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Fintech Sector in the Context of Financial Development and Problems of its Measurement

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ABSTRACT

Over the last 10 years, financial development has been technologically advanced, and trends in this area are linked to the fintech phenomenon. The **purpose** of this paper is to develop theoretical provisions regarding trends and patterns of penetration of fintech into the financial system and the methodological basis for assessing the development potential of fintech at the country level in the context of financial development and economic growth. To achieve this goal, the paper analyzes data on fintech across 150 countries, presented by the Statista global data platform. Using theoretical **methods** of systematization and generalization, as well as empirical statistical methods, the geography of the spread of fintech was analyzed, identifying the factors of country leadership, and the areas of penetration of fintech were considered. As a result of the study, it was revealed that the modern methodology for monitoring and analyzing the development of fintech does not meet the requirements for analyzing the impact of this segment on financial development. In this regard, the article presents a system of indicators for assessing the development of fintech at the country level, and also explains the reasons why measuring the fintech market and dynamically assessing its development is still difficult in practice. Taking into account the identified shortcomings of the existing system of the fintech development indicators, additional indicators for measuring the development of the fintech sector at the national level are proposed, corresponding to the standard for assessing financial development. A study of Russian experience based on available data showed a high level of innovation in the payment sector and insurance. At the same time, the need to expand the implementation of domestic fintech solutions in the areas of asset management, Regtech and blockchain technologies was identified.

Keywords: financial sector; financial technologies; fintech payments; fintech insurance; blockchain; Regtech; cybersecurity

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INTRODUCTION

The financial and economic crisis that shook the world from 2007 to 2009 revealed the scale of global imbalances, the foundation of which is fundamentally linked to pervasive financialization [1]. The growth of financial market depth, the reformatting of the organization of various goods markets into a stock exchange model, the involvement of currency markets into this orbit, and the emergence of interest rate derivatives markets — all these phenomena and innovations, while promising significant benefits for the economy, did not necessarily guarantee their immediate realization. On the contrary, it could not be excluded that the rapid pace of ongoing innovations creates inefficiencies that threaten the functions of resource redistribution and productivity growth. These inefficiencies manifested in the non-linearity of the relationship between financial deepening and economic growth, increasingly noted by researchers in the 21st century [2].

This context, associated with the increased financial instability of the 2010s, served as a basis for the criticism of existing institutions and models in the financial sector [3]. The course of subsequent events showed that the progress of the financial sector will occur along the path of increasing technological sophistication, with players striving to leverage the latest technologies, transforming them into expanded financial inclusion and their own profit. It is important to note that the internet, smartphones, big data, and neural networks, which are the foundation for advancing greater financial accessibility, presumably also help to mitigate the adverse effects of financial depth, allowing for a better allocative effect of transforming savings into investments [4].

The processes currently occurring in the financial sector, associated with fintech, are bringing new players into the orbit of financial markets, who do not necessarily possess licenses of financial organizations. This results in increased competitive pressure on incumbent banking businesses and the wealth management industry, stimulating their efficiency. Thus, the emergence and expansion of fintech should be viewed as a logical outcome of the failures in financial development over the past decades and as a response to the demand for more efficient institutions and mechanisms of economic interaction in the financial sector [5, 6].

TRENDS IN FINTECH DEVELOPMENT

The absence of a strict definition of the concept of "fintech" does not hinder its use in academic literature and in regulatory documents. As a working definition, the following can be proposed: *fintech* — it is the synergy of advanced information technologies (including data management) and technologies related to hardware development, within the realm of interaction among financial market participants, shaping the landscape of financial services and products. The power of modern technologies has defined the breadth of areas affected by fintech — payments, loans, insurance, cryptocurrencies, capital management, Regtech, cybersecurity and etc. [3, 7–9]. The assessment of fintech penetration in these areas is carried out using the indicator of investment inflow [10].

Fintech in payments is the leader in this regard. The current trends: (1) new B 2B payment solutions; (2) fintech analog of BNPL ("buy now, pay later"), evolving towards the creation of platforms that connect lenders and borrowers; (3) shifting focus from attracting new clients to deepening engagement with them; (4) reduction of transaction costs and services for the end consumer. Despite the unstable global macroeconomic conditions that led to a decline in investments across various sectors and markets in 2020 and 2022, the payment industry continues to see a significant volume of investment deals, promising growth in innovation.

The field of fintech insurance (InsurTech) is attractive to innovators [11]. Due to the economic instability of recent years, large investments in fintech solutions are being attracted by insurance companies with a high level of projected profitability. The following

areas of InsurTech development are highlighted: (1) the provision of SaaS solutions (Software as a Service) by insurers, which provide access to software through which insurance services are offered and which is serviced by fintech companies; (2) acquisition of startups that could strategically fit into the business system of insurers; (3) the growth of fintech startups focused on electronic technologies (for example, policies issued and distributed through chatbots).

Investments in Regtech are showing steady growth. With the increase in the volume of financial operations and digital transactions, as well as the complexity and variability of regulatory legislation, the demand for Regtech is growing, promising a reduction in compliance costs as a barrier to enhancing the profitability of financial organizations [12, 13]. The trends in the development of Regtech include: (1) the enhancement of technological capabilities for the operational processing of regulatory changes across multiple jurisdictions (Basel IV, ESG standards, the Digital Services Act, etc.); (2) the application of machine learning and artificial intelligence technologies to create AML/CFT solutions; (3) the use of AI for the collection and processing of information on current and forecasted financial risks.

A promising direction for the development of fintech in the world is *asset management*. The leading trends in this segment are: (1) promotion of electronic banking through applications, social networks, and messengers; (2) providing clients with targeted personalized information through the active use of artificial intelligence; (3) development of solutions and products for clients with varying levels of wealth; (4) expansion of offerings for access to ESG tools [14, 15].

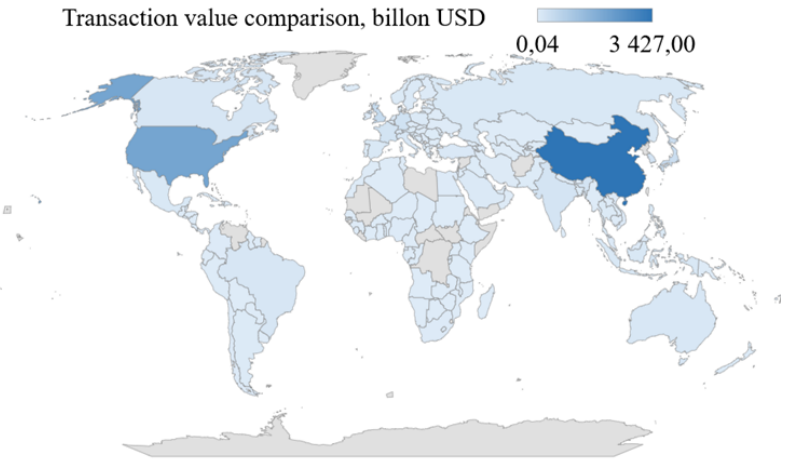
Active development affects the sphere focused on the use of *blockchain*. Among the innovative solutions are asset tokenization, optimization of cross-border payments, and real-time settlement. The main trends include: (1) the expansion of solutions in the field of decentralized finance (DeFi); (2) the creation of stablecoins and CBDCs; (3) the development of solutions for financing small and medium-sized enterprises (SMEs) [14].

Thus, modern fintech is transforming the financial sector, laying the groundwork for more powerful and efficient financial development, which brings numerous secondary positive effects for the economy. This aspect defines the *strategic role of fintech* and the competition among countries for leadership in relevant technologies and solutions. For example, the most advanced area of fintech is payments and transfers, and its high strategic role has led to a technological race that has resulted in the creation of a number of technologically advanced solutions in various countries today: SBP (Russia), The Single Euro Payments Area (European Union), FedNow Service (USA), Faster Payments (United Kingdom), Internet Banking Payment System (China), Immediate Payment Service (India), PromptPay (Thailand), and others. This process determines the relevance of cross-country analysis of fintech development.

INTERCOUNTRY ANALYSIS OF FINTECH DEVELOPMENT

The balance of advantages and vulnerabilities in the development of fintech, along with the conditions prevailing in different countries, determines the differences in its dynamics and depth of penetration. The cross-country analysis of fintech development today is based on a still imperfect measurement system [16, 17]. It shows not only the unevenness of fintech penetration into the economic life of different countries but also that this unevenness varies depending on the area of fintech (*Fig. 1–3*).

According to *Fig. 1*, China is the leader in the fintech payment industry. Let us point out three groups of reasons related to this: socio-demographic, regulatory, and economic. The Chinese market benefits from a large number of consumers (for fintech services, this includes smartphone users, who make up 68.4% of the country's population [15]). The development of the legal framework for innovations in



Top 5 (2023), billion USD:

China	**3 427.00**
U.S.	2 041.00
UK	445.10
Japan	375.50
Germany	270.00

Fig. 1. **Digital Payments Value, Billion USD**

Source: Compiled by the authors based on Statista. URL: https://www.statista.com/outlook/fmo/wealth-management/digital-investment/worldwide#assets-under-management-aum (accessed on 10.01.2024).

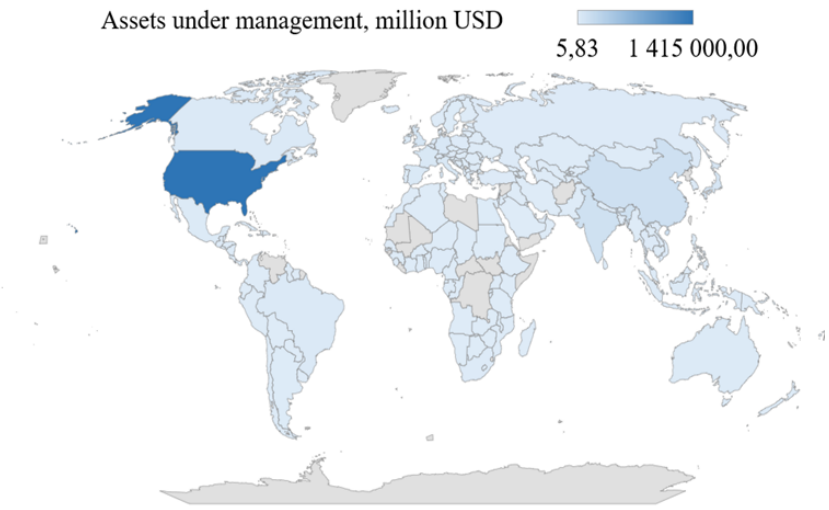
the financial sector is supported by the People's Bank and the Government of China, which are creating regulatory sandboxes for testing innovations and encouraging the development of RegTech [18]. The development of fintech services helps players become more attractive to young, tech-savvy consumers, expand the liabilities of the financial system, and increase investments in innovation [19]. Foreign investments played a significant role in the development of fintech in China [20].

The successes in the development of fintech in the payment sector are also evident in the U.S. They account for about 40% of global investments in fintech. This factor of successful fintech development is characteristic of the UK and developed countries in Europe, although the capitalization of fintech companies in these countries is significantly lower than in the U.S. In 2022, the UK ranked second in the world after the U.S. in the number of "fintech unicorns".

The development of fintech in Japan should also be recognized as successful. Tokyo has identified the digitization of finance as one of the key measures to achieve its goal of becoming a global financial center. This underscores the need to engage fintech companies and promote cashless payments through the use of innovations. The largest fintech companies in Japan are Rakuten and Z. Holdings, offering payment services PayPay and Line based on smartphones, reaching a vast circle of customers worldwide.

Russia is also among the top twenty countries leading in fintech development in the payment sector, holding the 13th position in the ranking. The success of payment fintech development in Russia is determined by the activity of the largest players in the payment market (Sber, Alfa-Bank, Tinkoff, etc.), as well as the proactive policy of the state, including in the area of payment infrastructure development.

The U.S. is far ahead in the development of digital investments. This leadership is due to the high level of development of the American stock market, which serves as a center for capital redistribution not only at the national level but also globally. The U.S. government is paying close attention to the development of fintech in the investment sector. The Strategic Center for Innovation and Financial Technologies (FinHub) of the U.S. Securities and Exchange Commission is engaged in coordinating and overseeing the implementation of new technologies in areas such as distributed ledger technology, automated investment advice, digital market

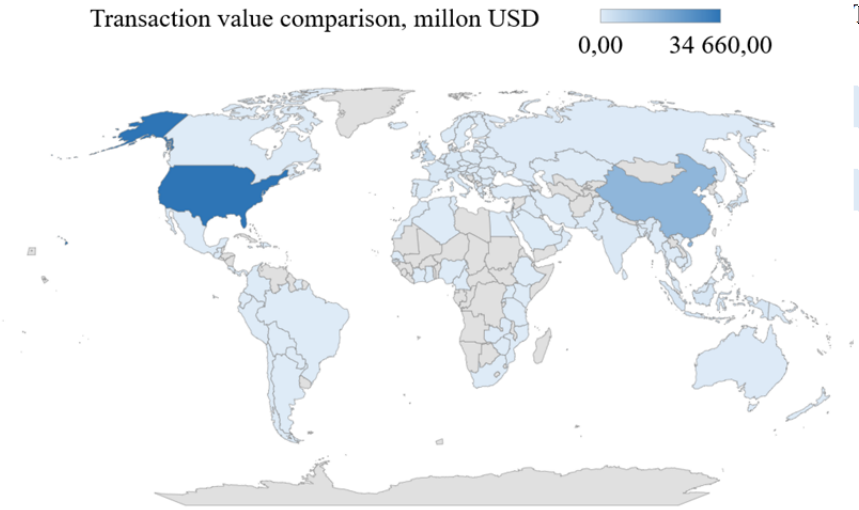


Top 5 (2023), million USD:

U.S.	**1 415 000**
China	132 600
India	121 600
UK	61 930
Japan	54 890

Fig. 2. **Digital Investment: Assets under Management, Million USD**

Source: Compiled by the authors based on Statista. URL: https://www.statista.com/outlook/fmo/wealth-management/digital-investment/worldwide#assets-under-management-aum (accessed on 10.01.2024).



Top 5 (2023), million USD:

U.S.	**34 660**
China	15 570
UK	4 692
Indonesia	1 180
Italy	1 006

Fig. 3. **The Volume of Raised Capital on Digital Platforms, Million USD**

Source: Compiled by the authors based on Statista. URL: https://www.statista.com/outlook/fmo/wealth-management/digital-investment/worldwide#assets-under-management-aum (accessed on 10.01.2024).

financing, and artificial intelligence (machine learning).[1]

Russia ranks 20th in the development of digital investments, significantly lagging behind the top five leaders: the volume of assets under management in Russia is more than six times smaller than that of Japan, which holds the 5th position. This lag behind leading countries is related to the banking model of financing in Russia and the still low level of development of the stock market compared to developed countries.

In terms of the volume of raised capital on digital platforms, the U.S. also leads, which is facilitated by a high level of development in the venture industry and SMEs in this country, in addition to the previously mentioned advantages. A trend in the development of the capital attraction market is the convergence

[1] Strategic Hub for Innovation and Financial Technology (FinHub). URL: https://www.sec.gov/finhub (accessed on 10.01.2024).

Table 1

Indicators for Assessing Fintech Development at the Country Level

Group	Indicators and subcategories	Description	Source
Indicators of fintech companies' development	The significance of the industry index of the stock market, for the calculation of which representatives of the fintech sector have been selected	For the calculation of the index, companies listed on the stock exchange that provide products and services in the areas of payments and clearing, online loans, and other financial sectors using big data, artificial intelligence, and blockchain are selected	Y.Yinhong, J. Li, X. Sun [15]
	The share of intermediate consumption of information and communication technology (ICT) products and services	The share of ICT products and services in the overall intermediate consumption of financial companies	R. Chaudron [21]
	The number of fintech companies	The number of all fintech companies by main business segments: loans, payments, investments, etc.	L.A. Maza, A. Moreno [17]
	The volume of fintech market assets	The total assets of companies engaged in financial activities using digital innovations	I.A. Sedykh [19]
Indicators of development of services and products in the fintech sectors	Digital payment market indicators	Payments for goods and services made online, mobile payments at points of sale (POS) through smartphone applications, and cross-border money transfers conducted over the Internet. They include transaction volumes; the average transaction cost per user; and the user penetration rate	Statista (information platform)
	Cryptocurrency market indicators	Trading volumes of cryptocurrencies; exchange rates in relation to fiat currencies	U. Kochanska, V. Papaefthymiou [22]
	The volume of loans and borrowings issued by fintech and big tech companies relative to GDP	Loans provided by fintech companies and large tech companies over the calendar year, normalized by nominal GDP	G. Cornelli etc. [16]
	Crowdfunding development indicators	Annual interest rates for P2P lending for small and medium-sized enterprises; crowdfunding volume; number of crowdfunding deals	I. Abarca [23]
	Digital investments: the volume of assets under management	It encompasses automated investment services (robot-advisors) and online trading services (online brokers). It implies the use of digital platforms, mobile trading applications, and other technologies to facilitate the buying and selling of financial assets. Includes client income, assets under management; average income per client; average income per client; user penetration rate	Statista (information platform)

Source: Compiled by the authors.

of traditional finance and digital platforms. This involves partnerships between existing financial institutions and digital platforms for capital raising, aimed at offering new products and services, as well as the development of hybrid models that combine the advantages of traditional financing with the speed and accessibility of digital platforms.

Russia ranks 15th in the world for the indicator in question, which is a high position and reflects the development of the use of digital capital attraction platforms, linked to the proactive state policy in the digitalization of the financial system.[2] At the same time, further growth in the volume of attracted capital on digital platforms in Russia may be achieved as financial literacy increases among both the population and entrepreneurs.

DEVELOPMENT OF METHODOLOGICAL SUPPORT FOR FINTECH ASSESSMENT

Three indicators used to assess the fintech sector at the national and international levels have been commented on above. As interest in the fintech has been steadily growing lately, the range of the fintech development indicators is constantly expanding. The study of this issue has revealed more than a dozen such indicators used in academic works and categorized them into two groups (*Table 1*).

Despite the presence of some indicators of fintech development, measuring this market and assessing the dynamics of its growth in practice is still challenging. This can be explained by the following reasons:

- The concept of "fintech" does not have a universally accepted definition and is interpreted differently in literature, including documents and reports from international organizations;
- There are differences in the identification of fintech and big tech companies, as well as innovative financial services in the legislation of different countries; a number of countries do not provide for separate accounting for fintech companies;
- There is a lack of uniformity in data collection across countries over time and in relation to the indicators proposed in theory;
- Fintech solutions and investments in fintech focus on different market sectors that are under the jurisdiction of various regulators.

All of this complicates the comparison of data across countries and the assessment of fintech progress on a broader scale. Moreover, we consider that in order to conduct a thorough and relevant assessment of the development of the global fintech market in the context of financial development, it is necessary to monitor and disclose a number of additional indicators, among which we consider the most important to be:

- The volume of assets of fintech and big tech companies to GDP;
- The cost of fintech services provided to the population and the real sector of the economy relative to GDP;
- The volume of investments in fintech (in total and by individual sectors) relative to GDP;
- The share of active users of fintech services (individuals) in total and by specific sectors (of the adult population);
- The share of active users of fintech services (entities of small and medium-sized enterprises) both in total and broken down by specific sectors.[3]

The availability of a statistical database on these indicators for countries around the world would allow for a deep analysis of the development of the global fintech market, including a more comprehensive comparison of the level of Russian fintech with the

[2] The main directions for the development of the financial market of the Russian Federation in 2024 and the period of 2025 and 2026. URL: https://cbr.ru/Content/Document/File/155957/onrfr_2024–26.pdf (accessed on 10.01.2024).

[3] The selection and design of the proposed indicators align with the methodology of the World Bank, implemented in the construction of the Global Financial Development Database. URL: https://www.worldbank.org/en/publication/gfdr/data/global-financial-development-database (accessed on 10.01.2024).

Table 2

Characteristics of the Reception of Digital Technologies in the Russian Financial Market

Sphere	Characteristics of the development of the Russian market	Subjects of technological changes
Fintech in payments	National payment card system "World" as an alternative to foreign payment card systems is created In order to ensure the possibility of transmitting financial messages within the country in the event of disconnection from SWIFT, a Financial Reporting System (FRS) is established Startups offer innovative services for the payment and administration of customs duties, international money transfer services, payment services through voice assistants, and other payment services using biometric technologies; Fintech companies, in addition to services for individuals and non-financial organizations, are actively developing specialized solutions for banks, the most relevant of which is an open banking platform with a catalog of API methods	– Bank of Russia; — Credit institutions; — Payment service providers; — Fintech startups
InsurTech	Startups offer technological services for corporate medical care; online insurance in the fields of auto insurance, corporate insurance, and sports insurance; services for automatic insurance compensation payments for flight delays or cancellations A number of startups (Mainslab, A1 Platform, Insurion, etc.) are developing and offering innovative solutions to insurance companies, including SaaS solutions, which allows for the automation of insurance service delivery	Insurance companies; Fintech startups
Regtech	The system of external information security audits is being improved, the assessment of the active market is being automated, stress testing platforms for banks are being developed, and compliance with regulatory requirements is being automated	Bank of Russia; Credit institutions
Cybersecurity	A pool of companies developing cybersecurity services for organizations is being formed: Cybertonica, Safetech, Sumsub, Whyhappen, Multifactoring Solutions are proposed to protect electronic document management systems and remote banking from financial and cyber fraud, to safeguard the data of financial companies, and to monitor and assess payment data for risk	Financial organizations; Fintech startups
Blockchain	Based on blockchain technologies, the Bank of Russia has developed and tested a technology for the implementation of the digital ruble as a new form of money Blockchain technologies are developed and used to create and implement business solutions. Since 2020, Masterchain has been providing opportunities for the creation of business applications that facilitate interactions among economic entities, including participants in the financial market	Bank of Russia; Fintech startups

Source: Compiled by the authors.

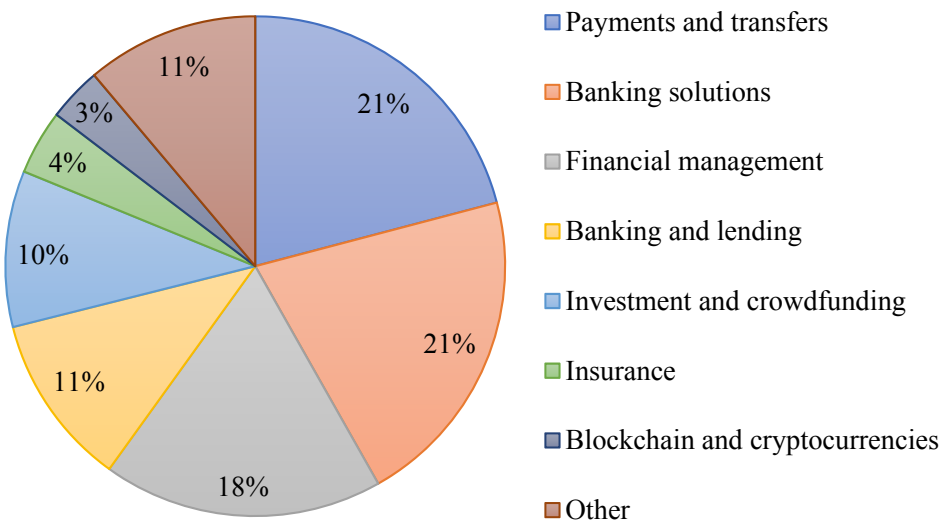


Fig. 4. **Breakdown of Fintech Sectors by Number of Companies in Russia**

Source: Compiled by the authors based on Rusbase data. URL: https://rb.ru/fintech/#startlogo (accessed on 15.04.2023).

advancement of this segment in other countries, the incorporation of metrics related to fintech into the matrix of financial development indicators, and a comprehensive analysis of the interrelationship between financial development, including the fintech sector, and economic growth.

ASSESSMENT OF THE POTENTIAL FOR USING DIGITAL TECHNOLOGIES IN THE RUSSIAN FINANCIAL MARKET

The development of the Russian financial sector follows a trajectory similar to the global one, increasingly relying on the use of digital technologies. The analysis of this process is presented in the *Table 2*.

In terms of the number of participants involved, digitalization in payments and fintech solutions for banks are leading in Russia (*Fig. 4*).

The analysis of this structure indicates that a significant portion of innovative companies consists of fintech startups offering services in the fields of banking and asset management. This is due to the established banking model of financing in Russia: the demand for banking and credit services among Russians exceeds the demand for investment services. Moreover, primarily banks in Russia invest in fintech, offer platforms for piloting solutions, organize expert support, allocate information resources, and establish sales channels. Consequently, the development of financial innovations is determined by the evolution of the banking model of the financial system in the country.

In order to ensure conditions for sustainable financial development in Russia, the following priority areas for promoting fintech and digital technologies in the financial sector can be highlighted:

- identification of fintech companies in Russian legislation with the aim of ensuring the existence of a unified comprehensive classification of financial institutions, as well as to protect the interests of consumers of fintech services;
- decentralization of Regtech development and blockchain technologies, along with increasing the engagement of participants in the banking system in this process, will have a positive impact on the growth of asset profitability and the equity capital of credit institutions;
- acceleration of the implementation of APIs that allow for a more even distribution of the benefits of digitalization and encourage competition in the Russian financial market;

- extension of the implementation of domestic IT solutions in Russian financial sector with the aim of reducing dependence on foreign software and operating systems;
- scaling up the use of distributed ledger technologies and smart contracts to reduce explicit and transactional costs for players and consumers in the financial sector.

These directions will contribute to overall economic growth through channels of capital turnover and liquidity, financial inclusion that ensures deeper public engagement and an increase in the savings rate, as well as through the channel of effective allocation in the process of transforming savings into investments.

CONCLUSION

In the context of rising inter-country competition, the presence of positive effects from financial and technological innovations encompassed by the concept of "fintech" on financial development should be viewed as an important aspect that determines the priority of technological dominance in the modern development of the financial sector. This conclusion is based on the positive transmission of financial development to economic growth observed by researchers.

The analysis of the spheres of fintech penetration determines the necessity of using the following topology for its research by sectors: fintech payments, fintech insurance, Regtech, fintech asset management, capital raising through investment platforms, fintech cybersecurity, and the crypto industry. The identified trends in each sector highlight the significant potential impact of fintech on financial development.

The conducted analysis of the global and domestic fintech services market reveals an overall strong position for Russia in this field. This is determined by a number of factors: the state's involvement in the digitalization of the financial sector contributes to the creation of a legal environment and the development of internal financing for fintech; the level of domestic specialists allows for the creation of innovations, effectively utilizing existing resources; the development of financial technologies in the country meets the growing demand for them from the population and businesses, encouraging healthy competition among players. However, conclusions regarding the level and success of fintech development in Russia or other countries are complicated by the imperfections of the monitoring and measurement system. The proposed additional indicators for measuring fintech at the national level, in line with the World Bank's financial development indicator standards, will contribute to a clearer understanding of a country's positioning in the competition within this sector. They will also enable more qualitative cross-country studies aimed at identifying the externalities of fintech growth for the economies of various countries.

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