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Digital payment technologies and interbank clearing in the Republic of Kazakhstan in terms of digitalization

Abstract

Object: To analyze background and implementation conditions of national digital currency in Kazakhstan in the conditions of digitalization and forecast the development of digital money in Kazakhstan using economic and statistical modelling. To develop the electronic money circulation system, second-tier banks, which are the main subjects of the financial market, provide remote services, develop strategies for general development, which prescribe rational ways to attract customers to remote service, apply modern technologies and improve the system of cashless money circulation, both nationally and internationally.

Methods: Statistical resources of the Committee of statistics of the Ministry of National economy of the Republic of Kazakhstan were used in the paper. Methods of deduction and systematization were applied. In this study an extrapolation forecast was made for the indicator "the volume of payments in the interbank money transfer system and the interbank clearing system" for 2021-2023.

Results: Nowadays financial ecosystems based on digital technologies are being actively implemented. This trend is noticed in different countries of the world. It opens new possibilities for development of national currencies. Commercial banks are creating new types of digital money by incorporating them into traditional economic interactions.

Conclusion: Kazakhstan is a perspective region for the implementation of its own digital currency. The country's unique geographical position, economic relationships with China, Russia and the West, the presence of international technology giants in the country make the electronic tenge a popular financial instrument that will significantly improve the competitiveness of the Kazakhstani economy, increase its attractiveness with similar projects from other countries at the global level. The concept of introducing digital currency and its transition to widespread use in Kazakhstan will ensure not only the creation and development of completely new ecosystems of financial products and services, but also the modernization of existing "traditional" ones.

Keywords: finance, national currency, money circulation, digitalization, innovation, payment system.

Introduction

The introduction and widespread use of new generation of digital currencies will help to change payment, clearing and interbank settlements significantly, increasing their efficiency, security, instant settlements and reducing financial transaction risks.

The increase in the level of digitalization of services in Kazakhstan stimulates an increase in the system of online payments and money transfer among population.

In general, for the analyzed 2020, 41.6 million transactions amounting to 538.8 trillion tenge were carried out through the Interbank Money Transfer System (IMTS) and the Interbank Clearing System. Compared to the same period in 2019, the number of payments in these payment systems increased by 21.4% (by 7317.5 thousand transactions), the amount of payments decreased by 16.9% (by 109.4 trillion tenge).

29.6 million electronic payment messages in the amount of 5.9 trillion tenge were sent through the specified system in 2020. Compared to 2019, the number and amount of payment messages in the QMS increased by 32.5% (by 7259.0 thousand documents) and 2.2% (by 124.0 billion tenge) respectively.

In general, 144.5 thousand payment messages in the amount of 28.6 billion tenge were passed through the Interbank Clearing System per day in 2020, which is 33.1% more than in 2019 in terms of the number of payments (by 35.9 thousand transactions) and 2.7% (by 0.7 billion tenge) on the amount of payments.

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During the pandemic, the number of online transfers and payments in mobile and Internet banking had increased by 18%. It is interesting to note that after the weakening the regime of pandemic, the indicator decreased slightly — to 16%. Thus, the population of Kazakhstan continues to use online services actively.

The volume of non-cash payments in 2020 amounted to 18.7 trillion tenge (43.6 billion dollars). According to analytical data, this is 2.7 times more than at the same period in 2019. Also, there is an increase in the share of non-cash payments from card turnover for the year from 40.1% to 64.2%.

A significant volume of non-cash payments are performed through Internet and mobile phones: 15.1 trillion tenge (35.2 billion dollars) – it is 3.2 times more than last year.

POS terminals account for 3.5 trillion tenge (8.1 billion dollars), an increase over the year by 59.4%. Other systems for conducting non-cash transactions account for less than 1%, or 99.3 billion tenge (over $ 232 million) — minus 19.1% per year.
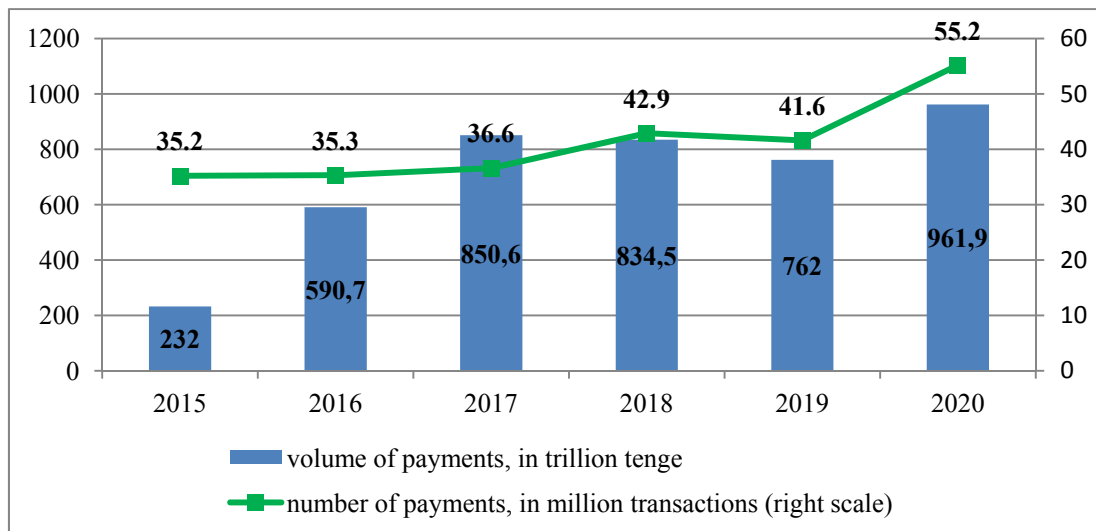

Figure 1. Dynamics of payment flows in the payment systems
of the National Bank of the Republic of Kazakhstan

Note: made by the authors

Literature Review

Having analyzed the possible forms and instruments of payments, we think, despite the ongoing digital transformation in Kazakhstan, there is one official form of the monetary unit which is enshrined in law — tenge. However, payment instruments are both cash and non-cash money (including electronic), which is established by the legislation and rules of the National Bank of the Republic of Kazakhstan. From the point of view of the implementation of the technology of payment instruments, the continuation of the development of electronic forms can be presented by forms of payments in digital currency.

Despite the widespread consolidation by national legislation of the monopoly right to issue money by the National Bank, there is a tendency towards the formation of private digital money and decentralized payment systems (Ali R., Clews R., Southgate J., Barrdear J., 2014).

Already there are several thousand different digital currencies, which may differ from each other in their characteristics. For example, they may depend on the presence of an emission limit. As you know, the most popular cryptocurrency Bitcoin has a release limit. At the same time, for example, Novacoin, PPCoin have no emission limit (Zvyagin L., 2018)

Digital money can be not only private, but also national. The issuer can be represented by the National Bank or different financial institution with monetary functions. Digital currencies are understood as "a new form of money that is issued electronically by a central bank and which is intended to serve as legal tender. It differs from other forms of money issued by central banks: cash and reserve balances and is intended for a wide range of people" (T. Mancini-Griffoly, Martinez Peria M., Agur I., Ari A., Kiff J., Popescu A., Rochon C., 2018).

Head of the Bank for International Settlements thought that central banks and regulators should pay special attention to cryptocurrencies and regulatory requirements (Carstens A., 2018). US Federal Reserve experts A. Berentsen and F. Shar (Berentsen A., Schar F., 2018) investigated different currencies, especially

cryptocurrencies. They had found a huge demand on this asset among households and business entities for serving private sector's needs.

Bank of Canada economists B. Fung and H. Galaburda (Fung B., Halaburda H., 2014) point out that digital currency will be accepted by market participants only if it is more attractive to use or better suited to meet their payment needs than existing alternatives.

Methods

Modern financial technologies use "block chain" for recording transactions with securities and confirming ownership of them. That is, each financial transaction is recorded in an unbreakable chain of blocks in the form of a distributed ledger, which ensures the safety and immutability of information. The National Bank issued electronic money for settlements on operations with securities.

In this study, an extrapolation forecast was made for the indicator "the volume of payments in the interbank money transfer system and the interbank clearing system" for 2021–2023 years.

Initially, using Irwin's criterion, it was found that the initial time series does not contain anomalous observations, but using a series criterion based on the median that the series contains a trend component (Table 1).

Table 1. Trend checking

General view of the series criterion based on the median (violation of at least one inequality is sufficient for a trend to exist)	Calculated values with probability of error $0,05 < \alpha < 0,0975$
$v(n) > \left[\dfrac{1}{2}(n + 2 - 1{,}96\sqrt{n-1}) \right]$	$2 < 3$
$K_{\max} < [3{,}3(\lg n + 1)]$	$5 < 6$
Note: made by the authors	

Using the least squares method, which provides the minimum distance of the function graph from the points of the original data, the initial data were approximated. The result was the following linear trend model:

$$y_t = -57.620 + 100.925t \tag{1}$$

To check the model, a number of residuals were investigated to fulfill the following properties: equality of the mathematical expectation to zero, randomness of the residuals and their compliance with the normal distribution law (Table 2).

Table 2. Checking the adequacy of the model

Checked property	Used statistics		Limit	Conclusion
	Name, calculation formula	The resulting value		
Randomness	Peak (turning point) criterion $p > \left[\dfrac{2}{3}(n-2) - 1{,}96\sqrt{\dfrac{16n-29}{90}} \right]$	$3 > 2$	2	Adequate
Rationality	RS-criterion $RS = \dfrac{e_{\max} - e_{\min}}{S}$	3,206	2.67–3.69	Adequate
Equality of the mathematical expectation of the levels of a series of residuals to zero	t-statistics of Student $t_{набл.} = \dfrac{\left| \overline{e} \right|}{S}\sqrt{n}$	0	2.26	Adequate
Note: made by the authors				

Thus, the model is qualitative and can be used for forecasting. The results of constructing point and interval forecasts for 2021–2023 are presented in Table 3.

Table 3. Point and interval forecasts of the volume of payments in the interbank money transfer system and the interbank clearing system for 2021-2023

Year	Point forecast, trillion tenge	Interval forecast, trillion tenge	
		Upper limit	Lower limit
2021	1052.560	667.516	1437.604
2022	1153.485	749.800	1557.171
2023	1254.411	830.010	1678.812
Note: made by the authors			

Results

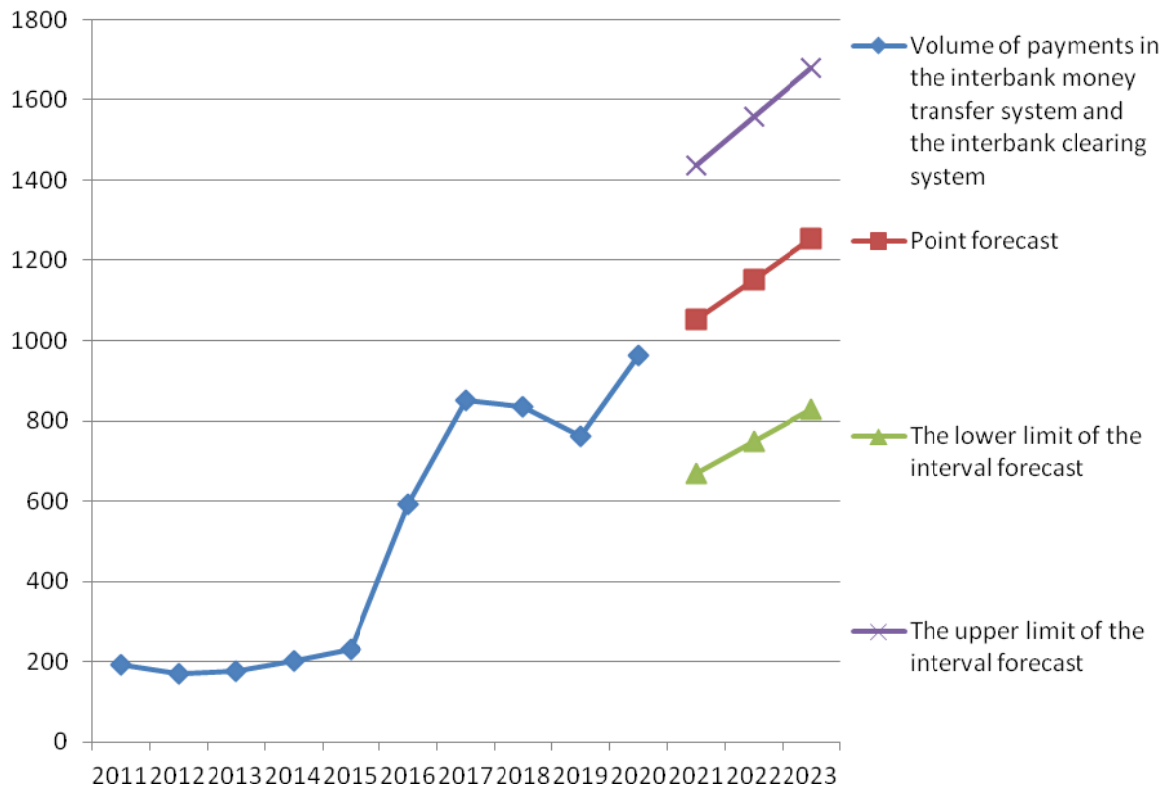The results of modeling and forecasting are presented in Figure 1 (trln tenge).

Figure 2. Point and interval forecasts of the volume of payments in the interbank
money transfer system and the interbank clearing system for 2021-2023

Note: made by the authors

The forecasting results obtained using the linear trend model allow us to assume that with a 95% probability the volume of payments in the interbank money transfer system and the interbank clearing system will be in the range of 667.516 trillion tenge to 1,437.604 trillion tenge in 2021, in 2022 from 749.800 trillion tenge up to 1,557,171 trillion tenge; in 2023 from 830.010 trillion tenge up to 1,678.812 trillion tenge. The point forecast for the same period of time will be: for 2021 1052.560 trillion tenge; for 2022 1153.48 trillion tenge; for 2023 1254.411 trillion tenge.

Thus, the indicator "volume of payments in the interbank money transfer system and the interbank clearing system" has a linear increasing trend of development.

Conclusion

Kazakhstan is a perspective region for the implementation of its own digital currency. The country's unique geographical position, economic relationships with China, Russia and the West, the presence of international technology giants in the country make the electronic tenge a popular financial instrument that will significantly improve the competitiveness of the Kazakhstani economy, increase its attractiveness with similar projects from other countries at the global level. The concept of introducing digital currency and its tran-

sition to widespread use in Kazakhstan will ensure not only the creation and development of completely new ecosystems of financial products and services, but also the modernization of existing "traditional" ones.

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Ю.М. Сайфуллина, Г.С. Серикова, М.А. Асанова, Г.Н. Амирова, С.Ш. Акенов

Цифрландыру шарттарында Қазақстандағы цифрлық есептеу технологиялары және банкаралық клиринг

Аңдатпа

Мақсаты: Зерттеу тақырыбының өзектілігі қаржы нарығы мен қаржылық технологиялардың дамуына байланысты электрондық ақша қаражатын белсенді қолдануға, сондай-ақ елдердің экономикасын цифрландыруға, шаруашылық өмірдің жаһандануы мен интернационализациясына негізделген.

Әдісі: Мақалада ҚР Ұлттық экономика министрлігі Статистика комитетінің ақпараттық ресурстары пайдаланылды. Сонымен қатар мақалада шегеру, индукция, жүйелеу әдістері қолданылды. Зерттеуде 2021-2023 жылдарға арналған «банкаралық ақша аудару жүйесіндегі төлемдер көлемі» көрсеткіші үшін болжамды әдіс пайдаланылған.

Нәтижелері: Қазіргі уақытта цифрлық технологияларға негізделген қаржы экожүйелері белсенді түрде енгізілуде. Бұл үрдіс әлемнің әртүрлі елдерінде байқалады. Бұл ұлттық валюталарды дамыту үшін жаңа мүмкіндіктер ашады. Коммерциялық банктер сандық ақшаның жаңа түрлерін жасайды, оларды дәстүрлі экономикалық өзара әрекеттестікке біріктіреді.

Қорытындылар: Қазақстан — өзінің цифрлық валютасын енгізу үшін перспективалы өңір. Елдің бірегей географиялық жағдайы, Қытаймен, Ресеймен және Батыспен экономикалық байланыстар, елде әлемдік технологиялық алыптардың болуы электрондық теңгені танымал қаржы құралына айналдырады, ол қазақстандық экономиканың бәсекегеқабілеттілігін айтарлықтай арттырады, әлемдік деңгейдегі басқа елдерден ұқсас жобалар есебінен оның тартымдылығы артады. Цифрлық валютаны енгізу және оның Қазақстанда кеңінен пайдалануға көшу тұжырымдамасы қаржы өнімдері мен қызметтерінің мүлдем жаңа экожүйелерін құруды және дамытуды ғана емес, қолданыстағы «дәстүрлі» экожүйелерді жаңғыртуды қамтамасыз етеді.

Кілт сөздер: қаржы, ұлттық валюта, ақша айналымы, цифрландыру, инновациялар, төлем жүйесі.

Ю.М. Сайфуллина, Г.С. Серикова, М.А. Асанова, Г.Н. Амирова, С.Ш. Акенов

Цифровые технологии расчетов и межбанковский клиринг в Казахстане в условиях цифровизации

Аннотация

Цель: Актуальность темы исследования основана на активном применении электронных денежных средств в связи с развитием финансового рынка и финансовых технологий, а также цифровизации экономики стран, глобализации и интернационализации хозяйственной жизни.

Методы: В статье использовались информационные ресурсы Комитета по статистике Министерства национальной экономики РК, а также методы дедукции, индукции, систематизации. Кроме того, в исследовании был применен прогнозный метод для показателя "Объем платежей в межбанковской системе перевода денег" на 2021–2023 гг.

Результаты: В настоящее время активно внедряются финансовые экосистемы, основанные на цифровых технологиях. Эта тенденция наблюдается в разных странах мира, что открывает новые возможности для развития национальных валют. Коммерческие банки создают новые типы цифровых денег, интегрируя их в традиционные экономические взаимодействия.

Выводы: Казахстан — перспективный регион для внедрения собственной цифровой валюты. Уникальное географическое положение страны, экономические связи с Китаем, Россией и Западом, присутствие в стране мировых технологических гигантов делают электронный тенге популярным финансовым инструментом, который значительно повысит конкурентоспособность казахстанской экономики, ее привлекательность за счет аналогичных проектов из других стран на мировом уровне. Концепция внедрения цифровой валюты и ее переход к широкому использованию в Казахстане обеспечат не только создание и развитие совершенно новых экосистем финансовых продуктов и услуг, но и модернизацию существующих "традиционных".

Ключевые слова: финансы, национальная валюта, денежное обращение, цифровизация, инновации, платежная система.

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