

Behavioral Finance and the Fast Evolving World of Fintech

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Abstract

The capital markets are in process of metamorphosis, under the pressure of financial and health crises, technical progress, liberalization of capital movements internationally. The article focuses on changing the behavior of portfolio investors under the influence of psychological factors and technical progress, which led to the emergence of complex trading systems and financial products. Financial products are used for the construction and management of portfolios not only on the classic principle of profitability - risk, but they are chosen taking into account the preferences of investors or other psychological considerations.

Keywords: capital market; behavioral finance; fintech

JEL Classification: G1; G4; O3

Introduction

The evolution of the contemporary economy determined a significant change, both of the forms of manifestation, but especially of the background of the contemporary financial systems, largely dependent on the culture of equity and the existence of a relatively neutral tax system that favors a sustainable, internal development of companies. Under these conditions, the financial system has developed new financing mechanisms for companies, creating new financial products (Matei et al., 2008; Subic et al., 2010) that will stimulate the emergence of innovative enterprises and the creation of a new trend in the field. Thus, as shown in (Aubrey et al., 2015), new enterprises, those in the stage of expansion or reconfiguration represent less than 10% of enterprises in the 11 countries considered in the study, but they create up to two-thirds of the new jobs total.

The development of innovative financial and investment products often starts from capitalizing on existing sectoral opportunities, either undervalued or underutilized or deficient. Traditionally, sectors such as agriculture or industry are not excluded from the process of innovation and adaptation to the new demands imposed by the financial and stock market. New investment products are supported by agriculture and farmers, generating a significant process

of stock market innovation. Thus, one can identify subtle links between financial and stock market innovation, the use of new technologies and a traditional economic branch, focused on capitalizing on a traditional production factor such as agriculture.

Innovative enterprises must identify sustainable sources of financing, with increased availability, to integrate and adapt to the competitive economic environment (Ciutacu et al., 2005, Matei, 2013, Panait & Petrescu, 2015, Brezoi, 2018, Siminica & Sichigea, 2018, Palazzo, 2019). As it is argued in the literature, newly established companies, under the pressure of the possibility and the need for an immediate gain, tend to expose themselves to risk and fail, being often exposed to dependence on external financing. As argued by (Tataj, 2015), successful innovative ecosystems, which stimulate new or expanding enterprises, are characterized by the existence of strongly interconnected networks, consisting of research and education institutions, large industry, capital investors risk, as well as the existence of creative and entrepreneurial talent. Therefore, benefiting from a solid infrastructure, innovative enterprises can develop feasible solutions, with a high degree of originality and functionality, for a contemporary economy increasingly exposed to high uncertainty.

FinTech and InsurTech companies represent, from this perspective, an essential element in expressing innovation and entrepreneurial creativity in the financial field, completing or expanding, as is the case of some classic financial fields and activities. Financial technologies (*FinTech*) and insurance services developed based on new technologies (*InsurTech*), in the conditions of refining contemporary financial markets, lead to the expansion and diversification of the digital market in the financial field, being of major importance in promoting innovative entrepreneurial services and financial inclusion (Botezatu & Andrei, 2012; Ene, 2017, Ene & Panait, 2017, Voica, 2017, Iacovoiu, 2018, Yue et al. 2019). At the same time, the extension of multi-financing and the capitalization of the possibilities of adopting FinTech solutions can become factors in consolidating the innovative entrepreneurial environment and facilitating the accessibility to new sources of financing (Manta, 2018, Minescu, 2018).

Behavioral Finance

The contemporary economic, demographic and social change requires a new approach of understanding financial behavior determined by the transformation of modern culture and financial landscape both in terms of practices of long-term financing and capital movements in the global economy. The main stream imposes green financing rules in assuring high levels of profitability that would require a clear definition of the conditions for capitalization in the context of an increasing demand for social responsibility standards and a more coherent application of monitoring processes, but also a continuous evaluation and transparency. In this context, although the financial institutions are considered to be one of the main triggers but almost in the same time beneficiaries of the past financial crisis, they must not reduce or worse interrupt their commitment to society.

As it is argued in literature (Cordella & Ospino Rojas, 2017; Braun et al., 2018; Bekaert & Mehl, 2019), excessive globalization of financial markets, although it has imposed a behavior focused mainly on high return on capital, should not exclude measures of social profitability, exceeding the classic binomial return-risk. Responsible financing uses social criteria, of good governance but also of environmental ones in the mobilization and orientation of capitals. The financial markets thus had to develop and include mechanisms to ensure the sustainability of the processes carried out but also of the management practices.

“*Greed and fear rule the markets*” is an aphorism well known to participants in the capital market, a market whose direction is, not infrequently, dictated more by human emotions and less by the value or potential of the assets that make it up. Behavioral finance arose, as an area of study of economics, from the need to understand how psychological factors influence the

decision-making process of investors in capital markets. The premises from which the study of behavioral finance starts are often opposed to traditional theories, theories that do not question the perfectly rational behavior of investors and do not take into account the impact of their emotions and prejudices in making the investment decision.

Table 1. Traditional finance vs. behavioral finance

TRADITIONAL FINANCE	BEHAVIORAL FINANCE
Markets are efficient	Markets are inefficient
Investors are perfectly rational	Investors are not perfectly rational
Investors do not make mistakes	Investors make mistakes that can lead to wrong decisions
Investors have perfect self-control	Investors have limits on self-control
Investors have a risk aversion	Investors are averse to losses
The investment decision is not influenced by emotions	The investment decision is not influenced by emotions

Source: authors based on literature in the field

The table above highlights the importance that behavioral finance attaches to human nature and how the latter influences not only the individual decisions of investors but the entire capital market as a whole. Psychological factors, therefore, play a central role in the study of behavioral finance, with great importance being given to cognitive errors (often called cognitive distortions) that investors make and their emotional reactions, whether they occur before the purchase decision is made, during the holding of an asset in the portfolio or after the sale.

Cognitive errors and emotional reactions that can affect the investment decision-making process

In modern economies, the investment process and the flux mobilizing the capital is determined by well-defined economic criteria based on efficiency and the possible remittance of advanced capital.

The main vector in making investments and developing new financial instruments and mechanisms, including those based on technology are investors, be they individuals or institutions. Investors implement and implement strategies with different time budgets and different risks for optimizing the results, the error being present and even more pronounced if the decision is adopted emotionally. In theory (Muntean, 2016; Bokhari, 2017; Lindqvist et al., 2018; Ady, 2018), the notion of "cognitive error" emerged in 1972, with the demonstration by Daniel Kahneman and Amos Tversky of how human decisions differ from rational choice theory. (Kahneman and Tversky, 1972)

The most common cognitive distortions that affect decision making are:

- *Framing effect* – Closely related to the prospectus theory (for which Daniel Kahneman won the Nobel Prize in Economics in 2002) is the tendency of the individual to perceive things differently, depending on how they are presented to him. The prospectus theory holds that a loss will have a greater negative impact on the investor than a gain of equal value will have a positive impact.
- *Bandwagon effect* – so-called “herd behavior” is the tendency to do or believe things because many others do or believe the same things. The bandwagon effect can cause investment in certain assets only because many others invest in them. A good example of a bandwagon effect is investing in cryptocurrencies, purely speculative, unsupported assets, which are virtually impossible to analyze fundamentally. Most of the time, the bandwagon effect affects the more investors the closer the prevailing trend is to the end (Figure 1).

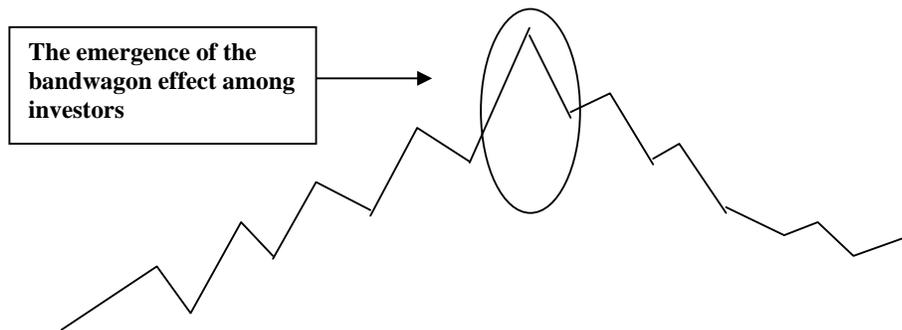


Fig. 1. The appearance of the bandwagon effect in an upward trend

- *F.O.M.O. effect* (fear of missing out) – Closely related to the bandwagon effect, the F.O.M.O. can make investors think they are missing out on great opportunities to make a profit, opportunities that others will take advantage of.
- *Wishful thinking* – describes the decision-making process that emerges from one's desires and expectations for the future, often ignoring evidence and reality. A good example of wishful thinking in finance is the statement of American economist Irving Fisher, who, just nine days before the 1929 stock market crash, claimed in a New York Times article that "stock prices have hit what appears to be a permanently high plateau". (Fisher)
- *Self-attribution* – represents the cognitive distortion through which the investor attributes only the successes of his own decisions and abilities, attributing at the same time the failures exclusively to external factors (bad luck, manipulation of the market by third parties, wrong information provided by others, etc.). Self-attribution can lead to an inability to recognize and correct one's mistakes.
- *Dunning – Kruger effect* – first described by psychologists David Dunning and Justin Kruger, this cognitive error mainly affects inexperienced investors who overestimate their abilities, but are not able to recognize their limitations. (Figure 2).

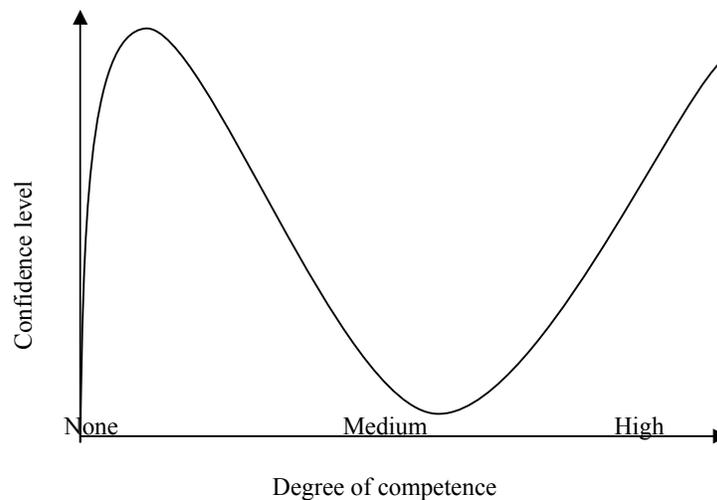


Fig. 2. Dunning – Kruger effect

Regarding the emotional reactions that can affect the decision-making process, they are not difficult to intuit:

- *Greed and fear* must be mentioned together because they are often behind the most spectacular growths and the steepest collapses in capital markets. British economist John Maynard Keynes identifies greed and fear as factors that profoundly affect the economy and markets, while Warren Buffett, the famous American investor, says that when selling and buying stocks, you should “*be afraid when others are greedy and greedy only when others are fearful*”.
- *Loss aversion* – not to be confused with risk aversion, is the fear of losing, whether we are talking about a quantifiable material loss of money or the fear of failure. While a certain degree of risk aversion is a desirable trait for an investor, loss aversion can interfere with his ability to recognize in time and liquidate an unprofitable position, which can lead to a considerably higher future loss. Also, the fear of loss can make an investor close a profitable position too early, with a minimal profit, for fear that the trend will not turn against him, generating losses.
- *Regret and fear of regret* – In the decision-making process, the investor can often be struck by the fear of regret. Anticipating regret after a wrong decision can interfere with the decision-making process, leading to the inability of capital market players to make buying or selling decisions.

Strategies to minimize the negative impact of psycho-emotional factors on investment activity

The multitude of psychological processes that affect the investor (whether we are talking about private investors or institutional traders) can have a negative impact on his activity. The potential negative effects of cognitive distortion and emotional reactions are obviously impossible to completely eliminate. Many financial institutions are increasingly relying on technology trading, using computer programs that, based on complex algorithms and predetermined rules, make decisions to buy and sell financial assets and execute transactions automatically, thus managing to eliminate from the equation the psycho-emotional variable, specific to human traders. In the absence of such tools, however, investors have at their disposal a series of strategies that, applied correctly and consistently, can reduce the psycho-emotional risks associated with capital market trading activities. Here are some of them:

- *Implementation of a set of rules for trading.* Perhaps the most convenient way to avoid many decision mistakes, implementing a set of rules that the investor should not deviate from is crucial to prevent emotional trading. It is preferable for the set of rules to include each stage of the investment process (buying, holding, selling). For example, the investor may have as a rule of the entry (acquisition) not to buy financial instruments before important political events (e.g. elections) or as a rule to remove the asset from the portfolio not to sell the asset in certain periods of time (e.g. to not sell the shares held in a company shortly before the publication of its annual report).
- *Avoid overtrading.* Overtrading is much too frequent trading, buying and selling portfolio assets in an almost compulsive manner, often without prior rigorous decision-making. Overtrading can emanate from a "betting" mentality combined with the F.O.M.O. The investor is often tempted to sell the assets held to buy others just out of a desire to take advantage of short-term trends. No wonder then that the most successful investor of all time, the American Warren Buffett, declares about the duration of holding a share in the portfolio that "*My favorite time to hold is forever*".
- *Analysis of all available information.* Crucial strategy to avoid the consequences of the framing effect, analyzing in an objective way all the available information remains may be the most convenient way to avoid making a wrong decision. It should be noted that in today's interconnected global economy, the investor needs to look at the big picture, as

- seemingly isolated events can have a major impact on any market in the world. The effects of the "trade war" between the United States and China, for example, are reflected in companies in Australia, with China being the country's main trading partner.
- *A constant and impartial analysis of investment activity.* Although self-criticism often proves to be a difficult process, a realistic analysis of decisions, successes, but especially mistakes, remains the best strategy to combat the trend of self-attribution. Maintaining a journal that includes not only mathematical statistics but also analyzes of the decision-making process that led to a certain action is imperative for the success of an investor.

Fintech – the Digital Metamorphosis of the Financial System

FinTech (financial technology) is a new field, at the convergence of modern technology with traditional financial banking services. Financial technology has managed to transform, in a short period of time, the way and speed of money. Dematerialized, money is transferred today almost instantly to any corner of the world through the Internet, infrastructure, and computer applications developed by companies in the field of financial technology. New technologies have advanced greatly since the introduction of the first electronic money transfer system by the telegraph by Western Union in 1871. Today, physical money tends to be used less and less in commercial transactions and often impossible to use without breaking the law. (Vucec et al. 2018, Marrara et al., 2019)

It is therefore not surprising that, globally, 64% of financial service users have adopted FinTech services (Ernst & Young - Global FinTech Adoption Index 2019). The global trend of digitalization of money will turn cash, as we know it today, in the form of coins and banknotes, into museum pieces in the not too distant future. The best example of this is Sweden, where the percentage of cash transactions fell from 40% in 2010 to 15% in 2016 and is currently less than 2% (The Riksbank's e- crown project Report 1). The level of investments made globally in financial technology highlights the interest of companies and governments of the world for this new field of activity. 111.8 billion dollars were invested in 2018 in financial technology, more than 100 times more money than ten years ago (in 2008, the financial technology sector managed to attract investments of 930 million dollars) (KPMG - Global fintech investment rockets to a record \$ 111.8B in 2018, driven by mega deals).

Amid digital transformation, the financial services industry today lives in symbiosis with technology, revolutionary services for both retail consumers and the business environment becoming indispensable for the smooth running of the global economy. We will analyze below the financial technologies that shape the global digital economy as well as the advantages, disadvantages and risks associated with them.(Meško et al, 2017).

Digital finance, electronic money and financial inclusion

Although the terms seem interchangeable and easy to confuse, a clear distinction must be made from the outset between FinTech and Digital Finance, the latter being only one of the branches of financial technology. Digital finance was born in response to the need for financial inclusion of certain social categories, ignored until now by the traditional banking system. Digital finance has gained momentum in less economically and socially developed countries, managing to integrate disadvantaged social groups into the modern global economy. Digital finance offers payment and money transfer services mainly, but not exclusively, where banks have failed to do so. The launch and expansion of these types of services in Africa have led to an unprecedented increase in people with access to modern financial services, with more digital finance companies currently operating on the continent than in any other region in the world. Electronic finance is the basis of digital finance. Electronic money, stored on computer systems such as mobile phones (often through e-wallets) is denominated in a currency issued by a central bank

and can be used for a wide range of transactions, often without needing to use a traditional bank account. In the report "Digital finance for all: Powering inclusive growth in emerging economies", the McKinsey International Institute sought to quantify the impact of digital finance on the economies of Brazil, China, Ethiopia, India, Mexico, Nigeria and Pakistan. The report concluded that the widespread adoption of digital finance will result in a 6% increase (equivalent to \$ 3.7 trillion) in the gross domestic product of these states by 2025 (McKinsey Global Institute - Digital finance for all: Powering inclusive growth in emerging economies). Although digital finance services have led to a revolution in financial inclusion, they also present risks that are often exploited by cybercriminals who, taking advantage of system vulnerabilities as well as the lack of experience and financial education of many users, manage to steal money from their electronic accounts. According to a report by Columinate InSites Consulting, financial fraud in South Africa has seen an upward trend, with 69% of users of digital financial services surveyed claiming to have been targeted by cybercriminals in 2019 (compared to 62% in 2018 and 46% in 2017).

Mobile payments

Smartphones have become payment tools thanks to financial technological innovations. Banks have been quick to welcome customers with new e-banking products that make easier payments to merchants through mobile applications that will replace bank cards in the future. The difference between such applications, developed by financial institutions and the electronic money mentioned in the description of Digital Finance is that the premiums are directly connected to the user's bank account, debited at the time of payment. There are obviously hybrid payment systems that allow users to use both a classic bank card and an e-wallet system. The most popular such system is the one used by the American company PayPal. Mobile payment most often uses NFC (Near Field Communication) technology, a technology that has recently been implemented in many classic bank cards.

The advantages of mobile payments using NFC technology are obvious, regardless of the device used (mobile phone or contactless bank card): speed and security increased by eliminating the risk of card cloning, for each transaction a unique security code being generated. Mobile payments and electronic finance have led to profound operational transformations in traditional banks. An example in this sense is the closure in autumn 2018 of ING Bank cashiers coupled with investments in the digitization of payment instruments and banking infrastructure.

Crypto coins – the rebellious child of financial technology

Cryptocurrencies are undoubtedly the most controversial creation of modern financial technology. These digital assets, used as payment instruments, originated in the early 1980s, but attracted public attention with the creation of Bitcoin in 2009. Using Blockchain technology, a list of records called blocks, linked together and secured by cryptography, cryptocurrencies have quickly become the subject of public debate, their status being difficult to regulate, and their circulation and the purposes for which they are used, almost impossible to control. Cryptocurrencies have quickly become speculative instruments, which are included in the offer of financial instruments of many brokerage firms. However, without an underlying asset, fundamental analysis of cryptocurrencies is impossible to achieve, with most experienced investors declaring themselves against the inclusion of cryptocurrencies in the sphere of financial assets. In an interview with Yahoo Finance, US investor Warren Buffett said about cryptocurrencies that:

"If you buy bitcoin or any other cryptocurrency you have something that produces nothing. You just hope the next buyer will be willing to pay more. And the next buyer hopes to find someone willing to pay even more. This way you do not invest but speculate." (Buffett, 2002).

However, cryptocurrencies present a hidden danger for the whole human society, a danger much more difficult to intuit but quantifiable and with a long-term impact: the pollution generated by the mining activities of cryptocurrencies. Cryptocurrency mining, ie the activity of validating transactions by solving a mathematical calculation by the computer offers the user of the computer cryptocurrencies as a reward. The opportunity for financial gain was immediately seized and private investors built massive data centers dedicated exclusively to the mining activity of cryptocurrencies. According to a study by two US researchers, cryptocurrency mining consumes more energy than mining gold or platinum (17 Megajoules to generate the equivalent of a US dollar in Bitcoin compared to 5 Megajoules to mine the equivalent of a US dollar gold and 7 Megajoules to the platinum equivalent). The study also revealed that the carbon dioxide emissions generated by the mining activity of cryptocurrencies between 2016 and 2018 were equivalent to those produced by one million cars in the same period (Krause & Tolaymat, 2018).

Anonymity and the legislative void in the field have quickly turned cryptocurrencies into preferred tools for illicit activities: tax evasion, money laundering, drug and arms trafficking, etc. Legislation and standardization in the field have become a priority in many states but the process is proving to be still difficult. To date, the European Union has failed to take any legislative action in this area.

Automated trading programs

Trading activity in the capital markets has undergone a strong metamorphosis with the improvement and large-scale adoption of computer programs capable of automatically trading any financial instrument in a given market. Automated trading programs could have an extended usage. If in financial investments they are perceived as doubtful instruments with a possible high negative impact, there are sectors as agriculture where this instrument could be implementing in cereal trading markets.

Algorithmic trading programs (often called Black Box trading software) are preferred by institutional traders due to their speed, translated by the ability to open and close a large number of positions in a short period of time (so-called High-Frequency Trading). Used mainly for very liquid financial instruments, traded in large markets, these computer programs use complex algorithms that allow them to make their own buying and selling decisions, with minimal interference from human operators.

Automatic trading has both advantages and disadvantages. Among the advantages of these systems we mention:

1. Minimize or eliminate emotions. Specific to human traders, the emotions associated with the trading decision-making process are minimized or even eliminated by using automated trading programs.
2. Increased speed of execution of sell or buy orders. In volatile markets, where the price of a financial instrument may change rapidly over periods of a second, the speed with which the order is launched can make the difference between a closed transaction in profit or loss.
3. Simultaneous monitoring of a large number of financial instruments. The ability of computer programs to monitor in real-time the price quotations of a large number of financial instruments makes them useful tools in the process of diversifying the investment portfolio.
4. In addition to the advantages, these software programs also have a number of associated risks and disadvantages:
5. Technical problems. Probably one of the most obvious disadvantages of automatic trading is the technical problems that can often have serious repercussions, like those from Knight

Capital Group would find out on August 1, 2012. On a fateful morning, shortly after the opening of the New York Stock Exchange, an error in the company's automatic trading program led to a loss of 440 million dollars in just 30 minutes.

6. The constant need for monitoring. Due to the complexity of these trading systems, they require constant monitoring by interdisciplinary teams of traders, programmers and mathematicians, who can intervene quickly and remedy any problems.
7. High initial costs. The development of automated trading programs, as well as the infrastructure needed to operate them in good conditions, requires a large initial capital, the costs often amounting to several million dollars.

However, the widespread adoption of automated trading programs highlights the fact that the advantages of these systems make them viable and often indispensable in trading activities in modern markets. However, such software programs can also be used for malicious purposes, market manipulation. In 2010, taking advantage of the ability to quickly open and cancel orders of the trading program he was using, the British trader Navinder Singh Sarao, caused a short-term crash of the New York Stock Exchange in order to buy shares at a lower price. Following an investigation, he was arrested and charged with manipulating the capital market in 2015.

Artificial intelligence and process automation in the financial sector

The use of computer programs with increasingly sophisticated algorithms has allowed the automation of certain processes in the financial sector. A good example in this sense is the use of chat robots, whether it is the case of phone calls that the customer initiates to a financial institution or we are talking about online platforms. The use of large volumes of computer-processed data (*Big data*) to identify inaccuracies in the company's operations can quickly reveal possible fraud attempts. Computer programs can also analyze customer profiles and make recommendations for appropriate financial products for each individual.

Conclusions

Despite the increasing influence of technology on the financial market, financial decisions are increasingly made on the basis of psychological considerations that exceed the strict criterion of profitability and risk of securities. Therefore, the behavior of investors on the capital market is followed not only by economists, but also by psychologists and sociologists who try to understand the most intimate springs of financial consumers who decisively shape their actions on the capital market.

The financial sector, often seen as conservative and traditionalist, could not ignore the changes in society due to the emergence and widespread adoption of new technologies. Many institutions with a tradition in the field have been forced to adopt an *Adapt or die* policy to counter the threats posed by the loss of a monopoly on many financial services. New financial services companies have quickly gained ground, offering innovative, secure and fast services at low prices. PayPal, for example, boasts 286 million customers globally, while Bank of America, one of the largest banks in the United States, has 66 million customers. Many financial institutions have understood the importance of the rapid integration of new technologies into business processes, succeeding in meeting customers with new products and services adapted to an increasingly technological world.

And central banks will have to accept new global trends in the future and prepare for the inevitable moment when cash, as we know it today, will become museum pieces. The Central Bank of Sweden, where only 2% of transactions are made in cash, has taken the first step in this direction, currently analyzing the opportunity as well as the best technical solution for creating an electronic currency - E-Krona (E-Crown, the Crown being the national currency of Sweden).

The future of money, as we know it today, will certainly be strongly influenced by future advances in technology as well as by the ability and desire of governments around the world to adapt to the new realities of the global economy.

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