Department of Economics and Business

Thesis in Financial Markets and Institutions

Behavior of individual investors in financial markets during pandemic

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INTRODUCTION

Much of modern investment theory and practice is predicted on the Efficient Markets Hypothesis (EMH), however the notion that markets incorporate all available information with accuracy and immediacy into market prices fail to explain recently developed discrepancies between theory and evidence. Behavioral finance, a subfield of behavioral economics, dates back to the late 1950s is a new theory which incorporates parts of standard finance, replaces others, and includes elements from psychology, neurosciences to deeper understand financial participants' decision-making processes. Behavioral finance offers an alternative foundation block for each of the foundation blocks of standard finance. According to behavioral finance: people are normal, markets are not efficient, even if they are difficult to beat, people design portfolios by the rules of behavioral portfolio theory and, expected returns of investments are described by behavioral asset pricing theory, where differences in expected returns are determined by more than differences in risk (Statamen, 2014). The majority of the empirical evidence indicates that individual investors, in aggregate, earn poor long-run returns and would be better off if they had invested in a low-cost index fund. This evidence of poor performance is particularly convincing when we include transaction costs (e.g. commissions, bid–ask spreads, market impact, and transaction taxes). While transaction costs are an important component of the shortfall, a second component is the reluctance of normal investors to separate their roles as investors from their roles as consumers which implies that many wants, beyond those of virtue and status, affect investment choices. Individual investors, or normal investors are not immune to cognitive errors and misleading emotions, yet they are not all alike, varying in their wants of utilitarian, expressive, and emotional benefits. Statamen defined individual investors as "normal-knowledgeable" and "normal-smart", but sometimes "normal-ignorant" or "normal-foolish". COVID-19 crisis has led to unprecedented repercussions on daily life and the economy, such as the excessive volatility and the unshaken confidence of financial institutions, that the traditional finance paradigm fails to explain exhaustively. Many of the biases and cognitive errors result to be accentuated or mitigated by the pandemic, which in turn reflected in financial markets.

In this dissertation, I present and analyze empirical studies in behavioral finance which deal with unconventional behavior on behalf of individual investors, firstly identifying who they are and then reporting evidence on why this new theory of behavioral finance could fill standard finance gaps. Secondly, I will illustrate the impacts of the 2020 Coronavirus crisis on financial markets as well as actualize behavioral finance theories at current pandemic times. In the last chapter will be analyzed the impact of COVID-19 on trading volume, proxied by share turnover, around the globe. In addition to the trend analysis will be analyzed also what factors and characteristics generated such result.

CHAPTER 1: BEHAVIORAL FINANCE

Behavioral finance is a relatively new but quickly expanding field that seeks to provide explanations for people's economic decisions by combining behavioral and cognitive psychological theory with conventional economics and finance. It is more broadly called Behavioral Economics and it arises from the inability of the traditional expected utility maximization of rational investors within the efficient markets framework to explain many empirical patterns, such as excess volatility. An underlying assumption of this field is that investments decisions and market outcome are systematically influenced by market participants who process information using shortcuts and emotional filters. This irrationality continuously affects investors decisions, often resulting in individuals acting in a seemingly irrational manner, regularly breaking traditional risk aversion concepts, and making predictable errors in their forecasts. Behavioral economics deals with biases of individual investors, markets, corporations, regulations and education, but for this analysis will be considered just the former two. Behavioral finance expands the domain of finance beyond portfolios, asset pricing, and market efficiency. It explores the behavior of investors and managers in direct and indirect ways, whether by examining brains in fMRIs or examining wants, errors, preferences, and behavior in questionnaires, and experiments. In this chapter I will firstly identify the typical individual investor, target of this analysis, with all his/her various predispositions. Secondly, it will be described how behavioral finance theory could better explain certain patterns that the efficient markets theory hardly justifies. Lastly, the attention will be addressed to the description of established behaviors.

I. PORTRAIT OF THE INDIVIDUAL INVESTOR:

For several years psychologists have collected evidence against the 'economic man', considered very unlike a real man (Edwards, 1945) due to principles that underlie expected utility, Bayesian learning, and rational expectations. This is not an adequate basis for a descriptive theory of decision making, since there are systematic, robust and fundamental violations in the central axioms of rationality, such as frame invariance, dominance or transitivity. In response, behavioral decision theorists have introduced a series of new concepts under the general heading of 'bounded rationality' (Herbert Simon, 1947).

Miller and Modigliani (1961) described rational investors as those who "always prefer more wealth to less and are indifferent as to whether a given increment to their wealth takes the form of cash payments (i.e. dividends) or an increase in the market value of their holdings of shares" providing a good starting point in the their description. Shefrin and Statamen (1984) argued that investors wants, cognitive errors, and emotions

affect their preferences for particular stocks as, according to Miller (1986), stocks are usually more than just abstract 'bundles of return' as they may have a story (i.e. family business, divorce settlements etc.) behind. These characteristics may lead investors to decide not to sell certain stocks and spend their proceeds, hence in order to comprehend these forces is important to understand investors behavior (Stataman, 2014). Rational investors are immune to framing errors, that is the wrong conclusion that for instance, a dollar in the form of dividends from shares is different from a dollar in the form of the share itself. Moreover, rational investors are resistant to the entire range of biases and emotions, beyond framing, that characterize normal investors. Individual or normal investors use to manage their equity portfolio and are prone to judgement and decision-making errors, due to the influence of cognitive errors and misleading emotions. Normal investors all not all similar, indeed knowledgeable investors have learned, imperfectly and with much effort, to overcome their biases and possibly distorted emotions through science-based knowledge, but they are still not exempted from failing sometimes. Stataman identifies three kinds of benefits that individual investors look for: utilitarian, which answer to the question, what does it do for me and my pocketbook? expressive, which answer to the question, what does it say about me to others and to me? and emotional which answer to the question, how does it make me feel? Usually investors are advised to forget emotions when making an investment, however this is neither realistic nor smart, because emotions complement reason more often than they interfere with it and prevent investors from being lost in thought when it is time to act (Stataman, 2014).

There exist four classes of anomalies that deals with (1.1) investors' perception of the stochastic process of asset prices; (1.2) investors' perception of value; (1.3) the management of risk and return; (1.4) trading practices.

1.1. Perceptions of price movements

Investors have always tried to spot trends and predict turning points in stock prices in different ways. Martin J. Pring (1991) states that 'the art of technical analysis is to identify trend changes at an early stage and to maintain an investment posture until the weight of the evidence indicates that the trend has reversed' based on the assumption that people will continue to commit the same errors that they have committed in the past.

Many investors tend to see patterns when there are none as Kroll et al. (1988) observed in their mean-variance portfolio model experimental test.

The best-established pattern detected is the extrapolation bias according to which people are optimistic in bull markets and pessimistic in bear markets, consequently, they expect a continuation of past price movements. Investor sentiment depends on the market performance during at least the prior 100 days of trading as reported by De Bondt (1993), the average percentage gap between the fraction of bullish investors and the fraction that are bearish, increases by 1.3% for every percentage point that the Dow Jones rises during the week before the survey.

The second set of facts has to do with the intuitive assessment of variability, in particular, investor perceptions of the likely variation in equity returns are too narrow. People are likely to elaborate dangerously tight probability distributions, and anchor too much on their most probable prediction. (Lichtenstein et al., 1982).
A second anchor is a price representative of past price levels, that is perceived variability (like expected return) depends on prior performance. According to this behavior, investors think they can predict the near future price changes with an eye toward recent movements, but this conduct tends to distort long-term forecasts since they remain anchored on past events (Ito, 1990).

1.2. Perception of value

Many people either lack financial education or are not capable of using valuation techniques i.e. dividend discount models, hence their perception of value depends heavily on popular models. These are socially shared mental frames that are extrapolated from mainly the so-called soft information. Soft information is often communicated in words and includes opinions, ideas, tips from friends or financial advisors and news from media. The result is that many people cannot distinguish good stock from bad stocks, and only stocks that experience rapid growth or that for some other reason appear on important business magazines are considered excellent investments. Annual surveys published by Fortune Magazine and analyzed by Shefrin and Statman in 1997 show that reputation is inversely correlated with predictions of returns, measured by the ratio of book value to market value of equity. This implies that, on average, stocks of highly reputed companies seem overpriced since they become poor market performers in the future. Conversely, stocks that in the eye of the investor seems bad, are those which are likely to bargains from an investment point of view.
Popular models resist change and the market response to earnings surprises and news are discounted, only around later announcements by the firm, prices adjust in such a way that earnings are believed to go in the same direction as in the corresponding quarter of the previous year.
Finally, the perception of value is influenced, among other things, by herding behavior and social pressure, resulting in the investor to put more confidence in what is familiar and comfortable.

1.3. Managing risk and return

An important notion of portfolio theory is that well-diversified portfolios can earn higher returns and be less risky. Yet, many households remain undiversified and do not know that risk depends on covariation between returns. Investors are incentivized to put wealth in few assets by the belief that risk can be managed by knowledge and trading skills. Moreover, people believe that risk exposure can be limited simply by the acknowledgment that in a bear market they will have the presence in mind to sell quickly, often creating an illusion of control. Risk attitudes are very subjective and there are several stylized facts relating to people's portfolio choices, other than under-diversification, that point to systematic risk positions. Households use to shy away from owning shares due to the frequent short-term losses they suffer from, this behavior account for the important magnitude of the equity premiums. Moreover, when investors face price volatility they tend to

act myopically as analyzed by Benartzi and Thaler, keeping a big portion of their financial wealth in riskless assets even though equity shares yield higher long-run returns. Standard finance models do not include many of the common beliefs of portfolio practices, such as its composition that must match with the time horizon chosen or that the higher ratio of stocks to bond held, the more aggressive, thus riskier, is the investor.
These misconceptions suggest a new behavioral theory of portfolio choice that can be represented by a pyramid which contains at the lower levels instruments that guarantee the financial survival (cash, bank certificates of deposits, savings account etc.), and at upper layers those instruments that offer upside potential as well as exposure to return volatility (bonds, stocks, options etc.). The pyramid suggested by aforementioned pyramid was suggested by Shefrin and Statamanin 1994 accounting for the increasing segmentation of investments that households engage in without considering the covariation among assets that can dramatically affect risk.

1.4. Trading practices

Traders are used to implement a variety of rules and techniques to control emotions and maintain discipline. The latter is difficult to sustain, and people believe that rigor is the principal function of an investment plan. Many individuals trade shares on impulse or on random tips without prior planning, letting sentiments drive their decisions and for this reason investors are inclined to buy shares in bull markets and sell them in bear markets. Rules applied often result in sub-optimal strategies (dollar-cost average guarantees that trader pays no more than the average price for the share that they buy), and traders' satisfaction is measured only by reference points without taking into account original purchase price, which could demonstrate a different result. Finally, these are the practices that characterize the individual investor.

II. FROM EFFICIENT MARKETS THEORY TO BEHAVIORAL FINANCE THEORY:

The efficient market theory reached its peak of dominance around 1970s, providing an answer to one of the biggest questions concerning financial markets and their behavior, that is how asset prices react to unexpected events. The first academics that answered were Mandelbrot (1963) and Fama (1965) outlining the importance of financial agents' behavior directly contrasting Bachelier (1900). Through the 1980s the consistency of the efficient market model was debated, more precisely whether stocks showed excess volatility relative to what would be predicted by the previous model. The anomaly represented by excess volatility seemed to be much more troubling than the January effect or the day-of-the-week effect (Siegel, 2002), and much deeper than price stickiness or tatonnement (Walras, 1954). These anomalies seemed to imply that changes in prices could occur for no fundamental reason at all. Finally, in the 1990s the focus shifted away from econometric analyses of time series, dividends and earnings toward new models of human psychology as it relates to financial markets. In order to better understand the shift from the theory efficient markets to behavioral finance models we look at how information is incorporated in both models.

2.1. The Efficient Markets Hypothesis

The Efficient Markets Hypothesis or Theory of Efficient Capital Markets states that prices of securities in financial markets fully reflects all available information (Fama, 1970). The underling condition for this hypothesis to hold is that information and trading costs are equal to zero, thus incentivizing the trade until prices reflect all available information. In reality such assumption it is not plausible because different operations have different costs, for instance, shorting a stock is more costly than longing it. Moreover, the acquisition of information and their analysis can be seen as an investment in time and money, and investors would expect such expenditures to result in an increased expected return. Hence it is possible to rephrase to: "investors are willing to spend resources on the acquisition of useful information until the marginal cost of acquiring information and the last trading operation equal the marginal benefit extracted from it" (Bodie, Kane & Marcus 2005). An important aspect of the Efficient Market Hypothesis is that it concentrates more on how fast information are taken into account rather than how well information is incorporated in asset prices. This points out to an important distinction due to the raising number of high-frequency traders.

2.2. Versions of the Efficient Markets Hypothesis

According to Efficient Markets Hypothesis, investors are sure that current market prices reflects all available information, and thus the expected return on an asset will be consistent with its risk (Fama, 1970). The Efficient Market Hypothesis were categorized in Fama's article (1970), later reviewed (1991), in three sub-hypothesis that differ among them by the notion of what is meant by the term "all available information":

- *Weak-form EMH*
- *Semi-strong-form EMH*
- *Strong- form EMH*

2.2.1. The weak-from hypothesis

It asserts that asserts that stock prices already reflect all information that can be derived by examining past market trading data, implying that analysis of past price movements is fruitless. This form of hypothesis holds that if past data ever produced reliable signals of future trends, due to the public availability and virtually no cost of acquisition, all investors would have learned how to exploit them, until their value will be lost because a buy signal, for instance, would result in an immediate price increase.

2.2.2. The semi-strong-form hypothesis

It conveys that all publicly available information regarding the firm's prospects must be already reflected in the asset's price. The mentioned information includes, in addition to past prices, fundamental data known only to company insiders, such as product line, quality of management, balance sheet composition, patents held, earnings forecasts, and accounting practices. Again, if investors have access to this information from publicly

available resources, one would expect it to be reflected in stock prices. Therefore, one cannot systematically outperform the market.

2.2.3. The Strong-form hypothesis

This version states that asset prices reflect all information relevant to the firm, including information available only to company insiders. It is almost certain that corporate officers have access to important information long before public announcements, and that if they could exploit this privileged position, they would earn very high profits. However, insider trading practices are forbidden by the regulating authority, but the distinction between private and inside information is opaque.

2.3. Efficient Markets Hypothesis and expectations

The efficient markets model states that the price P_t of a share, or of a portfolio of shares representing an index, equals the mathematical expectation (E_t), conditional on all information available at that moment, of the present value of actual future dividends of that share (P_t^*), that are not known at time *t* and are to be forecasted as well as the future price. Efficient markets say that price equals the optimal forecast of it, that is the best guess of the future using all available information.

$$P_{t+1}^{e} = P_{t+1}^{of}$$

The fundamental principle of optimal forecasting is that the prediction must be less variable than the element predicted, and the maximum possible variance of the forecast is equal to the variance of the value forecasted, implying that whoever performed the prediction has perfect foresight (Shiller, 2003).

2.4. Excess volatility anomaly

In computing the present value of the real dividends paid on the Standard & Poor's Composite Stock Price Index (an index of the 500 most widely held common stocks; it measures the general performance of the market), and discounting it by a constant real discount rate equal to the geometric average of the of the real return from 1871-2002 on the same index (r = 7.6% per annum), it is observable that it behaves like a stable trend as shown in Figure 1. In contrast the Standard & Poor's Composite Stock Price Index oscillates above and below the trend with remarkable frequency (Figure 1). This behavior casts serious doubts to the efficient market theory suggesting excess volatility in the aggregate stock market, relative to the present value implied by efficient markets model. Recalling the efficient markets model $P_t = E_t(P_t^*)$, to make it clearer that it is not a valid theory in this case, is possible to imagine the series P_t^* as air temperature, and P_t as a meteorologist's forecast of the temperature for the day *t*. One will be inclined to report the weatherman as crazy. One might argue that in stock markets there is not an immediate feedback about the reliability of the prediction, but this does not exempt the forecaster to adjust continuously his predictions, unless actual new information comes out (Shiller, 1981).

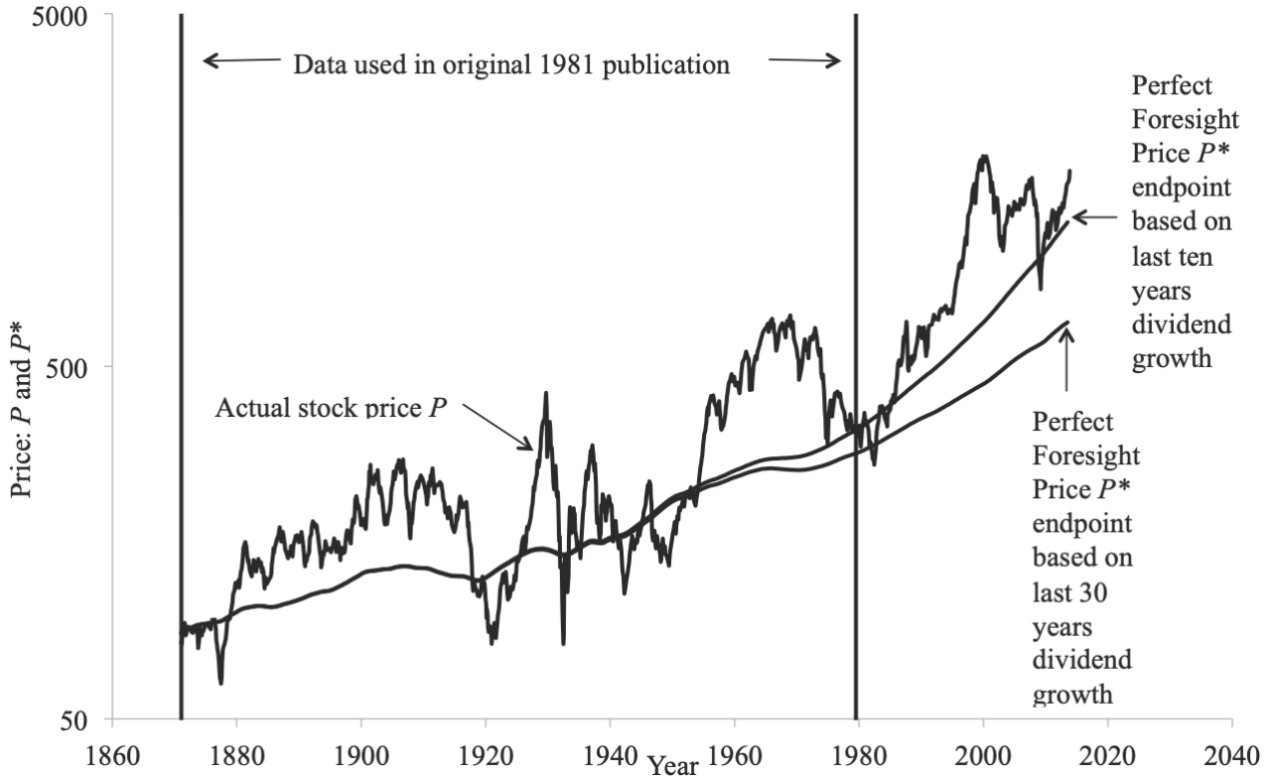

Figure 1: Real Standard & Poor's Composite Stock Price Index along with Present values with constant discount rate of subsequent real dividends accruing to the index 1871– 1913. The two present values differ in their assumption about dividend growth after 2013, one based on prior 10 years dividend growth, the second is based on prior 30 years.

2.5. Behavioral models

There is a clear element in the stock market price volatility that cannot be explained by efficient markets theory and by the end of the 1980s researcher started shifting toward other theories such as behavioral finance theory. Behavioral models developed with the presence of some sort of irrationality stemming from people and their irrational conducts. With the influence of new social sciences, as for instance psychology, new finance models that sees individuals more as "humans" than as perfectly rational investors began developing, such as:

- *Feedback Models*
- *Smart Money vs. Ordinary Investors*

These models reject the role of theory of efficient markets as accurate descriptors of actual financial markets, and account for the hypothesis that financial markets could not work always well or that price changes may not always reflect genuine information.

2.5.1. Feedback models

Feedback models is one of the oldest theories about financial markets and is able to ward off stock prices, together with other factors, from fundamental value. It states that when speculative prices go up, creating success for some investors, this may attract public attention which promotes word-of-mouth enthusiasm that in turn triggers expectations for further price increase. The more a stock is discussed, the more investors it attracts, increasing demand for the asset and triggering a second round of price increase. If this loop is not

interrupted it may produce a speculative bubble. The bubble will eventually burst when prices are unsustainably high. Moreover, prices are high only because of expectations of further increase, hence the bubble could burst for no fundamental reason, without the need for any disruptive information. What happens with upward trends can also be extended to downward trends with negative bubbles. The feedback that fueled the bubble crisis carries the seed for its own destruction (Shiller, 1991). The feedback model is close enough in the explanation of the apparent randomness of stock price fluctuations, observable in financial markets. Tversky and Kahneman shown, in their research on cognitive psychology, that human judgements of the probability of future events is systematically biased, and decisions tend to be made using a representativeness heuristic. That means people try to predict future events by looking at the most similar past patterns, which may lead the investor to match price patterns with trends ultimately resulting in feedback dynamics.

2.5.2. Smart Money vs. Ordinary Investors

Theoretical models of efficient financial markets represent every "economic man" as rational optimizers, but this is far from reality, as it is hard to believe that everyone knows how to solve complex stochastic optimization problems. Goetzmann and Massa (1999) distinguished between to separate classes of investors, *ordinary investors* (also called feedback traders) and *smart money investors* (also called marginal traders), according to their reaction to daily price changes. The research found that Individual investors tended to stay in only one of the two categories, rarely shifting between them. Efficient markets theory asserts that when irrational optimists buy a stock, smart money sells, and when irrational pessimists sell a stock, smart money buy, thereby offsetting the effect of ordinary investors on prices and make the markets efficient. Smart money may not ensure efficiency of the markets always, as pointed out by Miller (1977), they might be hampered by irrational investors. Smart money investors do not face any problem when buying or selling stocks they own, but when it comes to naked short selling, that is the sale of a share not owned by the seller, it is not always possible or relatively cheap. Some stocks could be in a situation where fanatics have bought into a stock so much that so much that only them will own share, trade will only be among them and in turn all together will determine the price of the share. This does not allow smart money, who knows that price is tremendously high and is not able to short the stock, to restore efficiency and profit from their knowledge. If selling short becomes difficult, a number of individual stocks may become overpriced.

2.6. Behavioral portfolio theory

The mean-variance portfolio theory, which is the theory of standard finance, is a "construction" theory, meaning that it provides the tools necessary for the creation of a portfolio for investors who only care about expected returns and risk. The aim of the mean-variance portfolio embraced by the owner is not very clear whether it consists of simply protection from poverty or includes also a chance to get rich, or it is made to ensure a comfortable retirement. Behavioral portfolio theory accounts for both construction and goals, it starts with the identification of the latter to subsequently provide an optimal construction of the portfolio (Shefrin

and Statamen, 1987, 2000). Behavioral portfolio theory describes investors who measure risk by the probability of failing to reach goals, by expected shortfalls from goals or by the product of the two. As in the mean-variance portfolio, behavioral investors are risk-averse, but they are not averse to high standard deviations of returns. This means that portfolios evaluated as high-risk by mean-variance investors, because they have high standard deviations of returns, are assessed as low-risk by behavioral investors when such portfolios offer low probabilities of failing to reach their goals (Statamen, 2014). For instance, considering a portfolio worth $1 today which will worth $100 million in a week from now. The standard deviation of a diversified portfolio of stocks and bonds will be lower than the standard deviation of returns of a lottery ticket, in addition the expected return of a lottery ticket will be negative whereas the expected return of a diversified portfolio is positive. This shows that, according to the mean-variance portfolio, the diversified portfolio is less risky than the lottery ticket, attributing to lottery players risk-seeking characteristics. Hence, standard finance will never prescribe lottery tickets. On the other hand, behavioral portfolio theory will consider risk-averse investors who prefer lottery tickets over diversified portfolios if they have sky-high goals because behavioral investors are averse to the risk of failing to reach these goals. To summarize this, behavioral portfolio theory will prescribe lottery tickets to investors that want to achieve $100 million in a week starting from $1 as the probability of failing to accomplish this goal is smaller for lottery tickets than for a diversified portfolio.

III. ESTABLISHED BEHAVIORS

A heuristics and biases framework can be intended as a counterpart to standard finance theory's asset pricing model. Investors rely on a limited number of cognitive strategies or heuristics that simplify the complex scenarios faced by them. In traditional finance theory, unsystematic biases are expected to be eliminated by the market as a whole having no effect on asset prices. However, behavioralists believe that both heuristics and biases, are systematic and thus could potentially affect market prices even for long periods of time. Stataman argues that these effects stem from investors reluctance to separate their roles as investors from their role as consumers. Below are described the established behaviors of investors.

3.1. Representativeness heuristic

Is the tendency for people to try to categorize events as typical or representative of a well-known class, and then, in making probability estimates, to overstress the importance of such a categorization, disregarding evidence about the underlying probabilities (Tversky and Kahneman, 1974). As consequence, investors tend to see patterns in data that are completely random, to feel confident that, for instance a series which is in fact a random walk, is not random. Tversky and Kahneman described different aspects of representativeness bias, such as:

i. *Insensitivity to prior information:* That is ignoring prior probabilities and base rate evidence.
ii. *Insensitivity to sample size:* That is making probability assessments based on representativeness alone.
iii. *Insensitivity to predictability:* That is not considering the potential lack of accuracy of the prediction, relying on representativeness alone.
iv. *Regression toward the mean:* The expectation of extreme outcomes to be followed by other extreme outcomes.

According to the representativeness heuristic people may see past return history as relevant to the future only if they see the present circumstances as representative in some details of widely remembered past periods. For instance, investors seemed to have act as such, just before the stock market crash of 1987. On that day the wall street journal published a plot of stocks right before the crash of 1929, suggesting comparisons. In this way historical events can be remembered and viewed as relevant, but this is not a systematic analysis of past data (Shiller, 1999). Generally, there are two kinds of representativeness biases: the horizontal bias and the vertical ones. Specifically, the horizontal bias means people tend to classify one thing with other things which are similar and forecast a thing according to the other thing' rules. The vertical bias means that people easily judge or forecast a something according to its history records (Zhao and Fang, 2013). Many researchers found out that this bias is brought to financial markets. Coval and Shumway tested it with the Chicago Stock Exchange

data and found that prices set by loss-averse traders are reversed significantly more quickly than those set by unbiased traders.

3.2. Overconfidence

Overconfidence generally refers to the tendency of investors to believe that certain things are more likely than they really are. This phenomenon has two main facets that are miscalibration and better-than-average effect. The former could appear in estimates of quantities that are not known yet, such as the future price of a stock or the value of a stock index, is also referred to "excessive precision in one's belief" by Moore and Healy (2008). Another facet of overconfidence is the better-than-average effect and is very well elicited by the question: Do you think that you have above-average driving skills compared to the other people? The main findings are that people have unrealistically positive views of themselves (Taylor and Brown, 1988).

In finance models, overconfidence is usually modelled as an overestimation of the precision of private information (Glaser et al., 2004). Assuming the liquidation value of a risky assets (i.e. Stocks) as a random variable *v*, and assuming that is distributed as a normal with mean 0 and variance σ_v^2. $\tilde{v} = N(0, \sigma_{\tilde{v}}^2)$. Defining as *s* investors' private information, which contains an error (or noise), ε, which in turn distributed as a normal ($\tilde{\varepsilon} = N(0, \sigma_{\tilde{\varepsilon}}^2)$ and is assumed to be independent from *v*. The signal *s* is usually written as a realization of the random variable $\tilde{s}$, which is the sum of the random variables $\tilde{v}$ and $\tilde{\varepsilon}$, that is: $\tilde{s}(= \tilde{v} + k * \tilde{\varepsilon}) \sim N(0, \sigma_{\tilde{v}}^2 + k^2 * \sigma^2)$. The parameter *k* captures the finding of overconfidence, and if the variable lies within (0,1), an investor is underestimating the variance of the signal *s*, in particular the variance of the error term. When *k=0*, the investor believes that he knows the value of the risky asset with certainty. When it comes to companies, overconfident CEOs and managers use to consider their abilities to be superior and this has shown to have an influence on corporate policies as well as overinvestment. Ho et al. discuss that overconfident managers overestimate the sustainability of a positive state and underestimate the risk profile of their investments. These biases lead 'overconfident banks' to ease lending standards, increase lending amounts, increase leverage, and incur additional debt. As soon as a financial crisis commences, however, overconfident banks suffer higher capital losses, more severe drop in their net worth, and a higher likelihood of CEO turnover and failures than for non-overconfident banks (Ho and Huang, 2016). Overconfidence may be reduced or reversed when investors are faced with easier question, known as the hard-easy effect. The hard-easy effect occurs when people exhibit higher overconfidence for more difficult questions and less overconfidence, or even underconfidence, for easy questions (Lichtenstein and Fischhoff, 1977). A second element influencing overconfidence phenomenon is the amount of information given to investors. Tsai, Klayman, and Hastie (2008) reported that the higher the amount of information available, the more confident is the investor on his prediction but reduced accuracy is exhibited. In conclusion, overconfidence is regarded as the most prevalent judgment bias, that can lead to suboptimal decisions on the part of the investor and for these reasons should be treated with caution.

3.3. Prospect theory

Prospect theory (PT) is one of the most famous elements of behavioral economics, invented by the psychologists Kahneman and Tversky in 1979, subsequently modified as cumulative prospect theory (CPT), in 1992. It addresses the issue of how people make prospects, that are like gambles, in financial markets under uncertainty. Prospect theory based upon 3 features:

i. Prospect theory assumes that choice decisions are based upon a subjectively determined reference point independent of the decision maker's state of wealth.
ii. Subjective reference points introduce a frame to a prospect, which affects choice behavior.
iii. A kink exists at the reference point of prospect theory's value function, assuming individuals weight losses at above twice that of gains.

Prospect Theory's value function describe how people value things shown in Figure 2.

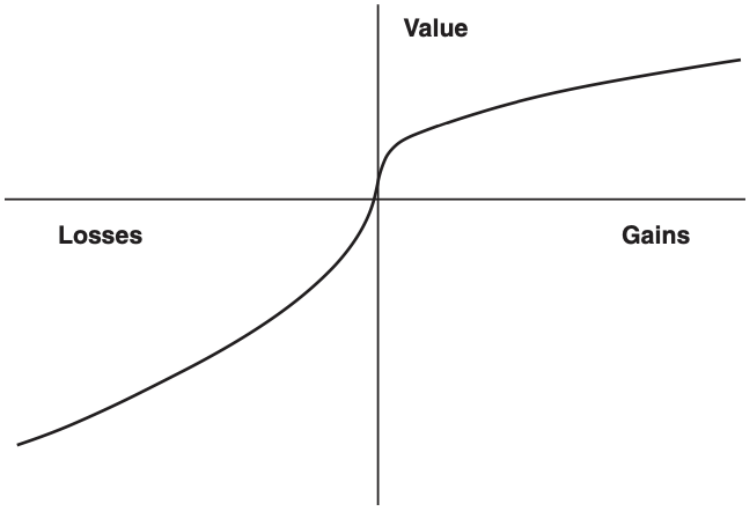

Figure 2: Value function. The value function is defined by gains and losses on deviations from a reference point (origin), where the function is concave for gains and convex for losses. This function is steeper for losses than gains (loss aversion). This means a loss causes a greater feeling of pain than a joy caused by the same amount of gain.

What can be observed in Figure 2 is that investors do not weight gains and losses linearly, on the positive value and positive gains quadrant the curve features diminishing marginal utility, meaning that investors' value increases at a diminishing rate, as gains increases. In the negative value and negative gains quadrant the curve is concave upward, implying that investors weight losses heavily. This shape shows investors risk attitudes: risk averse for gains and risk seeking for losses. The kink at the origin represent the so-called reference point and is the point from which the investor value its gains and losses, and it also imply that they are very conscious about little changes in their gains. Moreover, the reference point is purely subjective and thus psychological, and can be manipulated (i.e. marketing). Usually investors take as reference point today's wealth. Framing is a human tendency to make decisions based on the way information are presented to them, as opposed to just the facts themselves, hence the same information delivered in different ways can

lead to different judgements and decisions, demonstrating that people can be manipulated (Kahneman and Tversky, 1979). Finally, this value function represents an error that people are prone to be making, but it's not valid for each investor.

Cumulative prospect theory's weighting function represents how people deal psychologically with probabilities. It states that for very low probabilities people may round them to 0, and for very high probabilities they may round them to 1, but if they decide not to round them to the one of the extremes, they exaggerate the difference between 0 and 1 (Kahneman and Tversky, 1992, Figure 3).

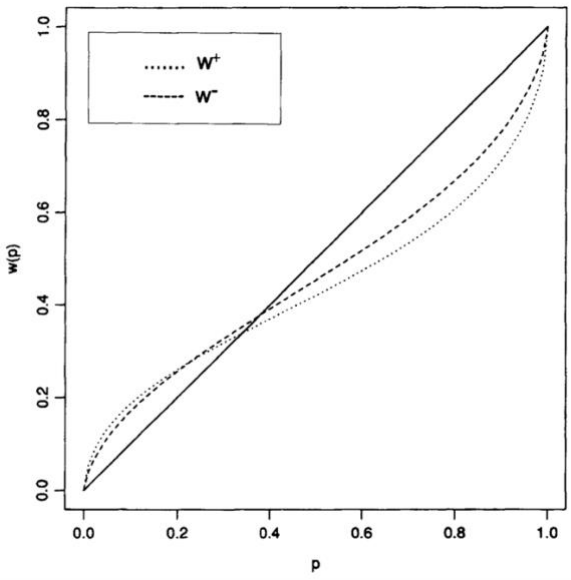

Figure 1: Weighting functions for gains (w^+) and for losses (w^-)

Figure 3 shows that, for both positive and negative prospects, people overweight low probabilities and underweight moderate and high probabilities. As a consequence, people are relatively insensitive to probability difference in the middle of the range. In conclusion prospect theory, and cumulative prospect theory severely attack the expected utility theory (EUT) proposed by Bernoulli (1738), suggesting a new method of the decision-making process on behalf of investors. In particular, CPT describes that investors makes choices based on change of wealth rather than total wealth. Moreover, subjects employ decision weights which contradicts the EUT and the capital assets pricing model (CAPM), and the S-shaped value function contradicts all models that assume risk aversion.

3.4. Regret theory

This theory is somewhat related to the kink of prospect theory's value function, and it states that people fear the pain of regret. This fear of doing something that makes you feel bad end up influencing future investors decisions. Regret could in fact both reduce investors' risk exposure, by unconsciously forcing them to buy lower risk assets, and paradoxically encourage risky decisions as being determined by the type of feedback received after the judgement (Zeelenberg, 1999). For example, a person who has to decide whether to get vaccinated or not, is mostly concerned about the negative side of his decision, that is not getting vaccinated and getting ill, anticipating a possible regret. However, there could be anticipated regret with safer decisions

such as gambling. In gambling decisions, people face two options that are: not to play, thus being guaranteed an unchanged level of wealth, and to play, thus being exposed to a possibility of larger payoff. In this situation there will be anticipated regret of missing out on a large gain opportunity, which in turn may lead people to undertake risk. In financial markets anticipation of regret may lead investors to select past winning stocks, because they are likely to feel like they have missed out on, past or even future, gains of those stock (Dodonova and Khoroshilov, 2005). Furthermore, gambling behavior is part of what goes on in stock markets, and in some sense, financial markets is a way of channeling this kind of behavior into something productive (Shiller, 2012).

3.5. Anchoring

It is common for investors to start with some initial arbitrary value from which they adjust, in forming their estimates and predictions. The initial value may be derived by the formulation of the problem, or it may be the result of partial calculation, but no matter the practice used Tversky and Kahneman argue that "adjustments are typically insufficient", and "different starting points yield to different estimates which are biased toward the initial value". The above-mentioned behavior is the anchoring phenomenon, according to which irrelevant information, anchors decisions and harm predictions. For instance, investors tend to remember the price they paid for a stock, and this information influences their subsequent decisions about what to do with it. Furthermore, investors tend to under-adjust and manipulate their predictions when are faced with harder problem, according to the hard-easy effect described in paragraph *3.1*. Anchoring bias severely affect asset valuation, and this is particularly evident in the real estate market. Northcraft and Neale (1987) asked test subjects to evaluate the bid price of a house, giving them identical information but for the ask price. The result presented important correlation between the ask price and the bid price, showing that the former was the anchoring factor. Finally, investors tend to reject the hypothesis that they were anchored or contaminated, resulting in contamination effects and hindsight biases, discussed in the following paragraph.

3.6. Contamination effects and hindsight bias

Contamination effect is what lead investors to put great confidence in their judgements upon overconfidence, simply because they obtain a plausible outcome. Hindsight bias refers to people's tendency to remember positive outcomes and repress negative outcomes (i.e. investors remember when their trading strategy turned to be successful, but not when it failed). In their study, Kahneman and Tversky found out, in their experiment, that subjects, after learning the eventual outcome, gave a much higher estimate for their predictability, than subjects who did not have prior knowledge of the eventual outcome. Thereby, hindsight bias is also called the "I-knew-it-all effect". Contamination effects and hindsight bias affect investors' stock selection due to availability bias, that is people easily remember and assign too much importance on recently acquired information, which represent the contaminating factors (i.e. media, corporate disclosures). Barber and Odean (2008) found that stocks with very high media coverage are those which underperform in the subsequent two

years. The tendency of investors to focus particularly on domestic investments (i.e. Stocks), rather than trying to exploit foreign opportunities, missing potential profits, probably reflects reliance on availability heuristic.

3.7. Framing

Briefly described in paragraph *3.3*, framing effects in decision situations arise when different descriptions regarding the same problem, highlight different aspects of the outcomes. "The frame that a decision maker adopts is controlled partly by the formulation of the problem and partly by the norms, habits, and personal characteristics of the decision maker" (Tversky and Kahneman, 1981). The main consequence, relevant to investing behavior, is that people change their mind on their own investment decisions and on the market, based on information and data that may have nothing to do with their investments or market fundamentals, totally ignoring covariance among assets returns. Framing bring investors to evaluate acts based only on the direct consequence of it, such as the money gained or lost. People adopt mental accounts due to this mode of framing: simplifies evaluation and cognitive strain; reflects the perception of consequences as causally linked to acts; and the fact that people are more sympathetic to desirable and undesirable changes than to steady states.

3.8. Herding

Most people get almost all of their ideas about financial markets from other people, through newspapers, television, analysts etc. which are supposed to be "experts". Herding is defined as the tendency of investors to behave like lemmings, in the sense that they are likely to look around and see what other investors do, and head that way, just like lemmings do. Herding, or correlated trading, is strictly related to feedback models *(paragraph 2.5)*, Nofsinger and Sias (1999) found that stocks with a high degree of herding from buying or selling, have significantly positive or negative returns over the same period. There are three main reason for herding: The first reason is payoff externalities (the outcome of an action is increasing in the number of agents undertaking it). For instance, investors tend to trade at the same time to benefit from a deeper liquidity. The second reason is reputational concerns and issues related to the principal-agent theory. For example, when an institution performs well in the market, relative to a benchmark, it is tempting for investors to mimic that institution. By doing so, the financial firm sacrifices the potential to perform better than average but hedges itself against a poor relative performance. One might even say that experts hide in the herd. Finally, the third explanation for herding is informational externalities. That occur when investors acquire noisy information from others, this information may be strong enough to the point in which investors voluntary ignore their own data. In the extreme case investors will not carry information anymore, and actions are the result of imitation only, in this case an informational cascade may occur.

3.9. Disposition effect

The disposition effect refers to the pattern that investors wants to avoid losses and seek to realize gains. For instance, if someone buys a stock at €50, which drops to €40 before rising to €47, most people do not want to sell until the stock gets above €50 again. That is, investors hold on to loosing stocks with the hope that, at some point in the future, it will raise, and possibly realize the contrary when it's too late. This effect shows up in the aggregate stock trading volume, that tends to grow during bull markets, and falls during bear markets.

CHAPTER 2: FINANCIAL MARKETS DURING GLOBAL PANDEMIC

Coronavirus outbreak in December 2019 in Wuhan (China), has infected over 133 million people and caused of almost 3 million deaths (WHO, 9th April 2021), with devastating effects on world economic, it is one of the biggest crises of modern times. With respect to the Global Financial Crisis (GFC) of 2008 could be referred to as the North Atlantic crisis, the COVID-19 pandemic is truly global, directly affecting almost every country in the world. According to the International Monetary Fund (IMF) the world economy will face the worst recession since the Great Depression and the total output loss through 2020 and 2021 could exceed $9 trillion. Traditional framework (EMH) is fine for stable economies, but in highly dynamic environment, such as COVID-19 crisis, it needs to be corrected, as investors must quickly adapt to unexpected changes. In this chapter will be analyzed the impact of this colossal health crisis on major stock markets and commodity markets with particular attention on individual investors.

I. COVID-19 AND FINANCIAL MARKETS

In financial markets the pandemic, officially declared by the World Health Organization (WHO) on the 11th of March 2020, triggered a flight to liquidity with sales of risky assets for cash and purchases of less risky assets (Gros, 2020). During late February and March 2020, the global stock market was characterized by extraordinary volatility. As of March 27, 2020, the top 10 infected countries, along with Japan, South Korea, and Singapore, and excluding Iran, saw a 10.6% increase in risk levels from February 2020 to March 2020. Figure 4 illustrate the key events during the outbreak of the pandemic.

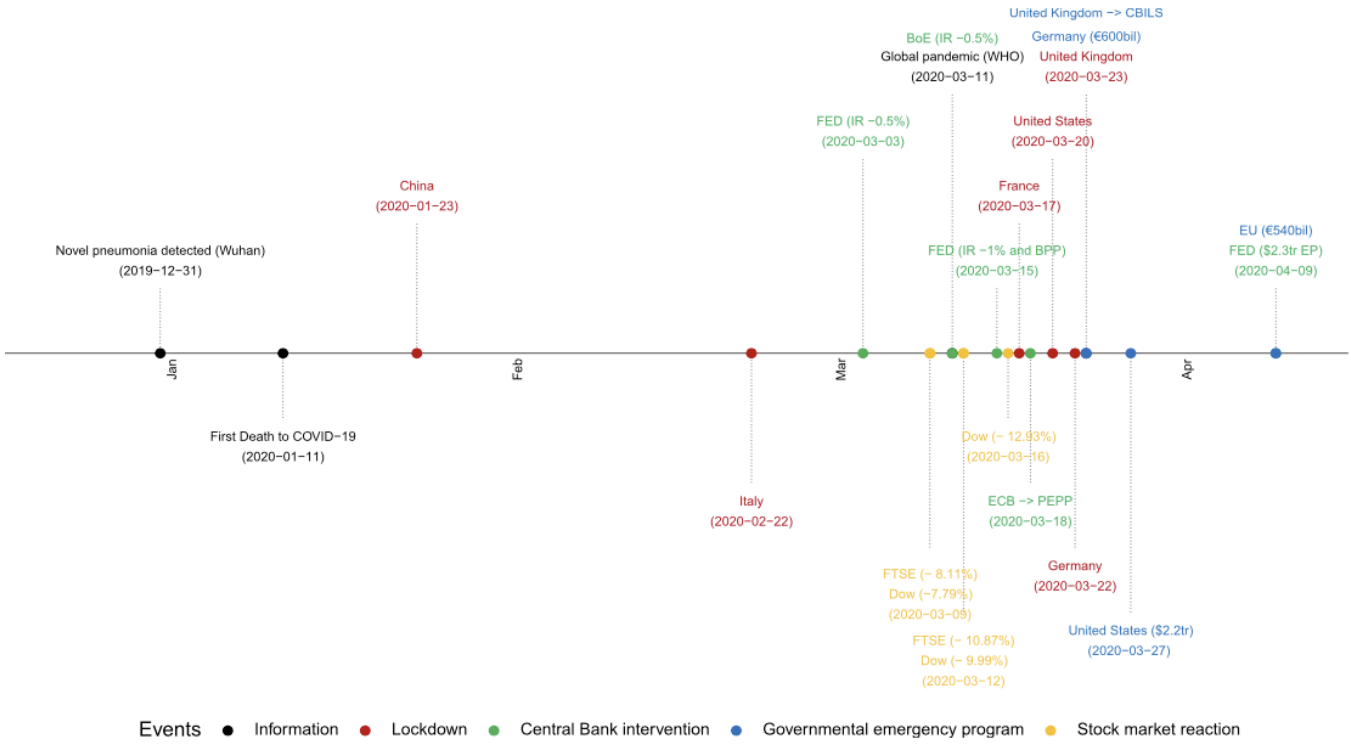

Figure 4: Key events during outbreak of Covid 19.

In foreign exchange markets this took the form of a rush toward the US dollar, as it is observable in Figure 5 that all 5 selected currencies (EUR, GBP, AUD, JPY and CNY) lost value in relation to the US dollar. The major appreciation of the US$ started on the 12th of March, when the President of the United States announced severe restrictions on travel from most European countries. Thereafter, the dollar appreciation lasted until the 24th of March. CNY is the only currency that almost maintained its value, but it is the only one that does not have a floating exchange rate. Only around the end of May FOREX markets began recovering. The red box indicates the period around the pandemic announcement. Among the selected currencies JPY and EUR lost least value, whereas AUD the most, due to the declining prices of commodities which account for 21.80% of GDP. On the 20th of March GBP traded at its lowest value since 1985.

Figure 5: Change in value of selected currencies in relation to US$, from 1 January 2020 to 11 April 2021

Among emerging economies, Brazil, Mexico and South Africa were those who depreciated the most, due to their reliance on exports which accounts for respectively 14.81%, 39.29% and 29.91% of the country's GDP. Furthermore, Brazil's President used to deny the severity of the crisis. Whereas, South Korea, Poland and India, relatively more advanced, followed closely the depreciation of developed economies currencies. Stock markets started to decline on 20th of February, soon followed by all major markets, ending up losing from 30% to 40% of their value at a very fast rate in the succeeding 4 weeks. On the 9th of March, losses on the markets were so large that triggered a market-wide circuit breaker (MWCB) on the New York Stock Exchange (NYSE), that is an extreme regulatory measure that temporarily halt trading implemented for the sake of stability to avoid huge swings in the market, due to panic selling. Negative returns and higher volatility are observed in all financial securities and commodities except for the US treasury bonds, suggesting the investor sentiment and perceived uncertainty created by the COVID-19. Figure 6 shows the VIX index, which represent

the market's expectations for volatility over the coming 30 days based on the S&P 500, it is used by investors to measure the level of risk, fear, or stress in the market when making investment decisions. VIX index jumped extremely high by the end of February, peaking on the 16th of March, and then starting a gradual decline.

Figure 6: VIX Volatility index on the S&P 500 by the CBOE, for the period August 2019 – April 2021

Moreover, global markets uncertainty increased even more when Covid-19 shifted from epidemic to pandemic stage (11th of March 2020 onward).

Stock markets plunged in the wake of the COVID-19 pandemic, with investors fearing its spread would destroy economic growth. Encouraged by figures that suggested cases were leveling off in China, investors were initially optimistic about the virus being contained. However, confidence in the market started to diminish as the number of cases increased worldwide. Investors were deterred from buying stocks, and this was reflected in the markets. The Dow dropped by more than 3,500 points in the week from February 21 to February 28, which was a fall of 12.4 percent. The Nasdaq Composite index fell by approximately 2,400 points in the four weeks from 12th of February to the 11th of March 2020 but has recovered approximately 6,000 points up to April 2021. All major markets have a common point of inflection; however, the impact of the pandemic differs significantly among markets. Figure 7 represent the S&P index for selected parts of global stock market (USA, Japan, Eurozone, UK and China). For instance, China seemed to halt the spread of COVID-19 already by the late February and the lock down was gradually removed since then, demonstrating the importance of fast and hard actions. However, is important to say that Chinese stock markets' performance is heavily influenced by the government, which controls several listed companies. The UK stock market performed the worst among selected countries, whereas the US and Japanese stock markets performed better than Eurozone. The emerging markets suffered much larger losses than developed ones, due to their high reliance on exports and the decline in commodity prices (Stigliz, 2020).

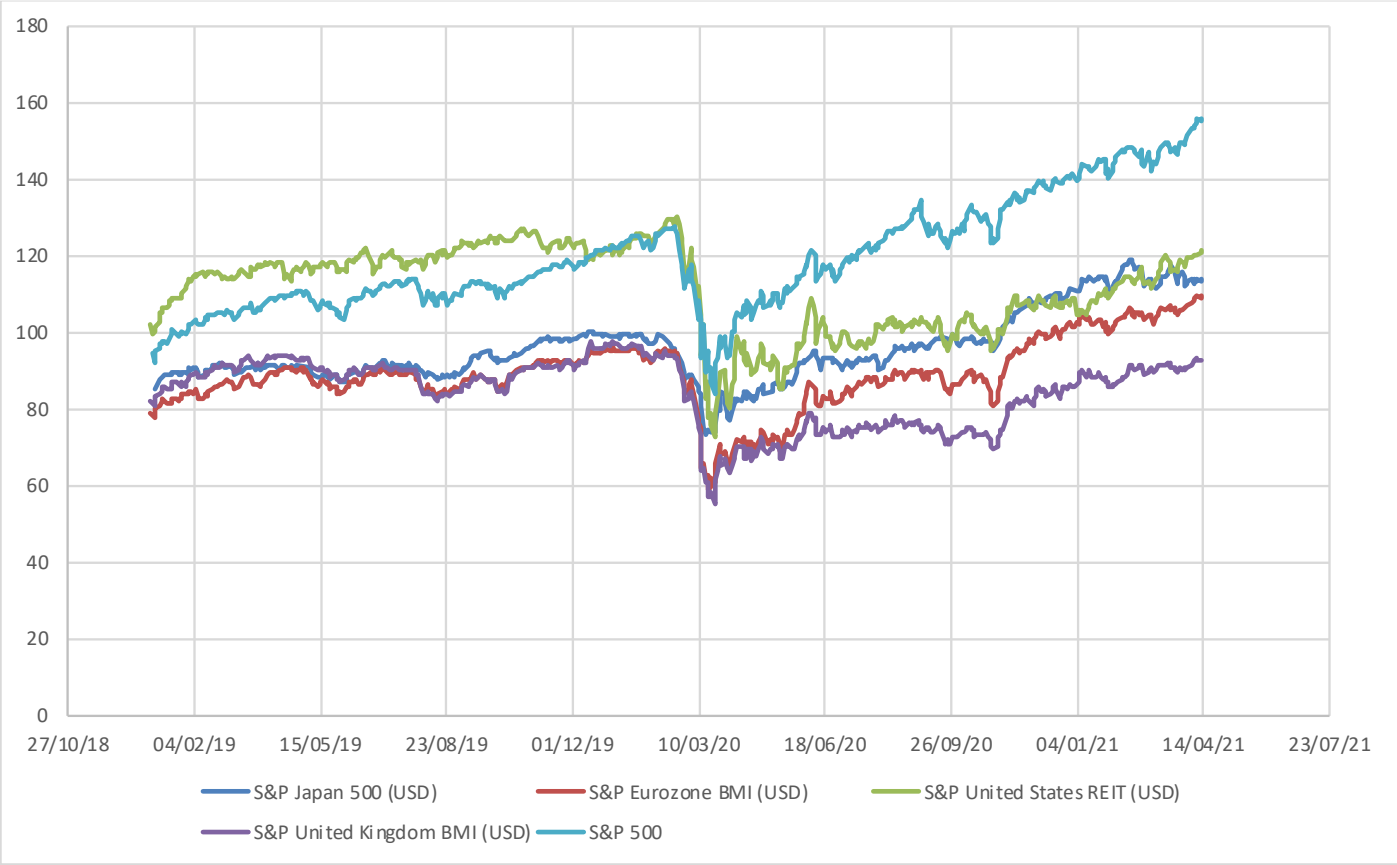

Figure 7: Change in value of the S&P indices for selected parts of the global stock market, 1 January 2019 to 14 April 2020

Equity market declines amplified in the pandemic stage led to higher negative returns, which affected the most European markets, probably because of the higher media coverage that lead to negative sentiments which caused markets to decline and volatility to rise. Another reason of the sudden fall could be that most European countries announced lockdown around the start of the pandemic phase. This resulted in a shutdown of almost all the economic activities which bound to affect the market. Size is another major factor which shaped the impact of the pandemic on businesses. Stock prices of companies with large market capitalization (large caps) performed better than medium capitalization companies (mid caps) which in turn performed better than small capitalization ones (small caps). This fact is unusual as, over last 10 years, small and mid caps outperformed large ones due to better returns they offered but is in line with the sentiment of investors which shifted toward safer assets. This preference shows the point of view of the market, which sees company size as a shelter against adverse conditions. One way to gauge the impact of the pandemic on the financial sector is to compare sectoral stock indices illustrated in Figure 8. Health care did the best loosing 10% globally since the start of the stock market fall on 20th of February. On the other hand, falling oil and gas prices generated a global loss of 33% on the energy sector. Financials, which are made of banking, insurance, and diversified financial firms, have been the second sector most badly affected, with a fall of 27%. Insurance companies have been affected less badly than banks, due to the increased uncertainty which may lead to a raise in insurance demand, even though they faced lower investment returns in the short run and higher costs to be paid to individuals and companies.

Sector	19 February to 9 April
Health care	–10%
Consumer staples	–11%
Utilities	–16%
Communication services	–17%
Information technology	–18%
Materials	–18%
Consumer discretionary	–21%
Real estate	–22%
Industrials	–24%
Financials	–27%
Energy	–33%

Source: Authors based on data for S&P Global indices by sector from S&P Global Intelligence database.

Figure 8: Change in the global stock market index by sector

Looking at the US treasury yield curve, which shows what US treasury securities are yielding across the various different maturities, the curve features an inversion as the Coronavirus spread across countries. The yield curve goes back to its upward sloping shape only after the Fed announced interest rates cut and quantitative easing. From the 2nd of January 2020 the yield curve shows that for one-month Treasury bills investors are going to get about 1.5% per year. On average, in normal times, for longer maturities treasury bills, notes and bonds interest rates are higher. Figure 9 shows that in reality on February the 18th the curve inverted for maturities ranging from 1 to 10 years, suggesting that investors who buy treasury notes and bonds expect a recession. This is not a perfectly accurate forecast, but empirical evidence shows that when the yield curve feature inversions, the economy will experience a recession 1 to 3 years later. On the 3rd of March the yield curve has an even deeper inversion, which is reversed to normal upward shape only after the Fed cut interest rates and goes further down as new policies are implemented. This indicate that demand for shorter term securities has increased, probably due to the shift of investors preference for safe assets, and thus that financial markets participants are reacting.

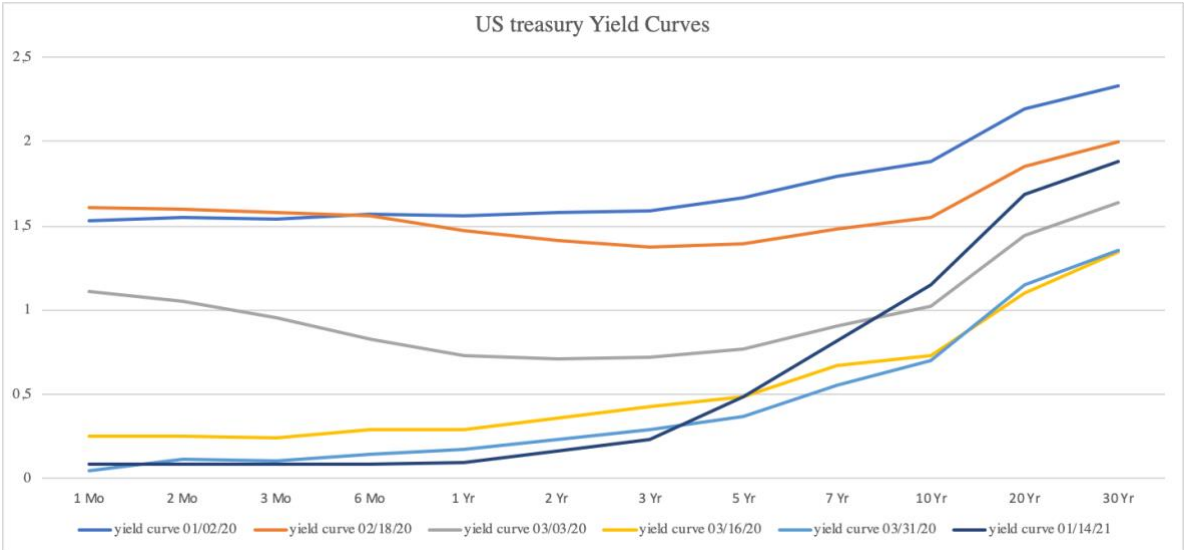

Figure 9: US Treasury yield curves for selected dates (mm/dd/yy).

In addition, the flight to safety is also indicated by the spread between corporate bonds (i.e. Moody's Baa investment grade bonds) and US 10 years treasury bond which peaked at 4.31% on the 23rd of March, after a steep increase started on the 18th of February.

Banks, in particular the four listed as "globally systemically important" by the Financial Stability Board (JP Morgan, Citigroup, HSBC, and Bank of America), entered the pandemic with, on average, a 'naked' capital adequacy ratio (actual equity to total assets) of 9.4%, which is 2.5 more than that of the 2008 global financial crisis (S&P Global). Nevertheless, in addition to the big challenge of the non-performing debts faced by banks, the pandemic is boosting the digitization of banking, affecting much more retail than wholesale banking.

The of decline and recovery of equity markets can be interpreted by considering the spread of the pandemic and economic policy response by major governments. Both stock and currency markets remained quiet until 20th of February seemingly in the belief that the pandemic could be managed without major economic consequences, but this underestimation enhanced uncertainty, once realized the severity of the event. Debt-based securities remained calm until the 4th of March. Risk premia, measured by BBB US corporate index, that investors demand peaked at 4.88% on the 23rd of March and later started to decline after the Federal Reserve's policy actions. The Fed reacted by reducing to zero-percent interest rates policy and implementing an initial US$700 billion Quantitative Easing (QE) program which later extended to an unlimited amount of dollars, it reopened liquidity swap lines offering UK, Swiss, European and Japanese central banks to exchange countries' currency for US dollar in unlimited amounts, later extended to 14 countries. The European Central Bank (ECB) announced on the 18th of March, together with the Bank of England, a respectively EUR750 billion and GBP200 billion QE. These extreme unconventional actions contribute to the creation of further uncertainty and may cause long-term problems. The market started to rise again around the 23rd of March, as well as the end of flight to the US dollar, when the Fed proposed to buy corporate bonds for the first time in history. On May 2020 the US announced a US$2 trillion aid package (representing approximately 11% of the US GDP) for households, businesses and local governments, including direct income injections, loans and guarantees to businesses, and pledged to cover 80% of earnings for salary employees and self-employed professionals. In the Eurozone, a total of EUR 240 billion has been made available for distressed member states via the European Stability Mechanism (ESM), while EUR100 billion has been committed by the European Commission for supporting employment schemes of member states. Individual member states have also embarked on domestic fiscal stimuli programs. At the global level, the World Bank provided financial assistance of up to US$160 billion to low-income countries (World Bank, 2020). The International Monetary Fund (IMF) has financed more than 100 emergency financing requests of about US$100 billion. These events highlight the crucial role of the states and the hierarchical nature of global finance, which confirms the dominant position of the US as their policy actions had the most impact on financial markets. The second tier in the hierarchy is constituted by economies with strong currencies, such as Japan, the Eurozone, and the UK. Stronger currency's countries depend less on the US$ and can obtain a privileged access to it. Furthermore, the Covid-19 crises has the high reliance of emerging and particular developing economies in international

finance. Impact on stock markets has severely affected small and medium enterprises (SMEs). For instance, EUR25 billion has been given to the European Investment Bank to boost lending to SMEs.

II. IMPACT OF COVID-19 ON INVESTORS AND THEIR BEHAVIORS

The severe impact of Covid-19 dramatically affected risk and returns expectations of individual investors, leading to a reallocation of their portfolios. In this period characterized by extreme uncertainty, investors have started to reallocate their portfolios toward more conservative ones. However, the transition from risky to risk free assets is not the same for all investors, in particular an important portion of retail investors decided not to reduce nor increase their risk exposure. Prior to pandemic, investors preferences were stocks, mutual funds, real estate and bank deposits, that is they preferred higher returns and thus risk. However, since the returns on risky assets turned out to differ from the expected one, investors re-appointed their preferences in such a way that insurances came out to be their first choices, followed by other safe assets i.e. gold, bank deposits, provident funds (Zhang et al., 2020). Figure 10 shows the increase in demand for gold as an investment which more than doubles from 4Q 2019 to 1Q 2020, moving from 268.7 to 549.4 metric tons.

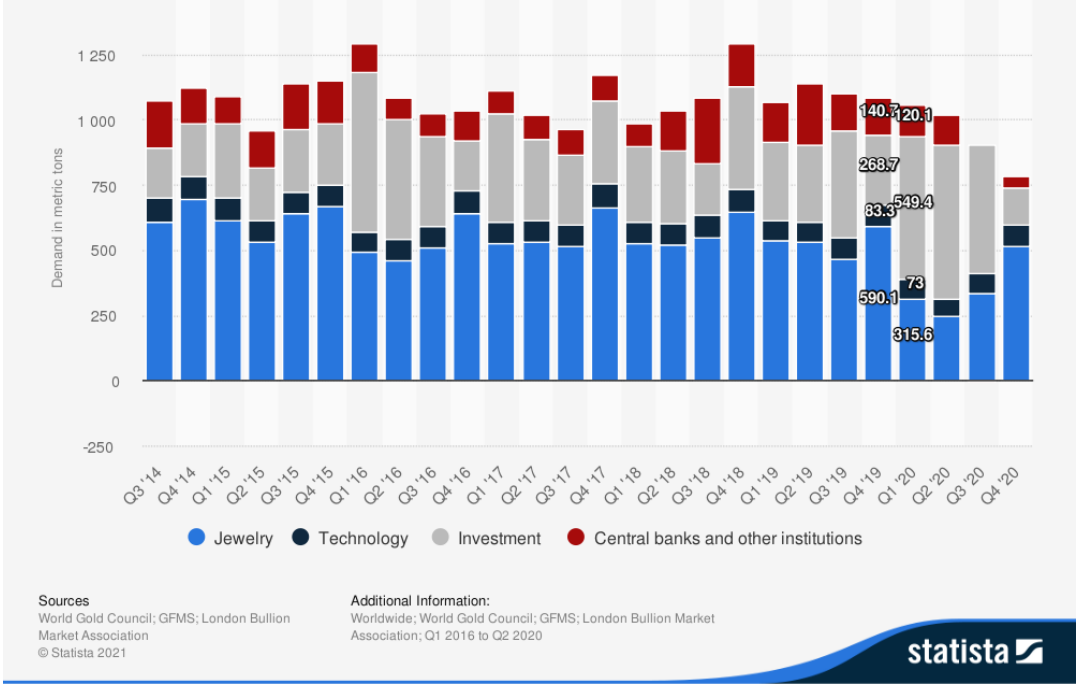

Figure 10: demand for gold worldwide from 1st quarter of 2016 to 3rd quarter of 2020 by purpose (in metric tons)

Not all investors re-allocated their portfolio fearing the market turmoil due to the pandemic, a significant portion of investors see the market downturn as a possibility to invest more, or for the first time. Surveys showed that age and/or experience appear to be an important factor in determining the likelihood of the risk attitude of the investor. Older investors seem less likely to change their portfolio, perhaps because it is more probable that they structured portfolios around a long-term plan, whereas younger investors constitute the major part of those who changed their holdings. However, an overall increase in trading activities is especially

pronounced among male and older investors during the period from February 23, to March 22. Ortmann et al. (2020) show that investors trading activities increased as the COVID-19 pandemic progresses, in both the number of traders and their average trading hours. The number of investors to open a new account with the broker increased, while at the same time established investors increase their average trading activities. Investors, on average, significantly increase their weekly trading intensity by 13.9% as the number of COVID-19 cases doubles with respect to pre-pandemic figures shown in Figure 11.

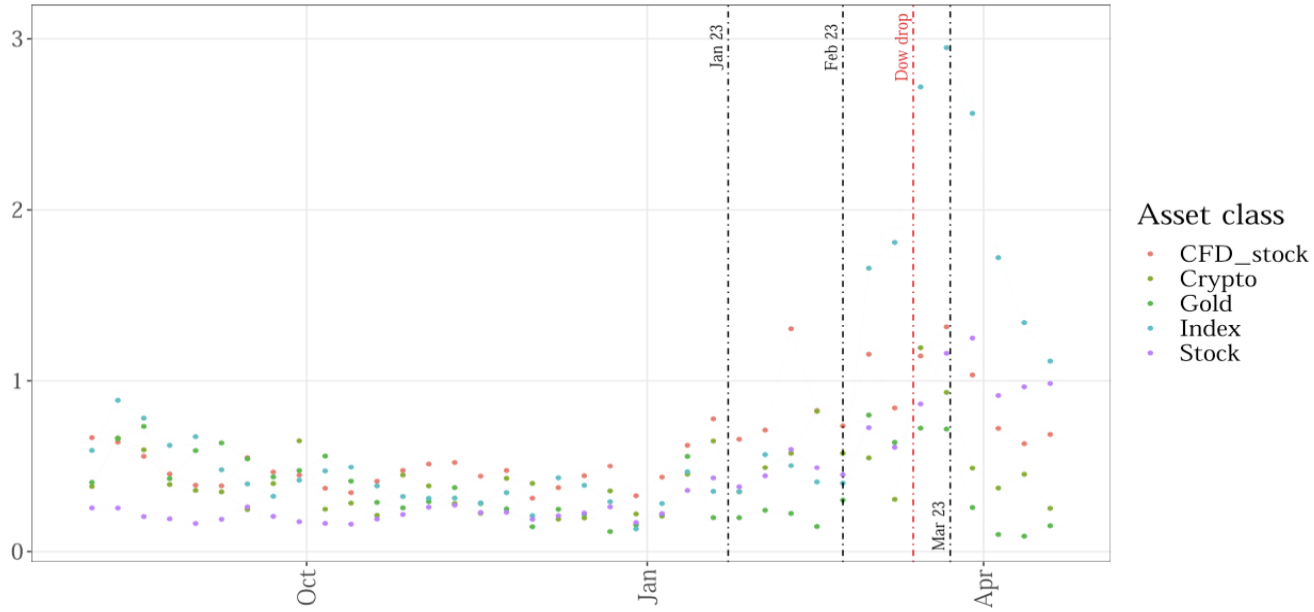

Figure 11: Trading intensity on selected asset class, by R. Ortman, et al.

In particular, retail investors open more stock and index positions, but do not move much to safe-haven (i.e. gold) or particularly "risky" (i.e. CFDs on stocks, cryptocurrencies) investments. Moreover, industries that are most affected by the crisis feature the higher trading intensity. For instance, travel-related industries featured early short-selling at the beginning of February. The huge uncertainty of the Coronavirus crisis is observable also in the inconsistencies of investors' expectations between short- and long-term, further amplified by governments provisions such as the unlimited quantitative easing. Bull investors rely on a fast recovery of the economy once the pandemic passes and see lockdowns as an opportunity to "buy-low sell-high", whereas bear investors think that this narrative is too optimistic (Ortmann et al., 2020).

2.1. Behaviors of investors during pandemic

The traditional finance paradigm, which suggests that markets and humans are perfectly rational and have perfect self-control, fails to explain the extreme volatility of the markets during pandemic, as already explained in Chapter 1. In periods of global crisis, such as the COVID-19, investors tend to focus on what is most easily accessible and consume information at its face value while the world adjusts to the crisis. This is ironic, because crises are the periods in which people must be most careful. The COVID-19 pandemic put at test every investor possibly accentuating many of their cognitive biases and phenomena pertaining to behavioral finance, described below.

2.1.1. Enhanced Overconfidence, Miscalibration, and enhanced Better-than-average effect

The overconfidence phenomenon comprises miscalibration and better-than-average effects which are shown to be prevalent on an investor level. It has also been shown to lead to stock price volatility, that is a prime characteristic of the markets during the Covid-19 crisis. Miscalibration is a cognitive bias in which the confidence is higher than the accuracy. This facet of the broader overconfidence phenomenon is shown to be very relevant in the field of finance, and in addition, the introduction of financial rewards to incentivize the correct calibration is useless. This cognitive effect is glaringly reflected in the GDP growth projections across the globe as the pandemic become more widespread. For instance, in the case of India, growth projections of GDP for 2020 were miscalibrated, they were predicted to be much higher than the actual likely value even if investors have seen the evolution of the crisis in other developing and developed countries. Moody's rating agency revised its GDP projections growth for India several times from February through April, from 5.4% on February 17, 2020 to 0.2% on April 28, 2020 as shown in Figure 12. Yet, growth projections remained relatively high, even though India was at a high risk of importing COVID-19 (Brockmann, 2020).

Date	Projected Growth Rate	ΔProjection	Cases	ΔCases
Feb 17, 2020	5.4%	-18.18%	3	-
Mar 9, 2020	5.3%	-1.85%	48	1500%
Mar 27, 2020	2.5%	-52.83%	883	1739.58%
Apr 28, 2020	0.2%	-92%	31360	3451.53%

Figure 12: GDP Growth rate projections (2020) by Moody's and confirmed cases in India

People usually see themselves unrealistically positively and tend to overestimate their abilities to be superior to those of an average similar group (Glaser and Weber, 2007). In the context of financial markets *better-than-average* effect has been shown to correspond with higher trading volumes as traders consider their information as better compared to their peers. Researchers found that people are very pessimistic about the economic outlook for the future. However, they are less pessimistic about their own private economic situation in comparison to the national and global economy as a whole. The implication of the better-than-average effect is that individuals, though pessimistic, think that they will do better than others in their country or in the world as a whole. On an aggregate level, this phenomenon could mean that people are less prepared for potentially long-lasting negative shocks to their economy than if their expectations of the future were better calibrated (Barrafrem et al., 2020). Overconfident financial institutions, as characterized by the riskiness of their investments prior to the 2020 Stock Market Crash, are therefore likely to suffer higher losses and failures in the post crisis. This may lead to long lasting changes in preferences about the riskiness of investments.

2.1.2. Illusion of control

In psychological research illusion of control is shown as an expectation of the probability of personal success which is inappropriately higher than the objective probability (Langer, 1975). Stress, competition, implemental mindset, choice, environment, and familiarity are conditions that have shown conducive to the development of an illusion of control and consequently as maladaptive for traders (Fenton-O'Creevy, Nicholson et al., 2003). Lockdowns imposed by many countries' governments put to the test the abovementioned conditions, especially from a psychological point of view, and it may have enhanced this phenomenon, as well as many others. This bias is a characteristic of the 2008 Financial Crisis that is the overconfidence in the risk management models that caused the financial bubble to burst is an example of illusion of control. In the current COVID-19 crisis this cognitive bias affects prevalently firms. In a study made by Wang and Xing, about uncertainty during COVID-19 crisis, they revealed a negative market reaction of the firms during the first quarter of 2020, which suggests that the market underestimated the impact of coronavirus outbreak on these firms.

2.1.3. Unrealistic Optimism

This bias is strongly related to the better-than-average effect. People with this optimism bias have sufficient confidence that they have the potential to experience a positive event rather than a negative event, especially if the event is perceived as a controllable event (Harris et al., 2008). In the financial context, some people believe that the opportunity they have, that is being able to achieve financial success, is bigger than that of others (Skala, 2008). The influence of the optimism bias was also noticeable during the financial crisis in 2008 because of the untested model that was justified with a temporary optimism attitude and minimized negative possibilities (Wang & Xing, 2020). In current COVID-19 crisis, even as banks have seen their profits plummeting and set aside big reserves to cover forecasted loan losses, investors remained optimistic during the 2020 stock market crash as they expected the Federal Reserve System of the United States to cut interest rates, buy bonds, provide aid, and backstop credit markets (Westbrook, 2020).

2.1.4. Enhanced Representation bias

Representativeness bias or Representation bias is the cognitive tendency for investors to be able to influence their behavior on the stock market (Zhao & Fang, 2014). In this case the bias occurs because people use to relate to their analogs and can predict the future of analogs, especially in the horizontal representation bias (Zhang, 2008). The beginning of 2020 and its peak in mid-2020 is the collapse of the stock market as a result of the current COVID-19 pandemic and has been found several times in the discussion of other papers that equate to the financial crisis in 2008 and the great depression that occurred in the 1930s (Brende, 2020). Such comparisons are a concrete example of the representativeness bias. Stataman alerts that while the market today may seem to be analogous to that of the early 2009 when a stock market decline reversed into a stock market increase, the market today may instead represent the stock market in late 1929, when the decline did not reach

its true low until 1932. In fact, biased comparisons may negatively impact the markets in the long run since they are merely sentiment-based representations.

2.1.5. Risk aversion

Risk aversion simply represents the investor's reluctance in seeking higher risks and instead preferring lower risk alternative investments. In periods of extraordinary volatility this behavior is particularly present as previously illustrated in the impact of COVID-19 on financial markets. Investors divested a significant amount of stock and risk aversion increased substantially. Factually, Bu et al. found that in Wuhan risk aversion increased noticeably as the coronavirus started to spread rapidly in the city. Furthermore, gold, seen as a safe investment, is observed to gain value as risk aversion increases. Such increases in the price of gold are likely affect investors behavior across the globe. Furthermore, the fact that investors reduced their leverage-usage, is another indicator of risk aversion due to public fear, as shown by Figure 13.

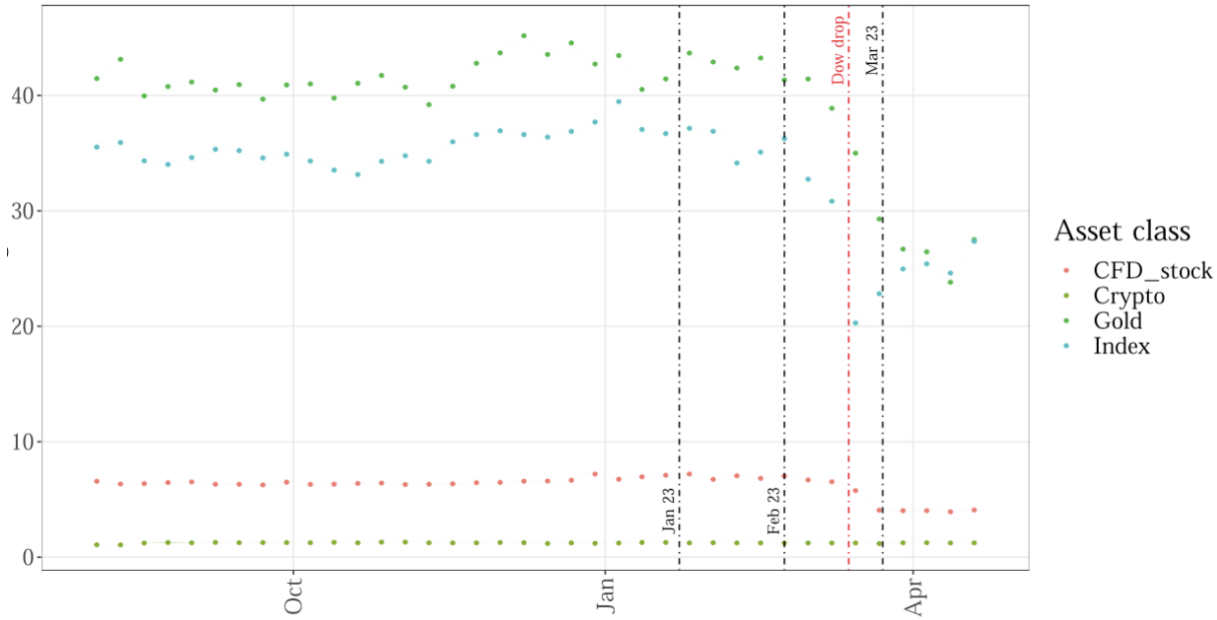

Figure 13: Decline in leverage-usage across asset classes between February 23, and March 23, that is most pronounced following the drop of the Dow, by R. Ortmann, et al.

2.1.6. Herding

When traders discount their private information and instead look at other traders' trades this is called herding behavior. When multiple people make the same decision in sequential fashion the so-called information cascade is likely to occur. Researchers found that, from the effects of the Government Response Stringency Index (which is a composite measure of governments response to COVID-19 based on nine response indicators) and short-selling restrictions on international stock markets during the COVID-19 outbreak, had important consequences on herding behavior. Kyzis et al. (2021) argue that the different responses of the national governments lead to uneven information disclosures about stock market fundamentals across countries. Differential rates of arrival of new information in turn alleviated the presence of herding behavior in international stock markets. According to Avery and Zemsky (1998), government responses can reduce multidimensional uncertainty surrounding the coronavirus crisis, which can effectively restrain herding bias.

Moreover, consistently with the overpricing hypothesis of Miller (1977), short-selling restrictions imposed by the national and supranational regulatory bodies in the EU are associated with lower levels of herding behavior. Furthermore, the VIX volatility index suggests herding bias. Finally, also the government and regulatory restraints imposed to control the transmission of COVID-19 within and across countries mitigated the manifestation of herding behavior in international stock markets on behalf of investors.

2.1.7. Availability heuristic

When investors make decisions, they tend to give too much importance on recently acquired information. Availability heuristic bias is strictly related to the overconfidence, in particular overestimation or underestimation. In both cases, when investors are confronted with the truth, either if they overestimated or underestimated something, they may incur losses and loose trust. In particular, this is what happened in the Global Financial Crisis of 2008, in which overestimation of the risk management capabilities of the banks after a long period of positive outcomes and excessive trust in investors and the markets led to an underestimation of true risk. When it comes to news, especially in periods of high volatility, investors are assailed by information, often even in stark contrast. Therefore, investors may base their decision on noisy information with inaccurate data, as the one disclosed at the beginning of the pandemic.

CHAPTER 3: ANALYSIS OF THE TRADING VOLUME ACROSS COUNTRIES DURING COVID-19

INTRODUCTION:

In this chapter I am going to analyze the impact of the COVID-19 on stock markets trading volume in different selected countries. This analysis is based on the article *Trading from home: The impact of COVID-19 on trading volume around the world* by M. Chiah and A. Zhong.

This period of high uncertainty is characterized by investors who are found to be severely influenced by sentiment and disagreement. Such sentiment, either when positive (due to high market returns) or when negative (due to low market returns), is predicted to boost trading volume. Moreover, according to Kumar (2009) and Shiller (2012) "financial markets is a way of channeling gambling behavior into something productive" and since casinos temporarily shut down during pandemic, the increase in trading volume is even higher for markets with greater gambling opportunities, as more gamblers land into trading.

During the pandemic the increase in the turnover (which proxies the trading activities) is higher for countries with more developed protection of legal rights and corporate governance, in other words countries with stronger economic development feature more trades. The trading volume is less prevalent among countries with a higher level of uncertainty avoidance index, which measures uncertainty avoidance, which is engaging in certain behaviors in order to avoid risk and the unknown. Countries with high uncertainty avoidance index (UAI) include i.e. Greece (112), Japan (92), France (86), Mexico (82), Israel (81), and Germany (65). The low UAI countries are i.e. Singapore (8), Denmark (23), Great Britain (35) and the United States (46).

The results support the presence of the overconfidence behavior, in fact those who are more confident in their abilities (which is accounted for by the level of individualism), tend to be more active traders, which is in line with Barber and Odean's documentation that overconfident individuals tend to be active traders (2001).

I. DATA AND METHODOLOGY:

The whole sample period goes from the 2nd January 2019 to the 15th May 2020. The estimation window, that is the period before the COVID-19, goes from the 2nd of January 2019 to the 22nd of January 2020 and it serves as a reference model for the normal level of trading intensity. The event window goes from the 23rd January 2020 to the 15th May 2020. There is a total period of 358 days and 12.665 observations, distributed among 37 of both developed and developing countries. All the data were extracted from Refinitiv Datastream, in particular the daily trading volume of international stock markets for the aforementioned 37 countries.

The following table (Table 1) presents the total average daily turnover for the whole sample period, calculated as the ratio between the number of shares traded in each day over the total number of share available in the market, as well as the turnover ratio for both the estimation window (pre-COVID-19) and the event window (COVID-19). It also reports the difference between the two means (pre and during Covid-19) and its p-value.

The last two columns report the percentage change in GDP growth for the corresponding country, and the corresponding GDP per capita expressed in millions of dollars).

Table 1: Summary statistics for selected countries

Country	Turnover	Pre-COVID-19	COVID-19	Difference	p-value	GDP Growth (%)	GDP per Capita
Argentina	0,044%	0,043%	0,049%	0,006%	0,0772	-3,47	11683,95
Australia	0,307%	0,267%	0,444%	0,177%	<0,0001	1,37	57395,92
Germany	0,001%	0,001%	0,002%	0,001%	<0,0001	1,22	47615,74
Belgium	0,146%	0,131%	0,197%	0,066%	<0,0001	0,94	47472,14
Brazil	0,413%	0,349%	0,630%	0,281%	<0,0001	0,53	9001,23
China	0,533%	0,509%	0,615%	0,106%	<0,0001	6,08	9770,85
Chile	0,078%	0,069%	0,105%	0,035%	<0,0001	2,59	15923,36
Canada	0,270%	0,234%	0,389%	0,155%	<0,0001	0,48	46234,35
Denmark	0,210%	0,190%	0,279%	0,089%	<0,0001	1,88	61390,69
Spain	0,195%	0,176%	0,261%	0,084%	<0,0001	1,91	30323,65
Finland	0,241%	0,215%	0,329%	0,114%	<0,0001	1,54	50175,3
France	0,203%	0,178%	0,287%	0,109%	<0,0001	1,55	41469,92
Greece	0,167%	0,159%	0,195%	0,036%	0,01	2,15	20316,57
Hong Kong	0,194%	0,173%	0,266%	0,093%	<0,0001	2,18	48675,62
Indonesia	0,077%	0,070%	0,099%	0,028%	<0,0001	3,99	3893,6
India	0,257%	0,227%	0,363%	0,136%	<0,0001	5,71	2009,98
Ireland	0,197%	0,170%	0,289%	0,119%	<0,0001	6,84	78582,95
Italy	0,390%	0,348%	0,533%	0,185%	<0,0001	0,97	34488,64
Japan	0,379%	0,347%	0,488%	0,141%	<0,0001	0,99	39289,96
Korea	0,341%	0,278%	0,560%	0,283%	<0,0001	2,18	31380,15
Mexico	0,097%	0,092%	0,116%	0,024%	<0,0001	0,99	9673,44
Malaysia	0,090%	0,080%	0,123%	0,042%	<0,0001	3,33	11373,23
Netherland	0,291%	0,260%	0,398%	0,139%	<0,0001	2	53022,19
Norway	0,176%	0,146%	0,279%	0,134%	<0,0001	0,62	81734,47
New Zealand	0,110%	0,098%	0,151%	0,053%	<0,0001	1,77	42330,91
Peru	0,011%	0,007%	0,022%	0,014%	0,1064	2,21	6941,24
Philippine	0,044%	0,042%	0,052%	0,010%	<0,0001	4,77	3102,71
Poland	0,161%	0,140%	0,231%	0,091%	<0,0001	5,15	15422,45
Portugal	0,197%	0,163%	0,312%	0,149%	<0,0001	2,61	23403,22
Singapore	0,154%	0,130%	0,235%	0,105%	<0,0001	2,66	64581,94
Thailand	0,305%	0,268%	0,431%	0,164%	<0,0001	3,8	7273,56
UK	0,221%	0,198%	0,303%	0,105%	<0,0001	0,77	42962,41
South Africa	0,273%	0,245%	0,366%	0,121%	<0,0001	-0,57	6374,03
Sweden	0,265%	0,235%	0,367%	0,132%	<0,0001	1,04	54651,09
Taiwan	0,251%	0,226%	0,338%	0,112%	<0,0001	2,7	589,91
Turkey	0,858%	0,813%	1,006%	0,193%	<0,0001	1,31	9370,18
US	0,687%	0,588%	1,013%	0,424%	<0,0001	2,39	62886,84
Average	**0,239%**	**0,213%**	**0,328%**	**0,115%**	**<0,0001**	**2,14**	**31967,25**

3.1. Estimation window and the Reference model:

The trading volume of shares represents is strictly correlated with the size and the development of a country, and it is based on the number of shares traded. For this reason, the daily share turnover ratio (ADTV) represents a good proxy to measure trading activities, as it is computed as:

$$ADTV = \frac{\#shares\ traded_t}{tot.\#shares\ in\ the\ market}$$

To measure the change in trading activities in the event window (23rd January 2020, to 15 May 2020), the following regressions represents the reference models:

$$Turnover_{i,t} = \alpha_i + \beta_1 D_1 + \epsilon_{i,t} \quad (1)$$

$$Turnover_{i,t} = \alpha_i + \beta_1 D_1 + \beta_2 R_{i,t} + \beta_3 R_{i,t-1} + \gamma' Z_{i,t} + \epsilon_{i,t} \quad (2)$$

Where:

The $Turnover_{i,t}$ is the daily turnover ratio of the country *i* for day *t*; D_1 is a dummy variable which can equal two values: 1 if the day *t* is in the event window, and 0 otherwise; $R_{i,t}$ and $R_{i,t-1}$ are the market returns for the country *i* on day *t* and *t-1*; $Z_{i,t}$ is a vector of control variables which includes the GDP growth rate of the corresponding country, the GDP per capita of the corresponding country, the ln(GDPperCapita), the VIX index, and the EPU (policy uncertainty index). The above panel regressions are calculated using robust standard errors which are reported in parenthesis.

In order to explain the factors that caused different impact of COVID-19 in trading activities across countries, the second regression (Equation (2)) is expanded with interaction terms between country-level variables and the dummy variable (D_1):

$$Turnover_{i,t} = \alpha_i + \beta_1 D_1 + \beta_2 R_{i,t} + \beta_3 R_{i,t-1} + \beta_4 CountryLevel_{i,t} + \beta_5 D_1 * CountryLevel_{i,t} + \gamma' Z_{i,t} + \epsilon_{i,t} \quad (3)$$

According to Li et al. (2013) investor behavior around the globe is affected by national culture, hence the $CountryLevel_{i,t}$ variable includes: Corporate Governance, legal rights, GDP per capita, GDP growth, anti-self-dealing index (that is a measure of legal protection of minority shareholders against expropriation by corporate insiders), gambling opportunity, trust, individualism, masculinity, and uncertainty avoidance (Hofstede, 2001).

The following table (table 2) shows the data used to determine the gambling opportunities for each country in the sample.

Table 2: This table reports the number of casinos for countries/regions in the sample. Source: Word Casino Directory.

Country/Region	No. of Casino		Country/Region	No. of Casino
US	2144		Finland	16
Canada	216		Belgium	10
Mexico	212		Singapore	10
Netherland	188		Poland	9
France	183		Portugal	9
UK	160		Turkey	9
Argentina	107		Denmark	7
Germany	86		Greece	7
Philippines	70		Norway	7
Australia	59		Hong Kong	6
South Africa	59		New Zealand	6
Spain	57		Malaysia	5
Peru	42		Sweden	5
Italy	36		Thailand	2
Chile	30		Brazil	1
South Korea	30		China	0
Japan	25		Indonesia	0
Ireland	23		Taiwan	0
India	21			
Total				3857

It is important to notice that US accounts for the 55,59% of total casinos in the sample, hence it features the highest gambling opportunity.

II. RESULTS:

Table 1 gives an overview of the countries included in the sample, which comprise 37 markets. The average daily turnover is 0,239%. It is observable that the daily turnover ratio is higher for countries with higher GDP i.e. US with a turnover of 0,687% and a GDP per capita of $62.886,84. The table also present the average turnover for the two periods i.e. Japan went from 0,347% to 0,488% average daily turnover, with a difference of 0,141% that is statistically significant at the 1% level. Apart from Argentina, Greece, and Peru, the difference between the pre-COVID-19 and the COVID-19 turnover is statistically significant, meaning that there is evidence of a more intense trading activity during the pandemic. The following table (table 3) presents the structural breakpoints (that is when a time series abruptly changes at a point in time) of share turnover for the 5 countries with the highest individualism score, and the 5 lowest uncertainty avoidance score according to Perron (2006). In addition, includes also the lockdown starting dates. It is noticeable that the US structural breakpoint (19th March 2020) occurs the day after the lockdown initiation (18th March 2020), which means that the high gambling opportunity is supported, as it shows that the trading volume experienced an abrupt change the day after the lockdown. The other countries do not feature this characteristic, since they possess remarkably lower number of casinos, hence gambling opportunities.

Table 3: Structural breakpoints for highest individualism and lowest uncertainty avoidance for selected country/region (in 2020).

Highest Individualism	Structural Breakpoint	Lockdown Initiation
US	19th Mar	18th Mar
Australia	25th Feb	13th Mar
UK	26th Feb	23th Mar
Canada	28th Feb	16th Mar
Netherland	24th Feb	15th Mar
Lowest Uncertainty Avoidance	Structural Breakpoint	Lockdown Initiation
Singapore	27th Feb	7th Apr
Denmark	24th Feb	11th Mar
Sweden	24th Feb	No lockdown
Hong Kong	29th Jan	27th Mar
China	24th Feb	23rd Jan

*Table 4: regressions (1), (2) and (3) output. The *** means that the value is calculated at a statistical level of significance of 1%. Country level daily turnover ratios are multiplied by 1000 before running the regression.*

Variables	(Eq.1) Turnover	(Eq.2) Turnover	(Eq.3) Turnover
COVID Dummy	1,1532***	0,2927***	0,2857***
	(0,0213)	(0,0284)	(0,0284)
GDP Growth		0,0185	0,0181
		(0,1482)	(0,1483)
GDP per capita		0,0203	0,0203
		(0,1507)	(0,1507)
VIX		0,0543***	0,0533***
		(0,0011)	(0,0011)
EPU		−0,0014***	−0,0013***
		(0,0001)	(0,0001)
$R_{\{i,t\}}$		−2,8363***	−3,1506***
		(0,5466)	(0,5502)
$R_{\{i,t-1\}}$			−2,5024*** (0,5320)
Constant	2,1301***	1,2079	1,2172
	(0,0102)	(1,5214)	(1,5219)
Observations	12.665	12.665	12.664

Adj. R-squared	0,1884	0,3371	0,3382
Number of countries	37	37	37

Table 4 reports the reference model in regression (1), the coefficient of the COVID-Dummy is 1,1532, this shows that in the COVID-19 period, the average turnover was 54% higher than in the pre-COVID-19 period:

$$\frac{\beta_1}{Constant} = \frac{1,1532}{2,1301} * 100 = 54,138\%$$

This result confirms the table 1, indeed the average percentage change in turnover between the average pre-COVID-19 and the average COVID-19 was 53,991%. In the second regression (2) the VIX volatility index is found to have a positive significant relationship whit trading activities, implying that investors traded more when volatility was higher. This is in line with Baker and Wurgler (2006) in which trading activity proxied by turnover is regarded as a sentient indicator. Together with regression 2, regression 3 illustrate the negative relation between market returns and turnover. Schmeling (2009) demonstrated that cross-country variations in culture and institutional quality are related to difference in the impact of sentiment on global financial markets. Thus, to better understand the cross-country differences in trading activities the following table (table 5) reports the regression output of equation 3, which includes the various country level variables and the interactions between such variables and the COVID-19 Dummy. PANEL A shows the role of national cultural variables on trading activities in COVID-19, and includes trust, individualism, masculinity, and uncertainty avoidance. PANEL B instead shows the impact of governance (which includes governance index, anti-self-dealing index, and protection of legal rights), stock market development, and gambling opportunity.

*Table 5: Trading activities in COVID-19. *, ** and *** stand respectively for 10%, 5% and 1% statistical significance.*

PANEL A	*(1)*	*(2)*	*(3)*	*(4)*
Variables	*Turnover*	*Turnover*	*Turnover*	*Turnover*
*COVID Dummy*Trust*	*0,6506****			
	(0,0868)			
*COVID Dummy*Individualism*		*0,0088****		
		(0,0008)		
*COVID Dummy*Masculinity*			*−0,0017**	
			(0,0008)	
*COVID Dummy*Uncertainty avoidance*				*−0,0018***

				(0,0008)
COVID Dummy	*0,2653****	*−0,1510****	*0,3774****	*0,4030****
	(0,0292)	*(0,0478)*	*(0,0570)*	*(0,0545)*
Trust	*1,8415*			
	(1,3279)			
Uncertainty Avoidance				*−0,0008*
				(0,0117)
Constant	*12.984*	*1,3907*	*0,8359*	*1,2867*
	(1,5204)	*(1,5035)*	*(1,7206)*	*(1,8121)*
Observations	*12.316*	*12.665*	*12.665*	*12.665*
Number of countries	*36*	*37*	*37*	*37*
Control	*Yes*	*Yes*	*Yes*	*Yes*
Adjusted R-squared	*0,3391*	*0,3438*	*0,3372*	*0,3374*

PANEL B	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*
Variables	*Turnover*	*Turnover*	*Turnover*	*Turnover*	*Turnover*	*Turnover*	*Turnover*
*COVID Dummy*Governance*	*0,4979****						
	(0,0943)						
*COVID Dummy*Legal rights*		*0,0363****					
		(0,0065)					
*COVID Dummy*GDP per capita*			*0,0615****				
			(0,0103)				
*COVID Dummy*GDP Growth*				*−0,0090*			
				(0,0099)			
*COVID Dummy*Anti Self Dealing*					*0,3420****		
					(0,0829)		

*COVID Dummy*ln(1+ no. of casinos)*						*0,0965***	
						(0,0113)	
COVID Dummy Casino Dummy*							*0,3678 *****
							(0,0702)
COVID Dummy	*−0,0706*	*0,0783*	*−0,3099****	*0,3113****	*0,1099***	*−0,0046*	*−0,0461*
	(0,0745)	*(0,0478)*	*(0,1046)*	*(0,0351)*	*(0,0526)*	*(0,0449)*	*(0,0706)*
Governance	*−1,4168*						
	(1,5388)						
Legal rights		*0,0341*					
		(0,1071)					
Anti-Self-Dealing					*0,5088*		
					(1,2640)		
ln(1+ no. of casinos)						*−0,0039*	
						(0,1915)	
Casino Dummy							*−1,1085*
							(1,3690)
GDP Growth	*−0,0060*	*0,0095*	*0,0185*	*0,0205*	*0,004*	*0,0227*	*−0,0126*
	(0,1494)	*(0,1497)*	*(0,1482)*	*(0,1482)*	*(0,1510)*	*(0,1547)*	*(0,1526)*
GDP per capita	*0,0748*	*−0,0053*	*0,0065*	*0,0203*	*0,0182*	*0,0142*	*0,1125*
	(0,1623)	*(0,1638)*	*(0,1507)*	*(0,1507)*	*(0,1503)*	*(0,1643)*	*(0,1934)*
Constant	*1,7611*	*1,276*	*1,342*	*1,2037*	*0,9862*	*1,2706*	*1,391*
	(1,6034)	*(1,5194)*	*(1,5215)*	*(1,5214)*	*(1,6199)*	*(1,5216)*	*(1,5143)*
Observations	*12,665*	*12,665*	*12,665*	*12,665*	*12,665*	*12,665*	*12,665*

Number of countries	*37*	*37*	*37*	*37*	*37*	*37*	*37*
Control	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Adj. R-squared	*0,3385*	*0,3387*	*0,3389*	*0,3371*	*0,3379*	*0,3408*	*0,3385*

In models (1) (2) and (4) the coefficients of the interaction terms between COVID-19 Dummy and cultural variables are statistically significant (≤5%). During the period of pandemic is observable an amplification of the positive associations between trust and share turnover, and between individualism and share turnover. Investors in countries with higher uncertainty avoidance index experienced lower trading intensity during the pandemic. This fact shows that cultural differences play a role in explaining the increase in trading intensity during the pandemic. This is consistent with Chui and Kwok (2009) and Tan et al. (2019) researches, that different cultural background characterized by lower uncertainty and higher individualism shape risk-seeking investors, which in turn trade more. PANEL B shows the results regarding the country-specific institutional environment. It observable that investors that are in countries with better corporate governance, legal rights, and anti-self-dealing systems traded more actively during the pandemic, and this holds as well for countries with high GDP per capita, which implies wealthier investors. Trading intensity is also higher for countries with greater gambling opportunities, and this supports the view of Shiller (2012), that equity markets are likely to be substitutes for casinos during pandemic. Overall, the engagement in share markets trading on behalf of investors is greater all around the globe, during the COVID-19 pandemic. These results support the sentiment and disagreement hypothesis, in that investors intensify trading activities in periods of extreme sentiment (either positive or negative) and disagreement. Institutional environment and cultural differences give reasons to the various trading behavior of investors in different countries. Finally, investors value stock markets and casinos almost as close substitutes.

III. CONCLUSIONS:

This analysis examined the trading intensity of equity markets across the selected countries during the COVID-19 pandemic period, that is from the 23rd of January 2020 to the 15th of May 2020. The first result to be noticed is the spark increase in trading intensity all around the globe, as pandemic hit. This intensification is found to be stronger in countries with better corporate governance and legal rights, suggesting that investors are more willing to take risks in better institutional environment. Such conclusion is valid also for countries with higher GDP per capita, which can be translated into wealthier investors. Trading activity, during global pandemic, intensified more in countries with greater gambling opportunities. In conclusion, from the cultural dimension point of view, the trading volume increased more substantially during the pandemic among countries with higher levels of trust and individualism (uncertainty avoidance).

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