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THE TRANSFORMATIVE IMPACT OF FINANCIAL TECHNOLOGY ON BEHAVIORAL FINANCE

Introduction. Russia's military aggression against Ukraine caused large-scale financial losses for our state that exceeded 1 trillion US dollars [1]. Ukraine's additional financial needs for 2025 amount to 12-15 billion US dollars [2]. To address urgent issues regarding Ukrainian economy, as well as financial provision at the macro level, the issue of rapid adaptation to modern challenges has become relevant, including challenges in the financial sphere, which is actively influenced by the behavior of subjects of financial relations. Behavioral aspects of financial decision-making are studied within the framework of behavioral economics and behavioral finance. When developing a financial strategy at the macro and micro levels, the behavior of subjects of financial relations is actively taken into account. At the same time, it should be noted that the production of the behavior of such subjects and the adoption of appropriate financial decisions in the modern dimension are subject to the use of new financial technologies. Exploring the impact of financial technologies on behavioral finance is a relevant topic for research.

Analysis of recent researches and publications. The theoretical basis for the research of behavioral finance, its substantive characteristics, is laid in the works of leading world scientists, such as: J. Drury [6], D. Hirshleifer [15], D. Kahneman [18], K. Sunstein [19], H. Simon [21] and others.

In domestic science, the study of the behavioral nature of finance, its scientific conceptualization, as well as the coverage of behavioral finance as an important direction of modern financial science was conducted by scientists such as, O. Gaidarzhyska [10], V. Korneev [9], V. Kryvyi [8], I. Lutyi [7], P. Nikiforov [4], O. Tereshchenko [3], N. Shamanic [5] and others.

The key benefits of financial technology in the financial sector, as well as the cause-and-effect relationships of the expanding influence of fintech on the global financial sector have been researched by the following scholars: P. Schueffel [11], M. Jovovic Vucinic [13], Alan Turing [16], M. Balitska [1], S. Tsyganov [25], O. Mironov [26] and others.

It should be stated that modern challenges, also including ones connected with the need to correctly process large data sets to solve economic problems, the acceleration of online financial transactions, etc., affect the formation of new behavior of financial relations subjects in the sense of behavioral biases when making financial decisions. This problem has not received enough attention in scientific studies and requires more systematic consideration.

The aim of the article. The purpose of the article is to scientifically comprehend, evaluate, and systematize the transformative impact of financial technologies on behavioral finance.

Results. In the scientific literature a number of approaches to defining the concept of "behavioral finance" have been formed. Tereshchenko O. points out that behavioral finance studies the interrelation between financial decisions and the psychology of the participants' behavior in financial relations [3, p. 105]. When making financial decisions, participants in financial relations may behave irrationally; to explain this behavior, it is necessary to form scientific approaches based on a combination of new knowledge from psychology and financial science, which is the basis of the concept of behavioral finance [4]. In their research, P. Nikiforov and M. Marych substantiate the significant scientific and practical value of behavioral finance in the areas of personal, corporate and public finance to identify current problems and develop ways to solve them in all areas of the financial system of the national economy [4, p. 21]. The behavioral approach focuses primarily on psychological factors, which are the most important points in explaining many aspects of an individual's financial behavior [5, p. 183; 6].

A number of authors who believe that the study of financial processes from a behavioral perspective should be an important area of interest, both from a scientific and practical perspective, indicate the importance of behavioral finance in the practical activities of financial relations subjects; in this sense, behavioral finance does not deny, but, on the contrary, is a continuation and natural development of the theory of expected utility [7, p. 393]. Regarding the theoretical basis of behavioral finance, V. Kryvyi notes that, on the one side, behavioral finance opposes modern neoclassical financial theory, but on the other side, it

tries to improve and expand its existing models by including more real initial data on the behavior of financial decision-makers and markets; for this purpose, developments from other social sciences, primarily cognitive psychology, are used to explain phenomenas that cannot be explained within the framework of standard theory [8, p. 15].

Totally agreeing with the theoretical definition and practical significance of behavioral finance, which are indicated by leading scientists, it is essential to note that in modern realities the further development of behavioral finance will occur on the basis of the active usage of financial technology tools. To substantiate all stated above, we draw attention to the following: firstly, in the behavior of the economic relations subject there are both rational and irrational decisions; secondly, the decision-making of the economic relations subject is greatly impacted by the form and structure of the information environment; thirdly, irrational behavior affects both pricing and corporate management [9].

Making rational decisions by financial relations subjects lies in the plane of traditional finance doctrine, where it is generally accepted to use criteria, methods and tools for studying quantitative relationships and spatial forms of the real world, their idealization and abstraction. As for behavioral finance, as a rule, subjects of financial relations use approximate methods of knowledge processing and, as a result, have a tendency to make irrational decisions. This conclusion is followed by a team of authors in their researches [10, p. 25], and these authors note that the traditional view of the economic relations subject separates the concepts of risk and profitability, which encourages making a considered decision, regardless of the problem formulation, and behavioral finance places a significant role in how the problem to be solved is formulated.

The formulation of the problem to be solved is influenced by the information request of the financial relations subject, the relevance of the information found as a result of the search, as well as the behavior, personal qualities and professional skills of the specified subject. To reduce the impact of behavioral biases of financial relations subjects on making relevant decisions, to minimize the negative consequences of irrational behavior of subjects in the face of modern challenges, it is necessary to use financial technologies. Financial technologies are a new financial industry that uses technology to improve financial activities [11, p. 32]. M. Balytska and K. Brovenko point out in their researches that the behavior of financial relations subjects under the influence of financial technologies has significantly changed; they believe that it is financial technologies that modify the implementation of the financial system functions and act as a driver for the financial markets development [12, p. 60].

In our opinion, financial technologies provide tools for developing a financial strategy that takes into account the behavior of financial interrelations, clients and consumers of financial services. Financial technologies objectively affect the effectiveness of such a strategy. At the same time, the implementation of technologically driven financial innovations has both advantages and risks for ensuring financial stability at the macro and micro levels [13]. The risks of ensuring financial stability are, among other things, in the area of behavioral expectations and preferences of financial interrelations. FinTech has changed consumer expectations and preferences, increasing the number of users who expect fast and easily accessible services available on mobile phones and other electronic devices [13, p. 43].

The unjustified expectations of financial relations subjects may lead them to irrational behavior that does not take into account objective conditions and opportunities. The overload of the information environment, which encourages the endless collection of information by financial relations subjects, also affects the irrationality of decisions and is an additional risk for ensuring financial stability.

It should be noted that in the historical dimension, scientific research on behavioral finance and financial technologies intensified in the 1950s. In 1957, L. Festinger in his scientific work "Theory of Cognitive Dissonance" defined cognitive dissonance as one of the psychological phenomena of individual behavior, determined the nature of the concept of cognitive dissonance, as well as the possibilities of its application and development. L. Festinger stated that in order to avoid discomfort, an individual will, among other things, strive to reduce the awareness of information that can lead to such discomfort [14]. The study of the individual level of cognitive biases by D. Hirshleifer allowed him to implement the tools of scientific psychology in the behavior of financial relations subjects, and to form the postulates of behavioral finance [15].

In 1950, the British mathematician A. Turing conducted research aimed at determining the ability of a machine to exhibit intellectually conditioned behavior. In his scientific work "Can Machine Think", A. Turing describes the process of determining the moment of equalization of human and machine abilities, which is at the intersection of irrational human behavior and rational behavior [16]. Turing A.'s scientific works on the creation of the first computers and the development of programming methods laid the foundation for further research by scientists, including in the field of financial technologies. We should note that A. Turing was, in fact, one of the first to provide an impetus for further research into human behavior (rational and irrational) through the prism of digital tools and algorithms.

The psychological phenomenon of the behavior of the financial relations subject is that such a subject will prefer financial transactions with a simplified algorithm. Thus, the psychological content of the decisions of the financial relations subject, their behavior, is inherently subjective and is subordinated, to a significant extent, to behavioral biases.

We agree that the main idea of behavioral finance is not to state the presence of various behavioral biases of financial decision-makers, but to create models that would explain behavioral biases comprehensively and fully in order to further predict people's behavior and minimize its negative consequences. [4, p. 7]. By considering the achievements and conclusions in the field of behavioral finance and comprehensively studying the characteristics of the behavior of the financial relations subject, it is possible to rethink the processes of the financial environment and integrate this knowledge into the development of a more effective financial and informational environment.[7, p. 393]; at the same time, the use of modeling tools to study the characteristics of behavioral finance allows us to substantiate the main models of human behavior in the context of an expanding volume of the information environment regarding the financial condition of businesses and the competitive environment.

The irreversibility of the global process of expanding the volume of the information environment, including in the financial space, is indicated by the increase in the amount of available data, and the formation of a global information society. The so-called "information explosion" leads to information overload and complicates the process of making management decisions, actively influencing the behavior of financial relations subjects. One of the crucial values of the information area in making financial decisions is indicated by scientists who state that the use of psychological factors in economic analysis provides more complete information about the features of human behavior, harmoniously complements the conclusions of economic theory, which allows us to more adequately explain the process of making individual decisions by the population and, thereby, deepens the understanding of the behavioral strategies of individuals in modern financial science [5, p. 183].

The importance of economic and mathematical tools not only in economics but also in psychological research was pointed out by D. Kahneman (Nobel Prize laureate in Economics 2002 "For the application of psychological methods in economic science, especially in the research of opinion formation and decision-making under uncertainty" (together with V. Smith), who laid the foundation of psychological (behavioral) economic theory. The importance of his scientific contribution, including the theory of prospects, lies in the fact that the scientist supplemented the psychological methods of his research with the computational apparatus of probability theory. Having chosen the mechanisms of human decision-making in situations of uncertainty as the main object of research, D. Kahneman proved that the decisions made by people significantly deviate from what is prescribed by the standard economic model of homo economicus [17, p. 114]. Regarding the economic development of the state, the scientist focused on the following aspects: state policy that only reflects public resentment is senseless and absurd, but a policy that does not take it into account at all is unacceptable to the people; state policy should be sensitive to the discontent of the masses, but should not allow it to dominate [18]. The program developed by D. Kahneman "Save More Tomorrow" was supported by the US Congress; the main provisions of the program were applied during development of the state's financial and economic policy.

The topic of Kahneman's prospect theory was improved by the outstanding scientist R. Thaler (Nobel Prize in Economics (2017) "For his profound contribution to the study of economic behavior and the study of the buyers psychology"), who used the tools of behavioral finance and mathematical apparatus in his research. According to R. Thaler, psychological tools, cognitive and emotional factors are the basis of the "architecture of choice" and create a spatial environment ("pushing" a person to make the right choice) for concluding insurance contracts, determining lending directions, decisions on investing in real estate and other financial transactions [19]. R. Thaler's scientific works became important for substantiating the influence of psychological factors on the adoption of financial and economic decisions at the macro and micro levels, and allowed predicting the consequences of such decisions for fluctuations in market prices, profits, and the distribution of financial resources. R. Thaler's research on the process of market decision-making and social choice allowed creating a mechanism for adjusting such decisions in favor of public administration entities, forming a toolkit for the state's economic policy, and also contributing to the improvement of public welfare [20].

These prominent scientists laid the foundation for behavioral finance, shifting the focus from the economic approach to understanding the behavior of financial relations subjects to the psychological one. At the same time, an important aspect is the interdependence of the behavioral finance tools and the mathematical apparatus, which allowed systematization and processing of the necessary information for their researches. Mathematical algorithms, applied in data analysis tasks of various nature to determine the relationship between the size of firms and their economic growth, were used by the prominent economist G. Simon (Nobel Prize in Economics (1978) "For pioneering studies of the decision-making process within economic organizations"). In his research on behavioral finance, the scientist focused on the unreality of the psychological assumptions from which standard neoclassical models arise, he showed the influence of individuals' behavioral reactions on financial decision-making, and proved that human psychology, limited knowledge and resources, and the complexity of decision-making in situations of uncertainty make a person limitedly rational and contribute to the emergence of certain psychological phenomena [21]. Besides, the outstanding economist predicted the

transformative impact of financial technologies on behavioral economics, making a significant contribution to the central problem of microsystem aggregation and devoting further scientific research to the problems of artificial intelligence and computerization of science.

The interrelation between financial technologies and the behavior of participants in financial relations is presented in general terms in Table 1.

In the modern dimension, financial technologies significantly influence the behavior of financial

Table 1

The Interrelation between financial technologies and the behavior of participants in financial relations

Technologies that are in the base of fintech; fintech-products	Characteristics of the fintech usage sector	Display of interrelation between fintech and the behavior of participants in financial relations
Generative artificial intelligence	Artificial intelligence analysis of behavioral patterns of economic subjects	Generation of personalized offers, differentiation of offers for business
Big Data	Big Data for building predictive analytics of financial data	BigData is used by financial analysts to analyse mood, behavior, and personalise customer interactions
Robo-investment consultation	Robo-investment consultation, based on predefined algorithms of analysis and evaluation of investment opportunities	Increasing the investment market understanding allows expanding the possibilities of investor behavior aimed at increasing the profitability of investment projects
Machine learning as a subbranch of artificial intelligence	Usage of machine learning algorithms for analytical research and conclusions	Usage by banks to analyse customer behavior to assess credit risks
Financial security system and artificial intelligence	Financial security system improvement with the help of artificial intelligence	Detection of fraudulent schemes and illegal financial transactions through real-time transaction analysis; timely detection of suspicious patterns of fraudster behavior
Internal operational processes optimisation based on artificial intelligence	Internal operational processes optimisation, from document management to providing information on compliance of financial legislation requirements	Encourage rational behavior regarding conscious, legally justified choice of financial institution, funding of assets
Fintech-based chatbots and virtual assistants	Transformation of interaction with customers, high speed and accuracy of response to customer requests	Reducing the tendency of economic subjects to make irrational decisions in the process of competitive battle for financial success
Innovative financial products and services	Artificial intelligence contributes to innovation in financial products and services	Avoidance of abstraction behavior from specific conditions and personalities in financial processes, accelerating making of innovative decisions
Application programming interface (API)	Image recognition, voice recognition, translation and virtual assistants	Activation of ethical considerations into motivation to change financial behavior
Regulatory technologies (RegTech)	Formation of consistent development tools, ensuring compliance with environmental norms and standards	Implementation of ethical business practices, tools for avoiding conflicts of interest of economic subjects in the processes of making financial decisions related to consistent development

Formed by the author based on [22 - 26].

relations subjects, encouraging rational selection of financing sources, acceleration of financial decision-making, ensuring innovation and efficiency in all aspects of the global financial landscape. The term "financial technologies" functions in a quite dynamic innovative dimension, its essential characteristics are constantly being improved, and the range of its application is expanding. P. Schueffel, having examined more than 200 scientific sources published over a period of 40 years, concluded that there is currently no consensus on what the term Fintech means: "As the origins of the term can neither be unequivocally placed in academia nor in practice, the definition concentrates on extracting out the quintessence of Fintech using both spheres" [11, p. 32]. We believe that the opinion of the authors who define financial technologies as "a separate branch of finance that includes the use of innovative technologies to provide and receive, improve and optimize financial services, the development of which, on the one side, is extremely rapid, and on the other side, must be adapted to the requirements of the financial market and financial inclusion" is correct [12, p. 60].

Further development of financial technologies positively changes the financial space in the following aspects: increasing democratization of access to financial products and services; improving the educational component of financial science, expanding opportunities for involving all segments of the population and business in the use of financial products and services; structuring and rapid implementation of financial innovations at the macro and micro levels leads to the integration of new technologies into the

functioning of the financial system, ensuring transparency and convenience of financial transactions.

The behavioral approach is quite broad in its range of application, giving particular importance to clarity and conciseness in making management financial decisions. The search for new sources of profit and sources of capital formation will force the subject of financial relations to more flexibly apply new technologies in a changing environment, and go beyond the financial sector. The transformative impact of financial technologies on behavioral finances is that the behavior of the financial relations subjects in perceiving traditional financial models changes, which encourages the making of more rational financial decisions based on reducing the time spent on information search queries and processing the necessary information; financial costs are optimized and, ultimately, the potential and efficiency of the financial management process increases. In fact, financial technologies, that are based on the use of innovative tools and algorithms, change the cognitive biases of financial relations subjects to a behavioral focus on logic in making financial decisions.

The importance of financial technologies, including artificial intelligence, lies in the fact that they open up broad opportunities for improving analysis, forecasting and decision-making in the field of economics and finance, help to effectively process large volumes of data and identify complex relationships and patterns that may remain unnoticed by human analysis. [27, p. 39].

The importance of financial technologies for the functioning of the financial system of Ukraine was emphasized in the FinTech Development Strategy 2025, particularly, FinTech solutions are directed on maximizing the quality of financial services,

encouraging the development of an effective Fintech ecosystem, and influencing the successful development of modern innovative solutions in Ukraine [28].

Also, to support systematic changes in the Ukrainian economics by transforming the country's financial sector into a well-functioning, competitive market that meets European Union standards and is integrated into international financial systems, the USAID Financial Sector Reform Project in Ukraine (FSR Project) is being implemented; one of the main goals of the project conduction is to create conditions for effective and accessible financing, in particular through a developed financial infrastructure, and to increase financial inclusion through safe digital financial initiatives [29]. The timeframe of the specified project is 13.07.2022–12.07.2027. Despite current challenges and large-scale losses of the Ukrainian economy due to Russia's military aggression against Ukraine, the Ukrainian fintech market continues to function successfully, currently numbering 256 companies, 75% of which have already passed the break-even point, and 60% of fintech companies have representatives in the ranks of the Armed Forces of Ukraine [30].

Fintech companies in Ukraine actively integrate new technologies and contribute to the approaching of victory of Ukraine. Also, the growth of military technologies creates new opportunities for funding businesses, for investing in new projects. The structure of funding of fintech companies in Ukraine by the end of 2024 is presented in Figure 1. In 2025, 39% of fintech companies in Ukraine plan to attract foreign investments, 45% of fintech companies plan to attract their own funds, 39% – funding from private investors, 31% plan to attract investments from venture funds [30].
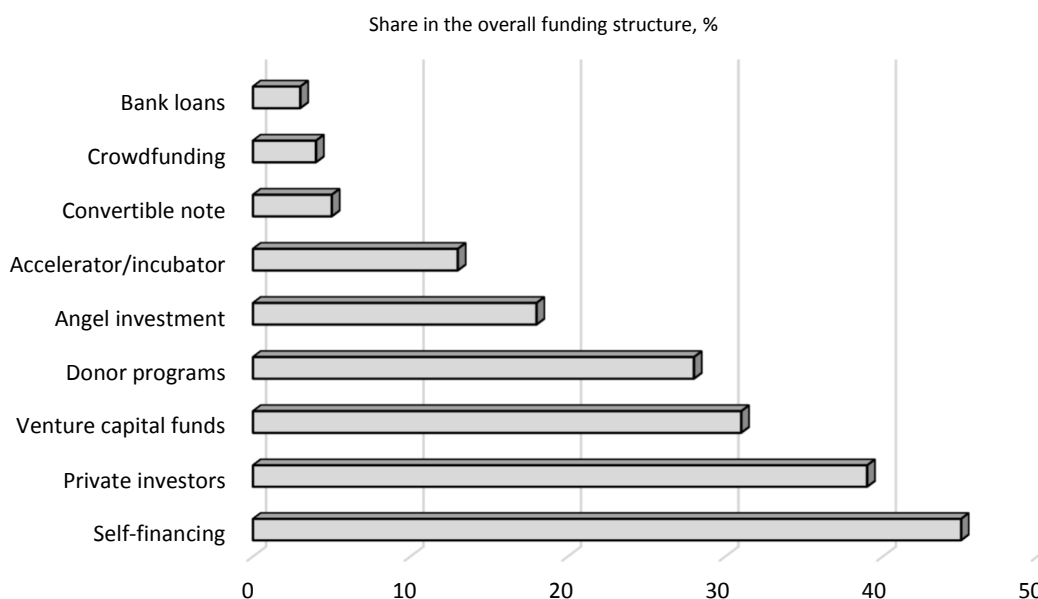
Share in the overall funding structure, %

Fig. 1. Fintech Funding in 2024

Source: Compiled by the author based on [30; 31].

Conclusions. Behavioral finance is a subject area of science that includes the development, systematization, and further implementation of behavioral and social tools in the functioning of finance at the macro and micro levels in order to substantiate the cause-and-effect relationships between the behavioral orientation of the financial relations subject regarding financial decision-making and objective economic reality. The transformative impact of financial technologies on behavioral finance reports, among other things, to the acceleration of technological progress, the increase in financial innovations. In fact, modern financial technologies provide tools for developing a financial strategy taking into account the behavior of financial relations subjects. It is essential to take into account that the implementation of financial technologies has both advantages and risks for ensuring the functioning of finance at the macro and micro levels. We believe that the specified risks are in the plane of behavioral expectations and preferences of financial relations subjects, including the forced transition to new financial technologies, and their further choice to ensure financial activity. The unjustification of such expectations, behavioral biases regarding the consideration of objective conditions and possibilities, are the key to the irrational behavior of the subject. Modern challenges have become catalysts for the financial relations subjects to be ready to change their actions and behavior, to make non-standard decisions regarding the active use of innovative financial technologies. It is necessary to act more rationally, to give preference to projects and technologies with a clearly regulated result. Financial technologies significantly affect the behavior of financial relations subjects regarding the rationality of the choice of funding sources, acceleration of financial decision-making, ensuring innovation and efficiency in all aspects of the global financial landscape. For financial technologies to have a positive impact on behavioral finance, it is necessary to create a favorable regulatory environment which is adapted to modern legislative requirements, balanced legislative regulation, and protection of the rights of clients using financial technologies.

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Лемішко О. Трансформуючий вплив фінансових технологій на біхевіористичні фінанси

В статті ознечено біхевіористичні фінанси, як предметну область науки, що включає опрацювання, систематизацію і подальшу імплементацію поведінкового інструментарію у функціонування фінансів на макро- і мікрорівнях з метою обґрунтування причинно-наслідкових зав'язків між поведінковою орієнтацією суб'єкта фінансових відносин щодо прийняття фінансових рішень і об'єктивною економічною реальністю. Проаналізовано взаємозв'язок фінансових технологій і поведінки учасників фінансових відносин. Показано, що трансформуючий вплив фінансових технологій полягає у зміні фокусу на раціональність вибору суб'єкта, у прискоренні прийняття фінансового рішення. Означене є запорукою забезпечення інноваційності у всіх аспектах глобального фінансового ландшафту. Визначено, що для позитивного впливу фінансових технологій на біхевіористичні фінанси необхідно сформувати сприятливу регуляторну середу, адаптовану сучасним законодавчим вимогам, захисту прав клієнтів, що використовують фінансові технології.

Ключові слова: біхевіористичні фінанси, поведінковий інструментарій, методи психологічних досліджень, фінансові технології, трансформуючий вплив, забезпечення інноваційності.

Lemishko O. The Transformative Impact of Financial Technology on Behavioral Finance

The article defines behavioral finance as a subject area of science that includes examination, systematization, and further implementation of behavioral tools in the functioning of finance at the macro and micro levels in order to substantiate the cause-and-effect relationships between the behavioral orientation of the financial relations subject regarding financial decision-making and objective economic reality. The relationship between financial technologies and the behavior of participants in financial relations is analyzed. It is shown that the transformative impact of financial technologies lies in changing the focus to the rationality of the subject's choice and in accelerating the making of financial decisions. Stated above is a guarantee of ensuring innovation in all aspects of the global financial landscape. For financial technologies to have a positive impact on behavioral finance, it is necessary to create a favorable regulatory environment which is adapted to modern legislative requirements, balanced legislative regulation, and protection of the rights of clients using financial technologies.

Keywords: behavioral finance, behavioral tools, psychological research methods, financial technologies, transformative impact, ensuring innovation.