NATIONAL BANK OF KAZAKHSTAN

The importance and role of stock market in enhancing the effectiveness of monetary policy

Monetary Policy Department
Economic Research № 2023-07
Working Paper

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June 2023

NBRK – WP – 2023 – 07

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Annotation

Central banks in the process of their activity constantly aim to increase efficiency of the impact of their policy on economic processes and price level in the country. This study analyzed the possibility of using the stock market as a potential channel of central bank transmission in the fight against inflation. To this end, the relationship between returns on the stock market of Kazakhstan and macroeconomic indicators was studied using a vector autoregression model with an exogenous variable before and during the period of inflation targeting.

Key words: *stock market, vector autoregression, monetary policy, inflation, money supply*

JEL-classification: C32, D53, E44, E52

The authors would like to thank Zhuzbayev Adam Muratovich, Head of Monetary Analysis Department of the Monetary Policy Department, and Seidakhmetova Bayan Alpysbaikyzy, Deputy Head of Monetary Analysis Department of the Monetary Policy Department, for consulting, methodological and editorial assistance in conducting the research.

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Content

1. Introduction

Central banks in the course of their activity seek to increase efficiency of influence on economic processes and price level in a country. In general, this influence is called a transmission mechanism; its characteristics and classification of transmission channels are sufficiently described in the literature. At the same time, each individual country has its own specifics of this mechanism due to the peculiarities of the national economy.

Thus, Kazakhstan refers to small open economies that are vulnerable to external risks due to poorly diversified exports and significant import dependence. In this regard, the currency channel has been a significant channel of the transmission mechanism of the central bank's monetary policy. After the transition to the inflation targeting regime announced in 2015, the National Bank abandoned the fixed exchange rate regime and switched to the free-floating exchange rate policy. The National Bank began to strengthen the interest rate and credit transmission channels, including the construction of a formalized forecasting apparatus, introduction of a key interest rate instrument, and activation of the communication policy. Nevertheless, due to the lack of a noticeable change in the diversification of the economy and the continued significant dependence of consumer and investment demand on imports, the exchange rate still remains an important and requiring analysis channel of the transmission mechanism of the monetary policy.

At the same time, in those countries where the financial market is represented not only by the banking sector, but also by a developed securities market, central banks can use the stock market as another effective channel of transmission. This channel is referred to in the literature as "asset prices" and includes not only securities but also real estate (some sources additionally include foreign currency in this channel). In this paper, the focus is concentrated on the stock market research, with equities as an asset, and returns as the price of the asset.

The development of the securities market expands opportunities for a number of market participants, so producers of goods and services have an alternative to bank loans, investors have the profitable investments. Besides, the infrastructure necessary for this interaction is formed, the turnover and volume of the whole financial market grows. On the general economic level, this allows to increase output, employment and tax revenues. In addition, the study of the stock market is substantially relevant because the studied relationship between the rise in inflation and changes in the behavior of firms producing goods and services is stronger through shareholders ("demanding" shareholders for inflation tax compensation from companies) than through holders of bonds and other securities. Accordingly, the underdevelopment of the stock market leads to the omission of the above opportunities.

This paper presents the world experience in the study of such a channel of transmission as the stock market, and an attempt is made to consider the possibility of its application in Kazakhstan. In particular, the influence of inflation and monetary conditions on stock returns has been estimated using econometric models.

Taking into account insufficient elaboration of this subject in domestic literature, the work has some elements of scientific novelty.

The domestic stock market and, in particular, the stock market, which has been receiving new impulses of development in recent years, became the object of research. In the framework of the research it was decided to not only consider the current situation, but also to touch upon the historical dynamics of the stock market development, its results and note the key reasons for its underdevelopment.

The work includes a literature review, methodology, description of the results and conclusion.

2. Literature review

A number of foreign economists have studied the issue of considering the stock market as an effective channel of a central bank's transmission mechanism through the logic of the "return-inflation" connection.

Thus, Ralph Chami, Thomas F. Cosimano, Connel Fullencamp in "The stock market channel of monetary policy" (1999) explain that an increase in inflation turns into a kind of "inflation tax" for security holders. This applies more to shareholders who, compared to bondholders, could potentially suffer greater losses, because fundamentally, stock prices depend simultaneously on both the firm's dividends and the value of its assets. In this regard, shareholders demand that issuers of securities, i.e., firms producing goods and services, increase their real returns. To provide acceptable real returns, firm managers are forced to increase efficiency, change the combination of factors of production involved, which will consequently change total output and employment in the economy, and, finally, inflation. The authors noted that this chain of shareholders' "influence" on firm output became possible after the mass spread of investment in securities among households, which gradually began to increase financial literacy and promote their interests.

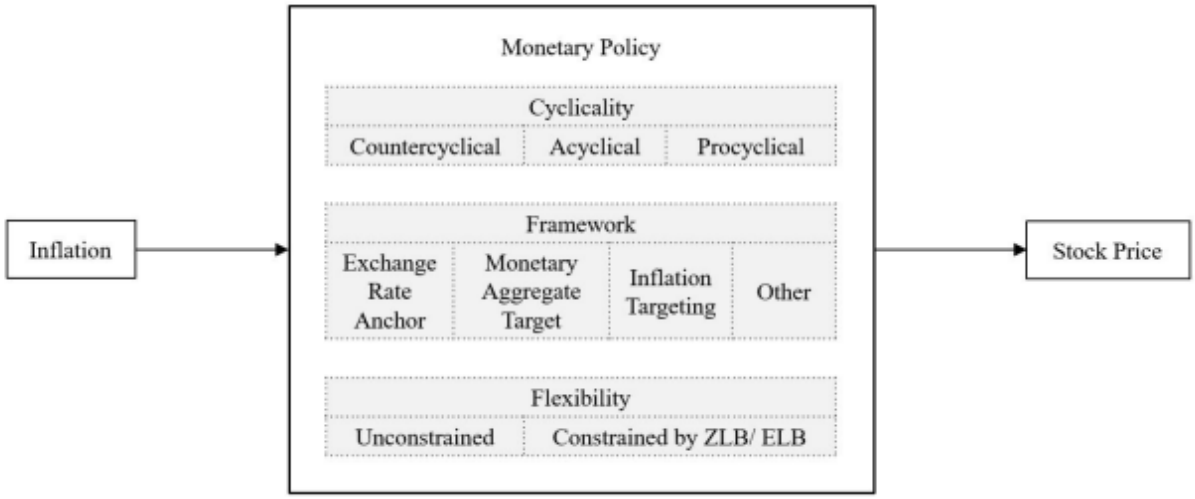
Researchers have also tried to answer the questions of how, when, i.e. under what conditions, and how central banks manage to use the stock market as an effective channel of transmission mechanism. Ralph Chami, Thomas F. Cosimano, Connel Fullencamp (1999) and Zhongxia Zhang, "Stock returns and inflation redux: an explanation from monetary policy in advanced and emerging markets" (2021), believe that a prerequisite for the success of central banks in the "stock market" channel is that the market trusts the regulator and its anti-inflation policies and is able to meet its announced inflation targets.

In 2008, Paul De Grauwe published "Stock prices and monetary policy," where he examined a strategy for practically influencing inflation through stock market returns. He concluded that central banks can influence stock prices by pursuing a "leaning against the wind" strategy in the stock market, which consists of a tighter monetary policy than prescribed by the Taylor rule in some cases and in the short term. Such monetary policy is implemented in order to reduce financial stability risks. In this case, central banks can improve the balance between output and inflation by reducing their volatility. At the same time, an effective result will

be achieved when inflation targeting is carried out with confidence in central bank policy.

It is noted that as long as the strategy of "leaning against the wind" is moderate, it is optimal and reduces the volatility of inflation, output, and stock prices. When this strategy becomes too active, it creates additional volatility in inflation and output. Consequently, the regulator's soft policies affecting stock market performance can be effective in reducing macroeconomic volatility.

Figure 1. Key Monetary Policy Elements that Affect Stock Returns and Inflation



Source: Zhang (2021)

At the same time, Paul De Grauwe draws the same conclusion as Ralph Chami, Thomas F. Cosimano, Connel Fullencamp in the study noted above, that the effective result is achievable only in conditions of inflation targeting, causing confidence of most market participants. In other words, if economic agents consider the inflation target sufficiently achievable, then the strategy considered by the author significantly improves macroeconomic performance.

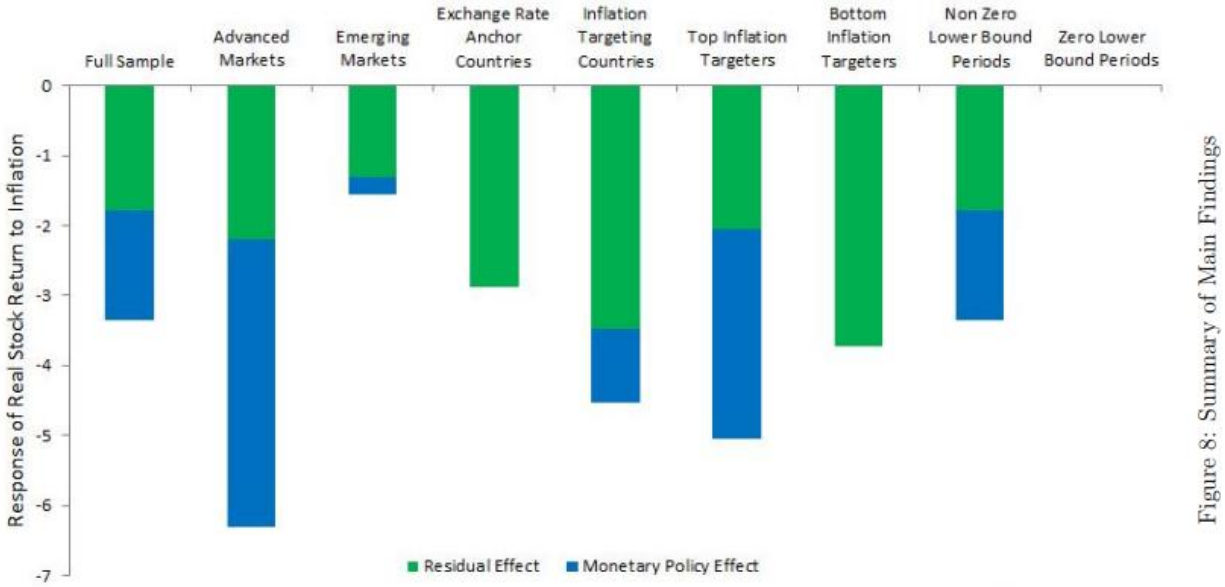
Zhongxia Zhang in "Stock returns and inflation redux: an explanation from monetary policy in advanced and emerging markets" (2021) investigated how monetary policy decisions change the degree of impact of stock returns on inflation using data from developed and developing countries. In doing so, central bank policies were classified according to three criteria: cyclicality, the regime used, and monetary policy flexibility (see Figure 1).

Zhang (2021) noted that as part of a countercyclical policy, central bank uses the interest rate to combat rising inflation, which in turn exerts downward pressure on stock returns. Regarding monetary policy flexibility, it is concluded that if interest rate changes are limited to Zero Lower Bound, then markets ignore inflation and the cyclicality of monetary policy. In other words, the results show that limited monetary policy flexibility alters the relationship between stock returns and inflation.

According to the results of the analysis according to the above criteria (cyclicality, used regime and flexibility of monetary policy) the central banks of

developed countries have the best influence on the price of shares, and the most optimal regime of monetary policy for this purpose is inflation targeting (Figure 2).

Figure 2. The results of Zhang (2021)
The relationship between stock returns and inflation



Note: Responsiveness parameters are taken from regression coefficients. Monetary policy cyclicality measures are average values in the sample.

Source: Zhang (2021)

Russian studies on the subject of central banks' influence on inflation by means of the channel of return on the stock market could not be found in the open sources. At the same time, the issue of the influence of inflation on the Russian stock market is considered from different angles in both scientific articles and popular publications for a wide range of readers. In the paper "Influence of macroeconomic factors on the dynamics of the Russian stock market" by Narzulloev M.R., Duysembaeva A.S. (2017) the exposure of the stock market to external and internal factors for the period from 2000 to 2015 was analyzed, using model estimates. The factors influencing the stock market were Brent oil price quotations, exchange rate, stock indices of developed countries, inflation rate, industrial production index, and the regulator's interest rate. It was revealed that there is a long-term relationship between macroeconomic indicators and the dynamics of the Russian stock market. At the same time, according to the variance decomposition of the dependent variable, the Russian stock market reacts more to changes in external factors (including oil prices).

The study of the domestic securities market, and, in particular, the stock market, is based on the materials of the Kazakhstan Stock Exchange (KASE), reviews of the securities market of the Association of Financiers of Kazakhstan, analytical articles of Kazakhstan experts and observers. In general, the authors consider the peculiarities of the stock market development, problems and possible ways to overcome them, analyze the infrastructure and influence of various factors on the dynamics of the securities market (hereinafter - the securities market). As in

the case of Russian literature, we could not find research works, in which the influence of central banks on inflation through the channel of stock market profitability was studied.

Based on the results of a review of the international literature on the subject under study, an attempt was made to identify the sensitivity of stock returns on Kazakhstan's securities market to the indicators used by Zhongxia Zhang, with the additional inclusion of endogenous and exogenous variables reflecting the specifics of Kazakhstan's economy.

3. Current state and trends of development of Kazakhstani securities market

The securities market in Kazakhstan during the period of independence and construction of the market economy has not been actively developed and the potential, which was forecasted by experts initially, has not been realized. Debt securities of the state, quasi-state and private sector are mainly issued and circulate at the domestic market. Thus, the aggregate share of the securities market (including transactions with government securities and corporate bonds) in the total volume of trading on KASE for 2018-2022 averaged 4.3%. Moreover, the share of shares in the total volume of securities is insignificant. Thus, at the end of 2022, the trading volume of government bonds was 6.0 trillion tenge, corporate bonds - 2.5 trillion tenge, while the equity market - 0.3 trillion tenge.

In order to give impetus to the development of equity market, the government periodically took large-scale measures such as the launch of the Regional Financial Center of Almaty (RFCA) in 2005, transformed into AIFC (Astana International Financial Center) in 2018, the program "People's IPO" (Initial Public Offering), announced in 2011.

Nevertheless, it was not possible to use the full potential of RFCA according to the developed concept, because the proposed format of the center - independent from the state authorities, with wide opportunities for investors and with a separate court, working in accordance with international law, in English - was not implemented in practice. Thus, one of the key factors that reduced investors' confidence in RFCA was the consideration of disputes between parties to transactions by the local district court, instead of the court working on the basis of English continental law. Later on this disadvantage was taken into account during the launch of the MFCA, however, there were still certain aspects that reduced the attractiveness of the Kazakhstan stock market for foreign investors.

Another measure of the state for formation of a wide class of holders of shares in the country, reduction of a share of the state in economy and increase of a degree of transparency and public control over subjects of quasi-business sector became realization of "people's IPO". Analyzing the results of the initial public offerings of KazMunayGas Exploration Production JSC, Kazakhtelecom JSC and KazTransOil JSC held before 2018, experts noted that not all of them were really "people's". In addition, the expectations of new shareholders were overstated (for example, the shares of Kazakhtelecom JSC which went public in 2006 fell below the offering

price from Q4 2007, and only in 2018 the company's quotations exceeded the levels of IPO). In general, the above-mentioned objectives of the "people's IPO" have not been solved and continue to be relevant for Kazakhstan.

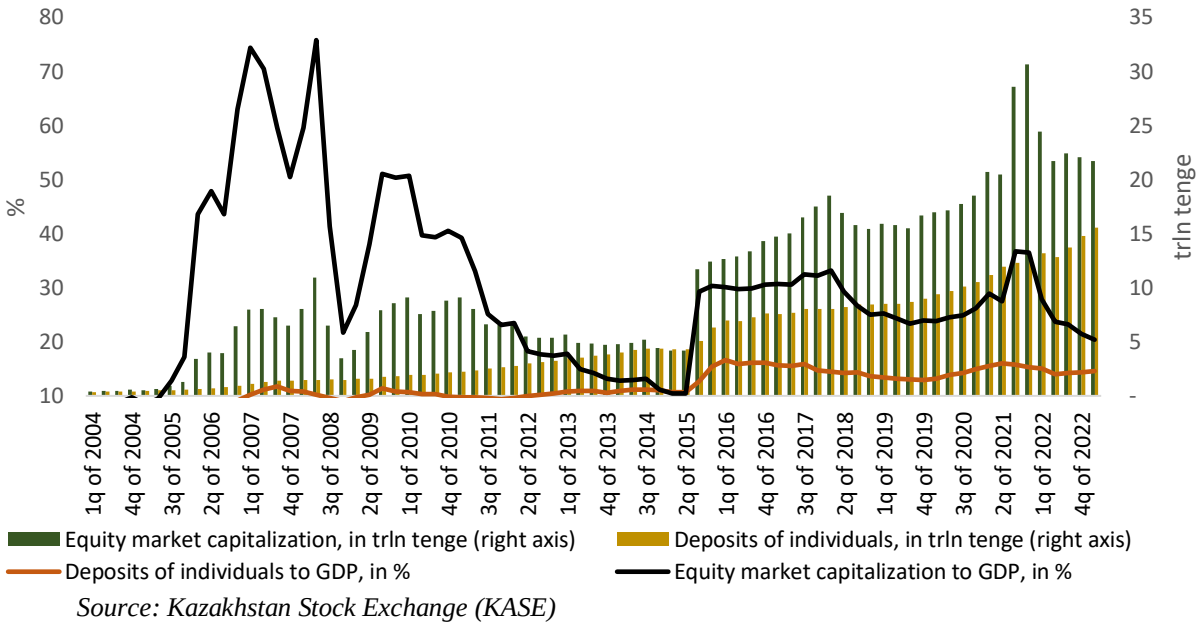
In addition, the decision to create Unified Accumulative Pension Fund excluded a whole class of financial market participants, which were also targeted by the "people's IPO". Earlier private accumulative pension funds (hereinafter - APF) maintained liquidity on the secondary securities market, contributed to the establishment of a more adequate market value of shares after the placement and reduced the volatility of share prices. With an exit of private APFs from the market, the number of exchange members decreased and there was a gradual decline in activity in the domestic stock market.

A number of major national companies had planned IPOs, but only a few of them implemented the process. The inability to launch IPOs of even the most prepared companies assumes that the real sector companies probably have: problems with the quality of assets, the weak level of corporate governance, non-transparent structure of shareholders of potential issuers.

Nevertheless, the IPO of JSC NC "KazMunayGas" in December 2022 in an active use of digital technology was quite successful. The Company attracted more than 153 billion tenge by selling just 3% of the total number of ordinary shares offered, with individuals and legal entities almost equally buying back the amount of shares offered (48.5% and 47.2% respectively).

As compared to stock market instruments, banking products are more widespread in the country, and as a savings instrument, deposits are traditionally preferred by most retail investors of average income due to their comprehensibility and accessibility, protection and, in recent years, rather high (relative to inflation) yields (Figure 3).

Figure 3. Deposits of individuals and equity market capitalization, in trln tenge (right axis) and in % of GDP

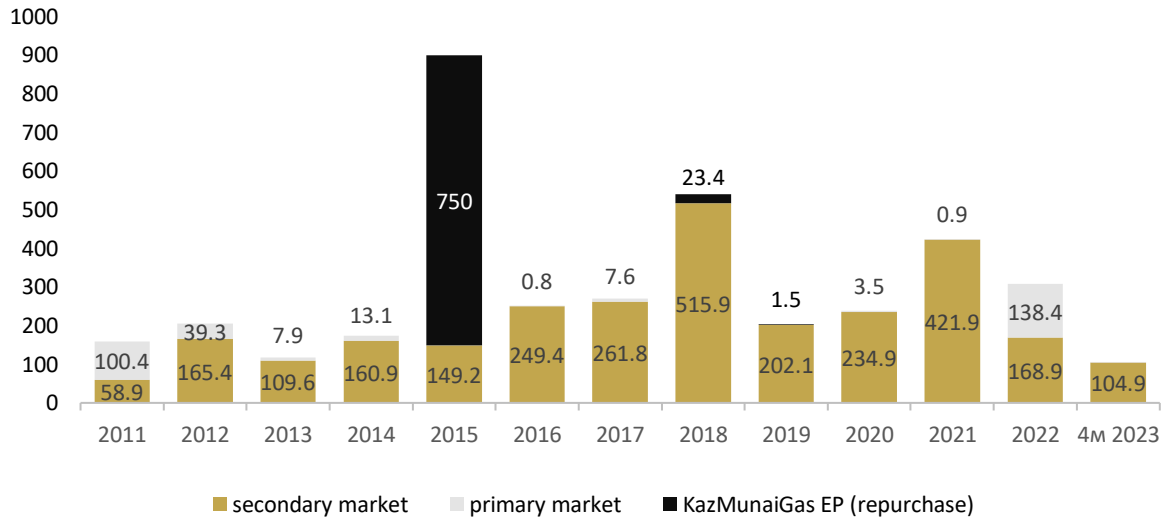


Source: Kazakhstan Stock Exchange (KASE)

Despite the fact that capitalization of the equity market is higher in absolute terms, the dynamics of deposits is less volatile and has a stable upward trend compared to the market capitalization of equities of individuals. There was an accelerated growth of capitalization of equity market in the second half of 2021, however, later on the indicator had a downward trend while the upward dynamics of the volume of deposits remained.

Noticeable peaks in certain years are explained by one-time events: in 2015, the main growth factor was the inclusion of KazMunayGas NC JSC's common shares in the official list of KASE. The transaction resulted in a threefold one-step growth of the stock market capitalization and an increase in the annual trading volume by KZT750 billion (Figure 4).

Figure 4. The volume of transactions in the equity market, in bln tenge



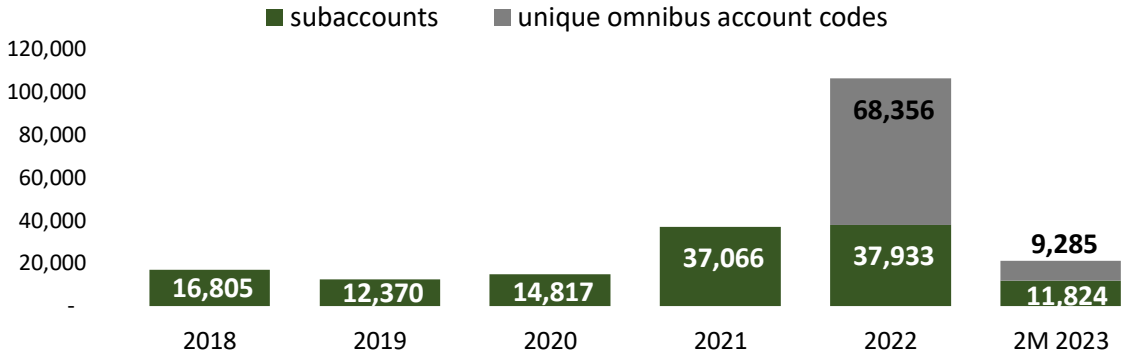
Source: Kazakhstan Stock Exchange (KASE)

In 2018, 21 share issues of 18 issuers went through the listing procedure (11 new listings in 2017), including 14 issues of 13 new issuers (Asker Munai Exploration JSC, Bank CenterCredit JSC, National Atomic Company Kazatomprom JSC, Shubarkol Komir JSC, etc.).

Equity market rebound in 2021 was part of a general increase in stock market activity, and was attributed to an economic recovery from pandemic restrictions, higher uranium and other energy prices, and accelerated digitalization.

In 2021, among the factors of the stock market development are the addition of new instruments (including high-yield bonds of microfinance organizations), removal of restrictions on the admission of units of investment funds (UIF) to the stock exchange and expansion of the list of instruments allowed for investment by investment fund managers, green and social bonds (Figure 5).

Figure 5. Dynamics of active retail investors



Reference: Omnibus account is an account for accounting of financial instruments opened in the Central Securities Depository of Kazakhstan, where a trade participant can account assets of several clients. These accounts are an alternative to the segregated accounting of brokers' client assets in the Central Securities Depository, in which a separate account is opened for each client.

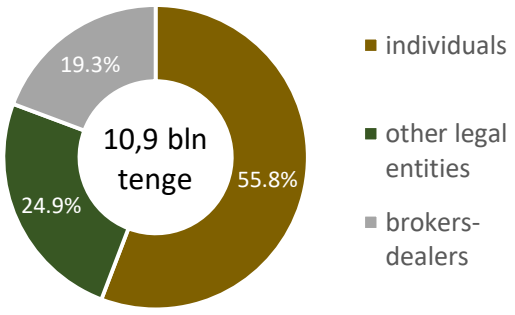
Source: Kazakhstan Stock Exchange (KASE)

The main reason for this growth in the number of retail investors was digitalization. Thus, as a result of the joint work of the National Bank and the Agency for Regulation and Development of Financial Market, a technical possibility and a legal basis for remote identification using biometric data were created. In their turn brokers actively used this tool and according to the data of the Central Depository the number of brokers engaged in development of retail segment has grown from 1-2 to 5 with over 20 thousand clients' accounts opened in the system.

According to experts' assumptions the real figures on the number of retail investors in Kazakhstan may be higher, since the citizens have the opportunity to open accounts in foreign jurisdictions and trade abroad.

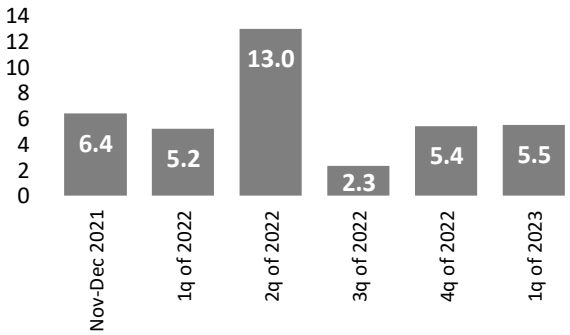
On November 15, 2021 KASE launched trading in foreign stocks in a new sector named KASE Global (Figures 6 and 7). The initial set of instruments included U.S. stocks already listed on KASE, as well as securities from the S&P 500 and NASDAQ Global 100 indices. At the moment, the new segment includes 41 shares, including the securities of Amazon, Boeing, Netflix and others, previously unavailable on Kazakhstan platforms. In future KASE plans to expand the list of traded instruments.

Figure 6. Shares of main types of investors in 3M 2023



Source: Kazakhstan Stock Exchange (KASE)

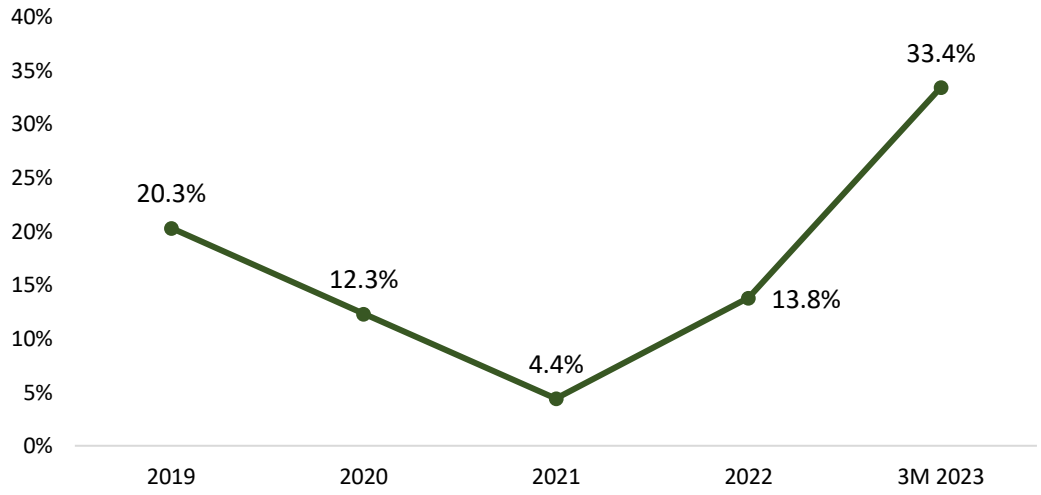
Figure 7. Trading volume on Kase Global, bln tenge



Along with this, it should be noted the work conducted by the Agency for Regulation and Development of Financial Market on protection of market participants' interests, first of all, investors from unscrupulous brokers (example: prohibition of unlicensed companies to consult on deals with securities), increase of brokers and portfolio managers' responsibility before clients as well as on revealing of unscrupulous players.

In 2022, after the imposition of harsh sanctions against the Russian financial market, investors began to look for safer and more profitable markets; accordingly, brokers followed them (Figure 8). Despite its small size, Kazakhstan's securities market is of interest to Russian players, at the same time, the Kazakhstani side approaches issues of cooperation taking into account the risks of sanctions regime violation.

Figure 8. Share of non-residents in the gross turnover of equity trading (the total amount of purchases and sales of bidders, excluding large transactions), %



Source: Kazakhstan Stock Exchange (KASE)

The results of 2022 both for Kazakhstan's securities market as a whole and for the stock market in particular were quite low - for the first time since 2015 KASE index finished the year with a decline of 11.5%, equity market "sagged" by 26%. Geopolitical reasons, growth of interest rates and revision of dividend policies were the main factors that reduced the opportunities and risk appetite of investors in 2022. Nevertheless, in 2023 trading showed a recovery in activity: in the first quarter the stock market grew by 47% compared to the same period of the previous year, while equity market grew by 2.2 times.

Thus, having analyzed the dynamics and trends of development of the market of shares in Kazakhstan, it is possible to conclude about absence of sufficient volumes of the market and the degree of its development, mass investments in it by ordinary households, i.e. those key preconditions which make it possible to use this market in transmission of the central bank.

Low level of investment literacy of the population, insufficient level of welfare of the population and number of citizens willing to invest their savings at

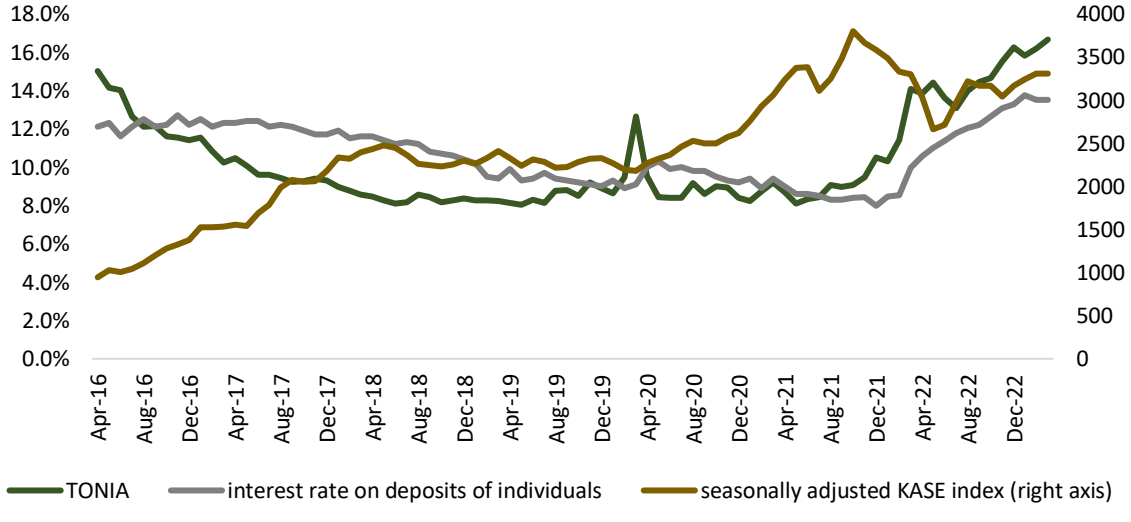
the stock market as well as low risk appetite of Kazakhstan citizens impede mass expansion of retail investment at the securities market.

Nevertheless, in recent years there have been positive changes and new impulses in the development of the securities market, including the introduction of digitalization of processes, removal of barriers to international trade, and improvement of investor protection. For example, the above-mentioned growth in the number of retail investors was ensured by facilitated access to stock market transactions via mobile banking applications.

In 2023 KASE plans to scale technical solutions and create a subsidiary company to act as a central counterparty, which guarantees the payment of securities transactions, which will increase the reliability of the stock market and attract the inflow of investors. It will also expand the range of services by including not only the stock market, but also other trading platforms, commodity exchanges and over-the-counter market.

The Agency for regulation and development of the financial market within the framework of solving problems on strengthening of investor base, increase of quantity of high-quality financial instruments and introduction of new issuers into the market during the last two years conducts systematic work. In order to involve investors in financing of small and medium-sized businesses through the stock market it is envisaged to subsidize interest rate on bonds (final rate for the issuer is 6%, without the need for collateral), as well as guarantees 50% of the principal amount up to 2.5 billion tenge by "Damu" Entrepreneurship Development Fund. Financial institutions are allowed to purchase these bonds in portfolios. Differentiated capital requirements for brokers were introduced to reduce market barriers and strengthen competition.

Figure 9. KASE index (seasonally adjusted), TONIA, and interest rates on deposits of individuals for the period from April 2016 to March 2023



Source: NBRK and KASE

Thus, it can expected that simplifying access for a wide range of investors to participate in stock market transactions, increasing transparency and guarantees in

transactions, and improving infrastructure will remove existing barriers to the development of the securities market and create the basis for its intensive growth.

Since this paper attempts to consider the stock market as a channel of central bank's influence on inflation, it is advisable to cite dynamics and analyze the relationship between relevant variables.

Thus, examining the dynamics of KASE index, the yield of retail deposits and the risk-free rate TONIA which is an operational benchmark of the monetary policy (Figure 9), it is necessary to note unidirectional relationship between deposit rates and TONIA which may testify to noticeable sensitivity of price conditions of bank products to changes in monetary conditions. At the same time, with regard to the KASE index and TONIA, it can be noted that in some periods (early 2016 to mid-2017, late 2021 to mid 2022) there was a negative correlation, which may indicate some corrective influence within the asset price channel from the perspective of monetary policy transmission.

At the same time, it is difficult to unequivocally assert the presence of quantitative influence of changes in monetary conditions on stock market indicators, because the dynamics of KASE index during the periods noted was subject to changes in the situation on world commodity markets and the geopolitical situation. So in 2017 there was a recovery of growth of oil quotations, since February 2022 - a sharp deterioration in the geopolitical situation. In the next part of the paper, these relationships will be empirically evaluated using econometric models.

4. Methodology and data

For the empirical analysis, we used a vector autoregressive model with an exogenous variable using "Choletsky decomposition method". Given the availability of data, the monthly frequency rates before (from February 2004 to June 2015) and during the period of inflation targeting (from March 2016 to March 2023) were used.

Vector autoregressive model (VAR) estimates series of equations in which each variable is expressed as a linear combination of that variable and all other variables in the system. In the VAR model, the current values of each variable depend on its earlier, i.e., historical/lagged values. A VAR model with an exogenous variable is called a VARX. In turn, an exogenous variable is a variable that affects other variables in the model but is not itself affected by them.

The general formula of the model is as follows:

$$y_t = c + \sum_{i=1}^{p} A_i y_{t-i} + B_t x_t + \varepsilon_t,$$

where c – vector of intercepts, y_t – vector of endogenous variables, A_i – matrix of coefficients of endogenous variables, x_t – vector of exogenous variables, B_t – matrix of coefficients of exogenous variables, and ε_t – vector of residuals.

Within the framework of estimation of the stock market sensitivity to the actions of the central bank, the dependent variable was the return of KASE index. The broad money supply (M3), annual inflation and weighted average rate on

deposits of individuals in national currency were used as endogenous variables, which was chosen as an indicator reflecting monetary policy decisions.

Despite the use in various studies of a narrower representation of the money supply (Zhang (2021)), this paper considers the broad money supply (M3), which takes into account to a greater extent the structure of Kazakhstani economy with a high share of imports in the consumption of goods and a significant level of dollarization.

Bond yields are considered as the main investment instrument in developed countries in various studies, as the growth of the central bank key rate increases the attractiveness of the bond market compared to equity market. However, in developing countries, including Kazakhstan, due to insufficient development of the stock market and the bond market in particular, deposits are more preferable, simple and less risky instrument for investments by the population.

As an exogenous variable, we used the US index return (S&P500), which reflects the return of the global stock market and the situation in the global economy. Given the export-oriented nature of Kazakhstan's economy, it is assumed that the dynamics of the KASE index depends on the situation on the global stock markets and the economy.

Table 1. The data

Variables	**Source**
KASE index	Thomson Reuters
Broad money supply (M3)	National Bank of Kazakhstan
Annual inflation	Bureau of National Statistics of Kazakhstan
Weighted average rate on deposits of individuals in tenge	National Bank of Kazakhstan
S&P500 index	Thomson Reuters

Source: compiled by the authors

In order to build the model, all variables were cleared from seasonality using CENSUS-13 within the statistical package EVIEWS (within the seasonal clearing each variable added index d11) and converted into logarithms, except for TONIA rate. Thus, the first difference of logarithmic indicators demonstrates the following: in the index (KASE, S&P500) - monthly returns, in the broad money - the percentage change per month.

Due to the fact that the VAR model is based on the method of least squares, one of the main conditions for its application is the stationarity of the used variables. Augmented Dickey-Fuller test and Phillips-Perron test were used to test the variables for stationarity (Table 2).

Table 2a. Stationarity test of variables (before inflation targeting)

Variables	**Augmented Dickey-Fuller test**	**Phillips-Perron test**
	H_0: the variable has a unit root (nonstationary)	H_0: the variable has a unit root (nonstationary)

log(kase$_{d11}$) (KASE index)	at level	0.1004	0.1061
	first difference	0.0000***	0.0000***
log(m3d11) (broad money supply)	at level	0.0000***	0.0000***
	first difference	0.0000***	0.0000***
infl_yy$_{d11}$ (annual inflation)	at level	0.0367**	0.2739
	first difference	0.0000***	0.0002***
dep_fizd11 (interest rate on deposits of individuals in tenge)	at level	0.0760*	0.0087***
	first difference	0.0000***	0.0001***
log(snp$_{d11}$) (S&P500 index)	at level	0.9287	0.8268
	first difference	0.0000***	0.0000***

*** at 1% significance level, ** at 5% significance level, * at 10% significance level

Table 2b. Stationarity test of variables (during the period of inflation targeting)

Variables		**Augmented Dickey-Fuller test**	**Phillips-Perron test**
		H_0: the variable has a unit root (nonstationary)	H_0: the variable has a unit root (nonstationary)
log(kase$_{d11}$) (KASE index)	at level	0.0925*	0.0512*
	first difference	0.0000***	0.0000***
log(m3d11) (broad money supply)	at level	0.9934	0.9988
	first difference	0.0000***	0.0000***
infl_yy$_{d11}$ (annual inflation)	at level	0.3392	0.7944
	first difference	0.0003***	0.0003***
dep_fizd11 (interest rate on deposits of individuals in tenge)	at level	0.7021	0.4826
	first difference	0.0000***	0.0000***
log(snp$_{d11}$) (S&P500 index)	at level	0.6350	0.6487
	first difference	0.0001***	0.0001***

*** at 1% significance level, ** at 5% significance level, * at 10% significance level

Source: compiled by the authors

According to the results of the tests, most of the initial seasonally adjusted variables are non-stationary at 5% significance level, the first difference of the variables leads them to a stationary form. Accordingly, the first differences of the variables were used to construct a vector autoregressive model. The optimal number of lags for the model was determined based on the Schwarz (SC) and Hannan-Quinn (HQ) information criteria. At the same time, in case of uncorrected sign of the variables with respect to economic interpretation, the number of lags was revised.

5. Discussion of the results

Before inflation targeting

The results of the model showed a positive correlation between annual inflation and stock market returns in the period before inflation targeting. The nature of this relationship is probably determined by the following:

-before inflation targeting, the monetary policy in Kazakhstan did not actively respond to inflationary processes;

-the "demand" of shareholders for an inflation premium for owning shares. Signs of coefficients of other considered variables in the model from the point of view of economic interpretation of their influence on KASE index are correct, however, many of the variables are statistically insignificant (Table 3).

Table 3. The result of vector autoregressive model with exogenous variable
(before inflation targeting)

Dependent variable: **dlog($KASE_{d11}$)**					
dlog($KASE_{d11}(-1)$)* **	*coeff*	0.32	**dlog($M3_{d11}(-1)$)**	*coeff*	0.09
	t-stat	4.00		*t-stat*	0.30
	p-value	0.00		*p-value*	0.77
d(infl_$yy_{d11}(-1)$)	*coeff*	0.20	**d(dep_$fiz_{d11}(-1)$)**	*coeff*	-0.86
	t-stat	0.19		*t-stat*	-0.94
	p-value	0.85		*p-value*	0.35
C	*coeff*	0.00	**dlog(snp_{d11})*** **	*coeff*	1.08
	t-stat	0.28		*t-stat*	5.00
	p-value	0.78		*p-value*	0.00

*** at 1% significance level, ** at 5% significance level, * at 10% significance level*
Source: compiled by the authors

According to the results, the influence of endogenous variables on KASE index is insignificant, except for the previous value of the index itself. Also, in this period, the index reacted more to changes in the foreign economic situation (Table 3). Apparently, the dynamics of S&P500 index affects the dynamics of KASE index (which includes the companies of the following sectors: oil and gas industry, banking sector, communication, power transmission, oil transportation) as follows: S&P500 index is the proxy indicator of world economy development and global demand. Decrease of global demand, as well as crisis phenomena in the world economy (developed countries) negatively influence on world stock markets, where some Kazakhstan companies are quoted. At the same time there is a decrease in

demand for Kazakhstan export products. Two above-mentioned channels, in their turn, lead to decrease of KASE index.

To confirm the obtained results, Granger causality test was additionally conducted, according to which none of the endogenous variables is the cause of changes in the dynamics of Kazakhstan's stock market (Table 4).

Table 4. Granger causality test results

Dependent variable: ***dlog(KASE$_{d11}$)***			
Excluded	**Chi-sq**	**Df**	**Prob.**
dlog(M3$_{d11}$)	0.09	1	0.77
d(infl_yy$_{d11}$)	0.04	1	0.85
d(dep_fiz$_{d11}$)*	0.89	1	0,35
All*	***1.00***	***3***	***0,80***

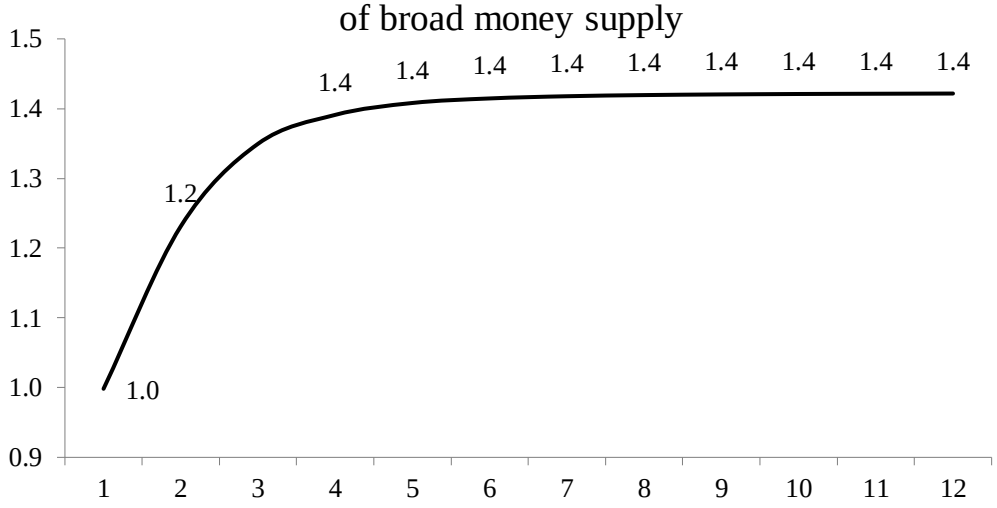
**** at 1% significance level, ** at 5% significance level, * at 10% significance level*
Source: compiled by the authors

In order to quantify the impact of the variables on the change in KASE index returns, the analysis of impulse responses based on the constructed model has been carried out. The impulse response characterizes the time of the return of the dependent variable to its equilibrium value under a one-step shock of the independent variable in a given size: one percent, one standard deviation from the equilibrium value.

According to the results of impulse responses, a 1 p.p. positive broad money shock results in an annual cumulative 1.4 p.p. growth of the KASE index. This demonstrates that part of the money supply increase is sent to the stock market generating demand for equities and thus positively affecting its returns (Figure 10).

Figure 10. Impulse response of vector autoregressive model

a) Cumulative response of KASE index to the shock of broad money supply

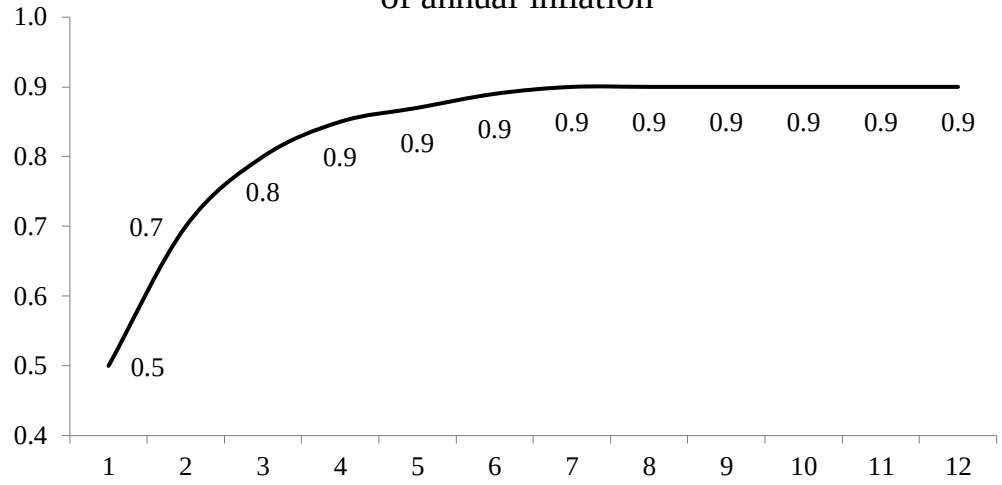


Source: compiled by the authors

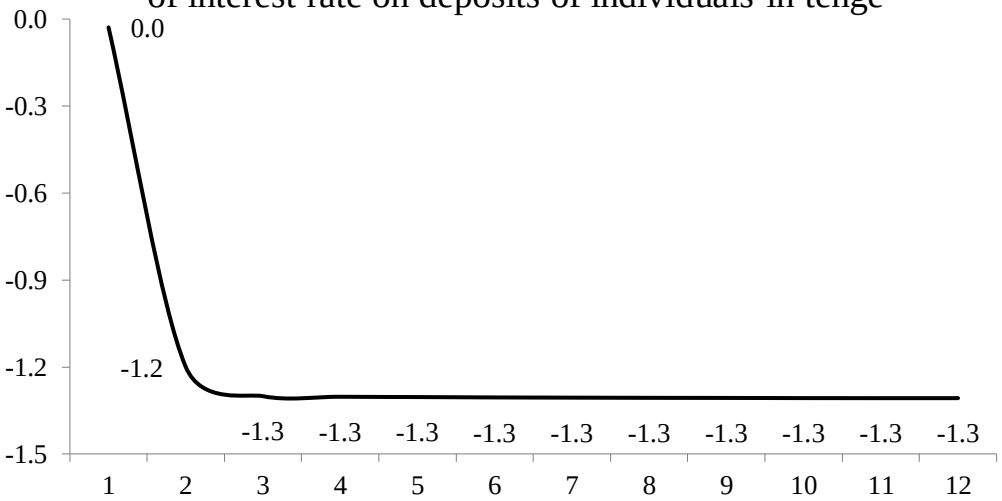
The effect of an annual inflation shock on stock market returns explains that stock market returns compensate for the rise in annual inflation. With a positive 1 p.p. shock of rates on deposits of individuals in the national currency, KASE index yields cumulatively decrease by 1.3 p.p. over the year, thereby demonstrating the flow of investors from stock market to deposit market (Figure 10b-c).

Figure 10b-c. Impulse response of vector autoregressive model

b) Cumulative response of KASE index to the shock of annual inflation



c) Cumulative response of KASE index to the shock of interest rate on deposits of individuals in tenge



Source: compiled by the authors

During the period of inflation targeting

With inflation targeting, the effect of macroeconomic indicators became more significant. However, many of the variables still remain statistically insignificant (Table 5).

According to the results, during the period of inflation targeting, the influence of the foreign economic situation, expressed through its proxy indicator - the S&P index, became weaker. At the same time, the dynamics of returns on Kazakhstani

equity market became more susceptible to changes in domestic market conditions. Thus, the effect of money supply and rate on deposits in national currency also became more pronounced compared to the period before inflation targeting. In addition, the sign of the influence of annual inflation on KASE index changed and the influence became negative, indirectly testifying to some influence of monetary policy on return of Kazakhstani equity market (Table 5).

Table 5. The result of vector autoregressive model with exogenous variable
(during the period of inflation targeting)

Dependent variable: **dlog($KASE_{d11}$)**					
dlog($KASE_{d11}$(-1))* **	*coeff*	0.27	**dlog($M3_{d11}$(-1))**	*coeff*	0.12
	t-stat	2.59		*t-stat*	0.62
	p-value	0.01		*p-value*	0.54
d(infl_yy_{d11}(-1))	*coeff*	-0.78	**d(dep_fiz_{d11}(-1))**	*coeff*	-1.80
	t-stat	-1.40		*t-stat*	-1.49
	p-value	0.16		*p-value*	0.14
C **	*coeff*	0.01	**dlog(snp_{d11})**	*coeff*	0.17
	t-stat	2.01		*t-stat*	1.61
	p-value	0.05		*p-value*	0.11

*** at 1% significance level, ** at 5% significance level, * at 10% significance level*
Source: compiled by the authors

The result of Granger causality test also demonstrates a more pronounced effect. However, despite the increase in influence, at the significance level of 10% the effect of the variables also remains insignificant and is not the cause of changes in the returns on the stock market of Kazakhstan (Table 6).

Table 6. Granger causality test results

Dependent variable: ***dlog($KASE_{d11}$)***			
Excluded	**Chi-sq**	**df**	**Prob.**
dlog($M3_{d11}$)	0.38	1	0.54
d(infl_yy_{d11})	1.95	1	0.16
d(dep_fiz_{d11})*	2.22	1	0,14
All*	***4.65***	***3***	***0,20***

*** at 1% significance level, ** at 5% significance level, * at 10% significance level*
Source: compiled by the authors

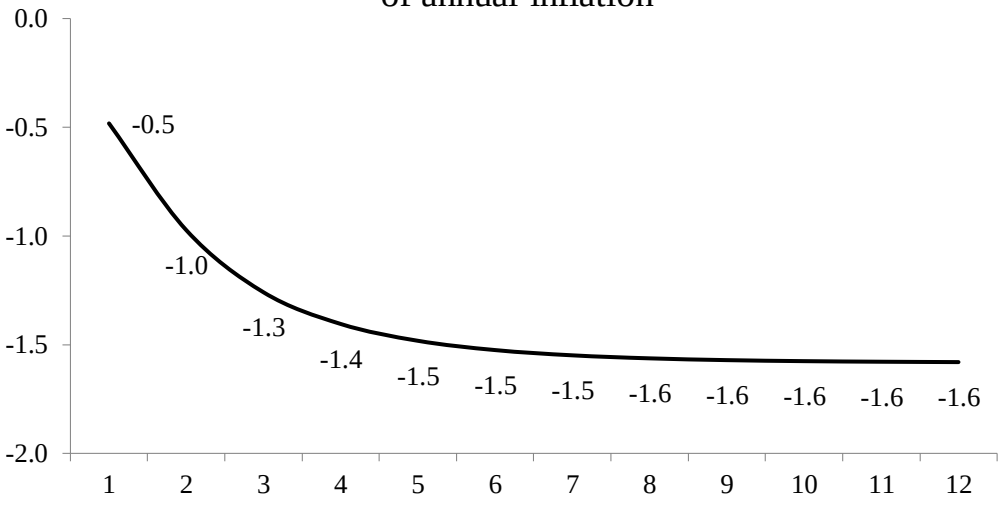
Turning to quantitative assessment of the impact, it is noted that a positive annual inflation shock of 1 p.p. leads to a cumulative decrease in the KASE index for the year by 1.6 p.p. (Figure 11b). Apparently, during the inflation targeting period the concept of "demanding" inflation tax from companies by shareholders is not fulfilled as after implementation of this monetary policy regime the inflation decrease was accompanied by improvement of the situation in the foreign sector and easing of monetary conditions (hereinafter - MCI), the inflation increase - by deterioration of the foreign economic situation and tightening of MCI. Thus, in 2020 KASE index decreased in response to quarantine measures and reduction of prices

for key export products of Kazakhstan, in 2022 - in the context of geopolitical crisis between Russia and Ukraine.

Figure 11a-b. Impulse response of vector autoregressive model

a) Cumulative response KASE index to the shock of broad money supply

b) Cumulative response of KASE index to the shock of annual inflation



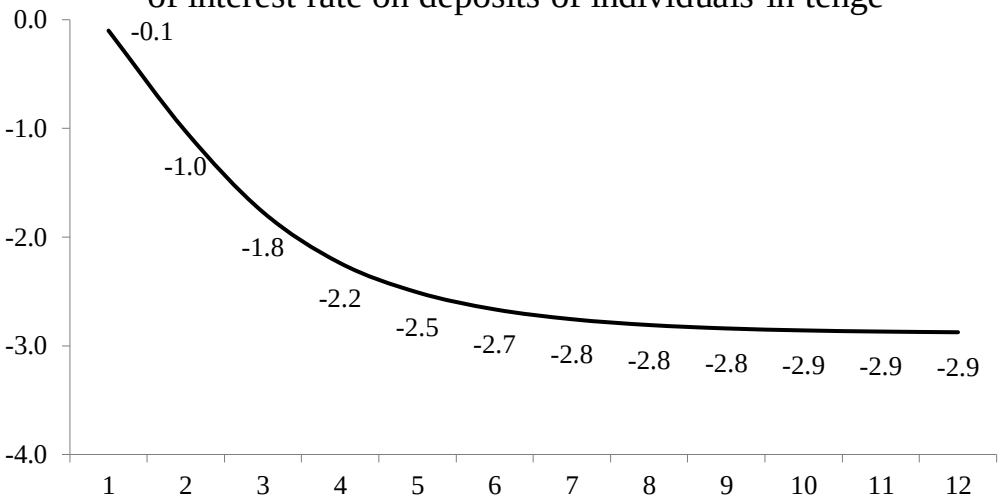
Source: compiled by the authors

The results of impulse responses showed that a positive 1 p.p. shock of broad money supply leads to a 0.3 p.p. growth of the KASE index cumulatively over the year (Figure 11a). In our view, the impact of the money supply on KASE index occurs in the same way as in other developed countries: the expansion of the money supply is an implicit easing of monetary conditions. This leads to an increase in inflation expectations and risk appetite, and as a result contributes to growth in the stock market. Nevertheless, this hypothesis should take into account that in 2020 and 2021 the growth of KASE index was accompanied not only by a significant

expansion of the money supply, but also by the active implementation of digitalization in trading instruments in the stock market.

Figure 11c. Impulse response of vector autoregressive model

c) Cumulative response of KASE index to the shock of interest rate on deposits of individuals in tenge



Source: compiled by the authors

Regarding the moderate impact of the money supply on KASE index, it is worth noting that the potential higher impact is limited by the underdevelopment of the stock market. Thus, during the pandemic of coronavirus the funds allocated by the Government were mainly directed to crediting the economy.

At the same time, a 1 p.p. increase in the rate on deposits of individuals in tenge leads to an accumulated decrease in KASE index by 2.9 p.p. over the 12 months since the shock (Figure 11c). The resulting "high" quantitative impact is probably also due to the fact that periods of significant deterioration in the foreign economic situation (quarantine measures in 2020, geopolitical crisis in 2022 between Russia and Ukraine) were accompanied by significant changes in monetary conditions and, consequently, in deposit rates. For example, the reduction of the TONIA rate against the background of softening of the MPC in April 2020 had a lag effect on the rates on deposits of individuals, as well as on the growth of the KASE index in the following months. Against the background of an increase in the prime rate in February 2022, the TONIA rate rose by 2.7 p.p. in March and was accompanied by a rise in rates on retail deposits thereafter. At the same time, there was a decrease in the KASE index by 9.4% in April and by 12.3% in May 2022. As a result, the risk-appetite decreases and the attractiveness of bank deposits increases compared to the instruments of the stock market.

The above-described results demonstrate a higher reaction of KASE index to changes in macroeconomic indicators during the period of inflation targeting. It probably testifies about strengthening of such channel, as prices of stock market assets, the transmission mechanism of monetary policy of the National Bank of Kazakhstan. At the same time, the effect is still weak.

6. Conclusion

This study analyzed the possibility of using the stock market as a potential channel of central bank transmission in the fight against inflation.

Based on the results of the study of international works, including Russian researchers, logical cause-and-effect relationships describing the mechanism of monetary policy influence on stock market yields were formulated.

In order to present the specifics of the Kazakhstan stock market, the important stages of development and the current situation were considered. At the same time, in order to identify the factors affecting the stock market return, a vector autoregressive model with the inclusion of an exogenous variable was built.

Thus, the dependent endogenous variable was KASE index return, other endogenous variables - broad money supply (M3), inflation and as a proxy of the monetary policy variable - weighted average rate on individuals' deposits in national currency; the exogenous variable reflecting the return in the world stock market - US index return (S&P500).

The periods before and after the transition of the National Bank to inflation targeting were considered within the framework of quantitative assessment.

According to the results, before the transition to inflation targeting the impact of endogenous variables on KASE index is insignificant, except for the previous value of the index itself. Also, during this period the index was more responsive to changes in the foreign economic environment. According to the obtained results of impulse responses, a positive 1 p.p. annual inflation shock in the period before inflation targeting leads to a 0.9 p.p. growth of KASE index cumulatively for the year. The effect of the annual inflation shock on equity market returns probably indicates that shareholders "demand" the inflation tax from companies. With a positive 1 p.p. shock of rates on individuals' deposits in national currency, KASE index yields cumulatively decrease by 1.3 p.p. over the year, reflecting a possible outflow of investors from the stock market to the deposit market.

During the inflation targeting period, the effect of endogenous variables, i.e. macroeconomic indicators, became stronger, while the influence of the external economic environment, expressed through the S&P index, weakened. During the inflation targeting period, a positive 1 p.p. annual inflation shock leads to a 1.6 p.p. decrease in the KASE index cumulatively for the year; a 1 p.p. increase in the rate on tenge-denominated retail deposits - KASE index annual decline by 2.9 p.p. within 12 months since the shock. Apparently, in this period the concept of "demanding" inflation tax from companies by shareholders is not fulfilled, as after introduction of this monetary policy regime the inflation decrease was accompanied by improvement of the situation in the external sector and mitigation of monetary conditions, the inflation increase by worsening of the external economic situation and tightening of monetary conditions.

Thus, with the transition to inflation targeting, the dynamics of returns on Kazakhstani equity market became more susceptible to changes in domestic market conditions, including the impact of monetary policy. It, probably, testifies about strengthening of such channel of transmission mechanism of monetary policy of the National Bank of Kazakhstan as prices for stock market assets. At the same time the effect is still weak. In addition, Granger causality test at 10% significance level shows that the effect of variables remains insignificant and is not the cause of changes in Kazakhstan stock market returns. Taking this into account, the results obtained in the work may reflect not only the hypothesis about strengthening of the transmission mechanism, but also partially the influence of other unaccounted in quantitative form factors: the breakthrough in digitalization during the pandemic, the listing of certain companies on foreign stock exchanges, the IPO of NC KazMunayGas JSC, etc.

It should be noted that, in general, statistical insignificance of many variables was observed for the two noted periods.

Based on the results obtained, we can conclude that the necessary economic prerequisites for the use of stock returns to influence the volume of output and inflation are gradually forming in the domestic economy.

At the same time, the volume of stock market in Kazakhstan at present is relatively small, the volume of trading in shares is much inferior to that in government and corporate bonds. With the development of the stock market infrastructure and the volume of equity market, its use for effective monetary policy may become a promising direction of the transmission mechanism of the National Bank.

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