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Contents

A High Price of Investing in Foreign Assets for a Kazakhstani Investor

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When foreign assets are included in a local investor portfolio, investment managers must decide whether to accept the associated foreign exchange risk. This paper attempts to empirically assess the role of foreign assets in the portfolio of a hypothetical Kazakhstani investor and the impact of foreign exchange risk based on historical data on returns and exchange rates for more than 15 years.

Key Words: optimal asset distribution, foreign exchange hedge.

JEL-Classification: G11.

Preamble

Investments in overseas assets have become a standard practice for most of the world's large institutional investors. Instruments such as US Treasuries, S&P 500 stocks, investment grade corporate bonds are present in the investment portfolios of almost every major pension fund or sovereign wealth fund in the world outside the US. Investors appreciate these asset classes for their positive long-term returns, the depth and liquidity of the markets in which they operate, high standards of corporate governance, and the quality of regulatory environment ensuring that investor interests are highly protected. But above all, foreign investment is motivated by the benefits of diversifying investment portfolios and gaining access to new risk premiums not available in the local market. This is especially true for countries with a poorly developed stock market, where insufficient capacity and limited variety of investment instruments do not allow building a diversified portfolio that meets their investment goals. Several studies prove that the benefits of overseas diversification are more significant for developing countries than for developed ones.

Kazakhstani private and institutional investors have been investing in foreign securities for many years. At the same time, despite the significant accumulated experience in foreign investment, empirical studies of the feasibility of allocation for foreign assets in the portfolio of Kazakhstani securities in the past were limited. This was largely due to the lack of data on the historical yields of Kazakhstani shares and bonds. The absence of total return indices of Kazakhstani shares and especially bonds in the past did not allow assessing their volatility and correlations with other asset classes. This study attempts to fill the resulting vacuum and empirically assess the role of foreign assets in the Kazakhstani securities portfolio based on the reconstructed historical series of total returns on Kazakhstani shares and bonds.

After the decision to invest in foreign assets, the investor must also decide whether to accept the foreign exchange risk arising in the portfolio with the addition of foreign assets. Such decision is largely determined by the investor's risk tolerance, beliefs, and considerations of the costs and benefits of hedging foreign exchange risk. As will be shown below, for a Kazakhstani investor, foreign exchange hedge of a portfolio is not only a means of reducing volatility but also an opportunity to offset for a negative rate differential.

Therefore, this paper attempts to empirically answer the following two questions: 1) whether the addition of foreign instruments to the portfolio of Kazakhstani securities is justified; 2) does a Kazakhstani investor need to hedge the associated foreign exchange risk?

Literature Review

Since the late 1960s, many studies have been published in the academic literature on international portfolio diversification. For the first time, Grubel [1], applying the modern portfolio theory, empirically showed that the US investors, by allocating a part of their portfolio to foreign stocks, could significantly reduce the risk in the portfolio and increase its profitability.

Later, Solnik [2], using the returns on equities of eight developed countries over 6 years, demonstrated that the percentage reduction in the variance of returns from an increase in the number of stocks in a portfolio is higher in the case of foreign stocks than when only the US stocks were selected. The same study concluded that an additional reduction in the dispersion of returns took place if the accompanying foreign exchange risk was hedged. These and other early works have shown the benefits of diversification for developed countries. In this regard, noteworthy is the work of Driessen, Laeven [3], which assessed the benefits of international diversification for 62 countries. The study found that the benefits of overseas diversification are significantly higher for developing countries than for developed countries. Relatively recent studies of this topic point to the decreasing benefits of international diversification in last decades due to the increased integration of countries into the global financial market and the growth of correlation between assets of different countries [4]. In this regard, investing in less integrated emerging markets is being actively explored.

There is no consensus on the issue of hedging currency risks both in the academic community and among practitioners. Opinions vary: from the need to fully hedge the foreign exchange risks in the portfolio to their full acceptance in the portfolio. The acceptance of the foreign exchange risk in the portfolio is most often based on arguments about the convergence of exchange rates to average levels and the leveling of currency fluctuations in the long run [5]. Thus, Froot in his study points to the ability of foreign exchange hedging to reduce portfolio volatility only over short horizons, while over horizons of several years, hedging, on the contrary, increases the variance of portfolio returns [6]. Another argument in favor of accepting foreign exchange risks in the portfolio is the low correlation of returns on local assets with fluctuations in the corresponding exchange rates, which leads to reduction in their overall level of volatility in the foreign investor's portfolio. However, empirical studies show that the effect of diversification is highly dependent on the type of asset. Thus, a study by Campbell, Serfaty-deMedeiros, and Viceira indicates that there is no diversification of asset and foreign exchange risk in a foreign bond portfolio, and therefore it is recommended to fully hedge the associated foreign exchange risk [7]. Other studies [8] state that the optimal hedge ratio (the ratio of the nominal value of the derivative to the market value of the hedged portfolio) for portfolios is highly dependent on the currency in which the investor values it. Thus, for stock portfolios valued in some currencies, the optimal hedge ratio may be close to 0, and for others, close to 100%.

Data Used

The analysis is based on the historical data of monthly returns on two local and two foreign asset classes for the period from August 2003 through June 2020:

– Kazakhstani shares represented by a total return index of the *KASE*. This index was calculated via the monthly capitalization of dividends on shares included in the index based on the return of the KASE price index. The data on dividends in the Bloomberg system have been used.

– Kazakhstani bonds, for presentation of which the *total return index of Kazakhstani government bonds* was compiled based on the data of revaluation of securities of the Kazakhstan Stock Exchange. The index included all government bonds for which prices were available in the stock exchange revaluation and which were meeting the following conditions: a) the bonds have maturity of more than 1 year; b) bonds have a fixed coupon rate; c) are denominated in the national currency. The total number of bonds included in the index for the analyzed period was 300 issues. The weight of each bond in the index is equal to the share of this issue in the sum of the market value of all issues in the corresponding period). The index itself is calculated as follows:

$$TRI_t = TRI_{t-1} \times \frac{\sum(\text{Net price})_{i,t} + \text{ACI}_{i,t} + Coupon_{i,t}) \times Nominal\ value_{i,t}}{\sum(\text{Net price}_{i,t-1} + \text{ACI}_{i,t-1}) \times Nominal\ value_{i,t-1}}$$

– global equities represented by the *MSCI World Net Total Return USD Index*, which includes corporate shares of large and medium capitalization in the markets of 23 developed countries;

– global bonds represented by the *Bloomberg Barclays Global-Aggregate Total Return Index Value Unhedged USD*, which includes local investment-grade bonds of 24 countries.

Two return series were calculated for each of the foreign classes:

– unhedged return in the tenge calculated as:

$$R_{KZT\ unhedged} = (1 + \text{return on assets in the US Dollars})(1 + \text{change in the FX rate}) - 1$$

(the calculation of the change in the exchange rate is based on the data of USD/KZT spot rate in Bloomberg, source – BGN)

– hedged return in the tenge determined as:

$$R_{KZT fully\ hedged} = R_{KZT unhedged} + R_{1MNDF short}$$

where $R_{1MNDF short}$ is determined as a realized gain from the sale of monthly non-deliverable USD/KZT forward contracts based on the forward and spot rates of USD/KZT in Bloomberg.

Table 1

Data Used (monthly returns from 01.08.03 through 30.06.20)

	Global Aggregate USD	MSCI World USD	TR KZ Bond Index	KASE TR Index	USDKZT	Short 1M USDKZT NDF (hedge)
Mean	0.34%	0.71%	0.39%	2.12%	0.56%	0.02%
Standard deviation	1.57%	4.30%	1.32%	9.92%	3.70%	2.99%
Maximum	-3.97%	-18.96%	-6.01%	-36.68%	-5.00%	-20.47%
Minimum	6.21%	11.22%	5.33%	54.75%	28.07%	7.12%
Number of observations	203	203	203	203	203	203

Source: computations based on the data from Bloomberg, Kazakhstan Stock Exchange

The Role of Foreign Assets in the Kazakhstani Investor's Portfolio

From the standpoint of portfolio theory, the decision to invest in foreign assets by a Kazakhstani investor should be considered from the point of view of the ability of these assets to improve the ratio of risk and return in the portfolio. Any asset is valuable not only by the expected return and the level of its risk but also by the ability to reduce overall risk of the portfolio due to a less than absolute correlation with assets in the portfolio.

The ability of foreign assets to improve the effective boundary of a portfolio consisting only of Kazakhstani shares and bonds was tested on the basis of historical data on returns for the period from August 2003 to June 2020 (Table 2). Effective portfolios were built on the basis of results of joint optimization of Kazakhstani shares and bonds with two foreign asset classes based on average historical tenge yields and asset covariances.

Table 2

Average Annual returns, Volatilities and Correlations of Assets in the Tenge

	Kazakhstani Shares	Kazakhstani Bonds	Global Equities	Global Bonds
Average annual return	25.41%	4.63%	14.75%	10.80%
Volatility	34.36%	4.56%	16.38%	13.18%
correlations				
Kazakhstani shares	1	-0.01	0.43	0.06
Kazakhstani bonds		1	0.01	-0.11
Global equities			1	0.01
Global bonds				1

Source: the author's computations

The effective boundary obtained as a result of co-optimization points to a significant improvement in the risk/return ratio on a portfolio of a hypothetical Kazakhstani investor (Figure 1), thus proving the justification of adding foreign assets to the portfolio.

Figure 1

Effective Boundaries of a Portfolio
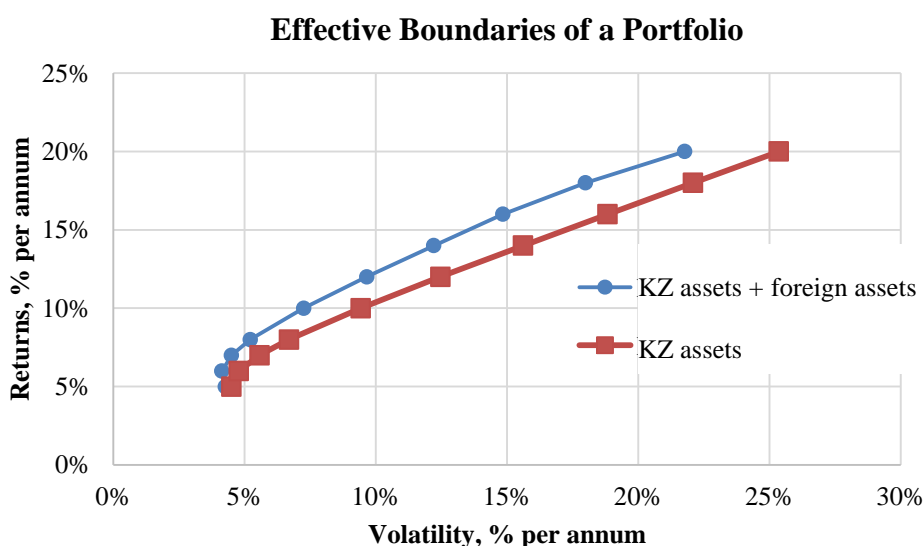
The improvement in the risk/return ratio occurred mainly in the form of reduction of the portfolio risk. It is noteworthy that, despite the increase in volatility of returns on foreign assets when recalculated in the tenge, their correlations with Kazakhstani assets have significantly decreased (Table 3). This indicates that currency fluctuations in the USD/KZT exchange rate themselves had a significant diversifying effect.

Table 3
**Profitability and Risk Ratios of Foreign Assets USD, KZT**

	Global Equities	Global Bonds	Global Equities	Global Bonds
	Return, % per annum		Volatility, % per annum	
USD	8.50%	4.11%	14.90%	5.43%
KZT	14.75%	10.80%	16.38%	13.18%
changes in correlation				
Kazakhstani shares	-0.05	-0.12		
Kazakhstani bonds	-0.11	-0.18		

Source: the author's computations

As can be seen from Table 3, a significant contribution to the return on foreign assets in the reviewed period was made by currency revaluation, which added 6% to the average annual return on foreign currency assets in the tenge. At the same time, the main part of this revaluation falls on exchange rate adjustments before and at the time of introduction of the free-floating exchange rate by the National Bank.

Thus, the presence of foreign equities and bonds in the structure of effective portfolios (Figure 2) proves the validity of including these asset classes in the portfolio of a Kazakhstani investor. At the same time, it should be noted that effective portfolios based on historical average values of returns in this analysis serve only to prove the validity of adding foreign assets to the portfolio and can in no way be a recommendation of specific distributions in the portfolio. Building an earmarked allocation requires the formulation of the future expected returns on assets.

Figure 2

Structure of Asset Distribution in Effective Portfolios
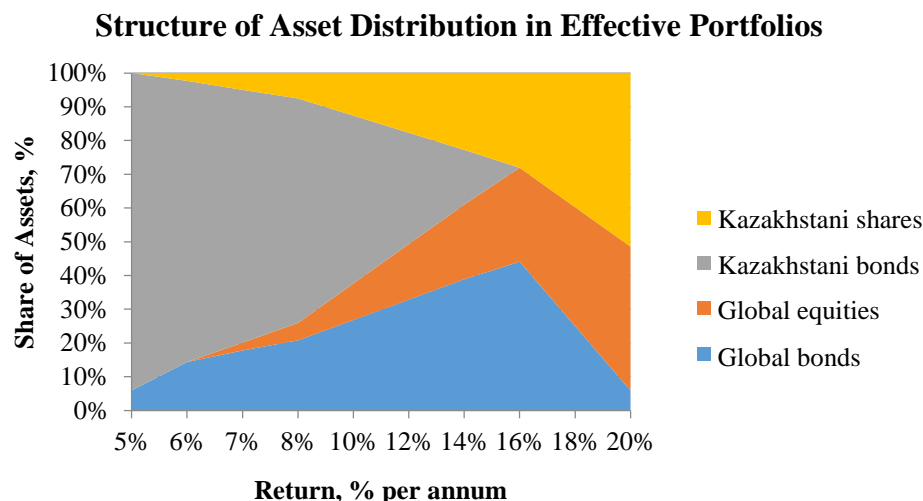
Foreign Exchange Hedge

Assumption of foreign exchange risk is not an inevitable consequence of investing in foreign assets. An investor, when making a decision to invest in foreign assets, essentially makes two separate decisions: to pursue the risk premium for a given asset class and a decision to invest in a given currency. If the first decision is largely dictated by considerations of building a diversified portfolio, the second decision, in addition to the general level of risk tolerance (due to the increased volatility of assets with the addition of currency fluctuations), is also influenced by investors' expectations about future exchange rates and hedging costs.

After assessing the prospects of appreciation/depreciation of foreign currency against the tenge, the investor should compare them with the foreign currency's forward rate, which, in turn, is determined by the differential of risk-free interest rates of the two currencies. Assumption of foreign exchange risk is justified if the investor's forecast about appreciation of the currency rate exceeds the current differential of the money rates of the two currencies, since, moving to another currency, the Kazakhstani investor gives up higher returns in the tenge in favor of lower returns in another currency. For example, in the current conditions, in order to persuade a Kazakhstani investor to accept foreign exchange risk in the US dollars, expectations of the exchange rate appreciation should be higher than the current differential of 10.1% (a one-year note of the National Bank is 10.68% and annual LIBOR USD – 0.58%). Thus, a large differential in risk-free rates represents the costs of assuming foreign exchange risk for a Kazakhstani investor, in addition to the costs of increasing the volatility of returns on foreign currency assets in the tenge.

In the event if an investor decides not to take the associated foreign exchange risk, he can hedge it. By hedging the risk, the investor forgoes the benefits of a possible appreciation of the foreign currency in favor of reducing the volatility of returns. However, due to the negative differential of risk-free rates in foreign currencies against rates in the tenge, foreign exchange hedging operations under the normal market conditions can also bring positive returns.

For example, the most common hedging method is the forward sale of foreign currency. In the case of a Kazakhstani investor, the US dollar forward rate is traditionally higher than the spot rate and can provide a positive return to the investor in the form of forward points in the absence of large fluctuations in the rate[1]. With a significant depreciation of the tenge, the sale of foreign exchange forward contracts brings losses to the portfolio, but more important is how the systematic application of this strategy affects the profitability and risk in the portfolio of a

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[1] This dependence of the forward rate on the spot rate is dictated by the covered interest rate parity $F_{\frac{KZT}{USD}} = S_{\frac{KZT}{USD}} \times \frac{(1+i_{KZT})}{1+i_{USD}}$. Due to higher interest rates in Kazakhstan compared to the USA, the USD/KZT forward rate is traditionally higher than the spot rate.

Kazakhstani investor over long horizons. To determine this, based on the historical USD/KZT spot and forward rates and returns on assets for the period from August 2003 to June 2020, the returns on foreign assets in the tenge were calculated taking into account the full hedge of foreign exchange risk.

<div align="right">**Table 4**</div>

**Comparing Returns on Foreign Assets with and without the Hedge**

	Global equities	Global bonds	Global equities	Global bonds
	Return, % per annum		Volatility, % per annum	
KZT without hedge	14.75%	10.80%	16.38%	13.18%
KZT with hedge	15.01%	11.07%	15.11%	6.96%
Change, +/-	*0.26%*	*0.26%*	*-1.27%*	*-6.22%*
change in correlation				
Kazakhstani shares	0.05	0.07		
Kazakhstani bonds	0.10	0.12		

Source: the author's computations

As Table 4 shows, hedging significantly reduced the volatility of return on foreign shares and tenge-denominated bonds but it also increased asset correlations. However, it is more noteworthy that average returns on these assets, given the hedging, are not lower than returns in the tenge without hedging, and are even slightly higher than them, thus indicating that the gain from hedging in the reviewed period has fully offset the lost profits from appreciation of the foreign currency.

Given the benefits obtained in the form of reduced portfolio volatility, foreign exchange hedge has the potential to significantly improve the risk-reward ratio in a Kazakhstani investor's portfolio. Effective portfolios built on the basis of returns on foreign shares and bonds in the tenge, after full hedging of foreign exchange risk prove this conclusion. The effective curve shows an improvement over the unhedged option (Figure 3).

<div align="right">**Figure 3**</div>

Effective Boundaries of Portfolio
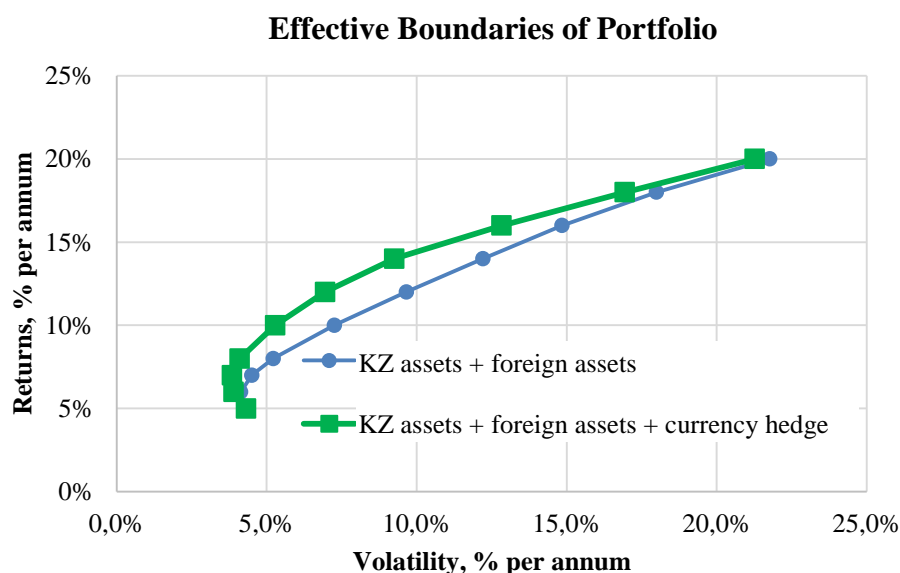
The reduction in benefits of foreign exchange hedging at higher returns is driven by a decrease in the overall share of foreign currency assets in the structure of their respective effective portfolios and, in particular, by a decrease in the share of global bonds, for which the benefits of hedging in the form of reduced volatility are especially large.

Figure 4

Structure of Asset Allocation in Effective Portfolios
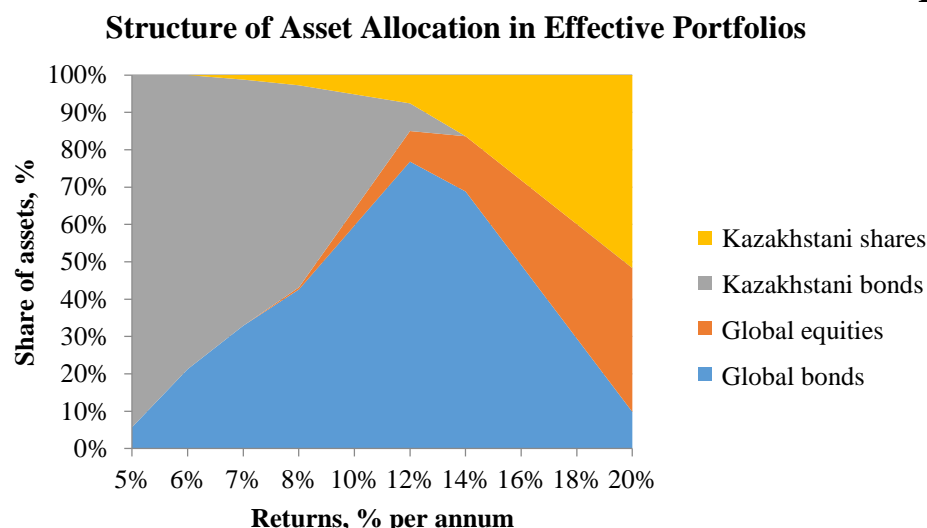
At the same time, full hedging of foreign exchange risks does not bring the same benefits for both foreign assets reviewed. The benefits of full hedging are apparently smaller for equities than for bonds, as indicated by the smaller decline in volatility of global equities after the hedge (Table 4). This is due to the fact that changes in the exchange rate drive a smaller part of fluctuations in the return on global equities in the tenge, as evidenced by a lower correlation between them than the correlation between the return on global bonds in the tenge and the tenge exchange rate. Thus, a significant part of the currency risk in equities is diversified by fluctuations in the dollar returns of the equities per se; therefore, the optimal share of hedging in equities should be below 100%.

Table 5

Profitability and Risk Ratios of Foreign Assets USD, KZT

	Global equities	**Global bonds**
Volatility in the tenge, unhedged	16.38%	13.18%
Volatility in the tenge with a 100% hedge	15.11%	6.96%
Correlation with the USD/KZT	0.48	0.91
Optimal hedge ratio	**61%**	**94%**
Volatility at optimal hedge	14.78%	7.07%

Source: the author's computations

The portion of foreign exchange risk covered by the hedge, which minimizes volatility of the total return, is approximated by the *Minimum Variance Hedge Ratio* that is defined as the angular coefficient of regression in the return on a foreign asset in the tenge with fluctuations in the USD/KZT exchange rate:

$$h = \rho\left(R_{KZT fully\ hedged}; \text{exchange rate movement}\right) \times \frac{\sigma(R_{KZT fully\ hedged})}{\sigma(\text{exchange rate movement})}$$

Calculations show that a hedge of about 60% would be optimal for global equities (which minimizes variance) (Table 5). In this case, the annual volatility of return on shares will decrease to almost the original volatility in the US dollars. The minimum variance hedge ratio for global bonds was 94%. However, the decrease in volatility with such percentage of hedging could not be proved on the historical series of returns.

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It is worth mentioning that an important assumption is made in this analysis: the forward market in the reviewed period had sufficient depth for hedging by Kazakhstani investors and the conducted hedging operations would not affect the amount of forward premiums. In real life, due to the limited capacity of the forward market, a Kazakhstani investor with a large allocation in foreign assets wishing to hedge all of its foreign exchange risk could face difficulties in finding the required volume of demand for forwards it sells. In addition, the sale of a large volume of forwards could lower the forward premium. As a result, the historical realized gain from the sale of forwards could be lower than presented in this analysis

Conclusion

The analysis of historical returns on Kazakhstani and foreign assets over 15 years presented in this paper has shown that adding foreign assets to a portfolio from Kazakhstani securities has a significant potential for improving the effective boundary of the investment portfolio due to a low correlation of foreign assets with Kazakhstani securities. Based on the historical values of the USD/KZT spot and forward rates, it was demonstrated that the systematic hedging of foreign exchange risk in the portfolio through the sale of monthly forward contracts was able to fully offset the lost profit from appreciation of the US Dollar in the tenge over the reviewed period; this, along with a significant reduction in volatility of foreign assets, shows the potential for improving the risk/reward ratio from the application of this strategy in a portfolio with foreign assets.

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Capital Flows and the Exchange Rate

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The paper assesses the impact of capital flows on the exchange rate broken down by categories. Capital flows are reviewed on a net basis and the impact of gross capital inflows from non-residents is assessed separately. To analyze the influence of capital flows, a SVAR model with constraints on the exogenous block was used.
Key Words: capital flows, gross inflow, real effective exchange rate (REER), SVAR.
JEL-Classification: F21, F31, F32.

Capital flows are an important aspect of the international financial system, providing countries with funding opportunities for priority projects, implementation of new technologies and management practice. This enables countries to increase their technological capacity, develop the financial sector, and promote trade openness. On the other hand, capital flows pose certain risks to the macroeconomic and financial stability – especially if they are short-term, large-scale and volatile. Risks can be more significant if countries have macroeconomic vulnerabilities or problems in the financial and institutional systems. Therefore, the key question for all economies is how to maximize the benefits of capital flows with minimal risks.

The attraction of foreign direct investors by Kazakhstan helped implement large projects for extraction and processing of mineral resources, with their exports formed the backbone of the country's revenues. However, while taking advantage of the benefits provided to the country by foreign finance, it is necessary to assess the risks. Thus, the most popular industry for investment is the development and production of mineral resources, which is the most vulnerable to fluctuations in prices for mineral resources. This, in an export-oriented economy, complicates the implementation of countercyclical macroeconomic policy, including the monetary policy. The purpose of this study is to assess the impact of capital flows on the exchange rate of the tenge. The analysis performed will enable to better understand the dynamics of the exchange rate of the tenge and its relationship with capital flows in the context of the resource-oriented economy.

Many works are devoted to the study of how capital flows influence the country's economy and the current macroeconomic policy. The combination of relationships and approaches considered varies depending on the structure of a country's economy. Research covers various approaches to measuring capital flows, such as gross or net flows, breakdown by types of investments as well as by instruments.

Most studies looking at capital flows use the concept of "gross flow". The focus on gross flows is justified by the fact that capital inflows and outflows can behave differently in different external and internal macroeconomic conditions and carry an important information component separately.

Gross inflows and outflows include one-way capital flows without deducting (netting) the flow in the opposite direction. However, the balance of payments statistics lack a set of flow data that is truly absolutely gross. Therefore, in studies, gross flows mean net acquisition of assets and the net incurred liabilities, which can be obtained from the data on the balance of payments. The "net" concept is used because liabilities are recorded net of their repayment, and assets – net of their return. Thus, positive values under the "Net incurred liabilities" item in the balance of payments imply the assumption of liabilities by residents (inflow), while negative values (outflow) imply their repayment. Positive values in the category "Net acquisition of assets" in the balance of payments mean the acquisition of assets by residents (outflow), while negative

values (inflow) mean their reduction (sale or disposal, closing of accounts, etc.). This is the main working definition of gross capital inflows used in this study.

Capital flows according to the balance of payments statistics include three main types: foreign direct investments (FDIs), portfolio investment and other investments. Each of these categories can be divided into components based on residence (assets and liabilities), types of investment instruments (equity and debt instruments). Additionally, the main categories of flows can be subdivided into economic sectors: banks, corporations, government and central bank. The data structure of the financial account in the balance of payments (BOP) is presented in table 1.

Table 1

Capital Flows Based on the Balance of Payments Statistics

	Capital Flows		
1. By types of investment	Direct investments	Portfolio investments	Other investments
2. By residence	Net acquisition of assets by residents (outflow)		
	Net liabilities incurred by residents		
3. By instruments	1. Equity participation 2. Debt instruments	1. Equity participation 2. Debt instruments	1. Cash and deposits 2. Credits and loans 3. Trade credits and advances 4. Others
4. By sectors		1. Government and central bank 2. Banks 3. Other sectors	

Literature Review

Capital flows between a country and the rest of the world depend on many factors. The literature distinguishes between incentive factors that drive global capital flows (e.g. economic activity, interest rates in the world's largest countries or international financial centers) and factors specific to the recipient country (e.g. the domestic economic growth, interest rates, institutional factors, etc.).

For example, the inflow of capital to Latin American countries in the second half of the 1980s can be partially explained by external factors primarily related to the recession in the US economy and low interest rates [1]. At the same time, in the ten new EU member states, capital inflows in the 1990s – early 2000s depended not only on external (business cycle, interest rates in the euro area, risk sentiment), but also on internal factors (the GDP growth, interest rate, real estate prices, and stock market index) [2].

When it comes to the impact of capital inflows into a country, one of the main negative consequences is the loss of competitiveness caused by appreciation of the real exchange rate. This occurs either as a result of nominal appreciation of the exchange rate under the floating exchange rate regime, or due to the price increases under the fixed exchange rate regime, or as a result of a combination of these two factors in intermediate regimes [1, 3]. The distinction between capital flows is the basis for understanding why different types of capital flows can influence the exchange rate. Empirical studies have shown that the magnitude of exchange rate changes does indeed depend on the capital structure, with the stronger effect on the exchange rate appreciation usually associated more with the inflow of debt investments than with equity investments [4].

Looking at empirical assessments studying the relationship between capital flows and exchange rates across countries, Brooks et al. (2001) used two-dimensional equations to examine the impact of portfolio and direct investments on the nominal euro and yen/US dollar exchange

rates. The authors confirmed that portfolio investments lead to the strengthening of the euro against the US dollar. At the same time, according to the study, capital flows were not a significant factor for the dynamics of the yen exchange rate [4].

Following their approach, Yesin (2016) concluded that none of the types of capital inflows to Switzerland had a statistically significant effect on appreciation of the real effective exchange rate of the Swiss franc between 2000 and 2015, although some types of capital flows had a minor effect in the short run [5].

The sensitivity of the exchange rate to various types of capital inflows was identified in the work of Bukovšak et al. (2017) based on the study of data from Croatia [6]. The authors, using the SVAR model, showed that the inflow of investments through debt instruments leads to appreciation of the national currency, regardless of their maturity, whereas investments in equity instruments, on the contrary, result in depreciation. The document also proves that capital flows to the banking sector do not affect the exchange rate, providing support for the use of countercyclical macroprudential measures by the central bank. These findings are relevant to the design of monetary policy, especially in countries such as Croatia, where the central bank uses the exchange rate of the Kuna against the euro as the key instrument to achieve its primary goal of price stability.

Several studies have examined the impact of capital flows on the real effective exchange rate for a group of countries. Athukorala and Rajapatirana (2003) compared the role of capital flows in Asian and Latin American countries and showed that inflows of FDIs tend to depreciate the exchange rate (to a lesser extent in Latin America), while exchange rate appreciation is mainly associated with other capital flows (mostly in Latin America) [7]. A study of capital flows from a sample of 57 developing countries showed that portfolio investments, foreign borrowing, assistance, and return on foreign assets led to appreciation of the real effective exchange rate, while the impact of workers' remittances varied across different groups of countries (in Central and Eastern Europe, they are even associated with depreciation of the exchange rate) [8]. On the other hand, in other works, the inflow of FDIs does not significantly affect the exchange rate. Combes et al (2011), using a panel co-integration method, showed that capital inflows to the private and public sectors were related to appreciation of the exchange rate, with the strongest effect associated with portfolio investments and the smallest – with direct investments, bank loans and transfers to the private sector [9].

Capital Flows in Kazakhstan and the Exchange Rate Dynamics

As part of the purpose of this study, the impact of net capital flows by type of investments, as well as gross capital inflows into the country from non-residents were assessed. A separate consideration of gross capital inflows from non-residents is interesting in that it is possible to determine whether a given capital inflow in isolation is a significant factor in the formation of the exchange rate. This approach is explained by the specific feature of the domestic foreign exchange market characterized by an excess of demand for foreign currency over its supply.

Foreign exchange inflows to Kazakhstan are mainly secured by exporters in the extractive industries and are built from tax payments to the national budget and other payments made as part of the operating activities. At the same time, part of the foreign exchange proceeds remain with foreign accounts and do not enter the foreign exchange market, thus creating a foreign exchange shortage in the domestic market.

Another source of foreign exchange supply is transfers from the National Fund to the national budget. These flows depend on the needs to finance the expenditure side of the budget; therefore, their flow to the domestic foreign exchange market remains uneven.
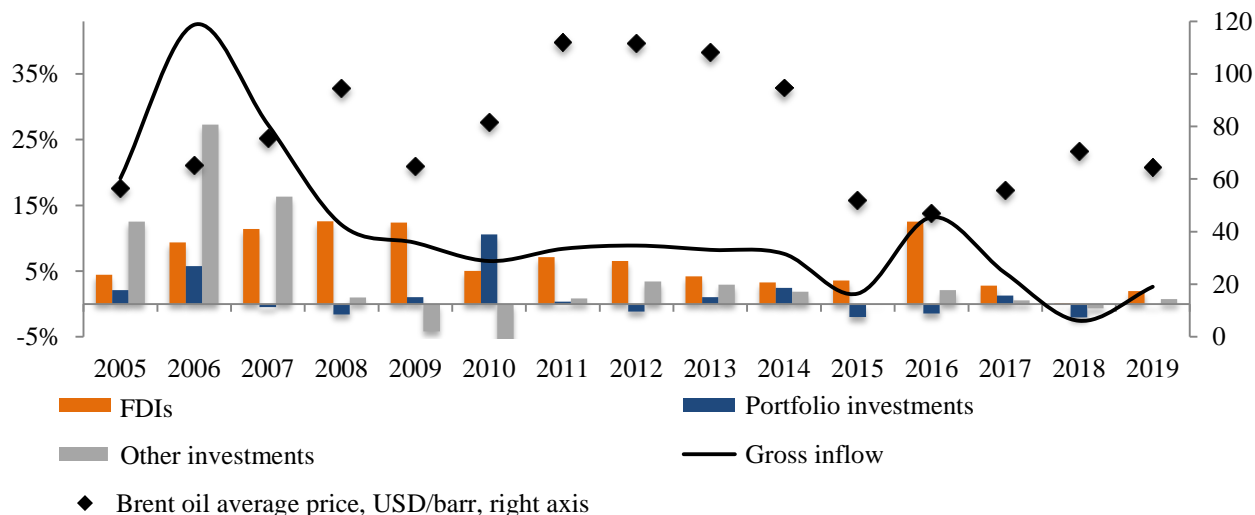
Capital Flows

A high level of world prices for energy resources and the dynamics of foreign borrowings of the banking sector became the determining factors for the balance of payments of Kazakhstan

in the pre-crisis period of 2008-2009. Favorable conditions led to a significant inflow of FDIs to Kazakhstan owing to the implementation of projects with participation of foreign companies in the areas of oil and gas production, transportation and exploration (Figure 1).

Gross Capital Inflow from Non-Residents, Broken Down by Types of Investments, as % of GDP

Legend:
- FDIs
- Portfolio investments
- Other investments
- Gross inflow
- Brent oil average price, USD/barr, right axis

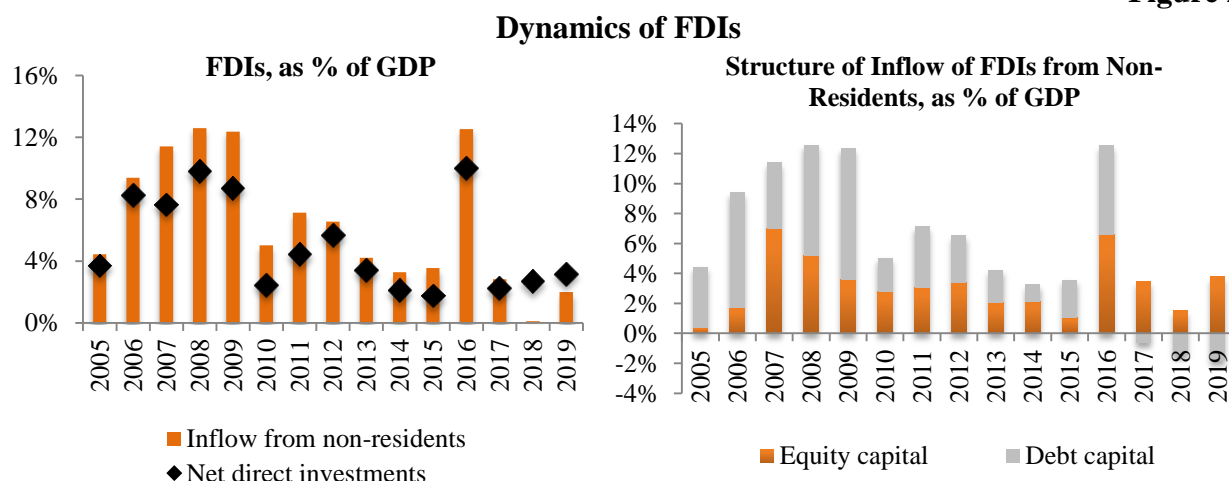*Source: National Bank of Kazakhstan*

The inflow of foreign capital into the country was also ensured by expanding the participation of non-residents in the domestic government securities market. In terms of portfolio investments, the inflow was observed as a result of investments by non-residents into the shares of Kazakhstani banks and enterprises. A massive inflow of other investments in 2006 was due to medium- and long-term borrowing by banks.

The inflow of external resources into the country during this period significantly exceeded the needs for financing of current payments and was not offset by the growth in foreign assets of the private sector. As a result of excessive supply of foreign currency, there was a significant upward pressure on the exchange rate of the tenge.

FDIs, which are mainly concentrated in the oil-extracting and related industries, account for the major portion in the inflow of investments from non-residents to Kazakhstan. Debt instruments prevailed in their structure, rather than equity capital (Figure 2). Debt instruments consist mainly of intercompany debt, i.e. financing of Kazakhstani enterprises by affiliated foreign companies. There are some statistical features of FDI accounting that can bias the objective assessment of the volume of foreign investments by non-residents. First is according to the balance of payments statistics, when the reinvested return is included in the structure of equity capital. These returns characterize the share of foreign shareholders in the income of enterprises in Kazakhstan, rather than the actual inflow of funds into the country. Second, the inflow of capital from some domestic companies registered in the EU countries (mainly in the Netherlands) is accounted for as an inflow of funds from abroad [10].

The inflow of FDIs from non-residents in 2002-2007 accounted for 9% of GDP on average, and in the post-crisis period after 2010 – 5%. Since 2009, FDI inflows have been declining, with the exception of 2016. During this period, the inflow of direct investments was secured by inter-company borrowing, of which about 60% were borrowed in the international financial markets through foreign special purpose subsidiaries.

Figure 2

Dynamics of FDIs

FDIs, as % of GDP

Structure of Inflow of FDIs from Non-Residents, as % of GDP

- Inflow from non-residents
- ◆ Net direct investments

- Equity capital
- Debt capital

Source: National Bank of Kazakhstan

The volume of portfolio investment inflow from non-residents is relatively low in relation to GDP, which is associated with an undeveloped stock market and a small amount of debt securities issuance. The predominance of funds invested abroad over the inflow of capital from non-residents is associated with investments of government-owned funds (National Fund, UAPF) [10].

A significant inflow of portfolio investments in 2010 occurred as a result of operations to replace the issuer of Eurobonds of its special purpose subsidiaries that were carried out in order to obtain tax savings in accordance with the existing legislation, as well as new issues of Eurobonds of Kazakhstani enterprises and banks (Figure 3). The negative value on portfolio investments in 2018 was due to the redemption by the "KazMunayGas Exploration Production" JSC of its shares and global depositary receipts and the redemption of Eurobonds previously issued by Kazakhstani enterprises and banks [11].

Figure 3

Portfolio Investments, as % of GDP

- Inflow from non-residents
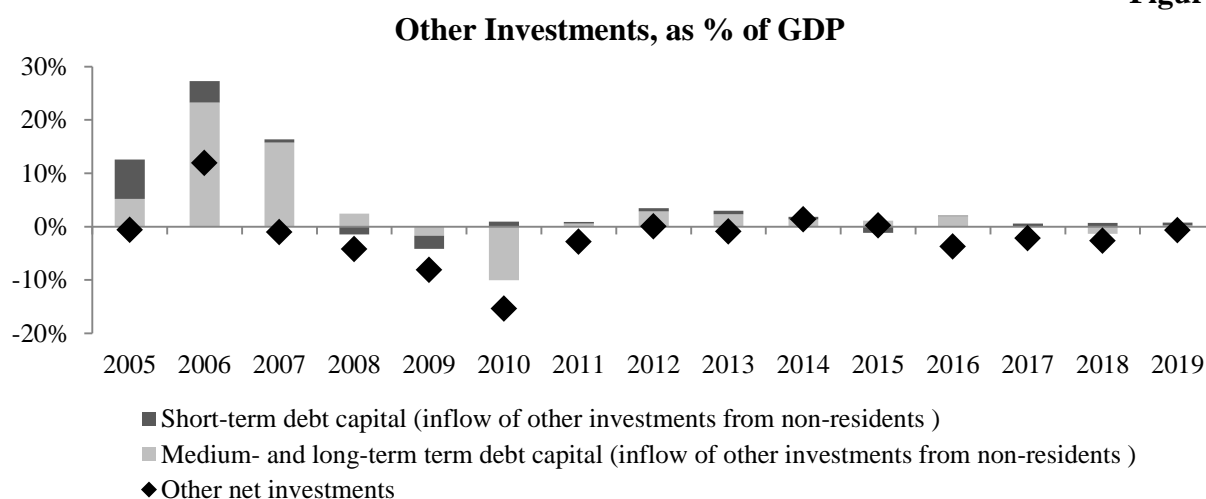- ◆ Net portfolio investments
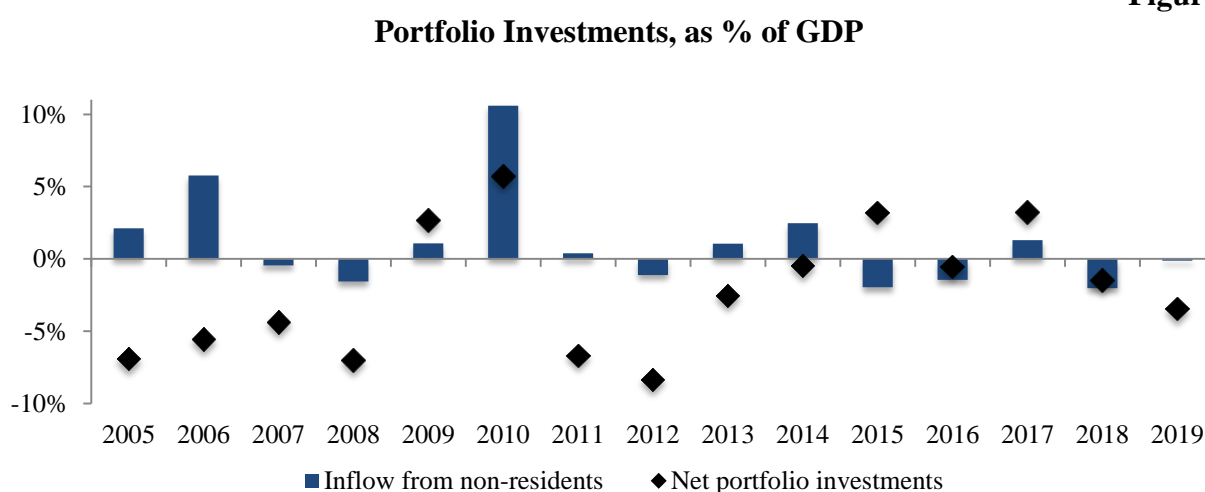
Source: National Bank of Kazakhstan

For other investments, with the exception of the period of increased borrowing from the banking sector, the inflow from non-residents is small, and since 2009, it has been near zero on average. Historically, medium- and long-term borrowings dominate in the structure of borrowings. (Figure 4). Negative values on other investments in 2010 are associated with operations of banks to reduce long-term and short-term foreign liabilities, mainly by partial

cancellation of external debt of Kazakhstani banks, as well as the assumption of liabilities of special purpose vehicles of Kazakhstani banks by parent banks.

Figure 4

Other Investments, as % of GDP

■ Short-term debt capital (inflow of other investments from non-residents)
■ Medium- and long-term term debt capital (inflow of other investments from non-residents)
◆ Other net investments

Source: National Bank of Kazakhstan

Exchange Rate

The adherence to a fixed exchange rate regime in the face of deteriorating terms of trade has had a negative impact on the economy for many years. Fixation of the exchange rate was conductive to consumption of international reserves, and the tenge was overvalued. To maintain the exchange rate, the National Bank was actively conducting interventions, mainly selling foreign exchange. As a result, the real exchange rate of the tenge against the US dollar appreciated (Figure 5).

In these conditions, the National Bank made a decision to move away from the fixed exchange rate regime and to go over to the inflation targeting regime. From August 2015 to January 2016, there was a significant nominal depreciation of the national currency – the Kazakh tenge depreciated by more than 50% against the US dollar.

Figure 5

Dynamics of Actual and Equilibrium REER

——— REER   – – – Equilibrium
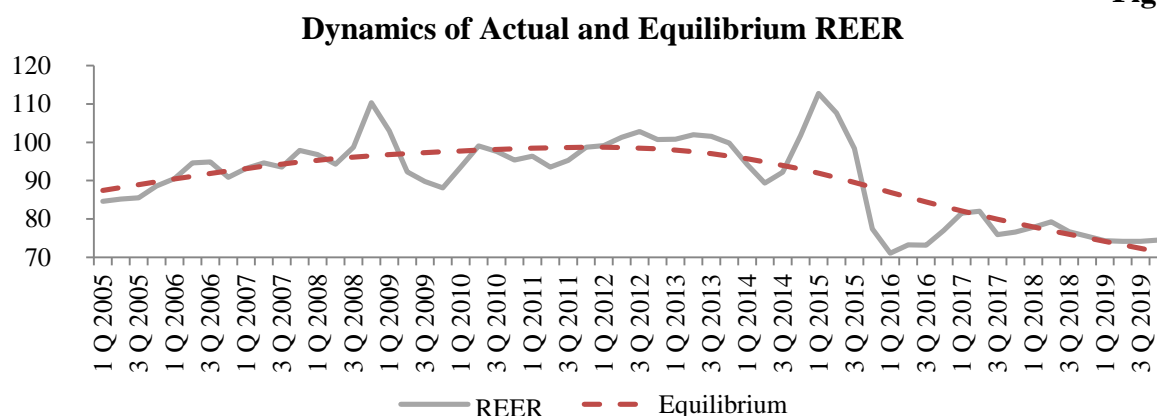
Source: National Bank of Kazakhstan

The periods of extreme REER numbers were characterized by accumulated imbalances in the economy. In 2008, imbalances in foreign trade increased as a result of depreciation of currencies in a number of countries – the main trading partners. In 2015, the REER was in a appreciation zone due to significant depreciation of the ruble amid falling oil prices, as well as the relative depreciation of the euro as a result of quantitative easing measures.

Given that Kazakhstan had been adhering to the fixed exchange rate regime for most of the reviewed period, the REER will be used to identify the impact of capital flows on the exchange rate. This is due to the fact that the fixed exchange rate does not in any way reflect the dynamics of the external investment process and foreign trade. In case of favorable export conditions, net inflow of investments and foreign exchange proceeds will create pressure on the real exchange rate towards appreciation of the national currency. REER is a more accurate indicator in determining the relationship between capital flows and the exchange rate of the national currency.

Research Methodology

The effect of different types of capital flows on REER in Kazakhstan was assessed using the SVAR model with exogenous block constraints. Limitation of the impact of exogenous variables is applicable for small open economies when it is necessary to assess the effect of an exogenous block on internal variables without the opposite effect.

In this study, Brent oil price is considered as an exogenous variable. Endogenous variables include capital inflow, real GDP and REER.

The data used covers the period from the first quarter of 2006 to the fourth quarter of 2019 and is reviewed on a quarterly basis. The sources of capital flow data are the balance of payments statistics of the National Bank of the Republic of Kazakhstan, the REER data – the statistics of the National Bank of the Republic of Kazakhstan, real GDP – the data from the Committee on Statistics of the Republic of Kazakhstan, and Brent data – Thomson Reuters. Indicators are seasonally adjusted and converted to statistical series (Table 2).

Table 2

Results of the ADF Unit Root Test

	Variables	I(0)	I(1)
		P-value	P-value
	REER	0.4457	0
	Real GDP	0.0989	0
	Brent	0.084	0
	Capital inflow from non-residents		
overall	Total inflow	0.018	0
	FDIs	0	0
	Portfolio investments	0	0
	Other investments	0.257	0
by asset classes	Equity capital	0.0028	0
	Debt capital	0.0049	0
by sectors	Government and the NBK	0.0068	0
	Banks	0.0258	0
	Other sectors	0.0002	0

The used variables are converted to natural logarithms, excluding capital flows (due to negative values) and real GDP (normal distribution[2]).

When constructing a SVAR model, the sequence of variables included in the model matters. The oil price as a proxy of external conditions that determines capital flows to the country is the first variable in the model and assumes a simultaneous effect on internal variables with a certain lag. The second variable in terms of priority – capital flows – implies an immediate response to external conditions. To assess an individual effect of different types of capital flows, they will be replaced by the corresponding categories.

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[2] Logarithmic transformation is carried out to bring the data distribution closer to the normal distribution

Real GDP as a third variable reflects its exposure to changes in previous variables such as oil price and capital flows. The last and the most endogenous variable – REER – implies a response to the previous variables included in the model with a certain lag. The use of REER allows taking into account the impact of capital flows also on prices in the country without the need to account for inflation separately.

Therefore, the reviewed model has the following matrix structure illustrated by [6].

$$A_0 y_t = \begin{bmatrix} 1 & 0 & 0 & 0 \\ a21 & 1 & 0 & 0 \\ a31 & a32 & 1 & 0 \\ a41 & a42 & a43 & 1 \end{bmatrix} \begin{bmatrix} Brent \\ Cap\_in \\ r\_GDP \\ REER \end{bmatrix}$$

In order to take into account the periods of accumulation of imbalances and the corresponding extreme values of REER as well as the transition to a freely floating exchange rate, a dummy variable was included.

Taking into account a relatively short time series, the number of lags in the model was selected without information criteria and is equal to 2 quarters. Since the choice of the optimal lag based on information criteria is aimed at avoiding autocorrelation of residuals, each model after construction was checked for the absence of autocorrelation of residuals through the LM test.

Results of Impulse Responses

Examining the impulse responses to a one-time positive shock of one standard deviation from capital flows demonstrates the sensitivity of REER to portfolio investments on a net basis. Based on the results of assessment of the constructed model, other types of capital flows on a net basis and gross inflow of capital broken down by types of investments (FDIs, portfolio investments and others) showed no statistically significant result (Figure 6).

The economic interpretation of the sensitivity of REER to portfolio investments on a net basis in the absence of a statistically significant response from the gross inflow on portfolio investments of non-residents consists in the predominance of capital outflow from portfolio investments in recent years and, therefore, the significance of the capital outflow factor for the dynamics of the exchange rate, in contrast to its inflow.

Figure 6

REER's Impulse Responses to Various Categories of Capital Flows

Net	Gross inflow
FDIs	

Portfolio investments	

Other investments	
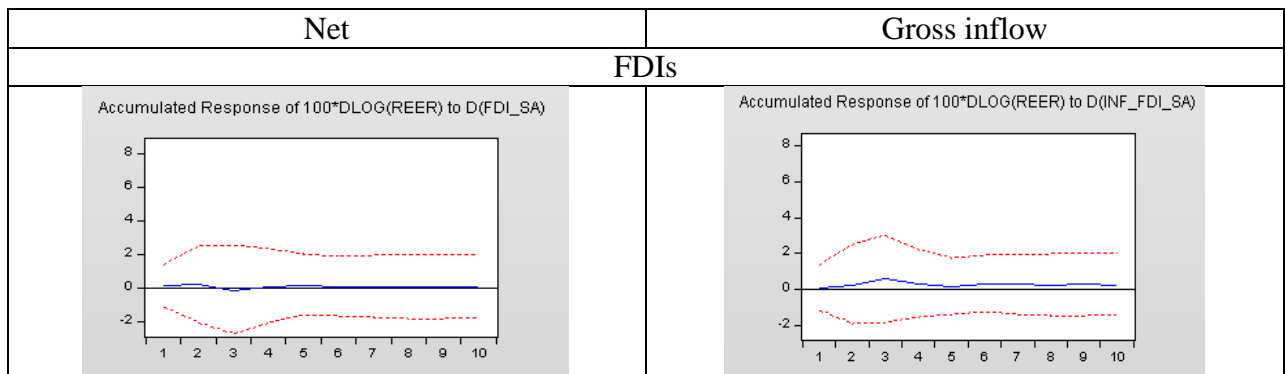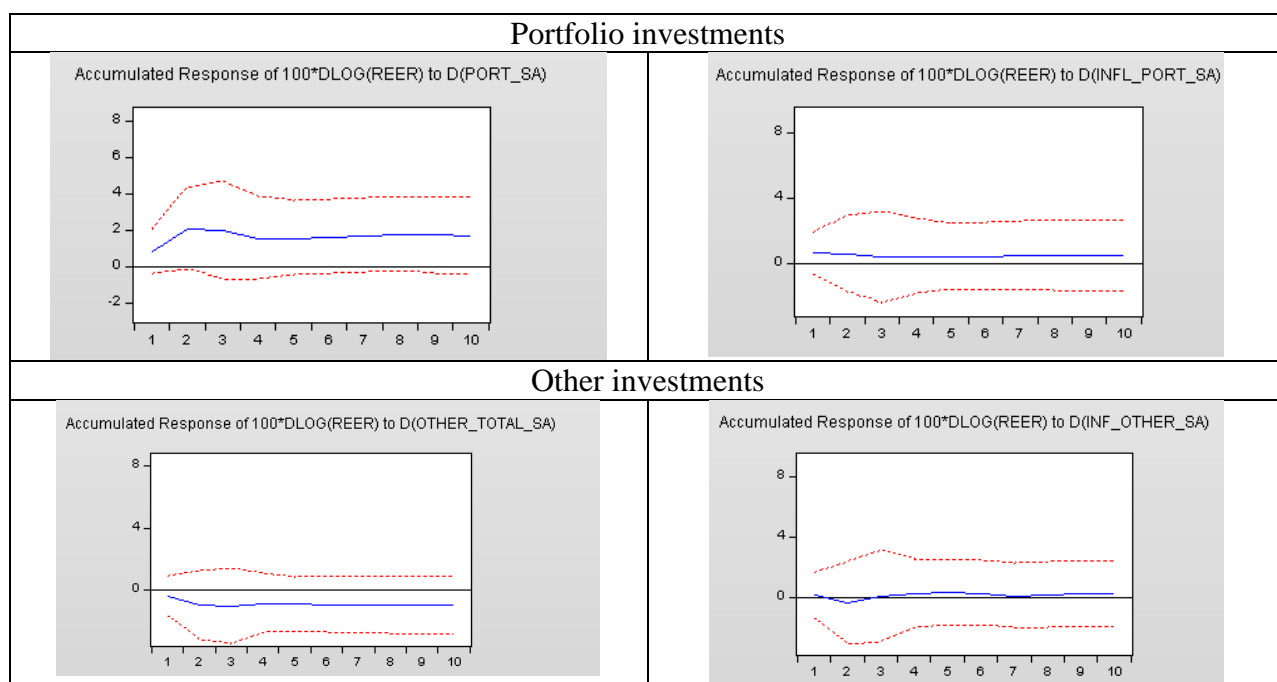
Source: computed on the basis of Eviews package

The statistical adequacy of the constructed model and its applicability for analysis is confirmed by the following criteria.

1. Lack of autocorrelation of residuals based on the LM statistics test. The p-values of the test statistics are above the critical 5% level. This allows us not to reject the null hypothesis of the absence of serial autocorrelation.

Table 3

Results of the LM-Statistics Test

	Net	**Gross inflow**
1. FDIs		
Lag	Prob.	Prob.
1	0.0656	0.1597
2	0.0748	0.1291
3	0.8844	0.9791
2. Portfolio investments		
Lag	Prob.	Prob.
1	0.3162	0.1251
2	0.1025	0.0607
3	0.9715	0.9033
3. Other investments		
Lag	Prob.	Prob.
1	0.0051	0.4399
2	0.0604	0.3618
3	0.7955	0.8397

2. The absence of heteroscedasticity in the residuals, i.e. the variance of residuals of the model is constant over time. The p-value of the test statistics is significantly higher than the critical 5% significance level, which suggests the homoscedasticity of the model residuals.

Table 4

Results of the White Test for Heteroscedasticity

		Net	Gross inflow
		Net	**Gross inflow**
1. FDIs			
	Prob.		Prob.
Chi-sq		169.40	171.92
df		170.00	170.00
Prob.		**0.50**	**0.44**
2. Portfolio investments			
	Prob.		Prob.
Chi-sq		165.05	185.77
df		170.00	170.00
Prob.		**0.59**	**0.19**
3. Other investments			
Lag	Prob.		Prob.
Chi-sq		156.52	178.77
df		170.00	170.00
Prob.		**0.76**	**0.31**

The variance decomposition demonstrates the proportion of the contribution of variances of different variables to explaining the variance of an observed variable. In other words, it shows how much of the future uncertainty of the dependent variable is due to the future shock in the explanatory variables. According to the results obtained, the positive shock of the inflow of portfolio investments on a net basis explains about 8% of the REER variance.

Table 5

REER Variance Decomposition on a Positive Shock from Portfolio Investments on a Net Basis

Periods in Quarters	Cholesky Decomposition of Variance, as %
2	7.88
4	7.20
8	7.07
10	7.07

Findings

According to the results of the study, it was found out that the gross capital inflow from non-residents by type of investments was not a significant factor in the formation of REER. At the same time, the empirical analysis based on the constructed model shows that a one-time shock from the inflow of portfolio investments on a net basis during 2006-2019 demonstrates a statistically significant response from the REER. The proof of exchange rate sensitivity to portfolio investments is consistent with the majority of studies in other countries. The lack of a statistically significant response in reaction to a positive shock from the gross capital inflow from non-residents on portfolio investments is most likely driven by its relatively low volumes (for example, the share of non-residents in the National Bank's notes is no more than 10% of the total volume of notes). The results obtained are a starting point for further research in this area; specifically, consideration of the relationship between the exchange rate and capital flows by instrument and by sector of the economy serves as potential directions in future research.

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Accounting for Cryptocurrencies under IFRS

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Development of distributed ledger technology, i.e. blockchain has led to the rapid development of cryptocurrencies. In just one decade, more than two and a half thousand types of new "digital assets" have appeared in the cryptocurrency market, where the most popular are Bitcoin and Ethereum. At the same time, investments in the new digital technology market reach colossal volumes.

With the emergence and development of new types of "digital assets", questions arise regarding the regulation of the cryptocurrency market, including accounting for cryptocurrencies. The IFRS Interpretations Committee has issued a guidance on accounting for cryptocurrencies, whereunder cryptocurrencies can be accounted for as inventories or intangible assets depending on the purpose of ownership.

This paper discusses the features of cryptocurrencies, aspects of their regulation and accounting in accordance with the requirements of international financial reporting standards.

Key Words: cryptocurrency, blockchain, Bitcoin, accounting for cryptocurrencies, IFRS.
JEL-Classification: M41.

Preamble

Since the first transaction using a digital electronic currency based on blockchain technology - Bitcoin (January 12, 2009), the world of cryptocurrencies has undergone significant changes. So, at the moment, the number of coins quoted on *coinmarketcap.com* has exceeded 2,700 items, and capitalization of the cryptocurrency market during peak periods exceeded $ 814 billion, which is lower than GDP volume of only 17 countries of the world. [1].

An explosive growth of the cryptocurrency market, with a peak price of $20,000 per bitcoin, has fueled interest on the part of traditional investors operating in the stock markets. Many venture capital funds, such as Founders Fund [2], began to invest significant amounts in cryptocurrencies, and trading in cryptocurrency derivatives began on some OTC platforms [3].

At the same time, despite the obvious interest in the cryptocurrency market among large investors, until recently, there were no generally accepted accounting principles for cryptocurrency assets. The first recommendations on accounting and reporting on cryptocurrency assets in accordance with the existing IFRS standards were given by the IFRS Interpretations Committee in June 2019, four years after the International Standards Board put on the agenda the topic of digital currencies accounting. The GAAP Financial Accounting Standards Board has carried out similar work to elaborate recommendations or develop accounting standards for cryptocurrencies, however, no official clarification on this issue has yet been received, with the exception of certain local practical recommendations from the Japanese Accounting Standards Board for GAAP Japan [4].

The accounting recommendations put a spin in the evolution of the crypto assets market, contributing to the extension of the list of potential participants in the cryptocurrency market, who now have guidance on how to record and report information about such assets in financial statements.

This paper is intended to disclose the accounting treatment of cryptocurrencies in the context of applicable international financial reporting standards.

Bitcoin and Blockchain. Operation Principles

Bitcoin is a peer-to-peer network based on the equality of participants, where all network nodes (peers) "communicate" with each other without a central element (server). More precisely,

the role of a server is played by numerous "nodes" from among the "peers" that help in maintaining the network.

The network allows participants to exchange transactions using the unit of accounting of the same name – bitcoin, and in essence is a decentralized payment system, guaranteeing its participants their anonymity as well as complete security and transparency of transactions for each anonymous participant.

Information about all transactions is a digital file similar to a register, multiplied and distributed among network participants – "nodes". All information in the file is structured in a sequence (chain) of blocks using cryptographic elements.

An instruction of one network participant to transfer bitcoins to another participant (peer) is a transaction [5].

Any member of the network ("peer") can initiate a transaction. This requires a pair of keys – "open" and "private", obtained on the basis of the ECDSA algorithm [6]. The first of them is publicly available and, in the converted form, serves as the address of the network participant (peer) and is required to confirm the authenticity of the digital signature. The second ("privacy" key) is private, i.e. is not subject to disclosure, and is used to create a digital signature.

To make a transaction, the initiator must have a certain amount of bitcoins. The availability of bitcoins at the initiator is confirmed based on previous transactions in which bitcoins were transferred to the initiator, and it is ascertained that they have not yet been spent in other transactions (UTXO – unspent transaction outputs). In other words, no records of account balances are kept in the system at all, and only transaction chains enable to identify what current amount of bitcoins the initiator has.

For the sake of clarity, let us consider the example.

Participant 1 decided to tra nsfer 10 bitcoins to Participant 2. Based on the chains of transactions, it was established that Participant 1 owns 35 bitcoins obtained earlier as a result of two transactions (17 bitcoins from Participant A and 18 bitcoins from Participant B). The UTXO transaction data are the "inputs" for the current transaction. The sum of 10 bitcoins to Participant 2 is its "output".

Since the system protocol sets a requirement that the amount at each of the "inputs" must be fully used in the transaction (i.e. the amount at the "inputs" and "outputs" of the transaction should differ only by the amount of the commission), the remaining coins in the amount of 24.5 bitcoins (including the commission of 0.5 bitcoin), due to the absence of other participants in the transaction, must be transferred back to Participant 1. Therefore, the sum of 24.5 bitcoins is also denoted as the "output" of the transaction.

The transaction itself consists of three blocks: the main one, the "entry" block and the "exit" block.

The main block includes the following parameters: hash - the "hash" of the entire transaction (in future, those following this transaction will be making reference to it), ver – the version of the transaction, vin_sz – the number of previous transactions (in our example, 2 transactions), vout_sz – the number of addresses where transactions are sent (also 2 in our example), lock_time – to create pending transactions, and size – the size of the transaction.

The "entry" block includes the following parameters: in – a list of incoming transactions (17 bitcoins from Participant A and 18 bitcoins from Participant B), hash – hash of previous transactions in the block in, n – indicates the number of the incoming transaction, scriptSig – confirmation of the right to dispose of coins (the recipient's public key for the previous transaction is indicated, i.e. the initiator of the current transaction and then his digital signature is affixed).

The "exit" block contains information on the following parameters: out – a list of outgoing transactions (10 bitcoins for Participant 2 and 24.5 bitcoins for Participant 1 as change), value – the number of coins that are transferred in the described "outputs", scriptPubKey – contains the "hash" of the address ("public" key) of the recipients of the coins [7].

A cryptographic "hash" (in Bitcoin and many other cryptocurrencies, this is the SHA256 function) in this example is an algorithm that converts input information into a sequence of specific lengths consisting of letters and numbers. In this case, if you make even the slightest change in the original (converted) text, the conversion result (a "hash" of the original text) will be completely different. Thus, the use of "hash" functions in transactions is dictated by the need to protect transaction parameters from editing [8].

Then the entire available transaction is sent to the network by a broadcast request via open channels without encryption. Network nodes verify the transaction, apply it to their copy of the registry (strictly speaking, the "nodes" tend to add a transaction to the emerging block), then retranslate this transaction to other nodes.

Verification by "nodes" is performed by comparing "hashes" of the previous transaction with their specified values in the current one and checking that Participant 1 really is the owner of the domain with the public key to which the money was sent. It is to confirm this that Participant 1 shows his "public" key in the transaction and puts a digital signature using a "privacy" (personal) key. "Nodes" confirm the right of ownership and disposal of the available coins by the initiator of the transaction by comparing the "public" key and the digital signature put by the initiator even without knowing the "private" (personal) key of the initiator of the transaction. It is important to note that since the signature is message-dependent, it will be different for each transaction and therefore cannot be reused by anyone for another transaction. This dependency on the message also means that no one can change the message as it travels across the network, as any changes to the message invalidate the signature.

After successfully passing the validation process, the "nodes" include this transaction in the forming block along with other transactions and report it to other "nodes". Since messages about transactions in the system are transmitted and received by "nodes" in a chaotic manner, because of the time difference, there is no guarantee that transactions in blocks will be located in the same order in which they were initiated. Moreover, since each "node" forms its own version of the future block, even the composition of transactions in blocks of different "nodes" may differ.

In this regard, a problem arises as to which block should be accepted by all "nodes" as valid in order to continue the chain of blocks. Consensus on this problem is achieved through the concept of "proof of work". The so-called "chain" of blocks emerges due to the insertion of the "hash" of the previous block in each subsequent block, due to which the chain cannot be forged by replacing one of the blocks in it. Since, based on the properties of the "hash" function, if one of the blocks is replaced, the "hash" of all subsequent blocks will change. In addition, the generated block must also contain its own "hash", and to ensure that the block is considered generated, that is, is accepted by all "nodes" to continue the chain, this "hash" must be below a certain target value set by the system ("Bits" parameter in a block). However, hashing data in a block will only result in one unique "hash", whose value depends only on the content of the block. Therefore, in order for the "hash" of the block to reach the same target value, the generated block also contains a "nonce" element – a certain number, which, when added to the content of the block, generates a "hash" below the target. This is achieved only by enumerating the options for that very number ("nonce" values). The probability of finding this number by one "node" is extremely small and requires a significant expenditure of computer resources. Nevertheless, someone on the network still manages to do this on average once every 10 minutes, i.e. a new block is generated every 10 minutes. It is this work of sorting through the "nonce" options and successfully finding the required value of the "hash" of the block that is "mining". For each successfully generated block of this kind, the "node" receives a reward from the network, and also receives a commission from the "peers" for each transaction (by the way, there may be no commission if the initiator of the transaction does not set it) in the block.

Economic Substance of Cryptocurrencies, Their Role and Essence

The choice of the applicable IFRS standard for accounting for cryptocurrencies is dictated by their economic essence and nature. It is what cryptocurrencies are in essence (money, financial instruments or other assets) that their accounting and presentation in financial statements depends on.

As described above, cryptocurrencies are used to make payments and transfers by participants in a decentralized system as a medium of exchange, thereby performing one of the functions of money.

Economists define money as the generally accepted means of payment, taken without restrictions in exchange for goods and services and in repayment of debt obligations. Regardless of its form, money must fulfill three functions: a means of exchange, a unit of account, and a store of value.

As part of the first function, cryptocurrencies are also used to pay for goods and services and, along with fiduciary paper ("fiat") money, are not secured with anything. However, the latter (including electronic money), due to the presence of historical experience of use and legislative status, are more common.

To determine the extent to which cryptocurrencies are involved in the economy as a means of exchange, the number of confirmed transactions per day can be used. Thus, the number of confirmed transactions using bitcoins for July 18, 2020 (during the day) amounted to 311 thousand transactions [9], and with the use of Ethereum on the same date – 1 million 72 thousand transactions [10].

Even if we do not take into account the fact that not all transactions cryptocurrencies are used to pay for goods and services (some of them are simply purchases of cryptocurrency for fiat currency for investment purposes, therefore, in these transactions, the cryptocurrency does not act as a medium of exchange), the number of transactions there are few cryptocurrencies. For comparison, the average number of transactions per day around the world in the VISA payment system in 2019 was about 379 million transactions [11].

This relatively low importance of cryptocurrencies for the economy as a means of exchange is largely due to a number of inherent disadvantages.

1. Irrevocable Nature of Transactions. Blockchain technology and system protocol do not allow a standard transaction to be canceled. Indication of an incorrect "public" key of the beneficiary will lead to an irrecoverable loss of the cryptocurrency.

2. Low transaction speed. In Bitcoin, for example, every new block is generated within 10 minutes. In turn, each block contains about 3.5 thousand transactions [12]. This adds up to a transaction confirmation rate of 5.83 transactions per second. In Ethereum, each new block is generated much more often (once every 13 seconds), and the number of transactions in a block depends on the limit and reaches a maximum of 476 transactions in a block [13], which ultimately gives a speed of 36 transactions per second. For comparison, Visa's throughput is 24 thousand operations per second.

3. Uncertainty of legislation. The regulation of the cryptocurrency market differs depending on the jurisdiction. So, according to the report of the Center for Global Legal Research at the US Law Library of Congress [14], the definition of the very concept of cryptocurrency has different interpretations depending on the country: digital currency – in Argentina, Thailand and Australia, virtual goods – in Canada, China and Taiwan, crypto-token – in Germany, payment token – in Switzerland, cyber currency – in Italy, e-currency – in Colombia and Lebanon, virtual asset – in Honduras and Mexico. Consequently, the approaches of jurisdictions to taxation of transactions on investment and use of cryptocurrencies also differ. For example, in Israel, cryptocurrency is taxed as an asset, in Bulgaria – as a financial asset, and in Switzerland – as a foreign currency. Denmark, Argentina and Spain treat cryptocurrencies as subject to income tax, but in Denmark, losses on cryptocurrencies are deducted from the tax base. In the UK, corporations pay corporate tax, businesses from the non-corporate sector pay income tax, and individuals pay capital gains tax. Thus, the lack of a unified legal framework

and common legislative regulation of the cryptocurrency market imposes restrictions on potential investors and stakeholders to the wide use of cryptocurrencies in their normal course of business.

Nevertheless, the use of various kinds of smart contracts, multi-signatures, Segregated Witness technology, Lightning Network and Atomic swap system channels as well as other best practices implemented in other cryptocurrencies and "hard forks" of Blockchain and Ethereum, in theory, will enable to overcome the limitations indicated in paragraphs 1 and 2.

In these conditions, the greatest constraining factor in the development of cryptocurrencies can be their status and the degree of regulatedness by the law.

The authors hope that the work on creating a unified legal framework for regulation of the cryptocurrency market will be initiated as the crypto-asset market develops and becomes standardized.

As for regulation of the cryptocurrency market in Kazakhstan, in July 2020, the corresponding amendments to the Law of the Republic of Kazakhstan "On Informatization" concerning blockchain technology and cryptocurrencies came into force.

As part of the amendments, the concept of a digital asset is introduced that is defined as property created in an electronic digital format using cryptography and computer calculations, and is not a financial instrument (the definition of a financial instrument is set out in Article 128-1 of the Civil Code of the Republic of Kazakhstan), as well as an electronic digital form of certification of property rights. There are two types of digital assets: secured and unsecured. Secured digital assets include a digital token and other digital assets that are digital means of certifying property rights to goods and (or) services issued (provided) by the person who issued the secured digital asset. The types of secured digital assets, as well as the list of rights certified by a digital token, are established by the person issuing the digital token. Unsecured digital assets include digital tokens received as a reward for participating in maintaining consensus on the blockchain. At the same time, according to the amendments, digital assets are not the means of payment.

Fulfilling the second function, money acts as a unit of account for goods and services, protecting us from the need to constantly recount one product in terms of another.

Although the list of companies willing to accept cryptocurrency for their goods and services is quite extensive, prices for such goods are in most cases denominated in fiat currencies. This is largely a consequence of the high volatility of the rate of cryptocurrencies themselves. In other words, the use of cryptocurrencies as a unit of account would require a fairly frequent recalculation of the value of goods and services expressed in them.

Performing the function of a store of value, money serves as the means of preserving purchasing power from the moment the income is received until the moment it is spent, and, unlike other assets that perform this function, it has the highest liquidity.

Definitely, cryptocurrencies, along with other assets, perform this function and cope with it quite well (cryptocurrencies performed especially well in this function at the beginning of 2018). However, the degree of their liquidity, despite the presence of an extensive list of goods and services purchased directly in cryptocurrency, as well as a large number of exchange offices and cryptocurrency exchanges, is somewhat lower than that of fiat money. This is associated with the fact that, after all, not all goods and services can be purchased for bitcoins.

Thus, we can conclude that today cryptocurrencies are not money, since they do not have such a significant role in the economy and do not perform all three functions of money. At the same time, they have a wide potential for being recognized as money in the future.

Therefore, it is difficult to apply paragraph AG3 of IFRS (IAS) 32 "Financial Instruments: Presentation" to cryptocurrencies at the moment. Besides, since the use of cryptocurrencies does not offer the emergence of contractual relations in the framework of transactions with cryptocurrencies (a sufficient condition for transactions in the system is the installation of the client program), they also do not meet the definition of a financial asset and a financial instrument (paragraph 11 of IFRS (IAS) 32).

According to the approach proposed by the IFRS Interpretations Committee, accounting

for cryptocurrencies should be viewed from the perspective of cryptocurrency holders and miners. The first group of holders purchase cryptocurrency in order to preserve value or invest in order to generate income, while not getting involved in the mining process. The second category includes those who decided to invest in computer facilities (computers, graphics cards and other equipment), electricity and other resources in order to maintain the network and create new units of cryptocurrency.

Accounting for Cryptocurrency by Holders

According to the IFRS Interpretations Committee, cryptocurrencies according to their nature fall under the definition of intangible assets. Thus, in accordance with paragraph 8 of IFRS 38 "Intangible Assets", cryptocurrencies are "an identifiable non-monetary asset without physical substance".

The non-monetary nature of cryptocurrencies is proved by provisions of paragraph 16 of IFRS (IAS) 21 "The Effects of Changes in Foreign Exchange Rates", whereunder "the essential feature of a monetary item is a right to receive (or an obligation to deliver) a fixed or determinable number of units of currency ".

The identifiability of an asset implies its divisibility, i.e. the ability to detach it from the organization and sell, transfer, rent, etc.

Therefore, a cryptocurrency, under IFRS (IAS) 38, meets the definition of an intangible asset on the basis that (a) it can be detached from the holder and sold or transferred individually, and (b) it does not give the holder the right to receive a fixed or determinable number of units of currency.

In doing so, accounting treatment will differ depending on the purposes of holding cryptocurrencies.

In the case when cryptocurrencies are purchased solely for subsequent resale in the ordinary course of business, the accounting of cryptocurrencies is carried out in accordance with the provisions of IFRS (IAS) 2 "Inventories". In the particular case when the organization is a broker/dealer of cryptocurrency, the requirements of paragraph 3b of IFRS (IAS) 2, similar to those for commodity brokers/dealers, the requirements of paragraph 3b IFRS (IAS) 2 similar to those set for commodity brokers/dealers shall apply.

If cryptocurrencies are held for the purpose of capital gains, retention and preservation of value, accounting is carried out in accordance with the provisions of IFRS (IAS) 38. Subsequent accounting for cryptocurrencies under IFRS (IAS) 38 provides for the use of one of the two methods: cost or revaluation method. Under the cost method, cryptocurrencies are measured at historical cost less accumulated depreciation and impairment. It should be borne in mind that cryptocurrencies in general have an unlimited life, therefore, there is no depreciation. However, if the price of the cryptocurrency goes down, the impairment costs will need to be recognized. Perhaps, the main drawback of this accounting method is that if the price of the cryptocurrency exceeds the initial cost, then the amount higher than the cost is not recognized by the cost method. This approach is illogical when an organization purchases cryptocurrency for capital gains.

Accounting under the revaluation method implies the existence of an active market that will be used to revalue cryptocurrencies at fair value, with any increases in value being recorded directly in other comprehensive income and decreases – in profit or loss.

Accounting for Cryptocurrency by Miners

Unfortunately, the aspects pertaining to accounting for cryptocurrencies by miners were not expanded in the Committee's comments. Therefore, one has to be guided by judgments in this respect.

As stated above, cryptocurrency mining leads to some cash receipts (block rewards and transaction fees) and costs (electricity costs, video cards, ASICs, and others). However, the process of calculating a given "hash" (mining) is more like participating in a lottery than a

process of systematically creating (developing) an asset, so it is very difficult to separate the costs incurred in the course of a successful block solution from all previous unsuccessful decisions. In this regard, it is proposed to consider all receipts and disposals separately.

The specific feature of a block reward is that it is not paid by someone concrete but the system itself accrues the reward for each successfully generated block.

However, it should be noted that the accrual of reward is not permanent, i.e. over time, the block chain reward will be decreasing until it reaches zero. Moreover, in some cryptocurrencies, there is no block reward at all. And miners only earn on transaction fees.

Therefore, the block reward is a reward for the services rendered to the network (finding a hash, creating a block, and updating the register). However, due to the lack of a formal agreement, and most importantly, the enshrined rights and obligations of the parties, the application of provisions of IFRS 15 "Revenue from Contracts with Customers" is not possible.

At the same time, the reward received by the miner for the block is certainly an inflow of economic benefits; therefore, it meets the definition of income according to the IFRS Conceptual Framework.

Therefore, upon receipt of a block reward, it must be included in profit or loss and measured at fair value.

The accounting records in this case will be as follows:

Dr: Intangible assets (cryptocurrency) or inventories (for a trader)

Cr: Other income (R&L statement)

A transaction fee is earned for the correct execution (validation) of a transaction and its inclusion in an individual block of transactions. Therefore, fees are earned not for the validation of the block as a whole (the block reward compensates for it), but for a separate (individual) transaction, in other words, transaction fees are paid by a specific network participant. Therefore, such receipts are accounted for in accordance with the provisions of IFRS 15.

Regarding the accounting of miners' expenses, there is an opinion that since cryptocurrency is an intangible asset, the miners perform the "development" of intangible assets. Therefore, all costs arising in the mining process (computers, electricity bills, etc.) must be capitalized, and when a block reward is received at the moment when the hash has been successfully found, development is completed and the development of a new intangible asset begins (i.e. a new reward for the next block of transactions). At the same time, according to paragraph 57 of IFRS (IAS) 38, the recognition (capitalization) of costs for the development of intangible assets can be carried out only if a number of conditions are met, one of which is the ability to accurately estimate the costs related to the intangible asset in the process of its development. In the reviewed example, the criterion of paragraph 57 (f) of IFRS (IAS) 38 cannot be met, because, first, there are many miners ("nodes") who also strive to find the required "hash" the fastest, and second, the finding of the given "hash" itself in a competitive race is more like winning the lottery than systematically developing some assets; third, it is difficult to separate the costs incurred in a successful "hash" solution from all previous unsuccessful decisions.

Therefore, the most appropriate solution is to record the costs incurred in the mining process in profit or loss as soon as they arise.

Conclusion

In general, we can conclude that the interest of investors and society has recently shifted from the cryptocurrencies themselves towards the underlying technology, which is confirmed by the data from Google trends. This trend is very favorable for the cryptocurrency market, as the increased technical awareness of an increasing number of investors helps accelerate the adoption of important innovations.

Under these conditions, there is a reasonable assurance that the technical limitations inherent in cryptocurrencies will soon be overcome, the number of cryptocurrencies will decrease, and their functionality and technical content will become more unified.

At the present stage of development, cryptocurrency is not recognized either as a monetary instrument or a financial instrument due to the existing technological and legislative restrictions. Therefore, their accounting as an investment instrument is carried out within the framework of provisions of IFRS (IAS) 2 "Inventories" or IFRS (IAS) 38 "Intangible assets". At the same time, the accounting treatment of cryptocurrencies depends on the purposes of holding, ways of acquiring/receiving and methods of selling cryptocurrencies. However, a further growth of the cryptocurrency market and their increasing role in the economy due to the shortcomings of the proposed approaches to their accounting and recognition may require the development of new or significant revision of the old IFRS standards.

As for the use of cryptocurrencies in Kazakhstan, this issue remained unresolved for a long time and, ultimately, received its legislative recognition within the framework of amendments to the Law of the Republic of Kazakhstan "On Informatization" that came into force. Based on the context of these amendments and taking into account the nature of cryptocurrencies (they are not secured by anything and are only entries in a distributed ledger), cryptocurrencies fall under the concept of an unsecured digital asset. However, the turnover and sale of the latter within the territory of the Republic of Kazakhstan are prohibited.

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Innovative Solutions in the Payment Card Market

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The purpose of the paper is to make an overview of the payment card market and innovative solutions in the global context that are used to modernize the traditional scheme of card transactions. The current level of development of the Kazakh payment card market and the infrastructure for accepting non-cash payments with their use is assessed. The performed analysis of the use of innovative solutions and trends in the payment card market is presented.

Today, the technological progress is a locomotive of global development, a driving force of worldwide changes and leverage of socio-economic processes. The world is moving by leaps and bounds towards the digital future, where the speed and mobility are becoming one of the most important criteria for the quality of services provided by the market. The financial sector is one of the main consumers of technological innovations and boosters for increasing the penetration rate of innovations in the lives of ordinary users.

The spread of the coronavirus infection COVID-19 is accelerating the transition of the payment services market to a digital service format [1]. Consumers all over the world prefer contactless and online methods of receiving services in order to keep the boundaries of social distance. Market participants offer solutions aimed at optimizing traditional banking solutions, including card payment schemes, which have a beneficial effect on the cost of these services.

A payment card, which was considered a product of banks, is becoming an integral part of the products of such tech giants as Apple, Samsung and others, and "customization" in the mobile phone for millennial consumers. Most research shows that a new generation of consumers is growing, linking basic transactional services to technology and emerging brands, none of which has historically been associated with financial services [2]. The focus is put on digital capabilities and flexible working style. At the same time, the services offered are provided through e-wallets, and such "digitalization" creates a breeding ground for realization of the risk of banks losing a share of potential payment card users.

Both in Kazakhstan and abroad, payment cards are the main instrument for conducting retail non-cash payments. Consequently, today the payment card market is one of the most dynamically developing segments. Over the last five years, the number of payment cards in circulation in Kazakhstan has almost tripled and amounted to 41 million. At the same time, 22% of this number of payment cards have been issued since the beginning of 2020, and in July of 2020, more than 23 million payment cards were used by their holders to conduct banking operations [3]. So, on average, every adult Kazakhstani citizen is a holder of 3 payment cards and caters for demand for constant modernization of the remote banking infrastructure, thereby indirectly participating in the progress of the payments market. Kazakhstan's legislation in the field of payments and money transfers, which governs and regulates the procedure for issuing, using and servicing of payment cards, allows organizations-participants in the payment market to develop and provide innovative solutions and products that meet the demand of the population, and contributes to the active development of a competitive environment.

It is the search for a balance between the demand of the population and the supply of financial market participants that forms the basis for the development of the Kazakhstani market of payment cards.

Today, within the existing legal framework, 22 second-tier banks out of 28 operating banks and the "Kazpost" JSC are issuers of payment cards.

During the period of January-July 2020, holders of Kazakhstani payment cards conducted about 1.3 billion non-cash transactions totaling 15.7 trillion tenge, which exceeds the number of cash withdrawals made during this period by seven times, and the total amount of money cashed out via payment cards – nearly by two times (Figure 1).

In general, over the last few years, the volume of non-cash transactions of the population has significantly increased: the result of seven months of 2020 exceeded the annual performance in 2018 (6.4 trillion tenge) by two times and the annual performance of the previous year (14.1 trillion tenge) by 12%.

In April of this year, due to the quarantine restrictions imposed in the country and the suspension of operations of a number of business entities, the volume of non-cash transactions decreased: in comparison with March 2020, the volume of non-cash payments and money transfers went down by 18% from 2.2 trillion tenge to 1.8 trillion tenge. However, after the end of May of this year, the positive dynamics of non-cash transactions was restored, exceeding the performance in April by as much as 33% and amounted to 2.4 trillion tenge.

Figure 1

Dynamics of the Use of Payment Cards for Conducting Transactions
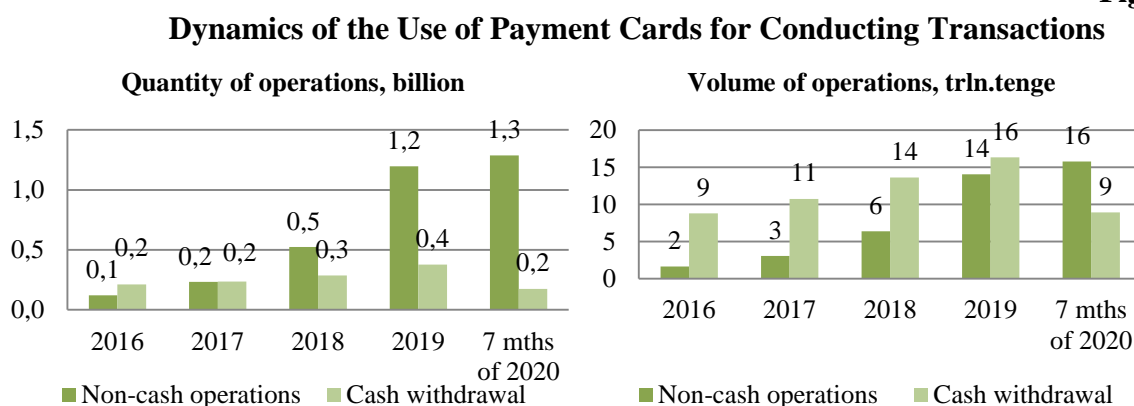
Source: National Bank of the Republic of Kazakhstan.

Consumers around the world are switching to the contactless and online methods of obtaining services in order to keep the boundaries of social distancing. The bulk of non-cash transactions of Kazakhstani people carried out in the period of January-July 2020 were also conducted online (80%). Today, 20 banks in Kazakhstan have a mobile banking service for users of iOS and Android systems [4], where the number of registered users has increased by 28% since the beginning of the year and there was a 50% growth in the activity of using personal cabinets (Figure 2).

Figure 2

Users of the Internet/Mobile Banking
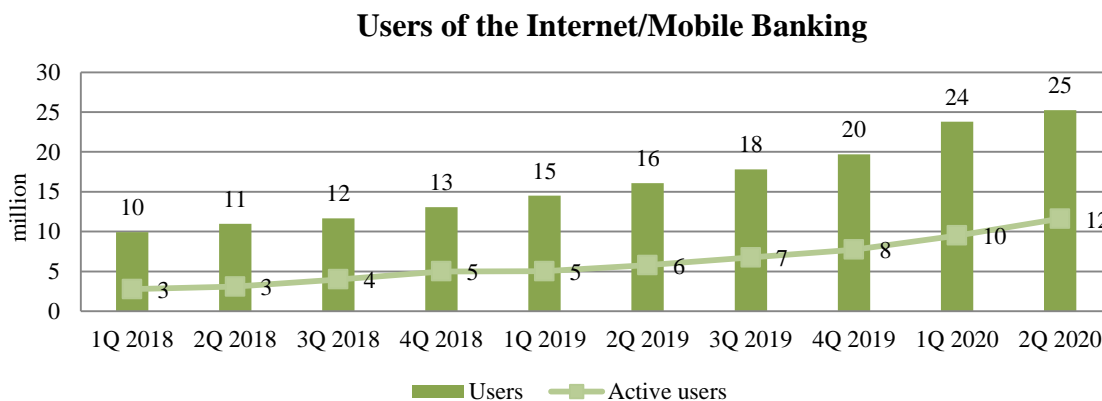
Source: National Bank of the Republic of Kazakhstan.

On average, users conducted more than 3 million daily transactions worth 59 billion tenge, and the total volume of online card transactions in January-July 2020 amounted to 12.6 trillion tenge and exceeded the volume of online transactions in 2019 by 26%.

In stimulating the development of contactless payments in Austria, Germany, Hungary, Ireland, the Netherlands, Great Britain and in a number of other countries, central banks and financial institutions have implemented measures to increase the limit on the amount of a transaction that can be conducted without entering a PIN code [5]. In April 2020, the National Bank of Kazakhstan also made a corresponding change to the regulation, which governs the servicing of transactions with the use of payment cards. Given that 79% of POS terminals operating in Kazakhstan support the contactless payment mechanism and about 23 thousand entrepreneurs are now receiving payments with the use of QR codes, it is expected that this measure will have a positive effect on the further development of contactless payment methods.

Apparently, the Kazakhstani market maintains a positive trend in the development of the base of online bank clients and the growth of non-cash transactions providing a prospect for further implementation of new digital projects. However, there is a difference in the concentration of non-cash transactions and the infrastructure of remote banking services: almost a third of payment cards in circulation (35%), half of banking devices for accepting non-cash payments (44%) and a third of online banking users are located in the cities of Almaty and Nur-Sultan. As a result, every second non-cash transaction within the country is carried out in the cities of Almaty and Nur-Sultan. Due to the geographical features and low population density, the gap between the rates of development of the country's regions and the cities of Almaty and Nur-Sultan is quite significant. Nevertheless, it is precisely this gap and the difficulties associated with the organization of physical infrastructure that are driving the development of innovative solutions and the prompt introduction of methods for online financial services.

When analyzing international experience in using innovations for card products, the main trend in the development of card products was determined: the implementation of payment cards and mobile phones. This trend towards widespread adoption of mobile devices as a payment channel is a result of consumer demand for smartphones as the preferred tool for online and contactless payments. Mobile devices are more convenient: the user interface of mobile payments is faster and easier than transactions with conventional plastic payment cards.

One of the examples of successful implementation of payment cards through a mobile application is the product of the Revolut fintech company, which currently has a client base of more than 12 million users and competes with Currencycloud and TransferWise. The project is a payment card (Visa, Mastercard) with three virtual accounts managed with a mobile application. Virtual accounts of the Revolut cardholder provide access to three electronic wallets in three currencies (out of 150 possible).l

The main difference and advantage in comparison with bank multicurrency payment cards is the use of the Revolut rate of the central bank, no service fees and low tariffs for money transfers (0.5% when exceeding 548,349 tenge per month). Compared to the cost of services of traditional institutions of cross-border money transfers, such as SWIFT (from $ 50) and international money transfer systems, the Revolut service presented an affordable way of international money transfers for clients. At the same time, the service is a platform for analyzing and managing finance, investing money in some of the main types of cryptocurrencies and saving money in special electronic wallets "vaults" [6].

The current legislation in Kazakhstan also allows banks to organize the issuance and distribution, through payment agents, of electronic payment instruments that have the characteristics of payment cards and provide access to the electronic wallet of its holder. Due to the implementation of simplified registration of unidentified electronic wallets, the lack of a validity period, the low cost of their maintenance and settlement in real time, this niche is one of the most promising areas and, therefore, is of interest to a number of participants in the payment market, including mobile operators that already working with the market of potential users.

As noted above, one of the reasons for the transition of users to mobile methods of payment is the resulting security of this solution. Since the use of a digital payment card instead of a traditional plastic card reduces the likelihood of a number of risks, such as its possible loss (the probability of losing a mobile phone is much less than a plastic card) and a forgotten PIN code (it is possible to pass Face ID, which provides an additional degree of protection). But it should be noted that digital payment cards cannot be considered a priori a secure instrument. So, one of the ways to ensure security in the use of digital payment cards is to use, instead of payment card details, tokens that do not have an independent meaning (value) for external or internal use and are based on existing ISO standards, therefore, can be processed and routed by merchants, acquirers and issuers as traditional payments with payment cards. This method of data protection is also used by Kazakhstani holders of payment cards.

At the same time, a number of technology companies are working on improving the level of security for the use of plastic cards. In 2015, the Dutch IT company Gemalto proposed the use of the Dynamic Code Verification (DCV) technology, which replaces the three-digit CVV code written on the back of a payment card by placing a special display in the zone where the static code is indicated. Such solution allows you to provide access to the code required for online payments, with a constantly changing value. This solution allows reducing the risks of a CVV code leak into the hands of ill-wishers. [7].

The use of biometric solutions to improve the security of payment cardholders has been practiced in the world since 2014. The Mastercard payment system was the initiator of the introduction of biometric identification of payment cardholders by matching fingerprints. In the same year, the first biometric Mastercard payment card was issued, in which identification of the payment cardholder is possible by scanning the fingerprint with an ultra-thin scanner placed on the payment card. Mastercard cooperates in this area with the European banks, the National Bank of Kuwait, Lebanese Fransa Bank and Italian Intesa Sanpaolo. Visa performs testing in collaboration with Mountain America Credit Union and Bank of Cyprus. Also, this proposal found a response in the markets of Germany (financial organization AirPlus) and France (financial conglomerate Societe Generale, national card settlement system Carte Bancaire) [8].

The banking market for customer service using biometric capabilities within Kazakhstan is represented by remote customer identification services that develop within the ecosystems of banks, and the National Bank's initiative to launch a center for biometric identification of bank customers. The National Bank's pilot project was launched on April 7, 2020 in order to provide the population with the opportunity to open a bank account online and issue a payment card during the period of the state of emergency in the country. The full-scale launch of the service, scheduled before the end of this year, will provide banks with the opportunity to fully implement the idea of a "digital" institution and will contribute to the emergence of new services and players in the market.

Among a number of trends in the optimization of card payment schemes, one can single out the initiative to build national card payment systems for payments within the country. The main reason for this focus on the development of national card payment systems is the high potential of such systems in segments less covered by banking conditions. The advantage of such systems is knowledge of the needs of the target customer segment. [9].

A vivid example of such system is the Chinese national payment system UnionPay, established in 2002 for domestic card transactions in China. Today this payment system functions as an international one and provides its services in more than 170 countries. India's national payment system RuPay was developed with the support of the consulting firm Ernst & Young in 2012 for anti-monopolization of the card market and to reduce the cost of transactions [10]. The Russian national payment card system MIR was created in 2017 in order to maintain the independence of the Russian payment market from external political and economic factors.

As at August 1, 2020, 8 international payment systems such as VISA International, MasterCard Worldwide, UnionPay International, American Express International, Diners Club International and MIR were functioning within the territory of Kazakhstan. In addition, a number

of banks issue local payment cards. The most common are the payment cards of Visa and Mastercard international systems (over 50% of cards in the market). More than 97% of card operations of Kazakhstani people are conducted within the country.

The use of products and services of international payment systems provides payment card holders with the ability to make payments anywhere in the world. At the same time, a high share of the use of payment cards in circulation for domestic transactions and positive trends in the development of the market of Kazakhstani financial service consumers suggest that there is a possibility of developing alternative local solutions in Kazakhstan.

Figure 3

Payment Cards in Circulation by Systems
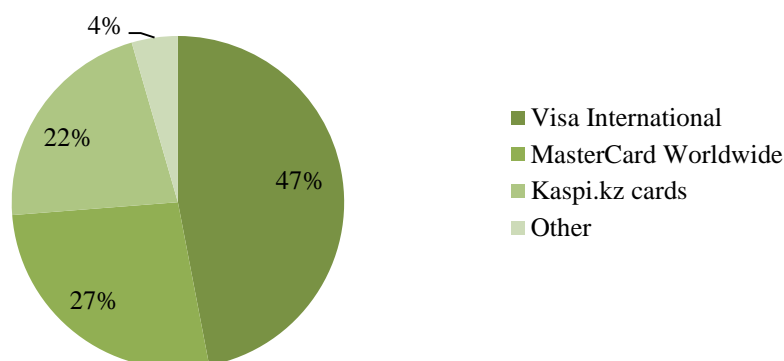
Source: National Bank of the Republic of Kazakhstan.

Among the latest trends, one can also highlight the interest of payment institutions in the use of distributed ledger technologies and Big Data capabilities, which, if successfully implemented, can completely change the existing scheme for making payments with payment cards.

The project of Visa B2B Connect, which is at the launch stage, is focused on optimizing cross-border payments and remittances [11]. The international payment system Mastercard is also testing the possibilities of using blockchain technologies. In 2017, the company announced the creation of a similar platform, based on the use of payment cards, the use of bank accounts and interaction between system participants. [12].

Similar test projects are currently being piloted by a number of international companies in order to use the advantages of blockchain and big data to reduce the level of fraudulent transactions, unburden operations centers and increase the speed of receiving information by participants in payment transactions.

Thus, the global market of payment cards is characterized by a high level of penetration of innovative technologies and is becoming one of the arenas for competition between financial institutions and tech startups. Using the advantages of technological solutions allows banks to offer the users a competitive service that meets the expectations of modern consumers of financial services.

The Kazakhstani payment card sector is a rapidly growing market with a wide user base. The positive dynamics of the growth of payment cards and transactions with their use, the expansion of banking mobile services, implementation of biometric identification projects, and the existing legislative framework suggest the compliance of the card segment with global trends. In view of the focus of the market and the regulator's initiatives on simplifying the processes of conducting payment transactions, the measures taken and the projects implemented are yielding positive results. Nevertheless, it should be noted that for any technical evolution, the widespread development of the Internet communications network plays an important role, and the solution of this issue can also serve as a driver for technical macroevolution in Kazakhstan.

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Financial Inclusion and Digitalization

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The paper describes the situation with the development of financial inclusion in the world and examines the impact of digitalization on expanding the consumer access to financial services. Digital financial services and financial inclusion are designed to provide more affordable financial instruments to people outside the formal financial sector. There are still a number of problems in this area that, when addressed, can widen access to financial services for people, businesses and governments.

Preamble

Digital technologies are rapidly developing worldwide as the largest driver of innovation, competition and economic growth, providing ample opportunities to support financial inclusion and sustainable economic development.

Today, the relevance of financial inclusion is determined by the role it plays in poverty reduction and economic growth. Financial affordability was included into the agenda of reforms for both individual countries and internationally. At the G20 Summit in Seoul (South Korea, 2010), financial inclusion was recognized as one of the nine key pillars of the global poverty reduction agenda in developing countries and economies in transition [1]. Access to financial services, according to surveys in this area [2], has not yet become widespread. Therefore, practical actions are needed on the part of key players in the financial market – the state, business, and consumers.

Digital technology is one of the most important factors in expanding access to financial services. Digital financial services have benefits for users and service providers, governments and the economy, such as increased access to finance for the poor and lower costs of financial intermediation for banks and service providers.

Definition of Financial Inclusion

An inclusive financial system is one in which most people have access to and use financial services [1,2]. Such systems provide users with access to the financial resources necessary to meet their financial needs, such as savings, loans, insurance services, etc. Lack of access to such services can contribute to persistence of income inequality and retard economic growth.

The World Bank believes that a definition of financial inclusion must also take into account financial sustainability and people's needs: "Financial inclusion means that individuals and businesses have access to useful and affordable financial products and services that meet their needs – transactions, payments, savings, credit and insurance – delivered in a responsible and sustainable way".[3]

The definitions of financial inclusion in different sources may differ in wording, but a common thing in all of these definitions is the universal access to a wide range of financial services at a reasonable cost.

Digital finance encompasses all products, services, technologies and infrastructure that enable individuals and companies to have online access to the products they need without direct contact with the financial service provider. Manyika, Lund and others define digital financial services as financial services delivered through digital channels including mobile phones and the

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[3] https://www.worldbank.org/en/topic/financialinclusion/overview

Internet. [3]. At the same time, their definition has been expanded to include all types of financial services such as payments, savings accounts, loans, insurance and other financial products; all types of users, including individuals with all income levels, businesses of all sizes, and government agencies at all levels; all types of financial service providers, including banks, payment systems, other financial institutions, telecommunications companies, fintech startups, retail outlets, and other businesses. According to Gomber, Koch and Siering [4], digital finance includes many new financial products, financial institutions, financial software, new forms of communication and interaction with customers. Based on the existing definitions, digital financial inclusion can be defined as the provision of financial services to users via digital channels. This can be the provision of services and access to a broader and more appropriate set of digital finance products for those who currently are not served by banks and other institutions, as well as underserved individuals and businesses.

Expanding Affordability of Financial Services

Why international organizations and governments pay much attention to financial inclusion? Financial inclusion begins with households and businesses opening a financial institution or mobile account through a money service provider and using the account to make payments, savings, and to get other financial products.

Access to financial services provides low-income people with the opportunity to make savings for the future, opportunities for investment in business and education, access to loans, risk management in connection with unforeseen situations, which ultimately improves their economic standing, contributes to the development of entrepreneurship and the private sector [5].

In addition to expanding individual opportunities, wider access to finance has other positive effects: the IMF research shows that financial inclusion supports economic growth and reduces inequality [6]. However, the financial inclusion of unproductive agents, as shown by Dabla-Norris et al., can have a negative effect on the economic growth. [7].

For central banks, financial inclusion matters for a number of reasons. First, due to the impact of the affordability of financial services in general on the long-term economic growth and poverty reduction and, consequently, on the macroeconomic environment.

Second, expanding access to financial services has a positive impact on financial stability by diversifying the funding base. A significant increase in the number of small depositors owing to a broader financial affordability will increase both the size and stability of the deposit base of banks, reducing the reliance of banks on "non-core" financing, which is usually more volatile during a crisis.

Expansion of access to financial services significantly changes the behavior of companies and consumers, contributes to "consumption smoothing", as households can adjust their savings and loans in response to changes in interest rates and negative economic events, which helps to maintain the price stability.

In addition, low-income groups are relatively immune to fluctuations in economic cycles, and their inclusion in the financial sector will improve stability of the deposit and loan base in the financial system. Hannig and Jansen (2010) show that financial institutions serving low-income people tend to do well in crises [8].

However, expanding financial inclusion is not a guarantee of improved financial stability. If financial inclusion is associated with excessive credit growth or the rapid expansion of non-regulated parts of the financial sector, financial risks can increase if control and regulation are not matched by the growing financial inclusion. Financial instability, in turn, can slow the economic growth and exacerbate inequality, thereby undercutting the goals of increased financial inclusion.

Unlike loans, expansion of coverage with other types of financial services does not negatively influence financial stability. These include expanding access to ATMs, bank branches and transaction accounts. Therefore, these services can be developed without compromising stability.

In general, financial inclusion can be instrumental to a variety of macroeconomic goals, and financial inclusion must be supported by a sound financial sector with adequate regulation and supervision. Efforts to improve financial inclusion must be accompanied by competition among financial service providers. Adapting financial services to new groups entering the formal financial sector requires an enhanced supervisory capacity, the development of well-functioning payment systems, and increased transparency of credit information.

Measuring Financial Inclusion

The international literature describes different approaches to measuring financial inclusion. Overall, today over 250 indicators describe financial inclusion in some way. The following indicators of financial affordability are most often used: the number of branches of operating commercial banks per 100 thousand people of the adult population, the number of ATMs of commercial banks per 100 thousand people of the adult population, the proportion of the adult population holding an account at a formal financial institution, the proportion of the adult population using a credit/loan at a formal financial institution over the last year, the share of active loans issued to small and medium-sized entities in the total portfolio of active loans provided by commercial banks.

Another approach to measuring financial inclusion is to include, in addition to quantitative and qualitative indicators, such as (1) use – regularity, frequency and duration of use of various financial products, (2) the quality of services received – their range, the level of consumer understanding of available financial services, (3) the impact of financial services – changes in the consumer's living standards, which can be attributed to the use of financial services.

For example, Honohan (2008) measures access to financial services by econometrically estimating the proportion of adults/households with a bank account [9]. However, this approach has many deficiencies as it ignores several important aspects of financial inclusion such as the affordability, quality and use of financial services, which together form an inclusive financial system.

In addition, a number of studies have shown that simply having bank accounts may not be enough to measure financial inclusion if there are constraints that prevent people from using their accounts properly, such as the remoteness of bank branches, transaction costs, and psychological barriers [10].

Kempson et al. [11] defined "underserved" people as those who, despite having a bank account, do not use it appropriately. In fact, in many countries, a significant proportion of the so-called "banking population" used informal non-bank financial services instead of banking services.

The problem with the currently existing indicators is the absence of an index that allows for a comprehensive comparison of countries across all components of financial inclusion. In the existing surveys measuring financial inclusion, there are distortions in the answers of respondents due to the incorrect understanding of the question. Different studies use different indicators of financial inclusion, depending on the purpose and objectives of the study. Overall, it can be argued that access to financial services, measured as the proportion of adults with an account at a formal financial institution, is the most commonly used indicator of financial inclusion as an easy-to-measure and interpret indicator.

It is exactly this indicator, along with others, that is used to assess financial inclusion in one of the most widely used sources of data on financial inclusion - the Global Findex database. The database, based on surveys of 150,000 adults in 148 countries, presents indicators of financial inclusion in groups by income, gender and educational level of the respondents. Indicators include the proportion of adults with an account at a formal financial institution; adults who have savings and took out loans using a formal account and others [2].

The latest Global Findex database published in 2017[4] shows that financial inclusion is trending upward globally. Efforts to expand financial inclusion globally and nationally are paying off. Since 2011, 1.2 billion adults have opened an account at a financial institution, including 515 million since 2014. Thus, in 2014-2017, the proportion of adults with an account at a financial institution or through a mobile money service increased from 62% to 69% globally, and from 54% to 63% in developing countries. In high-income countries, 94% of adults have accounts [2]. At the same time, the degree of financial inclusion varies widely depending on the region and income level. (Figure 1).

Figure 1

Percentage of Adults Having Accounts in the Formal Financial Sector (%), 2017
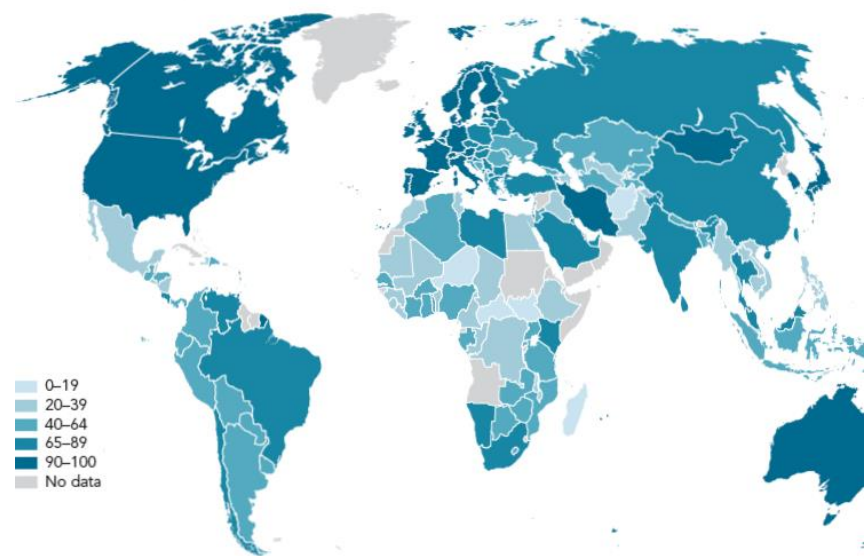
Source: Global Findex

Most of the accounts are held with banks, microfinance institutions or other regulated financial institutions (Figure 2). The data show gender inequality in access to the formal sector: men account for 72% of all adults with an account, and women – 65%. The same gender gap of 7 percentage points was observed in 2014 and 2011, in developing countries this gap remains unchanged and makes up 9 percentage points (Figure 3).

Figure 2

Percentage of Accounts, %

Figure 3

A Gender Gap in the Numbers of Account Holders, %
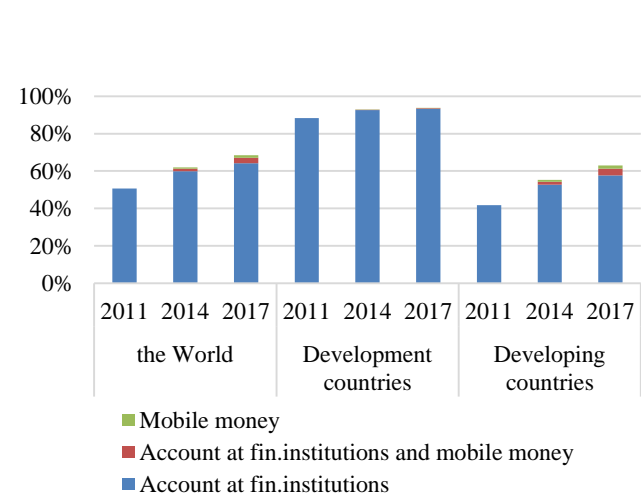
Source: World Bank data, the author's computations
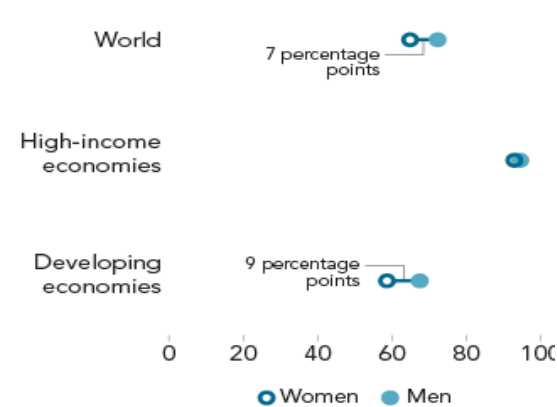
Source: Global Findex database.

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[4] The data for 2017 is the most relevant

Despite the increasing access to financial accounts since 2011, around 1.7 billion adults globally do not have access to banking services, an account at a financial institution or a mobile money provider. Almost all of the people with no account are from developing countries; almost half of them live in seven developing countries: Bangladesh, China, India, Indonesia, Mexico, Nigeria and Pakistan (Figure 4). More than half (56%) of all unbanked adults are women, the low-income or poor, and people with low educational attainment and unemployed.

The Number of Adults without a Bank Account, 2017
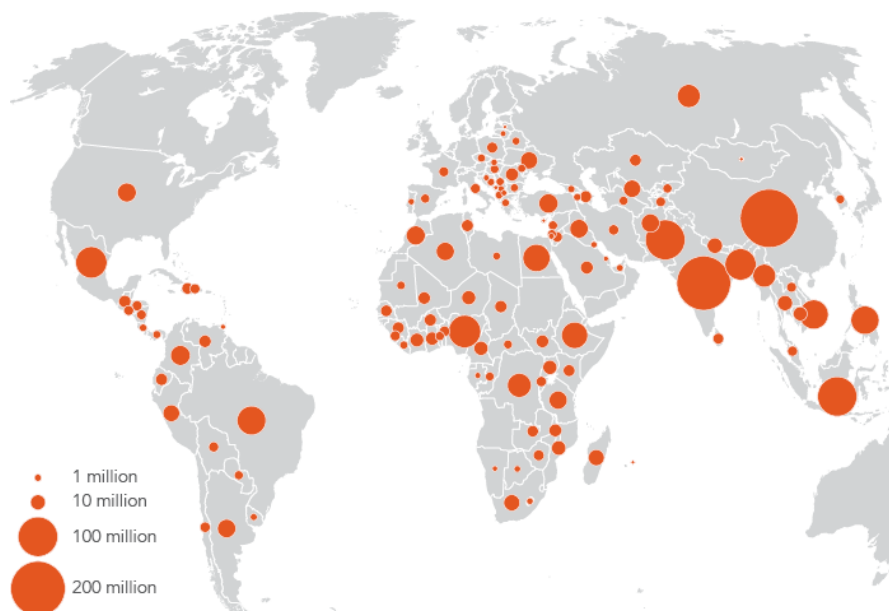
Source: Global Findex

According to the survey results [2], the most common reason for not having an account is the lack of money to open and use an account. The cost of services and the distance to the financial institution were named as the reason by about a quarter of the respondents. Also, the reasons mentioned included such as the lack of information and distrust in the financial system (19%) and religious beliefs (7%) (Figure 10).

Financial Inclusion in Kazakhstan

It is worth mentioning that financial inclusion in Kazakhstan is not measured. Therefore, in order to provide a comparative description of financial affordability in Kazakhstan, the Global Findex 2017 database was used.

According to Global Findex, the percentage of adults with a bank account is also growing in Kazakhstan. In 2017[5], this indicator made up 59%, exceeding that of 2014 by 5 percentage points and that of 2011 – by 17 percentage points (Figure 5). However, the gender difference in terms of account holding is minor – 3% (Figure 6).
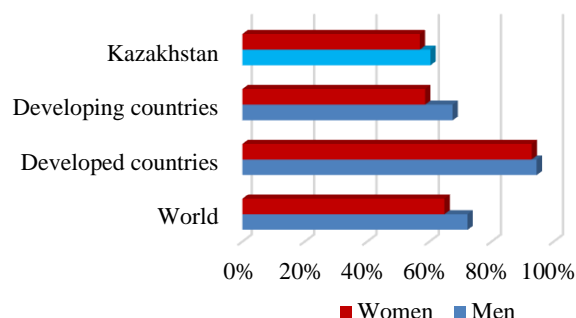
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[5] The Global Findex 2017 database was used for the purposes of comparative description of financial affordability in Kazakhstan.

Figure 5

Figure 5
Adults with an Account (%)

Figure 6

Figure 6
**Adults with an Account (%)
by Gender**
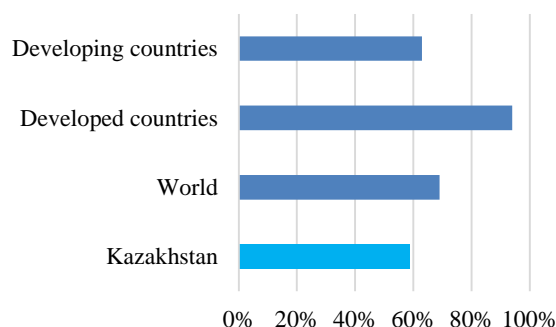
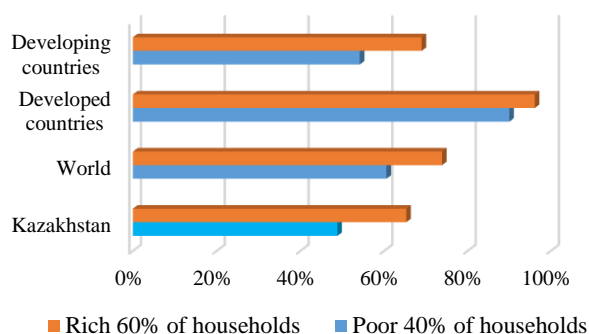Source: World Bank, the author's computations   Source: Global Findex Database

A more substantial (13 percentage points) gap was observed between the low-income and the well-off people with accounts. In 2017, 60% of the poorest households in the world had a bank account, compared with 74% of the richest households. In Kazakhstan, this gap was 16 percentage points in 2017, which exceeds that of developed countries by 10 percentage points, and by 1 percentage point – the level of developing countries (Figure 7).

The unemployed have less access to financial services than the employed. Globally, the gap in access to financial services between employed and unemployed individuals is 15 percentage points, of which in developed countries – 6 percentage points, and in developing countries – 16 percentage points. In Kazakhstan, the gap between the employed and the unemployed is greater than the level of developed and developing countries – in 2017 it amounted to 22 percentage points (Figure 8).

Figure 7
**Percentage of Adults with an Account
(%), 2017.
Breakdown by Household Income**

Figure 8
**Percentage of Adults with an Account (%),
2017.
Breakdown by Employment**
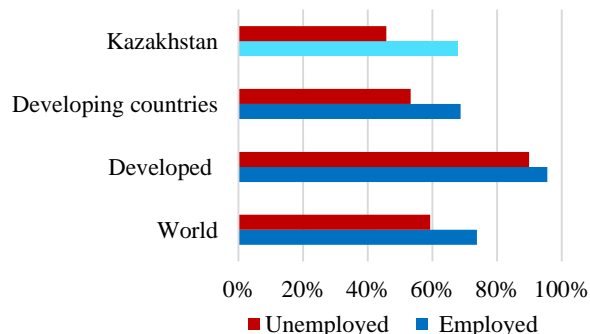
Source:World Bank data,2017,the author's computations Sources: Global Findex database; Gallup World Poll,2017

Half of the respondents interviewed in Kazakhstan (50.4%) do not have an account at a financial institution; the reason for this was the absence of need for financial services, which is much higher than the global level – 28% (Figures 9, 10). This may indicate a lack of consumer awareness of financial products and services, which, along with low income (36% of respondents), impedes financial inclusion.

| | Figure 9 | Figure 10 |

Figure 9

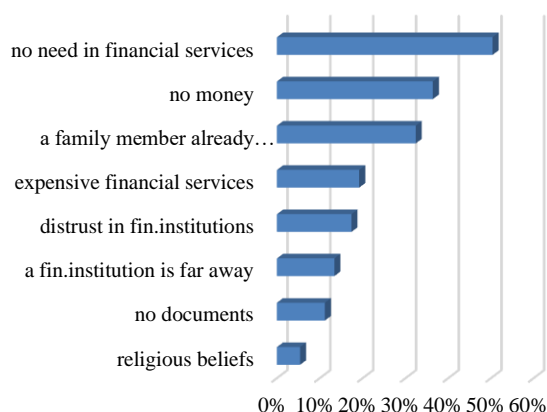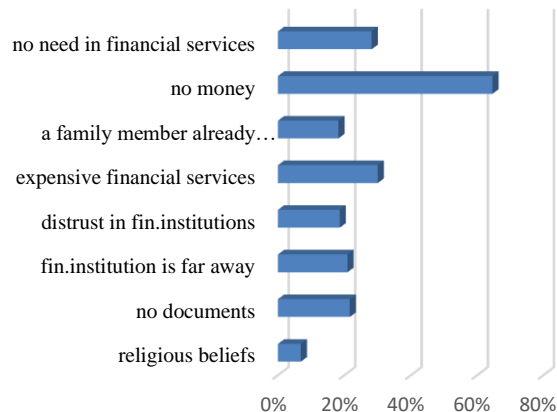**Reasons for the Absence of an Account in Kazakhstan (%)**

Figure 10

Reasons for the Absence of an Account Internationally (%)

Source: World Bank data, 2017, the author's computations

The Use of Digital Services in Kazakhstan

The National Bank of the Republic of Kazakhstan is actively working on the digitalization of financial services, measures are being taken to stimulate the development of non-cash payments and reduce cash turnover, in particular, to build and develop a mobile payment system for creating an alternative opportunity to make payments online using any tools – payment cards, electronic money or from a bank account at the client's choice, including by alternative identifiers (mobile phone number, IIN, QR code).

The results of the work carried out demonstrate a significant increase in the use of digital services in Kazakhstan. For example, during the period of January-August 2020, the volume of non-cash transactions with payment cards amounted to 19.1 trillion tenge, exceeding that of the same period in 2019 by 2.5 times, and of 2018 – by 5 times. At the same time, the main share of non-cash transactions was conducted in the online environment (80.3%)[6].

Over the past two years, the number of active payment cards has grown by 3 times, of active users of digital banking – by nearly 4 times, the number of overnight transactions in the digital banking format has increased by 7.6 times, and the amount of overnight digital banking transactions – by 9 times (Figure 11).

Figure 11
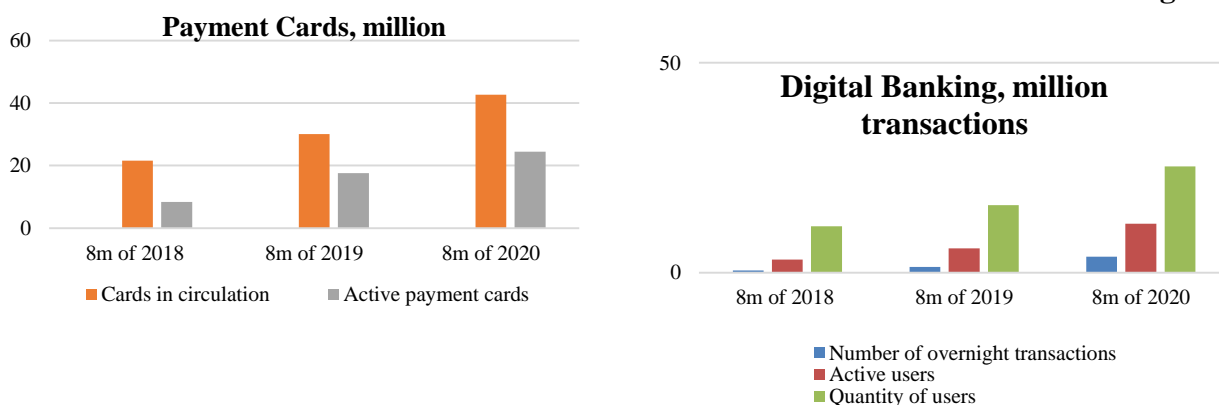
Thus, Kazakhstan demonstrates a significant breakthrough in the use of digital financial services.

In addition, a large-scale work is underway in Kazakhstan to improve the level of financial education. The National Bank of Kazakhstan has implemented a set of measures to

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[6] Data of the National Bank of the Republic of Kazakhstan

improve financial literacy within the framework of the Program for Increasing Financial Literacy of the Population of the Republic of Kazakhstan for 2016-2018; sociological surveys are conducted annually. According to the results of the 2018 survey, the level of financial literacy in Kazakhstan was 36%, according to Standard & Poor's – 40%, which is higher than the global average level of financial literacy.

On May 30, 2020, the Concept for Increasing Financial Literacy for 2020-2024 was approved; it is aimed at improving the financial knowledge of financial services consumers, expanding the availability of financial products, which provides for measures to increase financial inclusion[7]. In particular, a set of measures will be implemented to increase the infrastructural accessibility of digital financial services, expand the list of digital financial transactions, and develop alternative identification and confirmation options for financial transactions. It is important to mention that as part of increasing financial inclusion, the Concept provides for the development of digital solutions using biometric identification and authentication methods for improving financial affordability for persons with disabilities.

Given that financial literacy is one of the key elements in increasing the affordability of financial services, including the expansion of digital services, the measures taken to increase financial literacy in Kazakhstan will significantly improve the picture of financial inclusion, providing an accessible environment for all categories of individuals and all sectors of the financial market.

Digitalization and Expansion of Financial Inclusion

How the level of financial inclusion can be increased? Technological innovation, in particular digital technologies, is the most promising way to expand the access to financial services, as digital channels reduce the cost of serving low-income customers and increase the speed, security and transparency of transactions. According to Rodger Voorhies, Jason Lamb and Megan Oxman, the cost of providing financial accounts in digital format is 80-90% lower than the cost of the same services provided through branches of financial institutions [3]. Digital technologies are removing barriers to the provision of financial services, such as lack of identification and formal income, and geographic distance. Digitalization is making the rendering of financial services available to providers and users.

Digital technologies are represented by various technological solutions, including mobile network, Internet, contactless and NFC payments, electronic money, cloud systems, bitcoins, and can be used in all sectors of financial services, including transfers, digital payments, insurance, lending, and savings.

In addressing the problem of expansion of financial inclusion, mobile banking may have the greatest potential, given that the distribution of mobile phones often exceeds the distribution of the banking network: at the end of 2017, 82.5% of adults in the world had mobile phones, in Kazakhstan – 88.4% [2]. The ubiquity and broad coverage of consumers with mobile communications has become the basis for development of mobile payment systems. Empirical evidence points to the growing importance of mobile payment services in low-income countries. Currently, more than 850 million accounts are registered in various mobile payment systems in 90 countries of the world, and transactions amounting to $1.3 billion are processed through these accounts every day; the number of active mobile money accounts has nearly tripled, and the use of mobile phones for domestic remittances has roughly doubled since 2013. As a result, in low-income countries, about half of the population in 2017 received or sent remittances using mobile phones [2].

Mobile payments are the first step in the development of digital financial services because they generate data that financial institutions can use to construct credit ratings that do

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[7] The Concept for Increasing Financial Literacy for 2020–2024 was approved by the Government Decree of the Republic of Kazakhstan dated May 30, 2020 No. 338

not require long credit histories or collateral. These digital services, in turn, enable digital lending, which fintech companies seek to expand due to the profitability of this product.

A digital financial inclusion indicator that combines digital payments via mobile phone and the Internet [12] shows that digital financial inclusion improved between 2014 and 2017, even in countries where traditional financial service provision is less prevalent[8].

However, it should be noted that the development of digital finance is associated with a number of risks, such as technical network failures, complex user interfaces, ineffective customer service (fuzzy, expensive and time-consuming procedure), and non-transparent fees. There are high risks of fraud against customers, as well as privacy and data protection risks. Part of the risk is associated with new digital service providers that are not subject to consumer protection requirements applicable to banks and other traditional financial institutions.

At present, there are no internationally agreed regulatory standards for regulating digital financial services. However, the United Nations Secretary-General's Special Advocate for Inclusive Finance for Development (UNSGSA 2019) defines several preconditions for safe and competitive digital inclusion. These include data privacy, cybersecurity, digital identity, fair competition, reliable physical infrastructure, and financial and digital literacy. In this context, it is important to ensure effective supervision and regulation of the financial market, especially of non-bank financial institutions. Nevertheless, regulation should remain proportionate to the risks and support the safe use of innovative technologies[9].

In general, digital technologies are driving the expansion of financial inclusion. To accelerate financial digitalization, significant factors could be: (1) investment in mobile access infrastructure; (2) expansion of digital identification, including biometric systems; (3) expansion of open APIs; (4) a regulatory framework that ensures consumer protection and a competitive ecosystem. However, the expected benefits of digital finance can only be fully realized if the cost of providing digital financial services is low. In addition, users need to be well informed and well protected, and have confidence in a well-functioning digital infrastructure.

Certainly, digital technology alone is not enough to improve financial inclusion. Reaping the benefits of digital financial services requires an advanced payment system, a reliable and secure infrastructure, appropriate regulations and consumer protection measures.

Conclusion

Dimensions of the existing gap between the availability of finance, its affordability and use are still large enough to be able to improve the quality of people's life. Digital technologies are one of the effective ways to increase financial inclusion by providing financial services to the excluded or underserved, lowering the costs of financial institutions at the expense of scale, and thereby expanding financial inclusion. However, there is still a number of unresolved issues related to ensuring that digital financial services actually reach those previously excluded from the formal sector of the population, and not increase the digital divide.

Financial services innovation creates new risks that require appropriate regulatory oversight and surveillance. Emerging issues such as data protection and privacy, cybersecurity and competition policy are increasingly coming to the fore. Addressing all of these problems requires coordinated policies from regulators, governments, fintech companies in terms of consumer protection, infrastructure improvements, rules and regulations. In this regard, Kazakhstan also needs to start developing the necessary policies and programs, using the accumulated international experience.

In Kazakhstan, the picture of financial inclusion as a result of large-scale efforts carried out by the National Bank of Kazakhstan and the Agency of the Republic of Kazakhstan for Regulation and Development of Financial Market have significantly improved in recent years. Taking into account the accelerated development of financial services and new digital

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[8] The analysis included 52 emerging markets and developing countries
[9] https://www.unsgsa.org/

technologies, increasing the financial literacy of the population is considered as an important and significant element of the government economic policy aimed at improving the welfare and quality of life of the people.

Increasing the level of financial literacy broadens the access to economic and financial services, involving more and more participants in the economic turnover, and is a real contribution to improving financial inclusion.

Therefore, both for the authorities and for financial organizations, boosting financial literacy and financial inclusion should become an indicator of the degree of development of the financial system and the economy as a whole.

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