinary money, we also glimpse how the lack of regulation of the currency is the perfect fuel for a speculative investment. Cryptocurrency ability to move fast and in total security for both parties involved in the transactions doesn't, unfortunately, secure its value.

On purpose, the Nigeria case is a relevant case study about how underlying blockchain technology can't fill the gap left by the lack of an institutions acting as a monetary control agent.

On 2014 Nigeria faced a big crisis due to the collapse of oil price, the main good on which the African state economy was, for the most, totally relying on. Ahead of such economic crash a pseudo "middle

class" was blindly while heavily basing its growth on the oil sector rocking passive portfolio investments.

Two years later, on 2016, the events under a cryptocurrency perspective, started to become interesting.

What happened is that with the worsening of the economic crisis a huge depreciation of the local currency (Naira) took place and strict policies by the Nigerian government were deployed to prevent the buy of foreign currency as a "safe heaven".

The result of such Nigerian strict policy about international movements of money triggered the natural generation of a black market for currency exchange and a related important gap between USD/NGN rate on the black market vs the Naira official interbank rate. This difference is shown in the graph below (Fig.1)

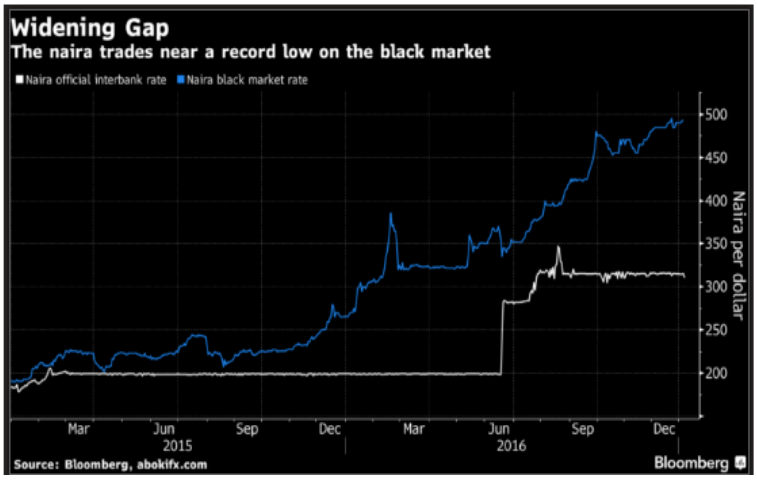

Fig. 1 – Gap between USD / NGN rate on the black market vs the NAIRA official interbank rate

In a such scenario any Nigerian that had to send from or to Nigeria an amount of money could do it in four ways: Wester Union, Bank wire transfer, Bitcoins and black market. The following scheme summarize the exchange rate that is applied to buy 100$ through the previous mentioned ways of transfer.

What you get for $100 in Nigeria, January 2017

Western Union	NGN 33,750
Bank Wire Transfer	NGN 32,000
LocalBitcoins.com	NGN 47,100
Cash Dollars (Black Market)	NGN 49,500

PayPal does not work in Nigeria

Fig. 2 – Exchange rate applied to buy 100 USD through available ways of money transfer

As above scheme highlights (Fig. 2) the exchange rate gap between the first two legal transfer systems and the last two ones is huge. Leveraging on above rates it clearly comes that Nigeria become heavily involved in the use of Bitcoins and heavily affected by related plus and minus from the utilization of such digital currency.

At the same time in which Nigeria has been, as shown in the graphs below, the top user worldwide of for almost a year, the volatility of bitcoins didn't unfortunately fail to show.

Fig. 3 – Popularity of localbitcoins.com in Nigeria (source: Alexa trend search website)

Country	Percent of Visitors	Rank in Country
Nigeria	16.1%	186
United States	12.9%	6,581
India	7.2%	4,491
Venezuela	5.2%	564
United Kingdom	5.0%	3,351

Fig. 4 – Monthly localbitcoins.com visitors by country in 2016

Two major events in 2016 plummet down the value of bitcoin sharply affecting the value of money owned by Nigerian investors. The first one took place on the 14th of January when the Bitcoin price recorded a16% decline after that Mike Hearn, a former google engineer, termed Bitcoin as a “failure”. The second one, happened on the 2nd of August: there was the second-biggest security breach at the Bitfinex bitcoin exchange. Hackers stole 120,000 bitcoins resulting in a further 15% decline of the value of bitcoin.

Whoever was owning bitcoins along these two dates lost an incredible percentage of his money in just few hours.

To summarize, the 2016 Nigerian events are a measurable proof about how the mentioned lack of monetary worldwide regulation about the value of a such currency is the perfect ground for speculative habits. Many other cases of speculation and derived “sharp & high” fluctuation of cryptocurrency have been happened following Nigerian case till our age. It is clear how as long as cryptocurrencies remain exposed to such behaviors, they will never fully fly to play their original role as cheap, reliable and fast economic and financial transaction enabler.

2. Bubbles

2.1 What is a bubble

The previously mentioned Nigeria case study describes the volatility of the Bitcoin and how tough is to leverage on the real underlying value of a such good to hold the price to the ground. Also the example of gold price trend highlights that even though gold is under the uncertainty given by fluctuation, it's for the most unlikely that it will lose 40% of its value in a day: the unlikely of this event is related to the real worth of the good and to how the price of a stock is only partly dictated by the market.

The "real value of a goods vs. the goods stock market price" theme is the core theme on which the concept of bubble revolves around: the focus of the analysis must be, then, on what happen when, for any reason, the value of the stock market is not adequately coupled with the economic growth itself.

The idea of bubble is perfectly explained by its broadly used definition: "an economic cycle characterized by rapid expansion followed by a contraction".

History again comes in support when trying to understand economic events underlying such crazy cycles; the three most famous bubbles along last century were:

- the tulips bubble, between 1636 and 1637
- the "dot-com" bubble, between 1997 and 2000
- the real estate bubble, on 2008.

When trying to understand the underlying principles that leads to the creation and eventually to the explosion of a bubble, the tulips bubble of 17th century is the bubble case that more clearly explains the sequence of events that could have a such impact on the market.

The 17th century saw the Netherlands entering the Dutch "golden age". Amsterdam was an important harbor acting as economic connection between Asia and Europe. Amsterdam became rapidly inhabited by wealthy merchants and their Maisons, surrounded by flower gardens turned into the image of wealth. One kind of flower was in particularly high demanded: tulip. Taken by ships to the east, tulips were considered an exotic flower and with the outbreak of the "tulips breaking virus" that

create a special spice of the flower both popularity and price started to rise rapidly. Eventually people just stopped to buy tulips, demand was just over; the drop of demand led to the unavoidable drop of prices and, as threatened, the bubble burst.

For the purpose of this analysis tulip bubble events are also useful to describe the stages typically constituting a bubble lifecycle.

Every bubble arises along an initial "mania" phase, characterized by an upward movement of price fed by an emotional willingness to pay large amount of money for something that is usually priced much higher than its intrinsic value [2]

This is where the bubble assumes its risky aspect: price progressively start to grow and grow thanks to investors buying and buying; consequently, the price is used to go up and up expecting the demand to continue to rise in the future.
All that needed to this house of cards to fell down is the progressive collective realization that the real value of the stock far exceed its worth. This awareness is often taken by an "unplanned" event pushing a stock value trend turnaround from a virtuous upward cycle to a vicious downward spiral. And such vicious downward spiral takes the value of the stock so down to an extent that while in the "likely case" it has an impact on the stocks market as a whole, in the "worst case" can bust down the whole world economy (as it happened with the real estate bubble in 2007).

Following the "mania" phase, then, next typical bubble lifecycle stage is the "awareness" stage: such stage, as mentioned, is triggered for the most by external events, that drive the collectivity awareness to the real worth of the asset.
Here the example of the real estate bubble, on 2008, comes in support. The real estate bubble is the most famous bubble that, taking for a while out of scope the recent economic issues driven by COVID, led USA to the deepest recession since the great recession of 1929.

As we'll see later, root cause of bubbles is a mix of complex and concurrent factors. Among these factors, what gave to the real estate bubble the possibility to make an entire nation crash was mainly a financial product: the Subprime mortgage.

[2] The real value of a company, asset, etc., which may not be the price it could be sold for now (Source: Cambridge Dictionary)

Leveraging on creative while risky financial assumptions and engine, Subprime mortgages were born to give a chance to people that couldn't provide the constraining guarantees required to access the normal mortgage market as well as to deal with the ordinary "high" interest rates: the relax provided by subprime mortgage, in terms of both guarantees and interest rates as well, gave the possibility to all people to buy a house booming the demand for houses followed by a sharply increase in the house prices market. Thanks to the subprime mortgage almost everyone could now access to the real estate market and this incredibly excess of demand created the best ground for speculative propose. Whoever could borrow money to buy a house, did that, expecting the price to increase even more.
Also the house mania got started escalating the typical virtuous circle that, in this specific case, linked the popularity of subprime mortgage with the willingness to own a house, and the house price skyrocketed between 2004 and 2005.

As every bubble, suddenly the spell was broken; most of the people that took advantage from the low interest rate of subprime mortgage weren't able to pay it back. As a consequence, the incredible growth of the price of houses started to slowdown.

The response from subprime mortgage providers was to lower even more the interest rate trying to make the system surviving. In 2007 the big fall of house price started, subprime mortgage followed and the bubble crashed resulting in the stock market free falling: the greatest recession from 1929 was going to move its first steps.

The previous explosion of the dot-com bubble in 2000 featured somehow similar themes: The Federal reserve lower the interest rate to pump up the economy making borrowing of money even easier. With the same monthly payment anyone could borrow nearly 40% more money in 2003 compared to 2000.

The two examples proposed gave a clear idea of how a bubble is created, fed and how, eventually, it crashes. Looking at the devastating result that the crash of a bubble may have, how to timely recognize a bubble is something that scholars, but also investors with speculative purpose, have been really interested by: the focus on the two concurrent flows going on during the "mania" phase, the first one that inflates the bubble for speculative reasons and a second one fed by the "irrational exuberance" created by the mania effect itself is critical.

Even though what is a bubble and which are the bubble lifecycle stages is now clear, relevant questions arises: what are the main drivers that are able to support this "out of the lines" performance of the stock market? What are the drivers that are able to pilot people to detach from the reality proposed by numbers and make them believe in an idea based on mere excitement of investors?

2.2 Bubble root causes

Many scholars have tried to figure out what are the main drivers that could lead to the creation but, most important, to the inflation of a bubble. Robert J Shiller in his book proposed 12 trigger factors that between the 1980s and the 2000s worked as a justification for the quick chaining trend that the stock market followed.

Following the Shiller classification, three main clusters can, the best, categorize the trigger events that led to the most recent bubbles: trust and market expectations, psychological factors and mass media impacts.

2.2.1 Trust and market expectations

To talk about excessive trust and expectations as a trigger for an inflationary bubble two main factors must be considered:

- the unconscious imagination, usually by a relevant technology innovation
- the optimistic trust in the stock market.

The best way to better details both is to go through major bubbles that took place under the in 1993 the World Shiller Observation Period.

Wide Web had its first appearance on media since 1994 when it started to be widely accessible from the public. The internet era was getting started, a kind of revolution that would have changed everything in the world as it was known so far. The internet gave the idea that everyone could have "ran the world", be part of everything, everywhere, anytime. Such huge emotion fed the idea that internet had to have for sure a strong economic impact. This is where mentioned "unconscious imagination" took its place as a trigger element that gave the possibility to an innovation to be inflated by excited investors, as a bubble. The dot-com mania was born and since 1997 the NASDAQ index

skyrocketed rolling, on a weekly basis, reaching high levels of price-earnings ratio till beginning of 2000.
This is a perfect example of how, what counts the most for an economic boom is not mainly the relevance of an important innovation itself while the unconscious imagination that is able to push to people.

The second trigger worth to analyze is about the trust in the stock market as a "reliable" form of investment (and the related optimistic market forecast).

As an example, during the 1980s, well earlier than the Real Estate bubble, people were believing that the real estate market, that "putting money into bricks", was the safest and most secure line of investment. As previously shared, such idea showed up as totally wrong and the real estate market was the center of gravity of one of the biggest speculative stock market bubble.

Similar experience took place since 1990: in those years the new "perfect investment" was the stock market. Robert Shiller conducted a survey in 1999 questioning a sample of wealthy American families asking if they agreed with the idea that the stock market was the best form of investment for long time investors. The 79% of the wealthy families, an extraordinarily high result for any type of survey, totally agreed the quote.

Many factors affected the idea that people built upon the stock market and, most of them are unreasonably made up upon psychological factors, widely shared ideas, certainties that, most of the times, are not based on forecast from expert analysts.

The question now comes by itself: where does these certainties comes from? Why people tend to base their decisions on shared ideas and not on forecast and analysis? Where does this trust come from? The following chapter will focus a specific section on the psychological relevant side of the "certainties" on which people base their decision.

2.2.2 Psychological factors

Clearly understanding the fundamental role that psychological factors plays in market trend is critical to appreciate how such relevant driver is able to push the market trend so out of track, so far from reality standards, to an extent to create a bubble.

Many psychological researches show how there is something, in human actions about market decisions, that couldn't be explained if the market acted in a total rational way; most of the decisions about whether to invest or not are somehow forced by external factors far from the rationality pushed by forecasts provided by experts.
The summary of such researches is that the process of decision making by investors is heavily sustained by two psychological behaviors: the strength of moral anchors and gregarious behavior.

2.2.2.1 Moral Anchors

Many psychologists have highlighted how in situation of need people tend to find anchors as a base to take decisions. Anchors can be distinguished in moral anchors and quantitative ones.

A quantitative anchor, not in interest of our analysis, is when the underlying "certainties" driving decisions are based on reliable expectations, such as the ones based on market trend studies, indicating what should be the "right level" of the market to measure whether the market is over/undercut.

On the other hand a moral anchor is driven by the psychological principle that explains how every human acts as in the form of *narration and justification*: a such behavior, the typical one featured by bubble cases, elucidates how investors, when adjusting their choices on moral anchors, tend to compare the proposed anchor (in the form of a story/fact) to their own wealth. People are not tent to sell the stocks when the value of the stock itself gets "slightly high" because they are not able to judge whether this high price is aligned to right level of the market. If the value of the market continues to grow, getting "sharped high", the investor would tend to sell confronting the anchor he's basing his decision to sell to its current standard of living.

To further support the *narration and justification* behavior a study by Amos Tversky and Daniel Kahneman shows how, when proposing a question that could be answered by a figure like: "how many states are in the EU?" people were highly conditioned by a number that was randomly extracted, as a kind of reference for the answer, while the question was proposed. This example perfectly explains how, in a situation of need, any anchor available is used in order to take a choice, no matter whether it is a quantitative or a moral one.

2.2.2.2 Gregarious Behavior

A second important factor to take in consideration, while analyzing psychological rationales feeding bubbles, is the gregarious behavior. Two studies help to understand it and the impact of social pressure on the ability to take a decision from an individual.

The first one comes from Solomon E. Asch (Social Psychologist, Warsaw 1907, September 14th – Haverford, 1996, February 20th) that through a quite famous experiment in 1952, explained how the social pressure has a strong influence on individual judgement. The Asch experiment consisted in testing just one person at the time vs. an easy challenge: the tester was introduced in a room filled by actors where everybody had to give their judgment on simple matter as "if shown 5 lines, what was the shorter". The actors were asked to all agree on the same wrong answer. The tested people, under the artificially created "social pressure", followed the other ones and gave the wrong answer too. The outcome of the experiment was clear: under social pressure most of the tested people follow the group; however, there is a twofold reading of the results: a first one, that sees the choice of the tested people as influenced by the willingness to pursue the social disapproval and a second one that sees the choice aligned to the idea that, if everyone in a group of people agree on something probably they are right. It's easy to appreciate how the latter one is consistent with previous findings: in everyday life people live under the almost certainty that, if, a vast number of people unanimously have the same opinion on a certain matter they are most likely right. A more balanced view is summarized in an Asch quote: "Life in society requires consensus as an indispensable condition. But consensus, to be productive, requires that each individual contribute independently out of his experience and insight."

Another important example of gregarious behavior is given by Stanley Milgram: it is about the power of authorities and straightly summarized in his quote "it is not what subjects do but for whom they are doing it that counts".

Milgram experiment revolves around a series of orders given by an authority (in the experiment represented by a scientist) to the tested people. The orders consisted in inflicting electric shock to a third person. The experiment demonstrates that following the direction of the authority, even if it is about an unpleased ask, the tested people continued inflicting the shocks. The reading of the experiment explained is a clear spotlight on the enormous influence that an authority has on people, authority that must not be only seen as someone having "power", but also as someone influential

leveraging on its knowhow or social position: on purpose, an investor in the context of an investment fund can be a proper example.

The psychological factors analyzed in this paragraph give just an idea of all the influencing pressure under which people, as investors or not, are subject to when they make a decision.

Economist scholars have for a long time tried to adapt psychological behavior to economic activities and, in particular, to understand speculative bubbles. One of the many adaptations is represented by the idea of "cascades of information" described by the economists from UCLA Sushil Bikhchandani, David Hirsh Leifer e Ivo Welch. A "cascades of information" is a phenomenon by which a belief is trusted by everybody in a group even though there are consistent evidence against the belief itself. This belief is able to create a snowball effect while more and more people are influenced by the social environment. It's clear the potential danger hiding behind the idea of a "cascades of information", not only talking about its ability to have an impact on the financial market and to create a speculative bubble but even under a political aspect, as an example, creating a wave of fake news during an election campaign.

2.2.3 Mass media

The role of communication channels in inflating speculative bubbles perfectly fits in the scheme of proposed psychological theories about human behavior: trusted media, newspapers, TV broadcasters can easily play the role of the "authority" mentioned in above Milgram experiment influencing information that consumers tend to believe in as a reliable truth.

As for the Milgram experiment, media & communications doesn't fail to be adapted to mentioned Amos Tversky and Daniel Kahneman experiment. When, for any reason, the population is under pressure to make a choice (ex. elections, referendums), newspaper can propose news giving a biased reading, covertly suggesting a moral anchor to the readers.

The relevance of how newspapers propose news to readers, how comm & media tend to stress some aspects about a news and to hide some others, how this approach has an impact on the stock market, will be the center of gravity of this paragraph.

Focusing on the stock market, communication means are able to create differentiated flows of way of thinking and to create the ground on which decisions of consumers and investors take place: often, unconsciously or on purpose, news are able to push changes in stock price, for example revamping past news and events regarding a specific matter. All in all, newspapers are able to give more power to a news pushing retroactive effect on market prices, possibly, inflating a speculative bubble.

A clear example of biased information is the concept of "filter bubble" introduced by the activist Eli Pariser (author and entrepreneur, Lincolnville 1980, December 17th) focused on how the most important news websites are acting a personalization of the search results depending on the person performing the research. He did an experiment showing how different people got totally different results googling the same world. This personalization is the perfect expression of the idea of creating different "flows of thinkers": every searcher finds out just results and news in accordance to his own ideologies.

According to the "filter bubble" concept, when a researcher start to search news about the stock market he'll probably find news in accordance to its previous belief, further supporting his idea: an effective vehicle to create the perfect snowball effect as described by Sushil Bikhchandani, David Hirsh Leifer e Ivo Welch in their theory about the "cascades of information".

Also, the mentioned 2016 Nigeria case study can be helpful again in understanding the possible impact that biased news can have on the ability of decision making of investors. The Fig. 5 shows the interest on google regarding the word "bitcoin" in 2016. As shown in the table between September 2016 a January 2016 the number of people in Nigeria searching for the word "bitcoin" on google saw a rapid growth.

Fig. 5 – Interest over time, from Google Trends, in Nigeria about the word "bitcoin"

As seen, the idea that pushed Nigerians to invest in bitcoins was the failure of the Nigerian government to face with the economic crisis and the consequent monetary crisis. Nigerians were looking (searching) for safe assets to protect their savings from the currency depreciation issue. A "filter bubble" in a context were everybody were looking for safe assets, thanks to an adaptation of the results to the searchers preferences, would have led to investing bigger amounts of money in a so flyable good as cryptocurrency is.

Even though the Nigerian one is a theoretical "filter bubble" case, it is a likely case about how communication channels play a fundamental role impacting the trend of the stock market, an idea commonly shared by many scholars. Many empirical researches are supporting such idea.

Under a literature perspective, two main clusters have been defined about how the information may affect stock markets ("Tests of Stock Market Efficiency Following Major Events" by Frank K. Reilly (University of Wyoming) and Eugene F. Dziekanski (University of Wisconsin at Oshkosh))

The first cluster can be represented in the idea of "Advocates of "efficient markets" that expect prices to adjust to major events so rapidly that those not anticipating the occurrence could not profit from such available information".

A supporting research was made by Victor Niederhofern, an American hedge fund manager that in 1971 published a research analyzing if along the days in which newspaper published news of world relevance corresponded with significant changes in prices in the stock market. His findings didn't highlight a strong relation between relevant news published and important consequent changes in the stock market; in contrast, he described news as often late in respect to the changes that a big event took in the stock market.

In contrast, a second cluster "…hold that price reaction is sufficiently imperfect as to provide an agile investor above-average profit by investing shortly after the announcement.". This second reading leaves open space to idea that the publishing of a relevant news is a fundamental push, negatively or otherwise, to the price level in the stock market.

2.3 Amplification factors - The feedback loop theory

The feedback loop theory is the simple explanation of how, once triggered, a round of price increase acts retroactively on a next one increasing price even more (thanks to a triggered growing demand from investors). The feedback loop theory follows the rules of a linear retroaction curve and bases its effectivity on both "adaptive expectations" and "trust": Robert Shiller (Economist, Detroit 1946, March 26th) differentiates its analysis form a such widely shared idea in its book "irrational exuberance" where he argues that the retroaction curve doesn't ground its effect on the idea of adaptive expectations but on trust of investors; he actually sustains the idea of the investor free falling in the net of the retroactivity itself, excited by the idea of "playing with the house money". Worth to stress that despite whether triggered by adaptive expectations or trust of investors the speculative bubble from a feedback loop can't grow forever: demand must eventually stop and prices consequently, all at once, fall. When the demand got started decreasing a negative bubble should occur: a descendent retroaction should make price fall lower and lower and demand must follow.

How the retroaction curve is contributing to the creation of a bubble is also supported by speculative events driven by Charles Ponzi (fixer, Lugo 1882, March 3rd – Rio de Janeiro, 1949 January 18th) a hundred of years ago. Along the 1920, Ponzi was able to attract more than 15.000 investors creating a chain scheme based on a positive retroaction: what subsequently gain the name of the "Ponzi scheme" worked as "promising high financial returns or dividends not available through traditional investments. Instead of investing the fund of victims, the con man was used to pay "dividends" to new investors using the funds from previous investors."

The Ponzi scheme is one of the most famous existing frauds and the perfect example of the great impact that seeing people making money has on other people: the Ponzi scheme explains how a retroactive curve can, clearly, feed a bubble and, when it explode, how it can have catastrophic impact on everyone involved.

The Ponzi scheme can even "unconsciously" create & feed a bubble: this happens when for any reason price in the stock market start to rise and such rising repays the investors that tend to invest more for the purpose of increasing their return (an idea really close to the concept of "irrational exuberance" when, more than the idea of investing in something based on its real intrinsic worth it happens for riding the waves of higher returns). "The more the prices increase the more the exuberance is strengthened by the increasing of price itself"

2.4 Rational and Irrational bubbles

Previous chapters tried to understand what a bubble is and the main triggers and factors that can inflate the bubble.

Scholars and speculators have for long tried to understand the mechanism that are behind a bubble to prevent it, or, to surf the wave of the speculative gain. Two sharply different schools of thought took space in the study of the triggers able to inflate a bubble. These two flows were born from two very different readings about the ability of investors to really understand the market and, so, to react: the "rational expectation" flow and the "irrational expectation" flow.

"In economics, "rational expectations" are model-consistent expectations, in that agents inside the model are assumed to "know the model" and on average take the model's predictions as valid."
Following the idea that agents, as investors, are able to base their decisions on trustable predictions (reliable news and in general all information available), speculative bubbles are, then, rationally created by agents themselves and so, able to be controlled. The concept of "rational bubble" has been contrasted for long time. The first thing that attracted critiques is the main pillars on which "rational expectations" model base its ground: the reliability of information that agents can use to make decisions. The critiques revolve around the idea that most of information available to investors, and that help them to create "expectations", are somehow biased: as the previous paragraph highlighted newspaper and information means in general are able to, giving less or more weight to certain aspect of a new, to change the idea that the reader have about that certain fact. Other critiques have highlighted how expectations must be studied just as the influence able to be imposed on investors. "Expectations have to be considered as an ultimate given, if it is their influence, and not the influence of their determinants, that the economist wants to examine". As quoted by Lynn A. Stout in "Irrational Expectations," 3 Legal Theory 227 (1997) "When applied to speculative trading, however, the rational expectations model appears both theoretically and empirically flawed."

On the other side of the coin there is the concept of "irrational expectations".
If talking about rational expectation what counts the most is the trust about the reliability of information available to consumers, irrational expectation takes in consideration the "human" factor meant, as Dan Ariely said, as "the meaning of their actions".

Even trying to pretend that, when making a choice, an investor is able to have all the information he needs, there are many other factors that must be taken in consideration. As the paragraph on impact of psychological factors on the inflation of a bubble highlights, many human's behavior can't be explained as base for rational decisions. Taking in consideration the idea of moral anchors, the impact that biased news can have on the behavior of investors, the pushes of social pressure, assuming that the trend of the stock market is supported just by rational actors and their ability to take decision "impartially", is hard to believe.

3. The role of technology innovations as a driver for bubble

The excitement from investors can be provoked by many factors. This triggering factors can be found, under a psychological perspective, in the form of social pressure or led by widespread ideas as a result of "cascades of information". Nevertheless, as seen in the "Bubble root causes" section, looking at the causes that leads to its inflation, it comes clear that something must kick off the "exuberance". In the case of the dot-com mania, what was able to excite the investors was a sort of "fear of missing out": everyone wanted to be part of the ideal "future" that the advent of internet was proposing.

It's clear how major innovations, in any field, have important impacts on the stock market through the ideal high expectations that such innovations indirectly suggest about life improvement. Changes and discoveries in any field, medical, physical, economical, carry with them an idea of change that suggest to impulsive investors the opportunity to "win against the house".

Within the different innovation fields, and even acknowledging the revolutionary aspect that important medical or others discoveries can have, nothing has as big impact on the stock market as technological innovation.

3.1 Tech bubbles

To better appreciate, it is worth to focus for a while on the birth of the internet as a technology lever: the idea that "the use of internet gives to people the sensation to be owners of the world" was the mantra. This means that, for the most, it was the "sensation" that the internet, the tech lever, gave to people that was able to sustain such an economic impact. So, improvement in the technological field are able to give the impression to investors that a new world is coming, a new world they must be part of. The sooner, the better.

The wide spread idea that technology innovations, more than others, are able to sustain the excitement of investors, gave birth to the term "tech bubble". A Tech bubble refers, in fact, to a market rise

sustained by a speculation in technology stocks, a speculation often sustained by valuation based on price/earnings ratios and price/sales ratio.

3.2 Case studies

3.2.1 The dot-com bubble: **priceline.com** *case study*

Priceline.com is the perfect example to share the Tech bubble lifecyle, how it was inflated and why. Priceline.com was founded by Jay Walker in 1998. It was born as an effective solution to a real problem: on those years, more than 500.000 airline seats were going unsold on a daily basis and Priceline.com was simply offering those seats to people that could propose the price they were willing to pay. By the end of 1999 it was selling more than1.000 tickets a day defining Priceline.com as a dot-com "overnight success".

In order to be able to sustain the increasing demand for tickets Priceline.com had to start to buy tickets at the ordinary open market loosing up to 30$ for each ticket sold. What was, then, the shield that a company losing money on any transaction while still considered as a "changing world" company was holding up? The IPO. The revenue coming from the IPO, once occurred, would have been significantly higher than extra costs they were facing with on a daily basis, to an extent to make Walker a very reach man. And buying shares about a no-profitable company, as Priceline.com was, at that age was seen as a profitable investment as the most important KPI the investors were looking at was the Customer Base dimension, seen as a KPI measuring the potential to grow and the ability to successfully operate a profitable IPO. To an extent that losing money become kind ok the symbol of a successful dot-com. To stress, in some cases, entrepreneurships in the internet sector was considering making money as counterproductive for their valuation as an internet company.

Three pillars on which basing a working internet company, then, starting to spread:

- the tendency to sell products at a loss in order to gain that market share
- a willingness to spend lavishly on branding and advertising to raise brand awareness
- a sky-high stock market valuation that was decoupled from any sort of profitability or rationality.

The dot-com bubble grew and grew till 1999 when the question became no more about whether the dot-com was a bubble or not but more about how much it could grow and when it would eventually

explode. The escalation, ultimately, started: the weakest dot-com started to totter, stock prices started to fall and, for many companies it ended up in bankruptcies. Nasdaq index lost 80% of its value: it went from 5.048 on March 10, 2000 to 1.114 on October 9, 2002.

The crash had an incredibly disaster effect not only in the technology field, but of course, on big hedge funds that rode the wave of vertiginously price/earnings index losing the chance to step out of the train on time before it crashed. Between 2001 and 2004, 200.000 people lost their job only in the Silicon Valley.

Today technology field is still featuring the dot-com scars and any new "changing world" like idea of business recreates the fear of possibly creating the excitement in investor, investing, once again, in something worthless.

Said that, and despite past economic tragedy and future fears, it is worth to stress how any economic boom is generally triggered by relevant technology innovations. Even today technology is continuously redefining life, society and business.

3.2.1 Unicorns case study

Unicorns are highly performing companies, usually and easily worth more than $1billion, based on business models that make them highly competitive thanks to their "digital purity". Unicorns are born without, almost any, internal structural cost resulting in the agility and ability to get high earning at additional marginal, sometime, zeroed, costs. What allows unicorns to be almost "costless" is their ability to rely on external assets (and costs) and, then, to match unlimited offering with unlimited demand. An example is Airbnb (net worth $31 billions) being a kind of hotel without owning any brick: Airbnb has 21.300 houses listed on its site without dealing with any maintenance or management cost. It's Digital Business Model, and underlying technology, enables Airbnb to make available such worldwide bouquet of accommodation on a worldwide level. The same concept can be applied to any of the more 400 unicorns recognized and listed in 2020. One of Airbnb most relevant "legacy" competitor, Hilton, has a significantly lower accommodation availability and a significantly higher cost per accommodation to face with due to building taxes, maintenance, employees etc. Hilton has 170.000 employee's vs 3.000 employees from Airbnb. Grammarly, as a further example, is a Digital Company providing text corrections, has only 200 workers in respect to 20.000.000 daily active users.

These companies, riding the wave of technological innovations, are able to be so highly competitive that would be worthless for any "traditional" company to try to compete. Thanks to their flexible nature and their ability to adapt to the demand of the consumers, these companies are able to pose a "disruption" threat to major market leaders.

Three factors mainly allow unicorns to keep up their "pure digital" dream:

- the technological levers, being represented by the fundamental space that smartphone is gaining in the daily routine of everyone
- the digitalization of content
- the mobility, that allows everyone to access to those contents everywhere, anytime.

Door Dash, a food delivery company, is a further example of unicorn relying on Digital business model; Door Dash entered the gold list of unicorns in 2018 and in less than four months saw its valuation tripled, even having bunch of complains about the "awful" service that if offers to clients on every possible online site.
How was Door Dash able to triple its valuation in four months? Has it increased the service quality? Has it squeezed the delivery times? Are they going to face with the risk of being a unicorn bubble?

Many scholars and frequenters of the financial world believe that they are living in a déjà vu experiencing again the tech bubble of 2000. In fact, the National Bureau of Economic Research has estimated that, on average, unicorn valuations are 50% overvalued. A study made by researchers at the University of British Columbia and Stanford made on 135 startups valued $1 billion or more highlighted how nearly half of them should be fairly valued less than $1 billion.

The unicorns are just another clue of how technological innovations are able to create business concurrently with a such excitement in investors to allow newborn tech companies to be up to 50% overvalued. This analysis doesn't want to point the finger on unicorns as the next "up to" burst bubble, but, eventually, it has all the right credentials to take a leading role in kicking off a next "tech leaded" exuberance of investors.

3.3 Importance of news in spreading tech bubbles

"The news does have a market effect but the final effect of that news is to precipitate market action that would probably have occurred anyway (although perhaps to a lesser degree) without

benefit of bad news" Charles E. Merrill. The advent of the internet gave the possibility to everyone to be everywhere, to reach people halfway around the world, to be able to gain almost any information and, every day, more possibility in any field are coming from the technological leverage.

But, however, internet, social networks and so on gave the possibility to post, and make public everything with almost no control… what is online once it is there forever.

Here it's where society as Facebook, Twitter, Google and similar had to start dealing with fake news, inappropriate content and so on.

Since anyone can post anything, matters as the stock market, technological innovations, medical discoveries etc. Become something anyone can argue on. Everyday freelancers and bloggers writing on financial site argues on matters that even famous economists would have reserves on, giving sentence that would, eventually, influence a naive reader. Considering how viral can go an article, thanks to others platforms such as social networks, the impact of a probably unreliable news on the stock market can be huge.

Sometimes, as highlighted by Forbes, fake news are not the result of superficial knowledge of the writer while, indeed, something artificially created as a mean for a purpose: "Fake news in the financial market has been a problem for a long time, we just didn't call it fake news" says Anton Gordon, co-founder of Indexer.me.

Following this view, technological developments, are not just the trigger events that push investors excitement but can actually create and spread financial bubbles though the mean of fake news.

Tesla, (formerly Tesla Motors, Inc.) is a famous American electric vehicle and clean energy company that from 2018 can boast incredible high shares in the stock market. In September 2018 Cambridge Core published an article called "What Does the Success of Tesla Means for the Future Dynamics in the Global Automobile Sector" mainly highlighting that "the success of Tesla has heralded a new era in the automobile industry as innovation and competition in the automotive sector increases, consumers will be the big winners". This was the idea that most of the article regarding Tesla was proposing: a new era for automobile industry was starting a Tesla was leading the army. Tesla shares started to rise and rise but, the revenues that would come out trying to guess looking at shares are totally different that the ones in reality.

On 2019 newspapers were getting started to sign a different tune. Forbes in February 2020 wrote: “Tesla’s 34% decline in U.S. revenues in the fourth quarter follows on the 39% year-on-year decline reported for the third quarter, and shows that this company has no commercial momentum in its largest and most important market.”

The electric car revolution simply is not occurring.

The difference between the value of Tesla on the stock market and the real ability of the society to work on its revenues and profitability tips its hands: it was the widely shared idea that Tesla was the future, more than its actually ability to “build the future”, that excited newspapers and so investors.

It eventually comes clear the role that newspaper, and, more in general, any type of communication channels, plays in spreading news able to kick off the excitement of investors. In particular, as seen, the tech world is always under the spotlight when it comes, for investors, to find the “one time in a life” shot.

4. The cryptocurrency fever and the bubble risk

4.1 The cryptocurrency bias

Despite the noble intent to override relevant constraints featured by ordinary economic and financial transactions when performed cross currency at a global level, cryptocurrency is still struggling to definitely fly. The issue sees its root causes in some cryptocurrency bias featuring different levels of ability to be fixed.

4.1.1 Too early too fast

Valuable concepts and related business models on which enterprises like Priceline.com or Tesla can be, seen out of its historical context, considered ad brilliant ideas.
Jay S. Walker, the founder of Priceline.com, and Elon Musk, the mind behind Tesla, were both able to predict a future that would eventually come but not, unfortunately, as soon as they predict.
This characteristic of "one-night success" to be in the right place but at the wrong time, is, unfortunately, what led to the eventually loose relevant chunk of market demand.

The idea of being highly innovative while exceedingly futuristic can be summarized in the concept "too early, too fast". This phenomenon can generally characterize all the enterprises that leveraging on incredibly illuminating and futuristic views able to arouse feeling of optimism, confidence and high expectations in investors, are not able, on the medium / long term, to constantly sustain the demand.

It's clear how these innovative revolutions in any sphere, but mostly in the tech environment, are fundamental and extraordinary discoveries. Just looking at the last few years, fundamental inventions saw the light for the first time making long lasting, "legacy", company suffering from their possible gain of share between consumers.

Online streaming platforms, retinal implants, digital assistants, Blockchain, e-cigarettes are just some examples.

Just listing some of these incredible discoveries it comes clear how, many of those, were actually able to gain consent and increase their ability of exciting demand while, on the other hand, how other ones are still quite too "futuristic for these days".

As an example of "working" discoveries disrupting legacy market let's focus, as an instance, on electronic cigarettes, a technology that even though is recently gaining more and more market share it was at first introduced in 1887. "Dr. Scott's Electric Cigarettes" published in 1887 on the Harper's Weekly is an article sponsoring the first electronic cigarette that could turn up without matches and reduce its injurious qualities.

It took years for the electronic cigarettes to actually gain such a consistence share in the market and to be able to put under threat major tobacco companies. "E-cigarettes are now the most commonly used tobacco product among youth, surpassing conventional cigarettes in 2014."

Even though the question about whether e-cigarettes are really able to, somehow help smokers to quit their habits or, to, anyway, safeguard their wealth is still under study, it's clear how such innovative tech took many years to be actually recognized and it is now gaining so much consensus throughout consumers that major tobacco companies as Philip Morris had to come out with their own e-cigarette.

The e-cigarette example perfectly fit the typical pattern of the "too early, too fast" concept. Something born too early to be able to deploy its intent of shaping somehow the everyday habits of consumers, introduced in the open market too early for its worth to be recognized.

Will Tesla motors follow the same path? Will bitcoins do so? As it did for e-cigarettes and dot-coms only time will tell.

What is true is that the electric car revolution proposed by Tesla as well as the currency revolution proposed by Bitcoins, for the time being, are both not occurring.

4.1.2 Investments in currency

The second "bias" that can lead to current failure of the initial mission of Bitcoins is its ability to attract speculative investors (instead of "trustee" driven by the ideal view of the future of currency.

How can this pattern be explained?

In history there are few examples of how investors, excited by the idea of gaining easy money following the flow of the most valuable currency, have then created a speculative bubble that led, in the worst case, to a national financial crisis.

One of such "worst case" can be found the 2008 – 2011 Iceland financial crisis case study.

Everything started few years earlier, on 2000, when Iceland executive allowed the bank industry to start a privatization path. As a consequence, the banking sector started to growth rapidly, somehow freed from constraints set out by government about interest rate and necessary requirements to get mortgages.

Rapidly, two factors were able to attract thousands of international investors: how easily Icelanders could get a loan and the related sharp growth of the value of Iceland currency (Icelandic króna).

Even though such incredible growth was due too international investors betting money in a rapidly growth country, this expansion was partially, if not fully, genuinely driven by the heedless behavior of banks triggering a huge demand for loans at an international level the led, inevitably, to a crazy growth of the value of the Icelandic Króna. Investors, on their side, met their match inflating a speculative bubble revolving around the Icelandic currency.

Iceland economy was crazily growing: between 2003 and 2008 prices on Iceland stock market increased by 900% thanks to global investors. In 2007 two third of the financial wealth of Iceland came from abroad.

In 2008 global recession hit Iceland and when bank tried to take their capital back faced with a suicide mission to take on.

Generally speaking, investing on currency is not something that economist are used to point the finger on. Currency investments, as government securities investments, intended as mean to "bet" on a performing country, are totally legitimate type investments. But as these investments are able to change the fate of the economic trends of a country some measure to control must be introduced as a possible solution.

As the Iceland case study highlights, speculative investments on currency can have disaster effect on the economy of a country and its citizens. Iceland was able to recover from the 2008 catastrophic economic situation only thanks to the support of government and financial, then nationalized, institutions.

The weak point for Bitcoins, unfortunately, is that it can't boast the same support. A such weak point as a consequence, is structurally threatening the Bitcoins ability to play the role they were created for: a unitary global currency.

Trying to read investments in bitcoins with the same lens as investment in any national currency has no sense: on one side, national currency reflects the economic, political, and social trend of the country (not considering the ability of impose monetary policy from the authorities). On the other hand, the value of Bitcoin is mostly imposed by the trend of the market and by investors behavior. Again, the "mantra" about the lack of relationship of Bitcoins with an its own asset is there… It looks, from this point of view, that investors are actually betting on empty box hoping future demand would eventually fill. Exactly, by the way, as it is used to happen about IPO's; IPO's, in fact, are partially built on the "empty box" analogy: the rising money ability and related magnitude in terms of fund that IPO allows a company to reach, will give the company itself an enormous power to growth and extent, to, then, fill the "empty" box [3]

4.1.3 The normative bias

What is the main gap that must be filled in order to be able to, at least start, to consider Bitcoins as a real currency and not just a speculative mean or money transfer for illegal purpose?
Third main bias to consider in order to understand the reasons why Bitcoins is sitting at the wrong "speculative and illegal" table is the huge normative hole in which Bitcoins is floating.

Till now most normative rules that have been imposed regarding bitcoins only covered the aspect of whether the use of the cryptocurrency is recognized or not by governments as a legitimate currency.

[3] Here "empty" is intended in the sense that IPO provide so much opportunity and so, take a such exponential growth, that confronting the before IPO vs after IPO boxes the latter one would look empty.

The European union, since 2014 is struggling to try to give Bitcoins a collocation on which base its normative regulation. Unfortunately, the only few steps forwards the EU took were not worded as a normative paper while as a kind of “by elimination” job: as an example, regarding the inapplicability of VAT/GST taxes to exchange between National currencies and Bitcoins. Both the European Union an G7, as many countries, in various events highlighted how Bitcoins may "pose challenges to countries in anti-money laundering/counter terrorist financing regulation and supervision” (da Guidance for a risk-based approach. Paris: Financial Action Task Force, June 2013).

How can Bitcoins be recognized as a proper currency if there is no regulation regarding, as an example, its interest rate ruled by financial institutions such as central banks? As long as Bitcoins keep featuring an unlimited ability to fluctuate between crazy high and crazy low levels, also due to the missing of a normative ground that could cap such fluctuation, it will never fly.

4.2 The past of cryptocurrency: an historical Bitcoin market trend analysis

The history of Bitcoins, even though relatively short, is full of fundamental events that were able to shock the stock market and investors in many occasions. The main events that characterized the trend that Bitcoin followed from its appearance in 2008 with the Nakamoto “white paper” perfectly highlight how Bitcoin is struggling to fit the role for which it is was created for.

The missing of normative regulation for Bitcoins, its “too early, too fast” inability to take its own place as a currency and the consequently, wrongly inspired, idea of speculative investment, were, as previously stressed, the main bias that led to the biggest “ups and downs” that bitcoins trend saw in its life.

To better characterized and explains how the previously mentioned bias have been able to strongly affect the trend of Bitcoins and its reliability as a global currency, two cases can be used: the launch of Silk Road and the biggest hack of Bitcoins history.

The Silk Road case is a perfect example about how the mentioned lack of a normative base for Bitcoin usage and transaction created a massive confusion that didn’t allowed the cryptocurrency to actually find its legitimate space. It is the most famous case where Bitcoin weaknesses were leveraged to fuel illegal activities, a perfect example of how the missing of a regulation acted as a laissez-paisser for illegal usage of the currency. On 2011, Silk Road was an online black market selling mostly drugs, it

was operated as a tor hidden serviced exclusively relying on Bitcoins for payment as Bitcoins was the only currency laying on the secrecy of the transactions.
The Silk Road case doesn't only highlight the importance of a regulation in stopping illegal purposes while also stressing global economic impacts from lack of a such regulation: when the FBI shut down Silk Road, on 2nd of October of 2013, Bitcoin price dropped from $139 to $109.71 in less than three hours. When Silk Road was closed it worth more than 3.6 million of dollars in Bitcoins.

The second mentioned event is about the greatest hake of Bitcoins that took place in 2010. On 15th of August 2010 a hacker was able to find a vulnerability spot in the system and created, from scratch, 184 billion Bitcoins. In order to face with such event and to survive the crisis Nakamoto had to just delete 184 billion of mined Bitcoins. A further relevant event further stressing the enormous possibility of failure of bitcoins and its distance from being an actual trusted currency (even though looking at the actual value of bitcoins, it would seem that no one noted it).

Everything mentioned, from Bitcoins most problematic issues up to the impact that these issues had on the market as well as the response of investors and buyers in respect to the Bitcoins matter, just highlight the unsuitability of Bitcoins in today's mechanism of demand and offer. The "too early, too fast" pattern, previously described, is satisfied by almost any movement that Bitcoins made along the market: the crazy rapid growth that the cryptocurrency is still experiencing is the result of two clear phenomena: it was started by the initial excitement that created in investors and consequently it was holding up by merely speculative purpose. The fact that Bitcoins could have a central role in an ideal future is still trusted by many but, for the time being, it's just an empty box that is not going to fill up soon.

4.3 The future of cryptocurrency: a potential evolutive scenario

As largely analyzed current fallibility of the cryptocurrency system due to its "bias" dictating the impulsive behavior of investors and, consequently, the ups and downs in the market, doesn't, anyway, state that the future won't be cryptocurrency-friendly.
The idea behind Bitcoins put the spotlight on a cashless, high-speed, future transfer of money that can keep up with the speed of a world that, thanks to new, ever going, innovations, needs the support of faster and faster business operations infrastructure.

The rush started at the end of nineteenth, with the dot-com, the idea that everyone needs to take place in the "new world" that could allow to do everything, be everywhere, anytime, to connect people all around the world will eventually never end.
Since then, many technology innovative levers were deployed and consequent economic growth happened. As a consequence, more than ever the rush for a first-row place in the fourth industrial revolution has been obsessing investors, sellers, buyers.

And the best seems still to come.

It seems we're now going to surf a new, relevant, technology wave able to dramatically improve our life and, as a consequence, able to push a new sharp economic growth: the 5G. 5G is the new mobile data connection technology promising to sharply increase both connections speed and bandwidth (meant as volumes of information transmitted per second). As a consequence, all the business models, such as the ones about Smart City or Digital Health, that required the real time transfer of huge volume of data (structurally inhibited by current 4G technology) will be enabled. A virtuous circle of demand and consequently economic growth will likely happen.
The 5G, whether morally questionable or not [4], is something that, if the world keeps developing at this speed, will be fundamental. In the case of 5G majors' industries are fighting to get exclusive on the technology. Investors and analysts are more and more stepping into such market.

On the other hand, who's betting on Bitcoins?

The purpose of the comparison between these two disruptive technologies and business innovations is to highlight how, more than the confidence that investors have in a project, it is fundamental the confidence that the technology society (in this case) have about the reliability and applicability of a new technology and business wave.

Once understood that Bitcoins right now are not finding their collocation and once understood the related root causes, the question now shift to whether and when the demand will eventually pose its burden on the need of a cryptocurrency.

[4] New anti-5G movements and groups are born every day on social media claiming that 5G will sharply increase electromagnetic pollution and, then, sharply increase risk for health (even though scientists still haven't found a common solution to such question).

Nothing can actually assure that a cryptocurrency, whether bitcoins or not, won't be needed in an eventual future. But as highlighted, to be there, relevant bias has to be fixed.

Starting from "necessary conditions", it is fundamental to set ground on which base the normative regulations, to start from an international recognition of the legality of the currency to safeguard its functionality. Being recognized as an actual currency would, eventually, protect the cryptocurrency from highly speculative investments, as an example, constraining its fluctuation between known values.

Even though, the possibility of recognize a cryptocurrency as an actual currency and so putting it under the safeguards of normative regulations is feasible and "necessary", there still are some "sufficient conditions" to happen: the attention is again posed on the mother of all the question, being "when and whether the real need of a cryptocurrency will actually arise".

The commercial world and related transactions are more and more shifting toward on the online channels. As seen, unicorns' companies, pursuing the dream of digital, online, pureness, are putting under threat major long-lasting companies that are more and more going on line to tackle the disruptive threat.

Nevertheless, such shifting is not happening as sharp as it looks.

Even though the IT world is making available all the means to pursue the "online world" dream, the global community is still not willing to totally embrace a such global process. eCommerce and on line transactions seems not as profitable as it seems to fully shift to a global on line market. Even the giant of e-commerce Amazon announced that it is losing money on the "one-day shipping" service that propose to its consumers.

A digital world based on international connections and total interdependence between all countries is the dream that cryptocurrency should pursue. A world so much based on internationality of production that struggle for fast, secure, almost real time links.
The necessity, then, is the key that could allow the shift of attention from a cryptocurrency as a speculative mean to an actual fundamental mean to pursue the purpose of interdependent world trade.

Will shining time for cryptocurrency eventually come?

Only time will tell, but, seen the actual position that the currency is taking in the world economy and, the obvious difficulty to reach international economical standards of cooperation for the currency to gain a legitimate position, it’s hard to imagine a future for cryptocurrency.

As said, time will tell.

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Figures and tables

Summary in Italian

Il concetto di moneta, di *currency*, nasce migliaia di anni fa per superare i limiti strutturali del baratto nella impossibilità di standardizzare e rendere equo il valore di beni e servizi oggetto di uno scambio. Anche l'uso di beni di *commodity* per superare tali limiti, quali il sale, mostrò rapidamente la corda, in termini di usabilità, al crescere dei volumi e delle dimensioni degli scambi commerciali.

Così per come si è sviluppata nel corso dei secoli, la *currency* svolge fondamentalmente tre funzioni di base:

a. unità di conto, intesa come rappresentazione numerica convenzionale del valore di un bene/servizio
b. mezzo di scambio, ovvero uno strumento attraverso il quale scambiare beni e servizi
c. riserva di valore, cioè un modo per accumulare e mantenere la capacità di acquistare beni / servizi nel tempo.

In aggiunta, la moneta si accompagna con un *collateral*, un qualcosa di autorevole che ne garantisca il valore della stessa nell'esercizio delle tre funzioni sintetizzate, ruolo giocato nell'epoca corrente da Banche Centrali e Istituzioni Finanziarie governative.

Quando uno di questi pre-requisiti viene a mancare non si può parlare di moneta.

L'analisi critica di sé e come le criptovalute si adattino a tale schema diventa, quindi, fondante per valutarne il suo efficace utilizzo monetario rispetto al rischio speculativo che ne ha caratterizzato la storia recente.

Le criptovalute nascono nel 2008. È opinione diffusa che l'idea di criptovaluta derivi dalla trasformazione, indotta dell'enorme innovazione delle tecnologie informatiche e delle telecomunicazioni, dell'utilizzo di Internet diventato un sistema coesivo globale, specie nell'ambito delle transazioni finanziarie.

In un tale contesto di mercato sempre più digitale e globalizzato, caratterizzato da crescente numero di transazioni economiche e finanziarie internazionali cross valuta, poter operare in *realtime*, con commissioni tendenzialmente nulle e, nel contempo, in modo sicuro, è un *must*.

Tutto inizia, quindi, il 31 ottobre del 2008, quando Satoshi Nakamoto pubblica il *white paper* intitolato "Bitcoin: un sistema di cassa elettronico peer-to-peer" che introduce e descrive, per la prima volta in assoluto, principi e funzionalità sia della nuova valuta che della Blockchain, l'infrastruttura tecnologica abilitante[5].

Il 3 gennaio 2010, il primo "blocco", il primo Bitcoin, è creato dallo stesso Nakamoto attraverso lo standardizzato processo di *mining*. Due mesi dopo, nel marzo 2010, la prima transazione della storia del Bitcoin viene registrata. Da allora il numero di transazioni in Bitcoin è costantemente cresciuto lungo un sistematico *rollercoaster* caratterizzato da minimi e massimi distanti finanche del 50%: una volatilità non proprio consistente con le performance che tipicamente ci si aspetta da un nuovo modello disegnato per sostituire progressivamente e definitivamente quello in essere.

La sintesi comune di diversi studi individua nell'assenza del citato *collateral*, ovvero nell'assenza di una istituzione finanziaria governativa che possa definire ed esercitare una politica monetaria globale, i razionali dell'esasperata "altalenanza" del trend. Mentre il Bitcoin copre sostanzialmente bene, infatti, il ruolo richiesto da una moneta nelle tre funzioni citate a inizio di questa sezione, la sicurezza di criptovaluta e transazioni si basa totalmente sulla tecnologia sottostante: non esiste nessuna istituzione garante che intervenga in corrispondenza di eventi consapevolmente o inconsciamente speculativi che hanno caratterizzato la storia recente e generato l'ampia volatilità menzionata.

Un esempio è quello del 2014 in Nigeria. Nel 2014 la Nigeria ha dovuto affrontare una grande crisi causata dal crollo del prezzo del petrolio, bene principale su cui l'economia statale africana si basava. Con il peggioramento della crisi economica ha avuto luogo un enorme deprezzamento della valuta locale[6] e sono state attuate rigide politiche da parte del governo nigeriano per impedire l'acquisto di valuta estera come bene rifugio. Il risultato è stato la generazione naturale di un mercato nero per acquisto valuta e un relativo importante divario tra il tasso USD / NGN sul mercato nero rispetto al tasso interbancario ufficiale: in tale mercato parallelo, l'acquisto di Bitcoin la fece da padrone rendendo la Nigeria, in tutto il mondo e per tutto il 2016, l'utente principale di famoso sito di Bitcoin *trading* (Localbitcoin).

[5] La Blockchain può essere sinteticamente definita come una tecnologia che gestisce un *ledger* distribuito e indelebile di informazioni: certifica, inoltre, l'affidabilità delle parti coinvolte in una transazione, garantendo bassissimo rischio frodi e scalabilità teoricamente infinita.

[6] Il Naira, diminuito quasi del 40% nel cambio verso il dollaro statunitense

Parallelamente due importanti eventi nel 2016 fanno precipitare il valore del bitcoin, incidendo fortemente sul valore del denaro degli investitori nigeriani. Il primo ha avuto luogo il 14 gennaio quando il prezzo dei Bitcoin ha registrato un calo del 16% dopo che Mike Hearn, un ex autorevole ingegnere di Google, ha definito Bitcoin un "fallimento". Il secondo, ha luogo il 2 agosto, quando c'è stata la seconda più grande violazione della sicurezza di Bitfines (piattaforma di Bitcoin *trading*) con il furto di 120.000 Bitcoin (e ulteriore calo del 15% del valore del bitcoin). Chiunque possedesse bitcoin in queste due date ha perso un'incredibile percentuale del capitale investito.

In estrema sintesi, quindi, gli eventi nigeriani del 2016 sono un esempio quantitativo di come la mancanza di regolamentazione monetaria sia terreno fertile per dinamiche speculative. Dal 2016 molti altri casi di speculazione, con conseguenti fluttuazioni della criptovaluta, si sono susseguiti: l'intento iniziale di veicolo affidabile, veloce ed economico per transazioni finanziarie delle criptovalute è, dunque, costantemente minacciato dal rischio di bolla speculativa che ne contiene lo sviluppo. Fin quando tale rischio non viene strutturalmente disinnescato le criptovalute stenteranno a decollare e continueranno a procedere sul citato *rollercoaster*.

In tale contesto, l'analisi del mercato delle criptovalute risulta particolarmente affascinante: analizzarne il comportamento socio economico, provare a istanziarne i comportamenti mappandoli sul ciclo di vita di una bolla speculativa, può costituire un efficace ausilio per meglio classificare l'oggetto "criptovaluta" e, eventualmente, meglio valutare se e come avvicinarsi a tale veicolo, sia nel suo intento genetico di *money transfer* (e, più in generale, di pagamento elettronico internazionale) che come eventuale veicolo di investimento.

Ma cosa è una bolla speculativa? Secondo una efficace definizione largamente condivisa in economia una bolla speculativa è un ciclo economico caratterizzato da una rapida quanto elevata espansione seguita da una altrettanto repentina contrazione.

Indipendentemente dal mercato in cui si manifesta (azionario, immobiliare, tecnologico, etc.) una bolla si caratterizza per il vertiginoso "surriscaldamento" del contesto economico in cui ha luogo e l'impulsivo desiderio degli investitori di entrare nel mercato, confidenti di trarne, sul breve/medio termine, elevato profitto. Il conseguente e costante aumento degli investimenti e, quindi, della domanda, genera altrettanto continuo aumento del prezzo, fino a livelli generalmente ingiustificati e

comunque non supportati da analisi oggettive del valore dell'asset (aziende per il mercato azionario, immobili per il *real estate*, etc). Ad un certo punto della fase espansiva alcuni investitori, spesso quelli entrati nel mercato nella fase iniziale dell'espansione, prendono coscienza della insostenibilità del valore percepito rispetto a quello reale e cominciano a disinvestire; altri investitori li seguono rapidamente generando inevitabile inversione del trend di domanda e prezzo. Rapidamente il ciclo economico transita da "circolo virtuoso", in cui investimenti e rendimenti crescono, a "spirale viziosa" caratterizzata da importanti perdite rispetto al capitale investito. Appena il mercato avvia la correzione, la bolla comincia a sgonfiarsi: in alcuni casi, scoppia.

È stato così nel 17° secolo, per la bolla dei tulipani, la prima delle bolle economiche note al mondo. È stato così tra il 1997 e il 2000, per le dot-com. È stato così per la bolla immobiliare del 2008.

Relativamente alle cause scatenanti, la vasta letteratura in campo economico e delle scienze sociali individua diverse teorie sul perché si verifichino le bolle. Queste *root causes* possono essere riassunte in:

a. elevate aspettative ed eccessivo ottimismo relative alle prestazioni di mercato
b. fattori psicologici, quali le *moral anchors*[7] e *gregarious behavior*[8], entrambi fenomeni attribuibili alla "pressione sociale" e al relativo impatto che questa pone sulla capacità decisionale degli individui.
c. canali di comunicazione, che svolgono deciso potere persuasivo, magnificato, per altro, dalla proliferazione di canali digitali (social network, blog, etc.) e dalla diffusione di informazioni spesso create e/o rilanciate da persone e canali non qualificati[9].

Indipendentemente dalla causa scatenante, il ciclo di vita di una bolla è, poi, generalmente caratterizzato nella fase espansiva, da fattori di amplificazione. Tra questi, il fenomeno del *feedback loop*: una volta attivato, un ciclo di aumento dei prezzi, agisce retroattivamente innalzando i prezzi ancora di più per effetto del concorrente innalzamento della domanda. L'esempio meglio rappresentativo di come una curva di retroazione sia in grado di contribuire alla creazione di una bolla si può trovare in una delle più famose e utilizzate frodi finanziarie, il noto schema Ponzi[10].

[7] In pratica, personali "narrazioni e giustificazioni" utilizzate dagli individui come ancore in situazioni di stress
[8] In questo contesto la mentalità di gregge è intesa sia nel senso di seguire i comportamenti di un gruppo per omologazione che nel seguire ciecamente un'autorità
[9] Un interessante effetto dell'avvento dei canali digitali è quello dei "filter bubbles", sistemi di "personalizzazione" nelle notizie disponibili selezionate a seconda delle preferenze e dello storico di ricerca internet di un utente
[10] Si basa sulla promessa di far guadagnare cifre elevate in breve tempo invitando un soggetto a investire delle somme irrisorie. Lo schema di retroattività agisce sottoforma di pressione sociale: veder fare soldi spinge gli investitori a voler essere parte del circolo virtuoso.

Lo studio delle bolle storicamente non si è limitato a comprendere solo gli eventi scatenanti una bolla ma prova a individuare un *pattern* riconoscibile e caratteristico di nascita e sviluppo di una bolla speculativa. Da qui sono nate due opposte scuole di pensiero e altrettanto opposte concezioni di una bolla: le *rational bubbles* e le *irrational bubbles*. Nel caso delle *rational bubbles* gli "agenti" conoscono il modello e sono, quindi, in grado di formulare previsioni basate su "cognizione di causa" e, di conseguenza, affidabili. I sostenitori delle bolle irrazionali, invece, affermano che indipendentemente da qualità e quantità delle analisi disponibili, la concomitanza di componenti psicologiche, nelle forme citate di *moral anchors*, *gregarious behavior*, etc prevale.

Dal punto di vista degli impatti socio economici, riuscire a individuare tempestivamente l'alba di una fase espansiva di una bolla è, in definitiva, chiave per riuscire a contenerne efficacemente gli impatti economici e sociali ed evitare disastri simili a quelli che hanno caratterizzato gli scoppi recenti del 2000 e del 2008.

Concludendo, e sintetizzando i risultati dell'analisi, Bitcoin e criptovalute continuano ad oscillare significativamente tra dinamiche improprie e speculative e la *willingness* originaria di giocare il ruolo per il quale sono state create[11].

Le principali motivazioni per le quali la criptovaluta non riesce a superare i limiti che la costringono in un tale scivoloso angolo possono essere riassunti lungo tre semplici direttrici:

- il citato buco normativo
- il conseguente rischio di costituire veicolo di investimento monetario speculativo
- il fenomeno del *too early too fast*

Sul primo dei tre *bias*, la mancanza di una politica monetaria globale che dia autorevolezza al Bitcoin e ne regolamenti l'utilizzo, è già stata analizzata in dettaglio.

[11] Silk Road è esempio efficace di uso improprio e speculativo del Bitcoin. Operativo fino al 2013, era un sito che si occupava principalmente di vendita di droghe che, appoggiandosi alla non rintracciabilità delle transazioni in Bitcoins, arrivò a valere fino a 3.6 milioni di dollari.

Relativamente all'uso della criptovaluta come veicolo di investimento speculativo è corretto evidenziare che investire in una moneta, confidenti sull'imminente crescita economica e sociale di un paese, è cosa legittima. Il rovescio della medaglia, come la crisi monetaria Islandese del 2008[12] dimostra, è il forte rischio speculativo, inconsciamente o dolosamente in agguato, che l'assenza o l'abbassamento di misure di salvaguardia nei confronti degli investitori esteri può generare.

Ultimo *bias* citato tra quelli che inibiscono la diffusione attesa delle criptovalute è quello del *too early too fast*, fenomeno che si istanzia in corrispondenza di importanti innovazioni tecnologiche che scatenano modelli di business (ed eccitamento di mercati rispetto alla crescita economica attesa), a volte talmente avanzati da non poter essere efficacemente implementati sulla tecnologia che li ha generati. È successo con il boom delle dot-com degli anni '90, quando si intravedeva il boom dell'eCommerce che sta, invece, avendo successo solo di recente.
Potrebbe accadere con il 5G[13], anche se tale rischio sembra fortemente mitigato dalla sperimentazione in atto su molti dei servizi innovativi che tale tecnologia promette di abilitare (es Smart City e Digital Health). È accaduto nel caso del Blockchain e delle criptovalute, "tecnologie" non sufficientemente supportate da adeguato volume di domanda globale, volume che sarà possibile generare solo con la creazione di un ecosistema di interdipendenza dei mercati locali.

Guardando al futuro e ai possibili percorsi evolutivi delle criptovalute, nonostante l'incerta collocazione che al momento il Bitcoin trova all'interno dei modelli economici globali, è verosimile che in futuro non possa non esservi necessità, in generale, delle criptovalute.

Per arrivarci, è necessario che e le criptovalute si affranchino definitivamente dalla attuale connotazione speculativa per mezzo della realizzazione di alcune condizioni "necessarie" (*must to have*) e alcune condizioni "sufficienti" (*nice to have*).

[12] Tutto è iniziato pochi anni prima, nel 2000, quando l'esecutivo islandese ha permesso al settore bancario di avviare un percorso di privatizzazione, liberandolo dai vincoli stabiliti dal governo in merito al tasso di interesse e ai requisiti necessari per ottenere mutui, abilitandone vertiginosa crescita. Nel 2007, due terzi della ricchezza finanziaria dell'Islanda proveniva dall'estero. Nello stesso anno i prezzi sul mercato azionario islandese erano aumentati del 900% grazie agli investitori globali. In quell'anno la recessione ha colpito l'Islanda e quando le banche hanno cercato di rientrare dei crediti si sono trovate di fronte a una missione suicida. L'Islanda è stata in grado di riprendersi dalla catastrofica situazione economica del 2008 solo grazie al sostegno di istituzioni governative e finanziarie, poi nazionalizzate.

[13] La nuova tecnologia di trasmissione dati mobile che promette un aumento tale di velocità di trasmissione e di larghezza di banda (intesa come volume di informazioni trasmesse al secondo) da rendere *realtime* qualunque sistema di gestione centralizzato e remoto di dispositivi locali.

Tra le prime, la più volte citata costruzione di una base normativa su cui poi, eventualmente, porre le fondamenta per una regolamentazione monetaria a salvaguardia del valore della stessa e, quindi, dei consumatori.

Tra le seconde, che si generi un significativo incremento della globalizzazione dei mercati mediante la creazione di un ecosistema economico caratterizzato dalla interdipendenza dei mercati locali. Un tale incremento renderebbe necessaria l'adozione di una *currency* unica, veloce, sicura. In sintesi, tutto dipenderà dalla volontà e dal livello di cooperazione e interdipendenza che i mercati nazionali riusciranno a stabilire tra di loro.

Le seconde senza le prime non hanno modo di realizzarsi. La prima, da sola, non basta.

La "necessità" è quindi la chiave per lo sviluppo e il riconoscimento della moneta stessa, non più come mezzo speculativo ma come mezzo per raggiungere uno scopo: la citata interdipendenza a livello di mercato globale.

Arriverà, alla fine, il momento di gloria per la criptovaluta?

Solo il tempo può dirlo, ma, valutata la sua attuale posizione nell'economia mondiale e l'ovvia difficoltà nel raggiungere standard economici internazionali di cooperazione necessari, è difficile immaginare un futuro rilevante sul breve/medio termine.

Come detto, il tempo, galantuomo, ce lo dirà.