The Impact of International Economic Sanctions on the Use of Financial Technologies

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Abstract: - The aim of this study was to elaborate a conceptual approach to the development of financial technologies under the impact of restrictions imposed by international economic sanctions. The development of this sector was analyzed based on empirical studies of available information on the state of the FinTech sector in 28 countries that are impacted by international economic sanctions, using the Global Sanctions Database presented by OFAC (Office of Foreign Assets Control). The research involved comprehensive research methods: situational analysis, system analysis, reproductive analysis, structural and functional analysis. The results of the study confirmed the main hypothesis: international economic sanctions do not block the development of financial technologies, as FinTech can ensure the development of the financial sphere of sanctioned countries because of its flexibility and mobility. The calculations proved that depending on the way of combining the internal perception of external restrictions imposed by the sanctions, which is unique for each country, international economic sanctions are a stimulator for some countries (China, Ukraine, Iran), while being a significant development blocker (r=0.896) for others (with a financial technology performance less than 1). This study will be useful not only to scholars who deal with the theoretical and methodological framework of the development of the financial sector of countries subject to sanctions.

Key-Words: - Development, digital technologies, financial technologies, global environment, sanctions restrictions, start-up.

Received: July 26, 2022. Revised: February 6, 2023. Accepted: February 27, 2023. Published: March 16, 2023.

1 Introduction

The rapid development of digitalization has triggered the emergence of completely new financial technologies, such as artificial intelligence, smart contracts, cryptocurrency, Big Data technology, blockchain, cloud technologies, etc. These technologies have widely captured all spheres of social life and business environments. Informatization, globalization and digitalization are becoming the modern “three whales” of the development of economic relations.

Such a powerful influence of the digital era on people’s daily lives and activities has caused the phenomenon of “digital breakthrough”, [1]. This means that the digital era inevitably changes the way the economy functions, causing disruption or interruption of traditional business models, [2]. Statistics show that 9 out of 20 companies in the world are digital, while 1 out of 20 companies was digital ten years ago, [3].

The escalation of military conflicts in Europe and Asia causes concern about the possible disruption of the chain of globalization trends due to the introduction of economic sanctions or other restrictions, which will be expressed in the complete or partial termination of relations in the context of growing internalization of business relations. According to the experts’ estimates, the adoption and use of digital technologies could increase China’s GDP by 23% by 2026 compared to 2020. In the United States, GDP growth could reach US$2.3 trillion by 2026. A significant increase in the value of digital technologies is also expected in the EU countries, [4]. The rapid development may be affected by external factors (such as, for example, the economic crisis caused by the coronavirus pandemic), certain restrictions, or any force majeure. There is an assumption that payment cards will completely disappear from circulation within the next 10-15 years, and payments will be digital only, [5]. The application of digital technologies for financial services (FinTech) creates a new communication interface between consumers and providers of financial services. Therefore, the question “Is it possible to stop significant globalization progress in the 21st century if sanctions are applied?” is very acute.

The aim of this study is to analyze the state and prospects of the development of financial technologies under the impact of international financial sanctions in the period of global digital transformations. The aim involved the following research objectives:

- Determine the nature and economic nature of international sanctions in the field of financial technologies;
- Identify factors of positive and negative impact of international economic sanctions on financial technologies, which correlate with the indicators of macroeconomic stability of the country as a whole.

2 Literature Review

Sanctioning is one of the economic and political tools for imposing demands on the infringing country and realizing the interests of one country by another, [6]. In [7] the authors state that countries around the world and international organizations tend to use economic sanctions as an alternative to military aggression when exercising influence on the infringing country through international diplomacy.

Identified four groups of restrictions in international practice that can have a significant impact on all sectors of the economy, [8]:

1) diplomatic sanctions – termination of negotiations, closure of diplomatic missions, exclusion of the infringing country from international organizations, etc.;
2) financial sanctions – financial aid termination, prohibition or complication of international loans (or demand for early recovery of existing ones), asset freezing;
3) trade sanctions – export and import restrictions, trade embargoes;
4) “smart” (individual) sanctions – asset freezing (or confiscation) or ban on movement (entry) against individual companies or individuals.

Although researchers from many countries, [9]-[11] have been actively discussing the actual effectiveness of their application for more than a decade, the growing dynamics of the use of sanctions in modern diplomacy speaks for itself. By the beginning of 2022, the UN has introduced 14 sanctions regimes against individual countries, while the USA has introduced 35. The EU should be considered an undisputed supporter of the use of tools of economic and political restrictions. Its representative bodies have introduced as many as 45 sanctions regimes. The Russian Federation is the world leader in terms of the number of international sanctions imposed as of July 1, 2022 – 76 sectoral and 4,655 personal restrictions, [12].

In general, an economic sanction is considered to be a punishment or manipulation of economic cooperation and relations in order to achieve political goals. Scientists, [10], define economic sanctions as a subset of foreign policy instruments that allow a country or some countries to pursue their political intentions in a target country during controversies. Economic sanctions can be applied when a country violates international law, human rights, or simply national interests of other nations, [13]. The most common economic sanctions are imposed in the trade, energy and financial sectors.

Sanctions often have serious implications. For example, authors, [11], argue that countries under US sanctions suffered a 13% reduction in their gross domestic product. UN sanctions have an even more significant impact on the economy – up to 25% of GDP [14]. Besides, the impact of sanctions on sectors of the economy is not reduced to individual enterprises under sanctions, they have much more severe effects, [15]. Economic sanctions often lead to negative exogenous economic shocks, banking crises [7], currency crises [5], and reduced economic growth with simultaneous increase in inflation and unemployment rates [16].

The probability that a state subject to international sanctions that have become partially or completely isolated from the international market further increases investor uncertainty about its economic prospects, [8]. Therefore, the introduction of sanctions entails a reduction not only in trade flows [9] but also in investment flows [5], makes full operation of blockchain technology impossible [2], causes restrictions on cryptocurrency circulation, etc. [17]. In general, the survey of the study conducted enabled distinguishing the following types of international economic sanctions that can be applied to limit the use of financial technologies, [13], [14] (Figure 1).

Besides the introduction of economic sanctions (mostly by a country that has a large influence on the world economy, or by a coalition of countries) indicates the probability of isolation of the infringing country from the international market of financial technologies, thereby increasing the investors' uncertainty regarding the development prospects of the sanctioned state, [8]. Scientists, [3], [18], found strong empirical evidence of bilateral effects of sanctions on countries through the globalizing interrelation of financial technologies. High economic uncertainty and the probability of a global banking crisis caused by economic sanctions, [7], lead to the instability of the financial sector not only of the sanctioned country but also of all related transactional payment networks.

Over the past 20 years, the shift from comprehensive sanctions against countries to targeted or so-called smart sanctions has been aimed at harming only those they want to punish through such restrictions. Banking institutions and financial companies may suffer greater losses from imposed sanctions if they operate in uncertain economic conditions, [9]. Things are somewhat different for fintech companies, especially payment companies, which are supported by traditional banks and usually subject to the same types of supervision by their correspondent banks, [3]. In this case, the lack of well-defined regulatory regimes in some jurisdictions that directly control financial technologies may enable taking advantage of "loopholes" in sanctions restrictions to facilitate some transactions that violate the sanctions, intentionally or not.

So, FinTech can facilitate or hinder sanctions regimes by being applied in different ways using different tools. Besides, sanctions can fundamentally reshape FinTech ecosystems, [19].

FinTech is often called, [17], [20], [21] a powerful tool for evading sanctions (for example, cryptocurrency mining as a way of investment). On the other hand, FinTech occupies an important place among regulators' efforts to monitor cross-border transactions for business by sanctioned entities, [22]. Financial supervision regulators "use technology to improve their monitoring systems, as well as their financial systems. In [23] the author cites an example of real-time monitoring of bank capital requirements, setting prudential supervision requirements, and real-time monitoring of capital market transactions to detect market abuse and insider trading". Business entities that deal with cryptocurrency assets are subject to many laws and regulations as any financial services business. These are some of the strictest rules governing the provision of financial services in the world, and crypto businesses invest huge resources in complying with obligations such as anti-money laundering and sanctions.

FinTech has become considerably popular because of its accessibility and ease of use. Besides, a significant number of financial technologies are conducted in such a way that is not subject to regulatory supervision. Consequently, there is a false statement that FinTech is not subject to sanctions,[24]. Although entities dealing with financial technology are not banking institutions, they provide a platform for finding and placing investments, move capital through a financial and payment platform, [25], and blockchain technology makes the investment process more transparent. In our opinion, we should not be emphatic about the overall positive or negative impact of international economic sanctions on financial technologies. Sanctions show a wide range of development for digital financial initiatives, which sometimes even help to legally circumvent the imposed restrictions.

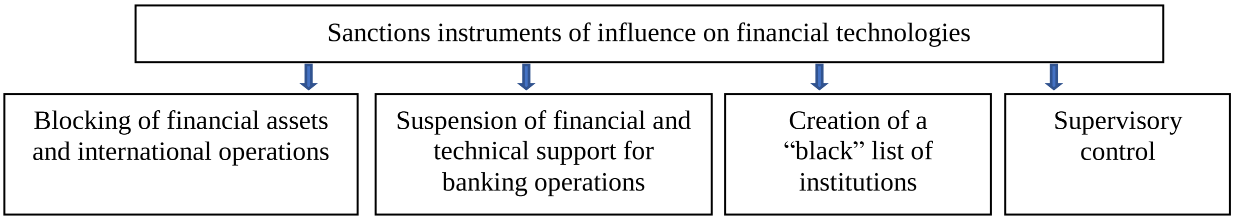

Fig. 1: Typology of sanctioning instruments of influence on financial technologies
Source: generalized by the author

3 Methodology

The development of the FinTech sector was analyzed on the basis of empirical studies of available information on the state of this sector in countries impacted by international economic sanctions. The study involved complex research methods: situational analysis, system analysis, reproductive analysis, and structural-functional analysis.

The impact of international sanctions on the use of financial technologies was studied by using a dataset of 28 countries under international economic sanctions for 2019-2021, as well as the Global Sanctions Database provided by OFAC (Office of Foreign Assets Control), which administers several different sanctions programs. Both comprehensive and selective sanctions were studied, such as the use of asset freezes and trade restrictions to achieve foreign policy and national security goals. The following countries were classified as sanctioned: Iran, Iraq, Cuba, the Russian Federation, Belarus, part of the territory of Ukraine occupied since 2014, Syria, North Korea, Eritrea, Burma, Congo, Ethiopia, the Central African Republic, Venezuela, Lebanon, Liberia, Libya, Yemen, Sudan, Hong Kong, Afghanistan, Somalia, Sudan, Ivory Coast (Côte d'Ivoire), Haiti, Guinea, China, Serbia.

The principles of scientists, [10], [14], were used to examine the total number of banking and financial relations in a country's fintech sector through the automated banking system Dealogic Loan Analysis and AnyLogic software application. All variables were added by pre-estimation, taking into account multicollinearity aspects.

The following model was used to study the relationship between economic sanctions and the expected efficiency of financial technologies (Formula 1):

$$EFinTech_{it}=\beta_0+\beta_1 FDI_{i,t}+\beta_2 CONTROL_{i,t}+\theta_t+\vartheta_i+\epsilon_{it},(1)$$

where *i* and *t* are year and country under research, respectively;

θ_t and ϑ_i are included for time control and country-fixed effects of imposed international economic sanctions

ϵ_{it} denotes error conditions.

A dependent variable, $FDI_{i,t}$ — Financial Development Index — is an integral indicator published annually by the World Economic Forum for the comparative analysis of various aspects of financial systems and the analysis of factors contributing to the development of the financial system.

The $CONTROL_{i,t}$ variable consists of a set of determinants defined as economic factors that determine the development of financial technologies under the influence of international sanctions in the studied countries: from the level of digitalization of social life to the growth of the country's GDP, [13].

The main hypothesis was advanced on the basis of all the indicators mentioned in the study: international economic sanctions do not block the development of financial technologies, as Fintech can ensure the development of the financial sphere of sanctioned countries because of its flexibility and mobility.

4 Results

FinTech represents the next stage of the development of financial services, characterized by the emergence of new technological and innovative start-ups at the intersection of the traditional financial services and digital tools. The very nature of financial intermediation services has been changing as a result of the use of new modern technologies. The world average indicator of the use of financial technologies in the economy is 64%. The implementation of FinTech in the financial sector of the economy looks as follows in terms of the geography (Figure 2). Mobile financial applications are the most popular among all FinTechs in the studied countries, both as a means of payment and as a way to control one's finances (Figure 3).

Cryptocurrency as a means of payment and investment ranks second in terms of popularity. Such popularity is explained by the example of Iran, which began to use cryptocurrency as the main means of payment in international trade after the US imposed sanctions on the use of dollars. This method of circumventing unilateral restrictions not only exposed the conceptual drawbacks of unilaterally managed sanctions regimes, but also confirmed that sanctions are not a critical prohibition, but only a process of interaction between business entities. Therefore, Iran increased the share of cryptocurrency payments from 0.2% to 5.3% for the period 2019-2021 to ensure the flow of money for the necessary purposes.

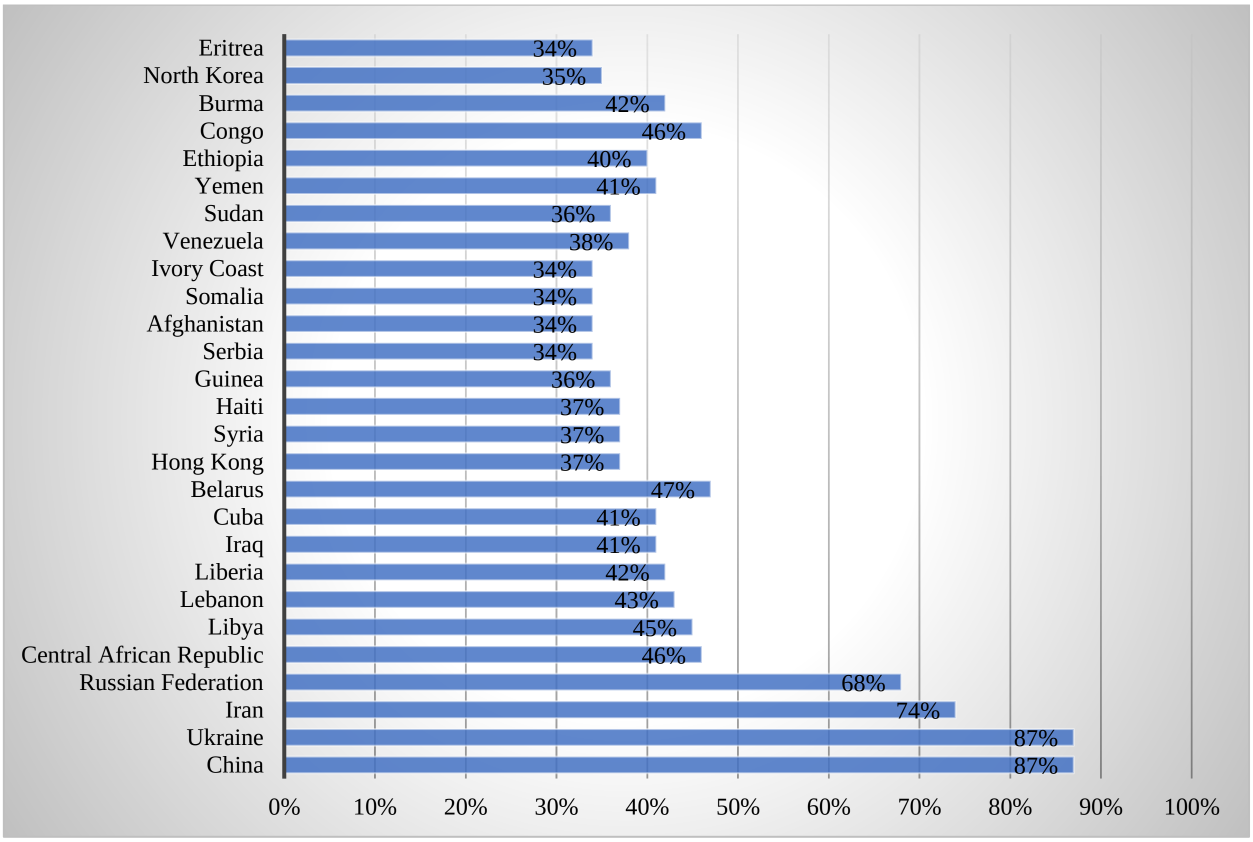

Fig. 2: The spread of FinTech in the financial sector of the countries in 2021

Source: author's research

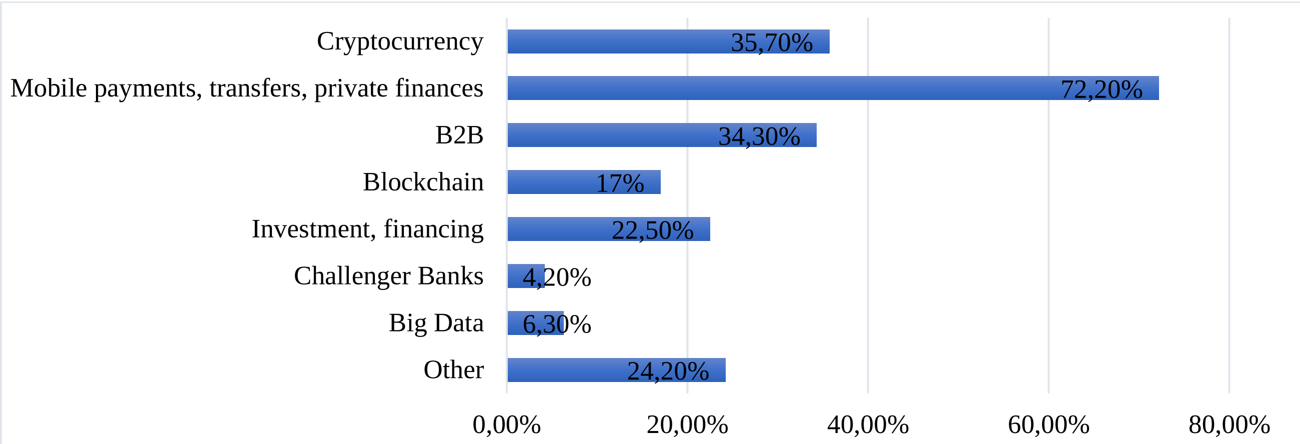

Fig. 3: The use of FinTech in the studied countries in 2021
Source: author's research

US regulators are increasingly imposing significant financial penalties on crypto-businesses contrary to popular belief that the crypto-asset industry is unregulated. The majority of these penalties relate to illegal issuance of securities ($1.38 billion), fraud ($928 million), and sanctions violations ($639.8 million) (Figure 4).

Just as traditional banking and financial institutions are penalized by regulators for violating sanctions regulations, crypto-businesses are no exception. An analysis of US regulatory actions since 2014 shows that $2.948 billion in fines have been imposed against cryptocurrency companies and individuals (Figure 5).

The dynamics of financial penalties in the field of financial technologies indicated in Figure 5 include fines imposed by the United States Securities and Exchange Commission (SEC) — $ 604.3 million, by the Commodity Futures Trading Commission (CFTC) — $ 505.2 million, the Financial Crimes Enforcement Network (FinCEN) — $ 1090.2 million, and the Office of Foreign Assets Control — OFAC) — $ 748.2 million.

Fig. 4: The structure of fines for violations of cryptocurrency circulation
Source: author's research

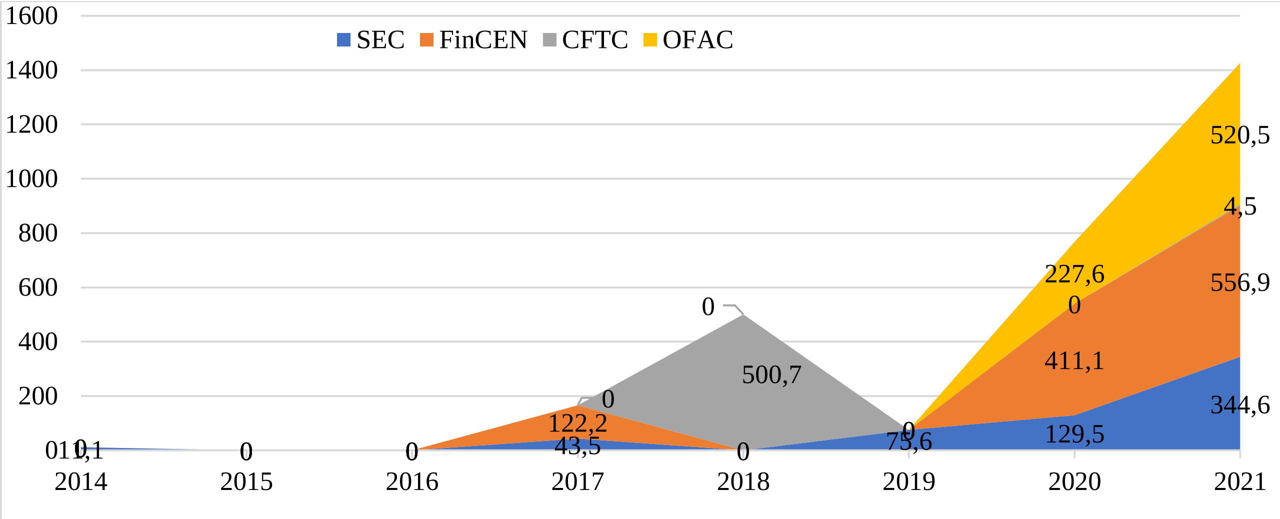

Fig. 5: Dynamics of fines for violation of sanctions rules in the field of FinTech

Source: author's research

The said punitive action was applied to infringing countries that have already been subject to financial monitoring sanctions. But this does not include objects of international cooperation (countries, corporations, cooperatives, etc.) subject to increased monitoring that actively cooperate with OFAC to eliminate strategic deficiencies of their financial technologies regarding the counteraction to money laundering, terrorist financing, or the proliferation of weapons of mass destruction. Coming under increased monitoring (to the so-called "grey list"), the country finds itself one step away from sanctions. The 2022 "grey list" includes 22 countries: Albania, Barbados, Burkina Faso, Cambodia, the Cayman Islands, Haiti, Jamaica, Jordan, Mali, Malta, Morocco, Myanmar, Nicaragua, Pakistan, Panama, Philippines, Senegal, South Sudan, Syria, Turkey, Uganda, United Arab Emirates, Yemen. A country's being on this list does not automatically impose international economic restrictions or bans, but most countries try to quickly eliminate identified strategic shortcomings in order not to lose international positions.

Despite the complex actions of the US government aimed at largely excluding the sanctioned country from the global financial system, the development of certain financial technologies can be studied through the case of Iran. The latter in many ways imitates what exists elsewhere, but on a smaller scale and, as the practice has shown, with much lower efficiency. After all, the globalization of the digital world produces its effects making it impossible for the financial sector to function effectively while being isolated.

Iranian has learned to use technological loopholes in the FinTech ecosystem to interact with external business channels, while developing its own set of financial tools. The impact of the "grey list" on the global functioning of financial technologies should be noted. Middle East Payment Service (MEPS) is a regional Payment Service Provider (PSP) in the Persian Gulf (registered in Jordan) serving financialinstitutions as well as retailers and corporations. Services and products include card issuing, processing and acquiring, merchant acquiring, ATM management, dynamic currency conversion, e-voucher, PoS bill payment, etc.

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Fig. 6: Iranian FinTech start-ups during international economic sanctions
Source: Tehran Times, [26]

Having found themselves in international isolation, Iranian companies began to copy most of the well-known digital financial offers. Iran developed its own SWIFT payment scheme for interbank transactions, Shetab banking system for online payments, Way2Pay.ir digital financial platform for convenient use of the symbiosis of FinTech, RegTech, InsurTech, etc. MEPS played a significant indirect role in the process of bypassing sanctions by Iranian FinTech due to the global nature of the financial system. Such digital financial autonomy has enabled Iranians to enjoy many of the same high-tech features as in any other country, although these systems have low efficiency and very high costs (Figure 6).

FinTech start-ups launched during 2019-2022 laid the foundation for reforming the country's financial system, despite the international economic sanctions imposed on a country. There were 32 fintech companies that provide access to digital financial services operating in Iran as of the beginning of 2022.

Many sanctioned countries should surely learn lessons from Iran's resilience, but there are several factors that change the picture. The Russian Federation became the leader in terms of international economic sanctions imposed on it in 2022, after a full-scale military invasion of the territory of Ukraine. Russia's economy is larger than Iran's one — and much more integrated into the global financial system, with greater FinTech penetration than Iran had when sanctions have been imposed on the latter. The Russian ruble lost more than 30% of its value in March 2022 after Russia's central bank, one of the key Russian financial institutions was cut off from SWIFT, and the country's central bank subsequently ordered to raise interest rates to 20%. Russia spent years building up foreign exchange reserves, but the coordinated multilateral freezing of the Russian central bank's assets caused the collapse of financial technology at a much faster rate than Russian expectations for the potential collapse of the country's financial system.

Iran's financial ecosystem has taken years to gain some independence and stability. The pushback will be severe in the case of Russia, as it has been cut off from Western financial tools, such as the ability to use foreign payment apps (for example, Apple Pay) in everyday life. However, if the burdensome sanctions regimes continue and expand, cryptocurrencies and VPNs will play an important role in Russia's financial operations in the future, similar to Iran. The reason is that the agility and innovation of fintech companies will help them to better maneuver throughout the sanctions period than traditional banks.

However, Russia suffers a negative internal influence on the FinTech development, in contrast to Iran, where the government created additional opportunities and prioritized innovative tools to improve the country's economic situation. The Russian government's ban on selling securities of Russian companies to non-residents resulted in a value drop of 22% in the first half of 2022, which affects the clients of Russian fintech companies. From the Russian government's perspective, the rejection of SWIFT was supposed to accumulate efforts to develop cryptocurrency (the digital currency of the Central Bank of Russia). It turned out instead that this contributed to the establishment of deeper ties with China and the development of its banking sector. However, if the harsh sanctions continue and expand, regulatory gaps that remain in certain FinTech sectors — including payment systems that were designed to avoid SWIFT and its relatively high transaction costs — will be taken advantage of, as cryptocurrencies become increasingly important to Russian FinTech companies and ordinary people.

The calculations clearly confirm the hypothesis proposed in the study: international economic sanctions do not block the development of financial technologies, as Fintech can ensure the development of the financial sphere of sanctioned countries because of its flexibility and mobility. Therefore, international economic sanctions are a stimulator for some countries (China, Ukraine, Iran), while being a significant development blocker (r=0.896) for others (with a financial technology performance of less than 1) (see Table 1).

5 Discussion

First, this paper describes the impact of international economic sanctions on the use and development of financial technologies. Therefore, it outlines global digital implications. It is critically important for the subject of sanctions to estimate own losses from such a decision, which depends on many determinants of the country's financial development, as sanctions are an external shock [8], that can cause an economic crisis in the target economy [7], which is the financial sector in this case. Second, this paper provides a deeper understanding of the moderating role of uncertainty and institutional constraints, [16], following the imposition of sanctions.

Agreeing with authors [9], we note that "In the new world to come, where a major global power may be shuttered from financial systems, we will see increasingly sophisticated regtech fighting increasingly sophisticated fintech in the struggle to trace the supposedly untraceable". Therefore, we accept the opinion of authors in [3] that digital financial technologies will play a vital role at all levels of the economy: from population control of their own finances to transactional payments of multinational corporations.

Table 1. Results of the model of the influence of variable variables on the resultant feature of the studied issue

Country	EFinTech	dy/dx	Std. Err.
China	1.07358	0.00121	0.003608
Ukraine	1.07358	0.00286	0.008528
Iran	0.91316	0.0033	0.00984
Russian Federation	0.83912	0.00847	0.025256
Central African Republic	0.56764	0.00143	0.004264
Libya	0.5553	0.00484	0.014432
Lebanon	0.53062	0.00341	0.010168
Liberia	0.51828	0.00693	0.020664
Iraq	0.50594	0.00209	0.006232
Cuba	0.50594	0.00286	0.002442
Belarus	0.57998	0.00676	0.005772
Hong Kong	0.45658	0.0078	0.00666
Syria	0.45658	0.02002	0.017094
Haiti	0.45658	0.00338	0.002886
Guinea	0.44424	0.01144	0.009768
Serbia	0.41956	0.00806	0.006882
Afghanistan	0.41956	0.01638	0.013986
Somalia	0.41956	0.00494	0.004218
Ivory Coast	0.41956	0.00275	0.004037
Venezuela	0.46892	0.0065	0.009542
Sudan	0.44424	0.0075	0.01101
Yemen	0.50594	0.01925	0.028259
Ethiopia	0.4936	0.00325	0.004771
Congo	0.56764	0.011	0.016148
Burma	0.51828	0.00775	0.011377
North Korea	0.4319	0.01575	0.023121
Eritrea	0.41956	0.00475	0.006973

This research confirmed the example of Iran that such technologies as blockchain and cryptocurrencies are powerful engines for the development of the sanctioned economy. But no matter how powerful cryptocurrencies as a tool are in the system of making payments and investing in business processes during the sanctions, it would be unreasonable to think that the effectiveness of financial technologies does not decrease under the influence of sanctions regimes.

Confirming Peksen's, [25], opinion, we conclude that sanctions will certainly not stop digital financial ecosystems, but they will play a crucial role in forcing the financial ecosystem to undergo transformation in various ways to become more self-sufficient.

6 Conclusions

Financial technologies are becoming an innovative trend that is developing rapidly in the current global digital environment. Its mobility and flexibility made FinTech not only a method of online payments for a wide range of ordinary consumers but also a powerful financial tool for making transactional payments between countries subject to international economic sanctions. Although this study in no way promotes the search for methods of avoiding sanctions, the obtained results not only expose the conceptual shortcomings of unilaterally managed sanctions regimes but also confirm that sanctions are not a critical prohibition, being rather only a process of interaction between business entities.

That is why the transformational processes taking place in the country's economy after the imposition of international economic sanctions on it entail the development of financial technologies to prevent banking and financial crises. The result is FinTech start-ups that create innovative products, technologies or interaction processes. This was the main confirmation of the research hypothesis: international economic sanctions do not block the development of financial technologies, as FinTech can ensure the development of the financial sphere of sanctioned countries because of its flexibility and mobility.

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Contribution of Individual Authors to the Creation of a Scientific Article (Ghostwriting Policy)

The authors equally contributed in the present research, at all stages from the formulation of the problem to the final findings and solution.

Sources of Funding for Research Presented in a Scientific Article or Scientific Article Itself

No funding was received for conducting this study.

Conflict of Interest

The authors have no conflicts of interest to declare that are relevant to the content of this article.