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### **DIGITAL IMPERATIVES FOR THE DEVELOPMENT OF THE FINANCIAL MARKET OF THE NATIONAL AND WORLD VECTOR**

**Abstract.** Trends in the modern financial market are characterized by new challenges of the financial environment and the impact of digital transformation, which form abnormal areas of development. Defining trends, digital models, determinants and technologies of the financial market has become an urgent necessity. The object of the study is the trends in the Ukrainian financial market and global markets of financial derivatives, Forex, OTC markets group under digital transformation. For this purpose, we have applied the methods of nonlinear dynamics, time series, technical and fundamental analysis, modeling, forecasting, market divergence, fluctuations and behaviorism. The study of the financial market has identified: the dominant trend in digital imperatives and digital technologies of the financial space; the cyclic and behavioristic development of the Ukrainian financial market; the growth in actualization of activities of Ukrainian financial institutions, which is associated with the alternative parabanking services; higher growth rates (3,3 units) of exchange transactions with precious metals, the dependence of the dynamics of currency on the impact of the global digital imperatives; the growth in OTC derivatives trades (the rate of growth of 1.1 units). Determinants of trends financial market are: financial and economic policy, digitalization of society, force majeure. The study of forecast patterns of changes in trends has enabled to determine the economic and mathematical model for calculating the index of forecasting the price of a digital financial asset and income from a transaction with cryptocurrency. A close correlation-regressive relationship (linear  $R^2 = 0.6361$ , exponential  $R^2 = 0.6948$ , power  $R^2 = 0.7142$ ) of the cryptocurrency exchange rate from the trading interest is determined (the elasticity coefficient is 2.7 units).

**Keywords:** financial indicators, determinants, financial assets, derivatives, patterns, digital financial technologies, forecasting, Forex, OTC.

**JEL Classification** G12, G13, G17

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## ЦИФРОВІ ІМПЕРАТИВИ ДЛЯ РОЗВИТКУ ФІНАНСОВОГО РИНКУ НАЦІОНАЛЬНОГО І СВІТОВОГО ВЕКТОРІВ

**Анотація.** Тенденції сучасного фінансового ринку характеризуються новими викликами фінансового середовища і впливом цифрової трансформації, які формують аномальні зони розвитку. Визначення тенденцій, цифрових моделей, детермінант і технологій фінансового ринку стало нагальною потребою. Об'єктом дослідження є тенденції на українському фінансовому ринку і світових ринках фінансових деривативів, групи ринків Forex, OTC в умовах цифрової трансформації. Для цього ми застосували методи нелінійної динаміки, часових рядів, технічного і фундаментального аналізу, моделювання, прогнозування, дивергенції ринку, флуктуацій і біхевіоризму. Дослідження фінансового ринку визначило: домінуючу тенденцію в цифрових імперативах і цифрових технологіях фінансового простору; циклічний і біхевіористський розвиток українського фінансового ринку; зростання актуалізації діяльності українських фінансових установ, що пов'язано з альтернативними парабанківськими послугами; вищі темпи зростання (3,3 од.) обмінних операцій із дорогоцінними металами, залежність динаміки валюти від впливу глобальних цифрових імперативів; зростання торгів позабіржовими деривативами (темп зростання 1,1 од.). Детермінантами тенденцій фінансового ринку є: фінансово-економічна політика, цифровізація суспільства, форс-мажори. Вивчення прогнозних закономірностей зміни тенденцій дозволило визначити економіко-математичну модель для розрахунку індексу прогнозування ціни цифрового фінансового активу і доходу від операції з криптовалютою. Визначено тісний кореляційно-регресивний зв'язок (лінійний  $R^2 = 0,6361$ , експоненція  $R^2 = 0,6948$ , потужність  $R^2 = 0,7142$ ) курсу криптовалюти від торгового відсотка (коефіцієнт еластичності 2,7 одиниці).

**Ключові слова:** фінансові показники, детермінанти, фінансові активи, деривативи, закономірності, цифрові фінансові технології, прогнозування, Forex, OTC.

Формул: 3; рис.: 7; табл.: 3; бібл.: 16.

**Introduction.** In today's world, economic processes undergo permanent globalization and digital transformation changes. Financial market is the «lifeblood» of the economic environment on a national and global scale. At the same time, an acute problem in the formation of an effective global financial system is the underdevelopment of the modern financial market against the backdrop of digital imperatives, namely: a low level of integration of national financial markets in the global financial cyberspace, and the introduction of innovation and information technologies.

The global financial space is characterized by globalization and transformation, digital changes. The proper operation of the domestic financial market leads to the development and integration of the national economy in the global environment. The globalization and digital processes are imperative to cover the global, national economic sphere, which influences the emergence of crisis phenomena and problems of inadequate financial market dynamics.

Ensuring the appropriate transformation of countries' economies requires the development of the financial market in terms of digital imperatives.

The basis of scientific approaches to the study of the modern financial market under the society digitalization is not fully formed. Therefore, there is an urgent need to develop new scientific theoretical and methodological, applied aspects of the study of financial market trends in terms of digital imperatives.

**Literature review.** Trends of the financial market, in particular exchange and OTC markets under the impact of the digital imperative, are the object of the studies of both scientists and practitioners: the trends in the financial market and the impact of digital imperatives (E. Brynjolfsson, 2000; U. Huws, 2014; A. Dzhusov, 2017), in particular artificial intelligence, robotics, digital trading of derivatives on exchange and OTC markets (F. Naurois & S. Koppikar, 2020); an important trend in digitalization in the financial market, mobile banking, blockchain, Internet of things, robotically (V. Bastide des, S. Rao & J. Marous, 2019); trends in the modern financial market dominated by the digitalization of society, in particular the need to allocate

financial engineering, crowdfunding, financial networking (V. Milovidov, 2017), banking networking (A. Capponi, F. Corel, J. Stiglitz, 2020), the creation and use of electronic networks (D. Rogers, 2018), in particular digital neural networks (Bestens D., 1997); the electronic financial market, in particular exchange-traded and OTC forms in the imperative influence, particularly because of the availability of mining digital currencies that requires the development of new methods of forecasting their prices (D. Heller & E. Truman, 2017); introduction of digital technology as the modern trend in the financial market, which are more likely to be revealed on the stock market, the OTC, in particular cryptocurrency (E. Rosenberg, P. Harrell, G. Shiffman and S. Dorshimer, 2019); C) the importance of trends in the digital development on impact of the financial market is undeniable that is revealed in financial innovations (J. Ackermann, 2013; E. Rosenberg, P. Harrell, G. Shiffman, 2019), in digital financial technologies (D. Arner, D. Zetsche, R. Buckley, 2017), which necessitate the use of digital platforms (D. Metz, 2019), the digital financial services (J. Cooke, 2018), the new financial products (K. Amosson, 2017) are one of the major trends of financial market development in terms of digital imperatives.

Despite the number of publications on the study of the financial market, the issue of trends of the financial market, which makes stock and over the counter of digital imperative remains insufficiently disclosed and requires further research.

**Methodology.** In order to identify trends in the operation of the financial market of Ukraine we have determined the dynamics of changes in inflation and GDP of Ukraine, quantity, volume and rate of growth of financial assets of banks, stock exchanges, financial companies, trends in price movements of precious metals and foreign currency trading in Ukraine. To determine the impact of globalization and digital transformation of the operation of the financial market of Ukraine, the following indicators are studied: dynamics of volumes of concluded derivatives on the world stock exchange financial market (in particular the subjects of financial market of Ukraine) on interest rates, securities, stock indices, currencies, precious metals; indicators of changes in the movement of the OTC markets group (where traders of Ukraine are actively engaged in trading), credit derivatives, trading capital, gold, currency; change of indicators of exchange rates EUR / USD (the National Bank of Ukraine is a participant of the Forex).

The methodology of the study of the financial market is a totality of methods of nonlinear dynamics, time series of economic growth rates, market fluctuations and divergences (to study the trends of the financial market of Ukraine and the world market of financial derivatives); correlation and regression analysis, extrapolation, analysis, market shocks, technical (charts of the dynamics of prices and trading volume, MACD, stochastic oscillator) and fundamental analysis at the macro- and mega-levels (to determine the trend of the OTC markets group, Forex).

The methods of evaluation: comparison of GDP with the volume of loans (excluding the loans and types of borrowers) is disclosed in the economic literature, in particular in the works of K. Sheedy; the approaches of definition of a currency devaluation, the level of its depreciation (without specifying algorithmic performance period) are analyzed by A. Willman; the methods of studying the dynamics of time series through the definition of a general growth rate are identified (without selection indicators for the criterion «influence» and clarify its period and group) by B. Park, E. Mammen, K. Pauwels, Currim I.; in the methods of technical analysis only a few features are mentioned by D. Brown, R. Jennings, K. Kavajecz, E. Odders-White (the authors draw attention to the significance of past asset prices without revealing in details the technical scientific approach; asset prices are analyzed technically only to determine liquidity), in the methods of fundamental analysis only its separate aspects are identified by E. Swanson, L. Rees, L. Juarez-Valdes, B. Lev, S. Thiagarajan (used for evaluation: financial reports of companies; the level of corporate services, development and risk companies); approaches to determine the actual prices of assets in the economic literature are formed on the basis of determining income assets (such methods neither take into account all factors influencing the asset nor consider digital financial assets), in particular in the works of R. Bansal and I. Shaliastovich.

In our study, we calculated the devaluation of the currency as an algorithmic ratio of the current exchange rate to the exchange rate of the previous period, determined and clarified the ratio

of the country's GDP (Gross domestic product) on its loans and borrowers =  $(\frac{\text{GDP of Ukraine}}{\sum_{j\text{-bank loans } i\text{-borrowers}}})$ .

In the study, we determined the rate of economic growth of time series of the financial market with a preliminary selection of indicators on the criterion of usefulness (trend impact) with the specification of the period and its group.

$$EGR = \frac{IiCPji}{IiPPji}, \tag{1}$$

where *EGR* — index of growth rates of the influential indicator of the financial market; *IiCPji* is an influential indicator of the *j*-group of the current *i*-period of the financial market; *IiPPji* — an influential indicator of the *j*-group of the previous *i*-period of the financial market.

In the methods of technical analysis, we distinguish tools: digital charts, digital figures-patterns, algorithmic-digital-indicators. In the methods of fundamental analysis, we distinguish tools: analysis of the economic and political situation at the micro-, meso-, macro-, mega- levels; cluster digital analysis; trend analysis; structural analysis; analysis of cyber threats and biorisks of the cyberfinance sphere; social analysis; informational psychological analysis; forecasting force majeure.

To determine the future price of a digital financial asset, modeling is used. We have identified the following algorithmic interdependence: with an increase in the IDFA index  $\geq 1$ , the predicted price of a digital financial asset increases, and vice versa:

$$IDFA = \frac{Voi \cdot CPdfa_i}{Vci \cdot APdfa_i}, \tag{2}$$

where *IDFA* is the index of forecasting the digital financial asset price; *Voi* is volume of open interest (positions); *Vci* is the amount of closed interest (positions — transactions); *Pdfac* is the current price of a digital financial asset; *APdfa* is the average price of a digital financial asset

In turn, we have determined that the revenue from a cryptocurrency transaction is formed in such an algorithmic interdependence:

$$ITj = \frac{RECj \cdot VECj - MCECij}{ICR}, \tag{3}$$

where *ITj* is income obtained from the transaction with *j* cryptocurrency; *RECj* is the rate of the *j* cryptocurrency; *VECj* is the volume of the *j* cryptocurrency; *MCECij* is the cost of *i* mining of the *j* cryptocurrency; *ICR* is the cyberrisk index.

Our study is based on the scientific provisions of fundamental and applied research in the fields of finance, economics and cybernetics.

**Results and discussion.** The study of the financial market of Ukraine, the market of global financial derivatives, Forex, OTC markets group in terms of digital imperatives has identified the need analysis of trends in the development of the financial market in Ukraine of under the digitalization of society and its separate segments — bank (credit, deposit, currency), stock, financial derivatives, precious metals, parabank (credit, insurance), as well as global digital markets and analysis of trends of the most electronic types — the market of world financial derivatives, OTC markets group, Forex, cryptocurrency market. It is expedient to conduct such study of the financial market development in certain periods of time that demonstrate the formation of modern market trends, patterns.

To estimate trends in the financial market development in 2010—2019, we have selected the following main imperatives (characteristics), the results of which are given in *Table 2*.

The calculations have been made using the statistical data of the National Bank of Ukraine (NBU), the Ministry of Finance of Ukraine, the State Committee of Statistics of Ukraine, the National Securities and Stock Market Commission of Ukraine, the National Financial Services Regulatory Authority.

The features of the current stage of financial market development is digitalization. The analysis of trends in the development of the digital financial asset market and the main exchange and over-the-counter market by the prevailing type of electronic trade of the global level as a component of the globalization and digital process, vector of the largest participation of the

financial market of Ukraine in the markets of global financial derivatives, Forex, OTC markets group, indicates the following (Table 1, 3; Fig. 1—7).

Table 1

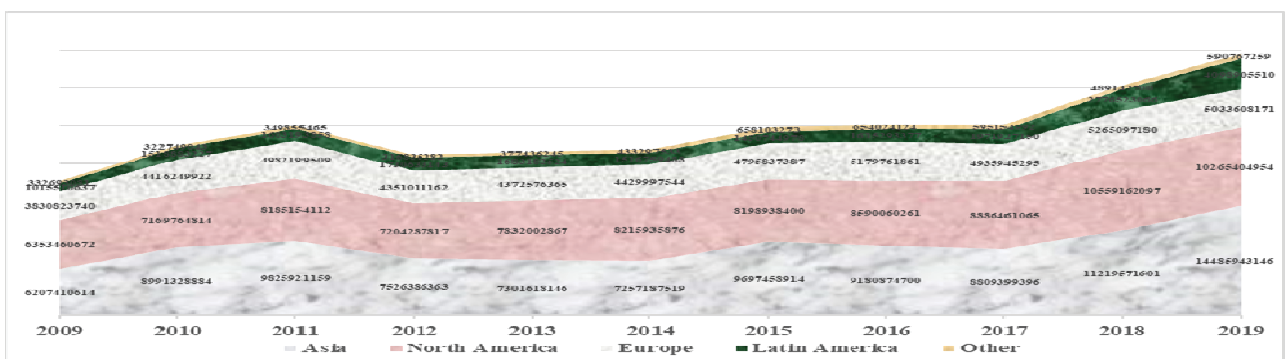
**Indicators of the state of global stock market (2010—2019)**

Indicators	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Growth rates 2019/2010
Volume of the global stock trading, billion of contracts	22,4	25,0	21,1	21,6	21,9	24,8	25,2	25,2	30,3	34,5	1,5
Volume of the global stock trading derivatives, billion of contracts	11,3/ 11,1	12,1/ 12,8	11,0/ 10,1	12,1/ 9,4	12,1/ 9,7	14,5/ 10,3	15,9/ 9,3	14,8/ 10,4	17,2/ 13,1	19,2/ 15,2	1,7/ 1,4
Volume of the global stock trading interest rates, billion of contracts	3,2	3,5	2,9	3,4	3,3	3,3	3,5	4,0	4,6	4,8	1,5
Volume of the world stock trading securities, billion of contracts	5,0	5,3	5,1	5,0	5,0	5,0	4,6	4,8	5,8	6,1	1,2
Volume of the global stock trading equity index, billion of contracts	8,7	10,2	7,5	6,8	7,3	8,3	7,1	7,5	10,0	12,5	1,4
Volume of the global stock trading currency, billion of contracts	2,5	3,1	2,4	2,5	2,1	2,8	3,1	3,0	4,0	4,0	1,6
Volume of the global stock trading precious metals, billion of contracts	0,175	0,342	0,319	0,434	0,371	0,317	0,312	0,279	0,318	0,582	3,3

Source: developed on the basis of [10].

In 2010—2019, there were trends observed (Table 3): changes in the volume of exchange trading, the total volume of the global stock exchange trading with derivatives, in particular options and futures, derivative financial instruments on securities, interest rates, stock indices, currency, precious metals (both upwards and downwards).

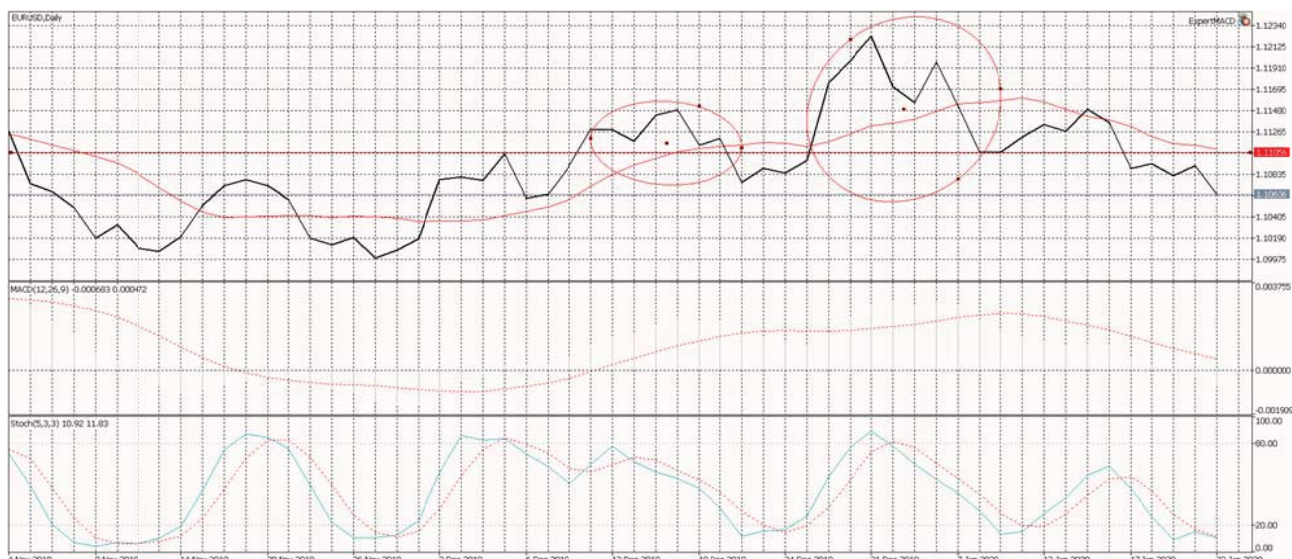
There was a trend in regional dynamics of changes in world trade (Fig. 1), which influenced both downward and upward (with a peak at the end of 2019). The largest aggregate share of global stock trade by a regional component was accounted for (as of 2019, in other years, the percentage values varied, but were similar to the indicators of the last year) in Asia (42%), North America (30%), Europe (14%), Latin America (12%) and others (2%).



**Fig. 1. Dynamics of trading volumes in the global stock market (2009—2019)**

Source: developed on the basis of [10].

In the period from 2009 to 2019, the dynamics of trading volumes in the global stock market was characterized by trends (see Fig. 1), the fluctuations in volumes of global trading, with the lowest level in 2009 and the highest one in 2019.



**Fig. 2. Trends in the EUR/USD market (2019—2020)**

Source: developed on the basis of [5].

Thus, the determinants of trends in the development of the global exchange market were: the socio-political, financial-economic, military situation in the world; the global financial and economic policy, man-made phenomena; globalization, an integration vector of countries; the global economy development (dynamics of the world GDP); the level of business activity of the global exchange market participants; the level of market risk; an increase in the range of exchange instruments, the development of exchange electronic trading systems and digitalization of society

It should be noted that the forex market is of great importance. Research of trends in the forex market development using the technical analysis of the major currency pair EUR/USD in 1999—2020 indicates: a rapid decline in the exchange rate (trend of «bears») at the beginning of the period, price growth (trend of «bulls») and significant fluctuations in the middle of the period, and the exchange rate correction at the end of the period. In turn, significant patterns of changes in the price trend were observed: at the beginning of the period (see Fig. 2) and displayed as the moving average, stochastic oscillator, «triple bottom» (which predicted changes in the trend from «bear» to «bull»);

- the end of the period is characterized by the indicators of trend changes, such as the intersection of the marginal price line and the level of support, figure patterns «head — shoulders», «double vertex», the high level of signals of the MACD indicator, stochastic oscillator, which demonstrated significant fluctuations in the overbought and oversold conditions of currency pair on the market (see Fig. 2).

The determinants of the technical analysis of the EUR/USD currency pair of the forex market for the period from 1999—2020 were: trends in Japanese candlestick charts; levels of support and resistance, their intersection; dynamics of stochastic oscillator; signals of the MACD indicator; volumes of trading ticks (boundaries of minimum price variation) scripts; fractals; «triple bottom», «shoulders», «double top» patterns, change in the level of business activity under the influence of SARS-CoV-2 (pathogen COVID-19).

Table 2

**Trends and determinants of financial market development in Ukraine (2010—2019)**

Period, main trend	Characteristic trends in the development of Ukrainian financial market	Determinants of financial market development in Ukraine
<b>(2010 — Q4 2013)</b> trends in the recovery of the financial market of Ukraine after the impact of the global financial crisis	<b>There were trends:</b> a decrease in the rate of inflation, an increase in GDP, a decrease in interest rate, hryvnia strengthening, at the same time, there was an increase in cash issuance, growth in the number of financially sustainable pecuniary institutions, in particular collective investment schemes, financial companies, pawnshops, credit unions, and the liquidation of troubled institutions; dynamics of increase in volumes of bank deposits and credits, currency trading, an overriding increase in prices for precious metals in UAH, bitcoins in US dollars, growth in capitalization of listed companies, increase in volumes exchange and OTC stock market, NBU gold reserves, services rendered by financial companies, assets of pawnbrokers and insurance companies; instead the volumes of foreign currency reserves, foreign exchange trading, factoring and leasing transactions, loans provided by pawnshops and credit unions changed depending on the market situation, the absorption of dissatisfied currency demand through intervention on foreign exchange markets carried out by the NBU. At the same time, the impact of digital imperatives was reflected in the growth of: exchange and over-the-counter trading in financial instruments on electronic platforms (the emergence of unified electronic trading systems); formation electronic financial: systems, tools, technologies (including e-banking, bank electronic cards, transfers, credit scoring, remote Internet services, electronic management of assets and liabilities, ATMs-terminals for receiving and receiving money, conducting electronic payments), the formation of electronic money, the implementation of information and consulting Internet services, as the first stage of the implementation of parabanking operations	<b>Were determinants:</b> recovery of the development rate of various spheres of the country's economy, increase in the amount of foreign investment in Ukraine in 2010—2012, and the level of business activity of market participants, reduction in the unemployment rate, the development of institutional and legislative market regulation through the adoption of regulatory legal acts of Ukraine regarding the activities of collective investment schemes, the depository system of Ukraine, the development of stock market, the creation is the National Financial Services Regulatory Authority
<b>(IV quarter 2013 — 2015)</b> trends of crisis phenomena of the financial market of Ukraine	<b>There were trends:</b> an increase in inflation, a decrease in GDP, an increase in the discount, credit and deposit rates, hryvnia instability, a decline in NBU gold and foreign exchange reserves and in the amount of foreign exchange trading, an increase in the volume of foreign exchange interventions, a rapid rise in prices for precious metals in UAH, change in bitcoin exchange rate, pricing of Ethereum in US dollars, decrease in the number of banks, insurance companies, credit unions and volumes of their assets, decrease in the amount of foreign investment, rise in unemployment levels, slowdown in rates of the development of economy sectors, reduction in the level of business activity of market participants; considering a significant level of the hryvnia devaluation during the specified period, there were tendencies of extremely slow rates a sluggish pace of growth in bank loans, deposits, trading on the stock exchange and OTC stock market, assets of financial companies, pawnshops, insurance companies, growth in the amount of financial leasing due to its relevance, growth of negative balance of the NBU currency interventions. Influence digital imperatives reflected in significant changes: stock market and OTC trading and electronic financial instruments, e-platforms; electronic tools, financial market technologies to the financial, economic and political state of the country. At the same time, there was a decline growth rates of electronic systems, tools, technologies associated with crisis phenomena in Ukraine	<b>Were determinants:</b> the consequences of the military and political, and financial crisis resulting in a systemic financial and economic crisis in the country, a decline in GDP, outward investment, the national currency depreciation, ultra-high financial risks, a decrease in business activity, liquidity of financial institutions that led to a decrease in the volume of trading of financial instruments and services rendered

Continuation of Table 2

Period, main trend	Characteristic trends in the development of Ukrainian financial market	Determinants of financial market development in Ukraine
(2016—2017) trends in the recovery of the financial market of Ukraine	<p><b>There were trends:</b> a decrease in the inflation rate, gradual recovery of the GDP growth rate, a slow decrease in the account, credit and deposit rates, a decrease in the rate of the hryvnia devaluation, recovery of the NBU gold and foreign exchange reserves, change in the volume of foreign exchange trading, positive balance of currency intervention, gradual increase in prices for precious metals in UAH, growth of the currency exchange rate in US dollars, and the volume of bank loans, deposits, factoring and financial leasing, increase in the number of financial companies and their assets, gradual increase in the level of business activity of market participants. At the same time in the financial market of Ukraine, there was a decreasing trend in the number of banks, stock exchanges, insurance companies, credit unions, pawnshops, a decline in the amount of foreign investment, an increase in the unemployment rate, a slow increase in production volumes, a decrease in the volume of trading of the stock market, and over-the-counter stock market trading. The digital transformation was reflected in the adaptation electronic tools, technologies, financial market systems (in particular electronic optimization: currency, monetary, securitization, settlement and clearing, stock, parabanking, management operations financial resources) to market realities</p>	<p><b>Were determinants:</b> the stabilization of economic and political tensions, GDP rates, the national currency strengthening, increase in business activity, recovery of financial institutions, increase in the volume of trading in financial instruments and services rendered</p>
(2018—2020) growth trends and significant impact of digital imperatives on the development of the financial market of Ukraine	<p><b>There were trends:</b> a decrease in the inflation rate, growth of GDP volumes, actualization of interest rate level, strengthening of stability of the hryvnia, growth of volumes of gold and foreign exchange reserves, increase in volumes of bank deposits and credits, business activity level, growth of volumes of stock exchange and over-the-counter stock market, growth of volumes of currency trading, the predominant growth of quantity and volume of assets of financial institutions. Digital imperatives influenced the intensification of the digitalization of financial market of Ukraine in the vector of electronic financial instruments, systems, technologies, operations (in particular, the formation of electronic financial pools, clouds, e-money, e-banking, e-wallets, e-brokerage, e-scoring, e-clearing payments, e-insurance, e-financial mobility and botany, e-lending, e-payments / transfers / payments, e-tools / products / things, blockchain systems)</p>	<p><b>Were determinants:</b> the stabilization of economic and political tensions, GDP rates, the national currency strengthening, increase in business activity, recovery of financial institutions, increase in the volume of trading in financial instruments and services rendered, in particular intensive development of the market digitalization (the introduction of a digital system, the formation and operation of the Ministry of Digital Transformation of Ukraine and the Committee on the Digital Transformation of Ukraine, Blockchain of the Association of Ukraine )</p>

Source: own research.

The study of the forex market using the methods of fundamental analysis has shown that during the period from 1999 to 2019, the determinants of changes in the price trends of the EUR/USD currency pair were: the political, social, financial and economic, defense-oriented conditions and the state of natural and technological security of the EU countries, the USA; the financial situation of the EU, the USA (reflected in the economic indicators of the European Central Bank, the US Federal Reserve System); the policy, reports, speeches of the heads of the European Central Bank, the US Federal Reserve System; budget, GDP level, inflation index, volumes of gold and foreign exchange reserves, balance of payments, currency stability index, economically active population of the EU countries and the USA; the level of government bond yield of the USA and EU member countries; decisions adopted (on carrying out reforms) at the general meeting of the members of the European Central Bank and the US Federal Reserve System; the stability of the EU and US financial systems; meetings of the European Commission and forecast economic indicators on the eurozone development; legislative changes made by the US Congress, the European Parliament, as well as the Council of the European Union; business activity of the forex market participants; volumes of trading operations, strategically formed by institutional and individual speculations on the forex market; the condition of the global commodity and financial markets; global financial crisis events; political, military situation in the countries of the East; Brexit.

For the period from 2010 to 2019, the weighted average monthly exchange rates of the BTC / USD, ETH / USD signified a trend in the gradual growth at the beginning of the period, with the highest values at the beginning of 2018 and a price decline at the beginning of 2019 and its adjustment in 2019 — at the beginning of 2020. The determinants of the digital currency market development were: market conditions, open interest in cryptocurrency, the overbought and oversold conditions of the market, trading volumes, the development of digital technologies, public digitalization, demand for decentralized mining of cryptocurrency with further hashing with the use of cryptographic methods. During the studied period from 2010 to 2019, the following trends were observed in the OTC Markets Group (see *Table 3*): fluctuations in trading volumes and changes in the price range of the OTC financial derivatives; an overriding decline in the market value of credit financial instruments; fluctuations in the value of stock capital, interest rates, gold, currency.

Table 3

### Indicators of the state of OTC Markets Group (2010—2019)

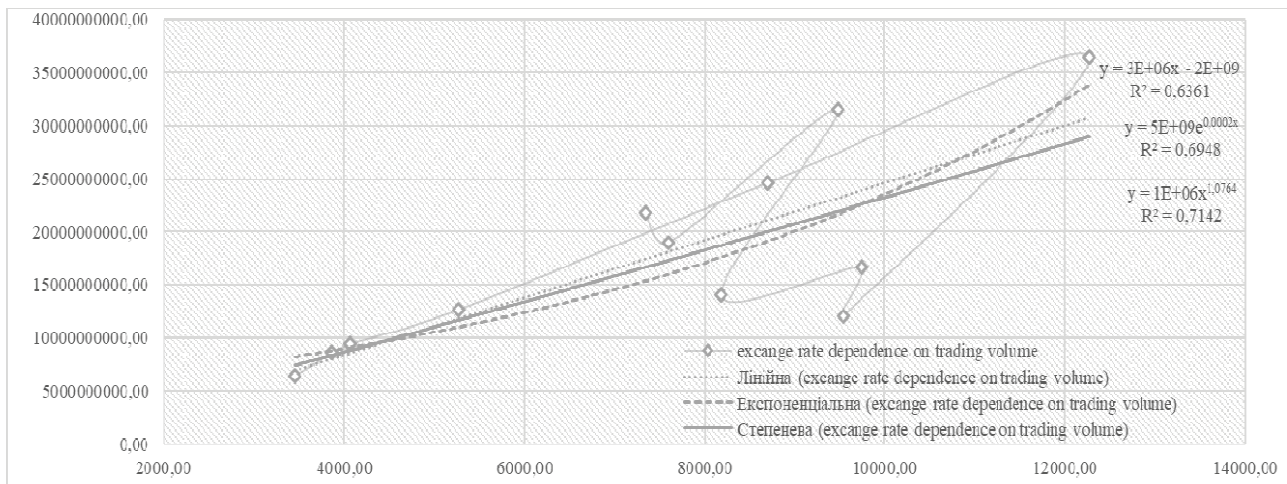
Indicators	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Growth rates 2019/2010
Total volume of OTC derivatives trading, trillion USD (H1)	582,7	706,9	641,3	695,9	691,1	551,3	552,9	542,4	594,8	640,4	1,1
Total market value of OTC derivatives, trillion USD (H1)	24,7	19,5	25,5	20,2	17,4	15,5	21,1	12,7	10,3	12,6	0,5
Total market value of OTC cred. deriv, trillion USD (H1)	1700	1300,0	1230,0	732,57	641,4	458,8	350,1	306,9	238,5	235,3	0,2
Total market value of OTC derivatives, trillion USD (H1)	796,3	773,1	732,2	706,3	690,5	616,6	522,6	523,9	607,8	579,0	0,7
Total market value of OTC interest rates, trillion USD (H1)	18,5	14,0	20,2	15,8	13,9	11,5	16,4	9,1	6,6	8,8	0,5
Total market value of OTC gold, trillion USD (H1)	55,5	57,8	61,1	82,6	34,5	27,8	33,7	23,3	22,7	30,6	0,6
Total market value of OTC currency, trillion USD (H1)	3,2	2,8	2,9	2,6	1,88	2,68	3,6	2,6	2,6	2,2	0,7

Source: developed on the basis of [9].

Thus, given the significant impact of digital imperatives on the development of the financial market of Ukraine and the global market of financial derivatives, Forex, OTC markets group, it should be noted that an important aspect of financial cyberspace is the trend of digital technology financial relationships of market participants (see *Fig. 4—7*). In turn, there is an economic interest

of market participants in obtaining significant profits with minimal risks. Using electronic platforms for trading operations, it is expedient to make a forecast of pricing for financial instruments, using methods of technical and fundamental analysis. We believe that it is advisable to use, in addition to algorithmic pattern methods, an auxiliary index for forecasting the digital financial asset price, which is based on the statement that the price of a digital financial asset depends directly on the market situation (supply / demand).

The rationale for these algorithmic interdependencies is the high rates of close correlation-regression analysis (function is: linear:  $y = 3E + 06x - 2E + 09$ ,  $R^2 = 0,6361$ ; exponential:  $y = 5E + 09e^{0,0002x}$ ,  $R^2 = 0,6948$ ; degree:  $y = 1E + 06x^{1,0764}$ ,  $R^2 = 0,7142$ ) of the cryptocurrency rate and the volume of trading (taking into account the open interest of market participants in cryptocurrency) (see Fig. 3).



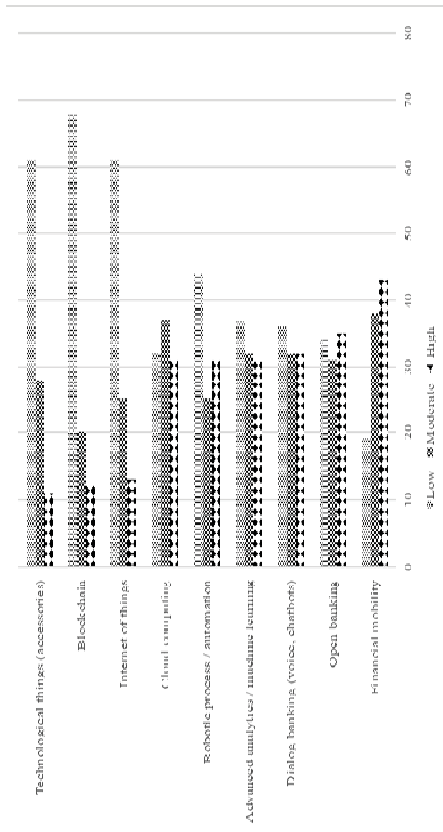
**Fig. 3. Dependence of the cryptocurrency rate on trading volume**

Source: developed on the basis of [8].

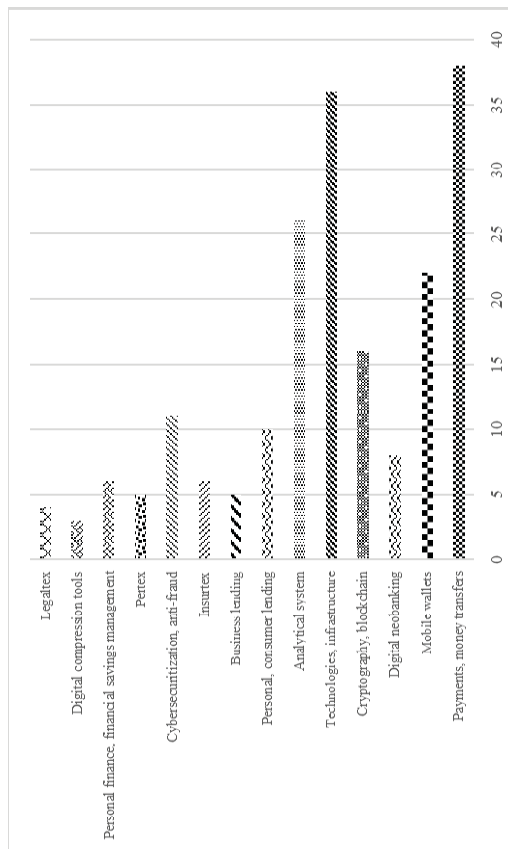
Thus, the correlation-regression analysis of the cryptocurrency rate and trading volume showed that with the increase in trading volume (in particular, open interest), cryptocurrency exchange rate increases in direct proportion (the coefficient of elasticity = 2,7).

The results of research on the financial market of Ukraine, the global market of financial derivatives, Forex, OTC markets group, which confirmed the relationship between global challenges, political, financial and economic factors and the main determinant of digital imperatives for the dominant trend of digitalization of financial space, give us a topic of scientific discussion.

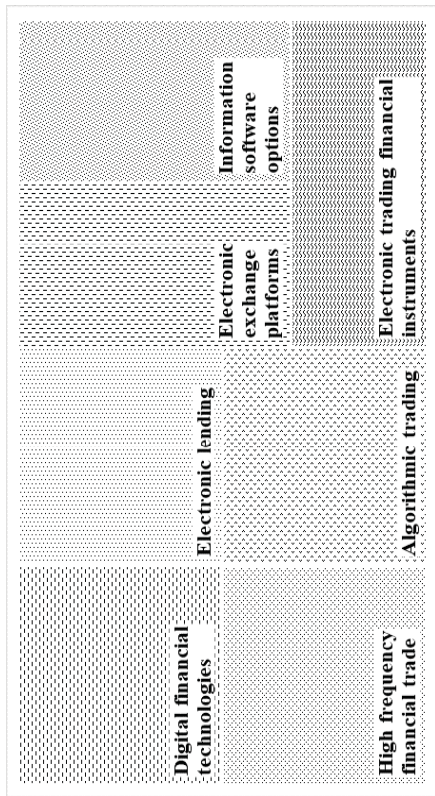
First of all, it is necessary to recognize that the formation of the dominant trend of digitalization of the financial market is influenced by modern imperatives of digital technology saturation of financial space, in particular: technological things, electronic banking, digital neobanking, cloud technologies, robotic financial operations, blockchain, legaltex, pertex, insurtex, high-frequency algo trading, electronic trading platforms, digital financial instruments. However, forecasting the price of a digital financial asset should be linked to the current price of the digital financial asset, the amount of open and closed interest of market participants.



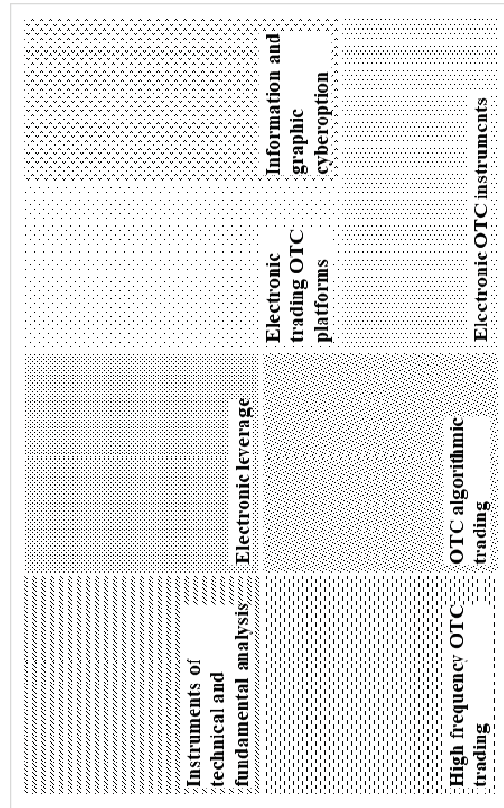
**Fig. 4. Digital financial technologies of banking services market**  
 Source: developed on the basis of [12; 13].



**Fig. 5. Digital financial technologies of parabanking services market**  
 Source: developed on the basis of [12; 13].



**Fig. 6. Digital financial technologies of stock market**  
 Source: own research.



**Fig. 7. Digital financial technologies of OTC markets group**  
 Source: own research.

**Conclusion.** The study of financial market trends in terms of digitalization of society, vector of the Ukrainian policy has revealed the features and trends of its development in certain periods, which are characterized as follows: at the beginning of the period under study (the second half of 2013—2015) there was the market recovery, the period 2015—2016 was characterized by crisis phenomena in the market followed by its revitalization, and the end of 2019 could be described as the period of increased digital imperatives, which were formed under the influence of the political, economic, digital, process, social, force majeure determinants. The study of digital imperatives of the financial market development on the global scale has revealed among the most digitalized financial markets the highest growth rate in digitalized trading in futures, Forex, interest rates on the global financial exchange market (in 2019, the largest percentage of digitalized financial trading was in Asia (42%), North America (30%), currency, securities in the OTC Markets Group, bitcoins on the cryptocurrency market, significant changes in the long-term trends in the forex market, as well as identified the patterns of «triple bottom», «head — shoulders», «double top». Changes in currency exchange rate trends in the forex market were underpinned by the technical and fundamental determinants. The study of digital imperatives of the financial market has enabled to carry out economic-mathematical modeling of forecasting the digital financial asset prices (which form the indicators of open interest (positions) and closed interest (positions – transactions) and current price of a digital financial asset), and future income depending on the cryptocurrency transaction (which form the indicators of rate, volume, costs of mined cryptocurrency and cyberrisk) and to reveal a close dependence of the cryptocurrency rate on trading volume (open interest) based on the coefficient of elasticity amounting to 2.7.

The Ukrainian financial market, the market of world financial derivatives, Forex, OTC markets group have been changing tendentially both in the direction of decreasing and increasing of indicators that characterize its development under the influence of political, financial and economic determinants, as well as the social development, military situation, globalization impact, integration vector, economic interest of market participants, the development of society digitalization.

The study of digital imperatives of the trends in the development of financial market of Ukraine and the market of world financial derivatives, Forex, OTC markets group has identified the need for qualitative changes regarding restrictive determinants, such as: the development of the digital economy on a national and global scale; global political stability; the development of a legal framework for digital financial assets, financial cybersecurity; the introduction of the up-to-date digital financial instruments; strengthening of the protection of a blockchain of financial transactions.

Digital imperatives of financial space trends have influenced the emergence of digital financial technologies, such as: technological things, electronic banking, digital neobanking, cloud technologies, robotic financial transactions, blockchain, legaltex, pertex, insurtex, high-frequency algo trading, electronic trading platforms.

It is advisable to carry out further research on forming an effective financial and economic strategy for the development of financial market of Ukraine under digitalization that will ensure the sustainable development of the financial market and economy at meta-, mega-, macro- and micro-levels.

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