

ECONOMIC REVIEW
National Bank of the Republic of Kazakhstan

No. 4, 2021

ECONOMIC REVIEW
National Bank of the Republic of Kazakhstan

Published by: National Bank of the Republic of Kazakhstan

Editorial Board

Chairperson of the Editorial Board

Deputy Governor of the National Bank Baimagambetov A.M.

Editorial Board:

Head, Monetary Policy Department

Head, Financial Stability and Research Department

Head, Balance of Payments Department

Head, Monetary Operations Department

Head, Department of the Development of Financial Organizations

Person responsible for releasing the publication – a staff of the Research and Analytics Center

The point of view and opinions of the authors do not reflect the official standpoint of the National Bank of the Republic of Kazakhstan and may not coincide with it.

ISSN 2789-3308

ECONOMIC REVIEW
National Bank of the Republic of Kazakhstan

No. 4, 2021

CONTENTS

Challenges to the Macroeconomic Modeling of Kazakhstan: Component Elements, Methods And Goals <i>Khakimzhanov S.T.</i>	4
Central Bank's Communication Policy <i>Turekhanova N.E., Mekenbayeva K.B.</i>	27
Development Prospects of the National Bank's Bullion Coins and Minted Bars as an Instrument of Investment <i>Kazhmuratov Zh.T., Shalgynbayev K.U., Maidanov S.Zh., Tabarak Y.Zh</i>	37

CHALLENGES TO THE MACROECONOMIC MODELING OF KAZAKHSTAN: COMPONENT ELEMENTS, METHODS AND GOALS

Khakimzhanov S.T. – Independent Expert (at the time of submission – Director of Department – Research and Analytics Center of the National Bank of the Republic of Kazakhstan)

The paper discusses the problems of macroeconomic modeling in Kazakhstan as a task of choosing the subject of analysis, the level of abstraction, the ability to describe the behavior of agents and the economic policy questions that the model is intended to answer. The inclusion of certain elements into the model is considered from the point of view of their ability to reflect the most relevant trade-offs of economic policy – between short-term and long-term goals, between rates of growth and its quality. The paper shows that a necessary condition for modeling the main balances of macroeconomic policy is the presence of state variables in the model. Examples from the recent economic history of Kazakhstan illustrate the need to model the impact of the level of government spending and the way it is financed on competitiveness and inflation; the mechanisms for building exchange rate expectations and demand for tenge assets; the dependence of credit quality on capital adequacy of banks and the operating efficiency of enterprises on their capital structure, heterogeneity in income distribution, labor market qualifications and household saving patterns. The purpose of the study is to help the developer identify priorities when choosing model elements, provide the customer with criteria for assessing the adequacy and usefulness of the model, put the user's finger on limitations in its applicability and help interpret its results in a more prudent way.

Key Words: macroeconomic modeling, macroeconomic model, macroeconometric model, Lucas critique.

JEL-Classification: B41, C68, E17, E52, E62.

1. Preamble and Motivation

At the current level of the economic science development, the construction of a universal applied macroeconomic model with a behavioral microstructure is not a well-formulated and methodologically consistent task. Despite significant progress over the past forty years, the models used in the macroeconomic policy analysis, especially by monetary policy authorities, remain controversial. Criticism of their methodological shortcomings, albeit often perceived as unjustifiably categorical, overgeneralizing and requiring the abandonment of model construction, is well-reasoned and generally fair at its best (as, for example, Chari, Kehoe & McGrattan (2008), Constancio (2017)).

Kazakhstan's macroeconomic models in this regard do not stand out from the general trend. The most obvious of their shortcomings is the absence of agents and variables in the model that are key for the analyzed issue and reflect their state and choice. For example, most macroeconomic models designed for the monetary policy analysis, lack any detailed representation of banks as agents with their tasks, controls, balance sheets and constraints. The absence of banks as agents is justified by the assumption of effectiveness of financial intermediaries, which enables to abstract from the agency problem. This greatly simplifies the model, but limits its applicability to the ideal case where these assumptions hold, deprives it of its ability to see and take into account the problem of the agency, which creates a discourse where this problem is ignored and leads to the adoption of policies that exacerbate it.

However, considering that the inclusion of all key elements in the model is almost impossible due to methodological and technical constraints, the key issue in the development of a model is the choice of agents inhabiting it and the variables they control. The answer to this question largely depends on the validity of assumptions that allow abstracting from the details of

the agent's behavior. For example, depriving an agent of the right to default suggests that the frequency of such behavior is negligible in the simulated economy and that there are mechanisms outside the model, which ensure that such behavior is negligible. Thus, constructing a model is, first of all, a diagnosis, albeit informal, of the state of the modeled economy in terms of the admissibility of simplifications and the presence of deviations in the agent's behavior from the orthodox narrative canvas.

Therefore, before building a model, the customer, together with the developer, must decide on a range of tasks, preferably a narrow one, whose solution the model will be able to illustrate. Hence, the first principle and key criterion for evaluating the model is its ability to explain, or at least to take into account, the phenomena that, in the opinion of the developer or customer, have shown themselves to be the most important and relevant for the analyzed issue in the recent past of the analyzed economy. This principle gives the developer clear guidelines for choosing the main parts of a macro model, requiring to abandon the non-critical copying of ready-made models intended for other countries, conditions and purposes, and directing the project towards solving a less ambitious yet more useful and difficult task – constructing a model that reflects the challenges and constraints the analyzed economy is facing. In this formulation, the problem of choosing the component elements of the model is the problem of “an optimal distribution of limited resources”. The criterion of optimality is the ability of the model to represent the relevant economic policy choice, reliably reflecting the main costs and benefits, and resource constraints reflect the availability of data and microeconomic studies of how the agents behave, methodological and technical limitations as well as cognitive limitations associated with the interpretation and communication of modeling results.

This seemingly natural and minimal requirement of methodological positivism and pragmatism is refracted in practice through the prism of political perception when faced with the limited possibilities of macroeconomic modeling.

As a result, the task of choosing elements to include in the model turns into a complex and poorly codified social game with many agents and stakeholders, complicated by the need to communicate policies and overcome the barriers of information asymmetry. Models that gain a competitive advantage in such a game may be significantly different from the optimal ones. They tend to be more ambitious, easier and cheaper to develop and maintain, are more likely to reinforce bias and, therefore, acceptable to a wider range of stakeholders but are less useful and less informative. This paper is an attempt to destroy some of the common myths and prejudices regarding the possibilities and methods of macroeconomic modeling and direct the interaction of customers and developers towards building models that are more useful.

For illustration, we discuss the problem of model element selection by using the example of Kazakhstan. We motivate the choice of agents inhabiting the model by the most critical and typical features of Kazakhstan's economy. Thus, the recent macroeconomic history of Kazakhstan shows the importance of fiscal policy, competitiveness and inflation, the mechanisms of building the exchange rate expectations and their relationship with the demand for tenge, widespread default on debt obligations; the impact of banks' condition, including capital adequacy, on the quality of lending decisions; the impact of capital structure of enterprises in the real sector on their operational and investment efficiency, structural constraints in the labor market and related income distribution and household behavior, heterogeneity of each type of agents.

However, pursuing only the first principle, the developer will sooner or later face a dimensional limitation. A simultaneous inclusion into the model of all economic phenomena and agents that are of interest for the customer leads to creation of either excessively cumbersome and inefficient models or models where the reliability of agent's behavior is sacrificed for technological simplicity and which voluntarily or unwittingly mislead the user about the consequences of economic policy. Therefore, the developer on the start needs to convey the third principle of macroeconomic modeling to the customer that requires making a choice based on technological constraints. It should also prioritize and limit the complexity of the model together

with the customer by incorporating only those components into the model that are necessary to achieve the goals.

However, before moving on to the problem of choosing the micro components of the model, it is necessary to discuss the requirements for these micro components. The second principle of constructing a macroeconomic model is the formulation and observance of minimum requirements to the level of detail and depth of representation of agents inhabiting the model. This is usually understood as the representation of agents as independent goal-setting entities that explicitly solve the optimization problem with limited resources, including those for access to information and its processing. The agent's objective function and constraints should be presented as structural parameters, that is, invariant with respect to actions taken by other agents, including the economic policy. The developer at this stage has considerable freedom of choice, but should strive to reflect his idea of the economic environment in the agent's task (define its information set), define the mechanisms for building expectations, select the variables controlled by the agent, the agent's objective function, and thus reflect the most significant compromises in his decisions.

In terms of the requirements to microeconomic reliability, the most important issues include the depth and stability of parameters (or Lucas critique), their assessment, mechanisms for expectation building, concepts of rationality and distribution of information, the plurality of equilibria, and the choice of equilibrium as a concept of solutions. The practice of using and interpreting models, their applicability for forecasting and for policy analysis is not less controversial. The choice of depth and endogeneity of the agent's model depends primarily on the issues faced by the economic policy.

The critique, recommendations, reservations and conditions presented in the paper will help developers and customers in choosing the target structure of the model, which allows analyzing relevant policy trade-offs, set criteria for assessing the usefulness of macroeconomic models, both those that are already built and those proposed for development.

The third principle of building models is the principle of specialization. It is based on the fact that models built in accordance with the first two principles are inevitably the result of a compromise in development, which is dictated by the range of issues for which the model can be useful to analyze. There are implicit expectations among some customers and users of some universal, the only correct model that can answer any questions for any country. We want to give users some guidance on how to evaluate the usefulness of models and the validity of their results as well as encourage developers to be more selective in their ambitions during the modeling phase and more modest in their claims about their scope.

The paper consists of three sections, one per principle. The first two sections are divided into parts. The first section substantiates the inclusion of the elements that are key to the analysis of certain aspects of the monetary policy. The second section discusses the aspects of the methodology for constructing model blocks and compliance of models with requirements of stability and parameter depth. The third section describes the constraints associated with dimensionality, points to impossibility of a universal model, and provides guidelines for finding a constructive compromise.

2. Choosing a Subject of Modeling

The macroeconomic model built for Kazakhstan, as for any other economy, should be able to explain the most important facts from the recent macroeconomic history of the modeled economy. Therefore, all elements of the model, which are presented in this section as the most important for the analysis of macroeconomic policy in Kazakhstan, are motivated by facts and problems that have manifested themselves particularly prominently in Kazakhstan.

Here, the elements or blocks of the model are understood as types of agents, households and organizations, including macroeconomic policy authorities, each of them making certain decisions and being limited in the choice of resources, tools and information. Traditionally, macroeconomic models have consisted of a minimum set of agents: a representative household,

one, two, rarely three sectors, presented by representative companies, and finally, an economic policy maker, represented as some kind of a rule, chosen ad hoc or justified as an approximation to the optimal policy.

2.1. Heterogeneous Households

In the last two or three decades, the arsenal of macroeconomic modelers has expanded significantly. Models with heterogeneous households and companies, such as HANK, have become common. The choice of households between consumption and saving is central to any macroeconomic model. This choice determines the balance between consumption today and consumption tomorrow, between short-term and long-term priorities, between rates of growth and its quality, a choice that determines sustainability and long-term growth prospects. And since these choices shape the consumption path over time, the demand for borrowing, the path of debt and net assets, then the main issues of macroeconomic policy ultimately come down to this very choice. Moreover, although macroeconomic policy does not make this choice for households, but only influences the expectations of households and creates an environment for their choice, this is enough to have a significant impact on the savings behavior of households.

The decision to save is central to explaining the sustainability of household income growth. Small changes in savings or borrowing accumulate and over time lead to large variances in household net assets, which define the boundaries of a household's opportunities for years to come and largely determine a household's behavior in other markets.

The household behavior in the labor market¹, commodity, financial and other markets is also important for the understanding of macroeconomic dynamics; however, behavior in such markets is secondary compared to a household's decision to save. The choice variables in these markets are more synchronous, the optimization itself is shorter or limited to the current period. The parameters of these tasks are market quotes or market expectations. The heterogeneity of household decisions in these markets is manifested primarily through the heterogeneity of state variables, such as financial, real or human assets saved and accumulated in previous periods.

As in most macroeconomic models, effects acting through aggregate demand tend to dominate the channels going through aggregate supply. This may be due to the fact that on relatively short horizons of macroeconomic regulation, which rarely extend to the duration of the business cycle, the effects of aggregate supply, more related to the agenda of economic development and associated with the accumulation of skills, organizational and human capital, where the performance of tradable sectors, are much slower, also because they are interrupted by business cycle regulation. Nonetheless, both should be taken into account in their entirety in formulating the policy, even if they are not included in the model.

Heterogeneity of household savings behavior includes not only the heterogeneity of initial conditions and conditions that households face in these markets, and manifests itself as a difference in net assets, debt (Deaton (1991), Carroll (1997)). Behavioral heterogeneity may also reflect more invariant and fundamental differences in the willingness to delay satisfaction, or in the intertemporal elasticity of substitution (Campbell, Mankiw (1989), Krusell, Smith (1998), and Hurst (2003)). And if the former can be explained in terms of dependence on economic history, it will require going far beyond the boundaries of the subject and horizon of economic history to explain the fundamental differences between households. However, endogenization of household heterogeneity is a mandatory task if the customer is interested in its connection with macroeconomic policy and if the customer is ready to bring the principle of searching for deep invariant parameterization to its logical end. Without endogenization to really deep parameterization, it is difficult to expect that the model will reveal a policy that is optimal on the horizon of economic history.

The search for a parameterization for which stability is not absolute is more demanded by the economic policy authorities. If we ignore long-term feedbacks, then household preference

¹ Decisions in the labor market depend on wages, expectations and household preferences incorporated into the model. For developing countries with high unemployment and structural unemployment, this choice is often

parameters can be assumed to be stable but heterogeneous, and the values of preference parameters can be estimated taking into account credit constraints. At the same time, the proportion of credit-constrained households could be made endogenous to the extent that their behavior is limited by access to credit rather than by fundamental preferences.

A low consumption volatility in models with representative households has required heterogeneous household models where two types are distinguished, one of which does not attempt to plan and smooth consumption by definition or by reason. For example, in Gali, Lopez-Salido, Valles (2007), “Ricardian” households smooth consumption through savings or debt, while “non-Ricardian” households face debt constraints.

Household savings shall mean the accumulation of financial capital, investment in real estate and human capital. Within the model, the decision depends on income, the expected return on invested capital, including interest rate on deposits, sometimes on consumption history to model adaptation. The household model must necessarily include such state variables, because it is through them that the main macroeconomic choice is made – between consumption today and consumption tomorrow. The ability of a household to delay consumption, save and invest is at the heart of any macroeconomic model. At the level of economic policy, it can be translated into a choice between growth today and growth tomorrow, between growth and its sustainability.

The simplest theoretical household models and stylized macroeconomic models are perfectly capable of reproducing the causal relationship that lies at the crossroads of all macroeconomic issues. In such models, there is a relationship between an increase in household debt, on which the household consumes today and a slowdown in demand in subsequent periods due to higher debt service costs and lower disposable income.

Surprisingly, empirical proof of this connection at the macro level has appeared relatively recently. Mian & Sufi (2010), using the state-level data, showed that an increase in household debt caused by expansion in the supply of credit is accompanied by a synchronous real rise in the cost of products of the non-tradable sector and the flow of employment into the sector, and with a lag of 3-4 years, causes a higher unemployment and a slowdown in the economic growth. Mian, Sufi & Verner (2017) trace the same relationship when comparing (in a cross section) countries. Di Maggio & Kermani (2017) also observed the Dutch disease-like symptoms as a consequence of expanding credit supply.

The empirically revealed dependence is explained as a causal relationship operating through the channels of aggregate demand. The model presents credit expansion as an ease of requirements to borrower creditworthiness, or as an increase in household income, permanent or perceived to be permanent. This opens up access to credit for households that were previously credit-constrained, but are at the edge of creditworthiness. This increases the demand for durable goods, including housing, boosts employment and wages in non-tradable sectors, but it also raises debt, reduces the space for consumer choice and smoothing for many years to come. As a result, after 3-4 years, the effect on demand from borrowers becomes negative and remains so almost forever. This story explains the macroeconomic consequences of a rapid and strong growth in the supply of credit to households in the US in the 2000s. This story just as well describes the Kazakhstani episode of credit growth in 2002-2007, followed by a crisis and slowdown.

The relationship between rising household debt and deteriorating borrowing capacity in the long run is a mechanism that allows making the share of non-Ricardian households endogenous. Reasons for an endogenous consideration of the share of credit-constrained households can be found, for example, in Marto (2014), who notes the dependence and instability of estimates of several seemingly structural parameters on the choice of the share of non-Ricardian households.

This indicates the need to divide households into groups, for modeling purposes, as informative as possible, so that household groups most fully cover the range of behavior in the household population. To the best of our knowledge, no studies have been conducted to estimate the corresponding elasticities for Kazakhstani households in a format that allows a relatively

deep interpretation. Therefore, building a model at first should do with rough parameter estimates based on aggregated data and international experience. Further development of the model's accuracy and understanding of mechanisms that affect the fiscal policy will require a deeper analysis of household behavior based on extensive surveys.

The most appropriate data source is the quarterly survey of household spending based on diaries. It has been conducted since 2001, on a sample of 12,000 households, subsequently reduced to 5,000. This data could potentially provide answers to many questions on the parameterization of household behavior, including the analysis of the consumption and savings dynamics during business cycles.

2.2. Credit Risk and the Supply of Credit

The credit channel of monetary policy, its ability to reinforce and create economic cycles is of particular importance for Kazakhstan. Historically, bank credit has played a central role in at least two economic cycles. In 2002-2007, a bank loan became one of the reasons for a rapid rise in prices in the real estate market to an unsustainable level. The loan portfolio of banks over five years has grown by an average of 40% per year. Credit expansion was financed by external borrowing from private banks, and a "sudden stop" in 2007 led to falling property prices and a banking crisis starting from massive credit losses, insolvency of four largest banks² and many-year stagnation of the corporate loan portfolio. The macroeconomic shocks of 2007 (sudden stop) and 2008 (drop in oil prices) served as a catalyst for deterioration in the loan portfolio quality, acting through the fall in real estate prices and depreciation of the exchange rate. However, the fact that the portfolio appeared to be so fragile in the face of quite ordinary shocks, had institutional, microeconomic and supervisory roots and manifested itself in the low efficiency of credit selection, in the poor quality of corporate governance, in related party loans, in hard currency lending to those borrowers who had not foreign exchange proceeds, and in high growth rates of the loan portfolio.

Fiscal policy in the first episode was quite soft, but not at the expense of oil revenues, which were completely preserved in the National Fund, but at the expense of non-oil revenues, which strongly correlated with the price of oil and with exports, as they came from companies that serviced the production of oil as such.

A more important channel for the influence of oil revenues on credit growth was their accumulation in the National Fund, which, judging by the reports of rating agencies, was perceived by investors as an implicit guarantee of government support for banks. This representation was also supported in verbal communications by the government. Thus, although the budget spending was not financed from current oil revenues, their accumulation in the National Fund sharply reduced the cost and other barriers for private banks to access the international debt capital market.

The second episode was less pronounced. It began in 2010 and involved provision of low-quality loans by less than well-capitalized banks to related parties, both corporate and individual. As in the first episode, the period of credit growth coincided with high oil prices, but, unlike the first episode, funding for credit growth came from domestic deposits, and not from external investors.

In most countries, bank credit is important for the growth and the monetary policy analysis to the extent that its supply keeps aggregate demand below or above sustainable levels. For Kazakhstan, the quality of bank loan is no less important, regardless of the degree of saturation of demand, both from the standpoint of its repayment and from the standpoint of its

² Alliance, Temir, BTA, Kazkommertsbank (KKB). The first three banks went through a restructuring that required the government to inject hybrid capital and write it off, and bondholders to admit a loss of 90 cents per dollar. We include KKB in the same list, since this bank, although it ceased to exist only in 2016, however adequacy of its capital and adequacy of reporting the quality of its loan portfolio have been causing doubt since the end of 2008, and its sale in 2016 required an injection of government resources into its capital to bring the value of assets up to the value of liabilities.

contribution to the creation or destruction of value. As the last two decades of Kazakhstan's history show, bank loans and defaults on them have played a major role in banking and macroeconomic crises. A macroeconomic model must be able to explain past events in order to be useful in predicting them in the future. The model should explain both rapid credit growth and stagnation, the mechanisms of deteriorating loan quality, poor underwriting quality and their implications for sustainable growth and welfare.

The level of credit risk directly affects the choice of optimal monetary policy. The higher the expected credit losses for the lender, the less appropriate are measures that stimulate or are aimed at stimulating credit activity. In the macroeconomic literature that includes the concept of credit losses, they are important because they reflect the degree of misallocation of resources across sectors and over time, and because they reduce the ability of banks to lend during a downturn, exacerbating the business cycle and prolonging the recovery phase. The impact of credit losses on credit supply in such models begins as capital approaches adequacy requirements and is stronger the lower the capital adequacy requirement. However, if credit losses are much greater than equity, they become important in their own right, as they lead to losses for depositors or taxpayers if they are carried over to public sector balance sheets.

Historically, there has been no interest in explicit modeling of banks in macroeconomic models. This was due to a number of reasons. Initially, the lack of a banking sector was due to a simplistic understanding of banking and the high level of abstraction of such models, which was justified by the belief that private banks were not interested in issuing low-quality loans. Later, with the development of theoretical models of banking activity based on the theory of agency and information asymmetry, the formal understanding of bank lending and the role of competition between banks improved. The first stylized macro models explicitly considering banks appeared in the late 1980s (e.g. Bernanke-Blinder (1988)). However, with the development of modeling techniques and growing dissatisfaction about the ability of models to explain the role of the financial sector, interest in explicit modeling of banks in macro models increased in the 2000s, and especially strongly after 2008, when it became clear that the vast majority of models were not able to model a banking crisis and credit risk in principle, as they were based on assumptions that exclude the possibility of their occurrence.

In the 2010s, macroeconomic models that include the credit channel model mainly focus on the relationship between monetary policy instruments and bank credit supply. The literature is full of credit channel models, but most of them focus on the mechanisms by which monetary policy influences credit supply. As a rule, this connection is established through the influence of the short-term rate on the conditions of bank funding, the impact on spreads, and through the strengthening of regulatory frictions. In other macroeconomic models, deterioration in loan quality occurs during the macroeconomic cycle when market conditions change and loan servicing becomes unprofitable or impossible. In such models, within the framework of rational expectations, defaults occur either as an inevitable result of information asymmetry, at the micro level, or as one of many equilibria, but in any case, *ex ante* issuance of loans is a rational reaction of the bank and leads to the creation of value.

Kashyap and Stein (1994), for example, show that the monetary policy influence on the corporate sector depends on the corporate sector's access to the wholesale funding markets. The small and medium-sized business, which in virtue of its scale is a captive client of a bank, is affected by the monetary policy via the supply of credit to a larger extent.

In many developing countries and economies in transition, the percentage of NPLs is often so high over long periods that they become inconsistent with the assumption of *ex ante* efficiency and require reasons beyond macroeconomics to explain. Explanations of the notoriously loss-making lending tend to go beyond the macroeconomic discourse and require consideration of institutional factors, analysis of accountability mechanisms, political economics, independence and powers of the supervisor, history and expectations of bank rescues. These factors can explain much higher credit losses and more pathological forms of lending than is possible in the models that assume good faith and responsibility of managers, and even more so

in macroeconomic cycle models, where agents, under the influence of shocks, control a limited set of variables and which use deep parameters. That is, parameters that do not change depending on the economic policy and/or actions of other agents.

For macroeconomic models, it is more appropriate to ease the requirement or definition of a deep parameter as independent of macroeconomic policy as it is presented within the model. This will allow an exogenous input into the model that model of such factors that simulate the impact of macroeconomic policy within the framework of the model but which can change under the influence of other types of intervention. For example, the parameters that determine the probability of default depend to a greater extent on the level of development of financial institutions and institutions of ownership rights. The variation in the share of non-performing loans between developed and developing countries can be very significant. Thus, in Ukraine, Kazakhstan, India, the share of non-performing loans during the banking crisis reached 50%.

The probability of default on a bank loan should endogenously depend on macroeconomic factors. However, its variability depending on institutional and other factors that, within the framework of the modeled economy, do not change significantly over the business cycle horizon, it is sufficient to take into account exogenously. At the same time, many macroeconomic decisions that affect the development of institutional factors, including through the mechanisms of spreading irresponsibility (moral hazard), must be considered based on significance of these factors.

Macroeconomic models in which some factors enter exogenously as constraint parameters should be used for sensitivity analysis of the welfare criterion. The estimates obtained can be used in assessing the feasibility of a particular decision that affects the value of the corresponding parameter. For example, a decision to bail out a bankrupt bank and its largest investors at the expense of the budget should take into account its impact on the quality of corporate governance and credit decisions taken by banks in the future.

The dependence of credit risk on banks' capital adequacy and fair value should be modeled explicitly, endogenously, since both depend on credit supply in previous periods and on monetary policy. At the same time, the dependence of credit risk on institutions for securing property rights can be modeled as exogenous factors without compromising the fairness of conclusions about the appropriateness of monetary policy measures.

This is related to the fact that the direct impact of the short-term rate on these indicators is relatively small, and macroeconomic models in the academic environment are traditionally validated depending on their ability to imitate the dynamics of the business cycle. In such macroeconomic models, the financial system amplifies or even generates business cycles.

The history shows³, in Kazakhstan's practice, banks are able to provide loans of extremely low quality in large quantities, due to violations in financial reporting practices, are able to operate for a long time and compete for deposits with good banks, having virtually no capital, due to weak control, they are able to withdraw assets through connected lending. If even one of these factors in the model for the monetary policy analysis is taken into account, this can significantly change the idea of the optimal policy.

2.3. Credit Risk and Capital in a Model of the Credit Channel

The credit channel was always present in discussions about the effectiveness of monetary policy, but has not usually received the same attention in macroeconomic modeling as other channels operating through monetary aggregates, interest rates, expectations, and the exchange rate. This was partly because the empirical analysis of the credit channel was not encouraging – estimates of its effectiveness turned out to be either statistically insignificant or varied greatly. This was partly because the compelling microeconomic theories of bank lending emerged relatively late, when the theories of money, liquidity, term structure, and the exchange rate were

³ Financial Stability Report of Kazakhstan for 2018-1st Half of 2019.

already sufficiently mature and were perceived as sufficient for the task of analyzing and formulating the monetary policy.

Theories of bank lending, which were credible until the global financial crisis and were widely used in the macroeconomic modeling, were based on the assumption that the minimum reserve requirement is a binding constraint on bank credit at all phases of the business cycle, that credit is limited by the amount of reserve assets, and the efficiency of the credit channel of monetary policy, therefore, depended solely on the frictions set by the regulator, that is, on the spread between the market short-term rate (which a central bank controlled through control of the monetary base) and the reserve asset rate (which a central bank set at zero, as a rule). Such a theory was also convenient, since it significantly simplified both the idea of the monetary policy mechanism and the requirements to macroeconomic models.

In the literature, two or three causal mechanisms can be identified that form the credit channel. The dependence of lending activity on monetary policy can be formed as a consequence of the problem of portfolio choice between various assets, including money, bonds and a loan portfolio. For example, in one of the earliest models (Bernanke and Blinder (1988)), the monetary policy influences the supply of bank credit.

A more general extended understanding of credit as including not only bank loans but also private sector debt in general, is formed by thinking about the balance sheets of private agents, companies and households. The monetary policy, through its impact on the yield curve and discount rate of asset flows, affects the level of capital of the corporate sector and net assets of households and, consequently, the aggregate demand. Bernanke (1993), Kashyap and Stein (1994), Gertler and Gilchrist (1993) are examples of such models.

This literature, as a rule, did not single out financial intermediation as an agent with its own tasks, balances, restrictions, regulation and frictions. In more recent macroeconomic literature, financial intermediaries have begun to gain autonomy. The problem of the task of banks as an agency problem required more detailed modeling of bank balance sheets. Within the narrower channel of bank lending, the literature can be divided according to its impact on the supply of bank credit: through funding conditions, through capital adequacy, through “risk appetite”. Common to this literature is an analysis of the effectiveness of monetary policy and its ability to influence bank credit.

At the same time, as evidenced by empirical studies such as the Financial Stability Report of Kazakhstan for 2019, the feedback from condition of the credit channel on the effectiveness of monetary policy is important, especially in the context of extreme decapitalization of the second-tier banks, which not only constrains the supply of new credit, but hinders the recognition of impairment of loans, claims and other activities to restore their value. Under such conditions, attempts to empirically analyze the effect of monetary policy on bank credit to the economy will inevitably face the problem of distorted bank reporting about the state of loan portfolio and capital adequacy. In particular, the stagnation or contraction of the loan portfolio will be perceived not as a consequence of its poor quality, but as a consequence of other reasons, for example, allegedly insufficiently favorable funding conditions. The extremely low efficiency of bank underwriting in the selection of creditworthy borrowers is also not considered within the framework of such models.

Such extreme conditions of the second-tier banks are not considered within the framework of macroeconomic models because such conditions do not arise in them on the equilibrium path. However, if the supervisory, audit, and appraisal institutions fail, if there is no market discipline, if the principle of accountability and controllability of managers to depositors is violated, as is the case with the pension fund, if there are no effective mechanisms for protecting depositors' interests, ensuring property rights, the problem of agency ceases to be a friction, financial losses reach proportions that are incompatible with the presumption of good faith, and financial intermediation institutions are degenerating into institutions engaged in redistribution of funds from investors and taxpayers in favor of managers.

A macroeconomic model is not required to explain the causes of low or negative capitalization of the banking system and the extremely low efficiency of credit selection, but it must be able to set both exogenously, as initial conditions. Endogenously, the model should take into account the impact of monetary policy on supply, depending on the actual capital adequacy, taking into account the quality of credit, the redistribution of value and the loss of value as a result of tied lending. Accounting for these factors in the model makes the reduction of interest rate less appropriate in case of low capitalization of banks and borrowers.

2.4. Dollarization of Bank Liabilities

In terms of bank funding, the most important problem for Kazakh banks is dollarization. Dollarization is a form of demonetization that significantly increases the risks of financial intermediation and is one of the immediate causes of disintermediation. That is why understanding its causes and analyzing the policies that can influence it are among the central monetary policy issues for a highly dollarized economy.

In Kazakhstan, dollarization has been historically high and quite volatile, and remains that way⁴. The share of foreign currency deposits in the deposit base of banks had been decreasing to 23% in 2007 and reached 70% in 2015.

Modeling the process of creating conditions for funding is important for a proper description of not only the credit and interest rate channel of monetary policy but also for understanding the foreign exchange market. The depth of the dollarization model chosen by the developer depends on the questions it is supposed to answer. On the one hand, dollarization reflects the choice of deposit currency by depositors, which, in turn, depends on the deposit terms and conditions offered by banks. Finally, dollarization at a higher level in the decision hierarchy reflects expectations of depositors and banks about the exchange rate.

The most obvious manifestation of the problems that dollarization creates is a foreign currency gap on its balance sheet. A bank cannot use foreign currency deposits for lending without exposing either its balance sheet or the borrower's balance sheet to foreign exchange risk. A short foreign exchange position limits a bank's ability to lend in the tenge, increases funding risks for the bank and the system, lowers the economic cost of lending, and weakens the effectiveness of monetary policy.

Therefore, when analyzing the credit channel of monetary policy, it is necessary to take into account the level of dollarization in order to assess sensitivity of the loan offer in relation to the cost of funding in a more realistic way. For a dollarized bank that does not have access to currency hedging instruments, an increase in the national currency loan will be accompanied by an equal increase in short currency position on the balance sheet. In the history of Kazakhstan's banking system, the overall short foreign currency position (that is, including the off-balance sheet position) of any bank had almost never exceeded 1-2% of owners' equity⁵ (with prudential limitations of 12.5%). At the same time, the size of the balance sheet short position in some years reached 60-70% of the capital for the banking system and up to 90% for the 75th percentile. Therefore, in order to model the impact of dollarization on the credit channel, it is advisable to deprive banks of the choice of a common open foreign currency position and simply limit it to zero, as a nodal solution for a wide value of parameters that is deliberately calculated outside the model.

In practice, Kazakh banks have historically covered their short positions on the balance sheet with off-balance sheet instruments. The most popular were non-deliverable forwards or notes concluded with non-residents for a period from one month to one year, as well as a combination of the dollar liquidity on the balance sheet and foreign currency swaps, either long-term with the National Bank or swaps on the exchange's money market for a period of 1-2 days. When choosing funding instruments, a bank with access to such hedging instruments takes into

⁴ Perry Mehrling, Lombard street.

⁵ Financial Stability Report of Kazakhstan for 2018.

account their maturity, current and expected value in order to secure a tenge loan portfolio with a balanced open currency position (OCP). The optimal solution to this problem for various parameter values sets the cost of synthetic tenge funding as a dependence on the expectations of various market participants and quotes in the deposit and foreign currency hedging markets.

This model allows presenting dollarization as simply an exogenous factor that increases the cost of synthetic tenge funding, interest rate and maturity risks, and thus desensitizes the loan offer against monetary policy instruments. However, the assumption of exogenous dollarization is not justified for the analysis of policies that can change the parameters of the tasks of depositors and banks, which, although they perceive dollarization at the system level parametrically, decide to dollarize their own balance sheets and collectively determine the level of dollarization.

Thus, when designing economic policy based on dollarization, it is necessary to take into account not only the impact of dollarization on its effectiveness today, but also the ability of this policy to influence dollarization and, thus, influence its own effectiveness tomorrow.

The second requirement to the policy analysis is the maximum completeness of representation of the channels of influence by the analyzed policy on dollarization. Thus, when analyzing the impact of interest rate policy, first of all, it is necessary to take into account its impact on exchange rate expectations. This can happen through a number of channels. First, typical of the literature on currency crises is the impact of the interest rate on the cost of maintaining a short tenge position and, thus, on the possibility of forming a spontaneous attack on the national currency. For expectations of depreciation to be justified as rational, the model needs either a ratchet mechanism that makes arbitrary exchange rate depreciation permanent, usually through a combination of price rigidity and rapid pass-through onto inflation. Second, a reduction in the monetary policy rate below the threshold determined by some unwritten rule may be perceived by the market not as a shock, but as a change in the rule associated with an increase in the Central Bank's tolerance for high inflation and justifying long-term expectations of higher inflation, a wider rapid depreciation. If at least these two mechanisms are not represented in the model, it cannot be expected as useful in understanding the relationship between rate policy and dollarization and in developing optimal monetary policy rules.

Using the example of monetary policy and dollarization, this example illustrates the general property of economic policy to affect the behavior of agents through its influence on their expectations. For the policy analysis, it must be represented in the model by rules, and policy shocks as deviations from the rules. In a good model, it is also desirable to make the rules endogenous, that is, to derive from structural parameters that reflect government preferences as the optimal policy for a given state of the economy. Shocks in this case are interpreted as changes in the government's preferences, say, between two conflicting goals or between a short-term and a long-term target indicator. All this in the modeling of monetary policy puts forward in the first place in the context of dollarization the task of modeling the process of forming expectations for the monetary policy and the exchange rate, depending on the monetary policy pursued.

However, the modeling of this side of the problem is far from being so obvious and unambiguous. It is obvious that dollarization reacts to the exchange rate expectations of the market, and therefore depends on the monetary policy, with reservations for radical uncertainty, delays and inefficiency of the mechanisms for forming expectations. In this respect, dollarization is a state variable and reflects, in a condensed form, the patterns of risk urgency and exchange rate uncertainty, and therefore the credibility and reputational capital of monetary policy and other measures that somehow affect these risks. And most economically, dollarization could be represented in the model in this way - as a state variable accumulating or spending depending on external shocks and policy shocks.

2.5. Policy of Government Spending

Since 2000, government spending in Kazakhstan has been the most important factor in the formation of aggregate demand. This is because the government dominates the country's export proceeds (more than 90% of producer income owned by residents).

To develop an optimal macroeconomic policy, the balance sheets of the central bank and the government can be combined at the level of balance sheets and the unity of the target function. This unity of balance sheets is not a constraint for modeling lack of coordination between the monetary policy and fiscal policy. In this case, the problem of developing an optimal monetary policy turns into a problem of finding a conditionally optimal policy, i.e., an optimal policy with an exogenously given fiscal policy.

Regardless of the objective, the impact of fiscal policy is central to understanding the business cycles in a resource-based economy like Kazakhstan, where about 20-40% of government revenue comes from the resource sector, where revenue variability (max-min range/average) in dollar terms within the cycle reaches 30%, and where the share of the government in oil revenues of the country's residents is 90%.

The fiscal policy in a macroeconomic context is usually understood as the policy of government spending in a broad sense, that is, including not only budget spending, but also public sector spending that the government controls, including purchases of state-owned enterprises and investment activities of public funds.

The fiscal policy has a more direct impact on macroeconomic processes, on product markets and on the labor market, because the government participates in these markets directly through government purchases or directly generates household income, influencing their demand in product markets and supply in the labor market. The choice of sources of financing the budget deficit between domestic and international debt directly affects the balance of payments, the foreign exchange market and the government debt market, expectations in these markets and the real exchange rate. Using these channels and tools, and having access to oil revenues and savings, fiscal policy can greatly influence the formation of business cycle, increasing or weakening the dependence of the economy on oil prices.

The fiscal policy also influences the level of activity indirectly, through the markets in which the government participates. Thus, transfers that increase household income also increase their credit limit. And if the household consumption was constrained by debt, a rise in public spending on social transfers could increase not only household consumption, but also their debt.

Therefore, when modeling the impact of fiscal policy, it is necessary to assess how much fiscal policy directly redistributes household income and how much government spending affects the demand. In the roughest model with a representative household and one product, there is no role for intra-period redistribution and sectoral differentiation of the impact of government spending on demand. A model that claims to analyze the impact of fiscal policy on the business cycle, must be take these channels into account.

Household heterogeneity allows households to be differentiated along the lines along which they are divided according to their share of budget transfers, depending on how limited they are in accessing the debt market, and depending on the income elasticity of their consumption and savings. Fortunately for the modeler, these lines, if not the same, lie close enough to avoid over-dimensioning the model by drawing a separation line between households in that part where it is most informative.

However, in any case, in a simple and rough model or in a model with heterogeneous households, the first step is to estimate the elasticity of demand to income and prices. For more details on the modeling requirements for the block of households, see the section on households.

2.6. Sources of Deficit Financing

A budget deficit can be financed by selling domestic or foreign assets accumulated over years of surplus, or by issuing domestic or foreign debt. No matter how the model describes fiscal policy: as a stand-alone scenario or as a flexible rule, the model, if it is used for forecasting

or for developing the optimal fiscal policy, should explicitly reflect the marginal choice between an external and internal source of financing.

In particular, a shift in the structure of deficit financing towards external sources in the model should lead to an increase in the supply of foreign currency in the domestic market, a short-term strengthening of the exchange rate at the spot, a decrease in domestic debt rates, an increase in net external debt with all the ensuing consequences, including a weakening of long-term expectations for exchange rate. A more detailed pricing model in the foreign exchange market on spot and forwards will be presented in the relevant section.

A balance of payments deficit caused by spending and an increase in the government's broadly defined foreign currency debt (including the central bank) requires that the central bank's net external assets be calculated after deducting foreign currency liabilities to domestic banks. The model should also take into account the impact on the balance of payments, the foreign exchange market, and the government debt market, expectations in these markets and the real exchange rate, the choice of sources of deficit financing.

The market of currency risk hedging, its limitations, maturity structure and pricing mechanism can be described with varying degrees of endogeneity. Decreasing dollarization creates more favorable funding conditions for bank lending and is statistically associated with greater sensitivity of loan supply to the monetary policy rate. Therefore, the macroeconomic model should correctly reflect the causal relationships between monetary policy and foreign exchange regulation, prudential requirements, the level of dollarization and bank lending activity.

If we consider the decision-making processes leading to high dollarization, it is clear that the depositor makes a direct decision on the choice of the currency of deposit based on his/her expectations about the exchange rate, foreign exchange risk assessments, market rates on deposits and other conditions of the deposit agreement. Tools and capabilities of banks in reducing the share of foreign currency deposits are relatively weak. Banks are developing a menu in the form of a line of deposit products, based on the expected reaction of depositors and designed to form a target funding structure, taking into account monetary policy and other factors of the macroeconomic environment, but the premium and rate differential demanded by depositors may be too high.

Finally, the foreign exchange market, where the government in a broad sense is the largest participant, cannot be described without creating a model of the exchange rate policy and the rules that determine the size and timing of transfer from the National Fund to the budget. Modeling the foreign exchange market, the mechanism for pricing the exchange rate on spot and forwards is a much more non-trivial task that allows for many different solutions.

In particular, the author's experience in developing the cap rate mechanisms used by the Kazakhstan Deposit Guarantee Fund indicates that the developers of bank deposit products do not always and immediately take into account the needs of funding, lending, risk management and liquidity management. The presence of less-than-well-capitalized banks in the deposit market exacerbates this problem.

The connection of the deposit market with the money market is also determined by both the level of development and opportunities for arbitrage between the two markets. Empirical analysis shows that the connection is quite ephemeral; nevertheless, banks have the tools to exploit the gaps between these markets.

The issue of foreign exchange interventions arises in connection with the presence of one-time flows in the foreign exchange market that are highly concentrated in time and by participants, which the foreign exchange market of Kazakhstan is unable to absorb, for a variety of reasons: structural, historical and institutional inertia. A model that ignores these reasons will inevitably be biased towards the usefulness of interventions. To develop an optimal monetary policy, it is also advisable to combine the balance sheets of the central bank and the government. The foreign exchange policy issues relevant to and for commitment to monetary policy include

the appropriateness of foreign exchange market interventions, the optimal mechanism, and the optimal intervention policy or rules.

Nonetheless, in the simplest formulation of such model, a quite detailed modeling of the currency and money markets will be required. It is advisable to separate such a model from a macroeconomic model with a simplified pricing model in the foreign exchange market. In such a simplified macroeconomic model, the foreign exchange market is usually modeled in the abstract, assuming a freely floating exchange rate. For example, assuming that shocks in the spot market are fully absorbed by speculative participants (under the implausible assumption of the fullness of the forward market) or partially (under the more plausible assumption of exogenous restrictions on the volume or horizon of speculative positions).

A more detailed foreign exchange market model would require an equally detailed money market model, including rules for intervention in the auto repo or government securities markets linked to target rate control. In this model, the balance sheets of the NBK and the government should continue to be considered as a single balance sheet. A transfer from the National Fund aimed at replenishing the NBK's gold and foreign exchange reserves, by definition, should not have any impact on the foreign exchange market and will not be considered as deficit financing. In the case of modeling the exchange rate policy and the policy of foreign exchange interventions, the resulting balance of payments deficit will also not be considered as financing the deficit of the united government, since the NBK's liabilities to banks in this case will not change, but only their currency structure will change. At the same time, adherence to the interest rate control requires complete sterilization of foreign exchange interventions through the sale of government securities in the market or the issuance of NBK's notes in the market. In any case, both in case of the sale of currency and in case of its sterilization, the net debt of the united government should not change. However, if interventions are designed to keep the exchange rate at an unstable level, selling the currency at a low price increases the government's fiscal losses after depreciation to a sustainable level.

3. Intrinsic Consilience of Macroeconomic Models and Micro-Foundations

3.1. Rationality in the World of a Model

A model is a deliberate simplification of a phenomenon. When modeling, a choice must be made as to what is important based on the objectives of the modeler. Most theoretical models face positive tasks: to rationalize a social phenomenon, to explain the behavior of individuals, organizations, and communities. Their creators exclude all possible factors, whose influence is not the focus of analysis, from the model and leave only those elements, whose interaction generates the desired effect. The exclusion of other elements of their stylized models does not mean that the authors consider them insignificant in practice, in the analysis of economic policy, for decision-making, in the development of mechanisms.

Such stylized models are proof of principle. They are changing our understanding of the economy. Their ability to abstract from what is not essential for the proof of the principle is their advantage, which enables to clearly demonstrate the cause-and-effect relationships that explain a particular phenomenon. Their conciseness is manifested in the fact that the results of the analysis are in the nature of logical statements that are valid if the assumptions of the model are observed. This class of models includes models of the microeconomic theory of choice, general equilibrium, models of the corporate finance theory. Such models become fertile for future research. They reveal contradictions in established ideas about the subject, help to get rid of underlying prejudices and other logical errors of earlier theories, and contribute to a more correct formulation of research questions and questions of economic practice. For example, the Modigliani-Miller model, the "debt is cheap" model (Stiglitz-Weiss (1982)).

Relatively large macroeconomic models are standing at the other end of the spectrum. Some are for forecasting, others for policy analysis. In these models, the number of simultaneously analyzed factors and processes is much greater than in theoretical stylized models. They combine elements of stylized models. Developers of large macroeconomic models

also face the choice of what to include in the model and how much detail. The choice is dictated by the need to take into account the relationships of various agents.

This paper reflects our understanding of what and how should be taken into account when developing models, how they should be used in developing economic policy. In order to demonstrate our position on what we think should be done, we will look at examples of how and why not to do it. The examples given will be taken from Kazakhstani practice, but they can be found in other countries, including developed ones. We hope that this will help dispel some common myths about the capabilities of models and will rationalize the practice of their development, interpretation and use.

Macroeconomic models have traditionally reflected not only the priorities and biases of economists, but also their ability at the current level of development to understand and model certain factors and their interaction. This dependence of the research agenda on the limitations of analytical tools was reinforced by the fact that the previously created models formed the idea of each new generation of economists about what factors economic models can take into account and what problems should be solved.

Thus, the ISLM model, historically intended to justify actions during a crisis, subsequently began to be used as a model for all times and occasions. It ignored the long-term consequences of policy, it lacked the state variables whereby these consequences accumulated, it underestimated the ability of agents to correct behavior and adapt in response to policy changes. The omissions and simplifications of the model, its deliberate lack of foresight, which made it so successful in a crisis of confidence, became a harmful ballast after the crisis. Having spread among economists and in macroeconomic policy bodies, the ISLM model explicitly and subtly formed a macroeconomic discourse to justify the growth of consumption through borrowing and introduced an inflationary bias into the monetary policy. In this light, ISLM became one of the causes of stagflation in the 1970s and the balance sheet crisis that accumulated in the United States in the last quarter of the past century and was realized in 2006-2008.

After the balance sheet crisis of 2006-2008, the criticism of the existing models as missing important phenomena and connections increased significantly. The vast majority of macroeconomic models used by regulators and central banks have proven unable to predict financial crises or reflect their impact on balance sheet risks. Most of the large models of those years that were used by central banks and fiscal policy authorities could not make such a forecast in principle, because they did not include the financial sector and its balance sheets, and there was no capital structure of the real sector. The results of the theory of corporate finance and microeconomic theory remained outside the rooms where macroeconomic policy decisions were discussed for a long time, also because the ability to represent these relationships in a macroeconomic model has not yet become ubiquitous.

This was justified by the fact that the models that were in operation used an established modeling technology, that is, relatively mature and widespread. They were backed by staff and were generally well integrated into the process and pace of decision-making at central banks. They were good at predicting short-term dynamics, perceiving it as a path of uniform growth, but ignoring changes in long-term potential or in the state of the economy. Bubbles, defaults and balance sheet crises could not have arisen in them, by design. Many of these models made uniform growth their key assumption to calculate the equilibrium path of the economy but only as a deviation from the autonomous trend of uniform growth. In such models, a significant deviation from the trend could only occur as a result of a shock. The scatter of welfare paths and metrics between good and bad policies in such models was not significant and did not exceed the scatter of short-term fluctuations over a long horizon. The role of macroeconomic policy in such models was insignificant and was reduced to the so-called fine-tuning, which allows smoothing out undesirable economic fluctuations that arise in response to external shocks.

These models could not reflect or reproduce such trends in the development of the world leading economies, enabling to ensure the growth of consumption due to the increase in debt. Financial penetration and financialization, increased trade and the international division of labor,

the outstripping growth of sovereign and private debt, especially the debt of low-income households, all contributed to rapid and seemingly stable growth in the decades leading up to the crisis. However, even a simple model in which current imbalances can accumulate in the form of debt pointed to the obvious unsustainability of such growth.

The models of those years experimented with the inclusion of exogenous frictions that could bring the dynamics of the model closer to the manifestations of the business cycle observed at the macro level. Such frictions include time-to-build (e.g., Kydland and Prescott (1982), McGrattan (1994)), money-ahead (Clower (1967), Aiyagari and Wallace (1991)), menu-costs (Akerlof and Yellen (1985), Blanchard, Kiyotaki (1987)), long-term contracts at nominal prices (Taylor (1979)), restriction on the ability to change prices (Calvo (1983)), cost of changing nominal prices (e.g. Rotemberg (1982), Ireland (2001)), price indexation (Christiano et al. (2005), Smets and Wouters (2007), Uribe (2020)), change in capital stock or investment costs (for example, Kim (2000), Ireland (2003), Bernanke, Gertler, Gilchrist (1999), Christiano et al. (2001), Smets and Wouters (2003)).

To explain a strong procyclicality of consumption, assumptions are made about the persistence of consumption in the form of habitual consumption at the household level (McCallum, Nelson (1999), Amato and Laubach (2004), Christiano, Eichenbaum, Evans (2005)) or the dependence of welfare on the country's inertial consumption standard (Smets and Wouters (2003)).

Models of monetary economies have used such frictions in order to improve the fit of model dynamics with observed dynamics, to justify the demand for money, to justify the Phillips curve, and thus to create a place and role for the monetary policy in the model. However, these models were not deep or structural, since they did not explain frictions as an interaction of individually optimal behavior of agents; they had no empirical micro-justifications and, as a result, were not invariant with respect to economic policy or restrictions on the behavior of agents aimed at their mitigation.

However, over the past three decades, the skills in creating macroeconomic models have accumulated and the understanding of challenges faced by the economic policy and monetary policy in particular has improved. Micro and granular data have become much more accessible, their quality and volume have improved, allowing more disaggregated models to be built for macroeconomic policy analysis. The financial crisis intensified criticism of traditional models that ignored the underlying and long-term causes of its occurrence.

How to build on the rest of the policy? For example, all monetary channels are important for the monetary policy but so do the fiscal channels. It does not need to explain fiscal policy, it is enough to take for granted the rules by which it is described, but only for the purposes of monetary policy analysis. In order to develop the fiscal policy, it can only analyze different policy options.

The development of macroeconomic modeling techniques has gone hand in hand with an improved understanding of the role of economic policy and what constitutes good policy. One of the milestones on this path was the understanding that changes in macroeconomic policy that worsen people's expectations and change their well-being also cause adaptation to the changed policy – people change their behavior, their perceptions, expectation building mechanisms, some relationships in the economy are replaced by others, are fixed in public institutions, culture, and system of moral values. An economic policy that is designed to optimize welfare but is unaware of its effect on the economic system is shortsighted, ineffective, and counterproductive.

Economic research and economic models occupy a special place in this process. Research aimed at analyzing macroeconomic data improves the understanding of how the economic system functions, reveals patterns between variables. The most successful of these studies inform the economic policy, change it, lead to reforms in the economic policy, which, in turn, trigger the process of adaptation to reforms and changes in the patterns and interactions identified in the studies that motivated the reform. Studies that link macroeconomic series and macroeconomic models built in this way provide poor policy guidance.

This understanding was demonstrated by the Friedman-Phelps critique, which predicted that the monetary policy's attempts to boost employment at the cost of inflation would eventually lead to stagflation in the US. The Lucas critique generalized the Friedman-Phelps arguments and led to a paradigm shift in the economic policy and economics, in particular in the methods of building macroeconomic models designed to evaluate the policy.

3.2. Micro-Foundations, Structural Models and Deep Parameters

A paper by Lucas (1976) criticizing the macroeconometric models of that time remains relevant to this day, more than forty years later. The paper raises a methodological question about the principles of building macroeconomic models and their ability to predict the response of the economy to changes in the economic policy. The essence of the critique is that macroeconometric models, in which the parameters of behavioral equations are estimated from some historical sample, are of no value for the analysis and development of optimal economic policy, because the behavior of agents described by data over the sample period is their response to the economic policy pursued at that time. Consequently, the behavioral equations of macroeconometric models are a collapsed form of some more general, structural representation of the agent's behavior, in which economic policy appears explicitly, the parameters are structural, that is, they are invariant with respect to the economic policy. And when the economic policy changes, the parameters of the contracted form of behavior will change. Therefore, in order to analyze the impact of policy on the economy, the model must have good microeconomic foundations, and the parameters of the model must be structural, that is, independent of the economic policy and therefore stable.

Interpretations and reactions to the Lucas critique can roughly be divided into two main approaches: empirical and theoretical (Sergi). The empirical interpretation considered parameter stability as the main and only criterion. Criticism of parameter instability existed even before Lucas, but Lucas substantiated the reason for their instability and set a research program aimed at building models free from this criticism.

Within the framework of empirical interpretation, Sims (1972) and Hansen and Sargent (1980) proposed to estimate the parameters of folded forms of equations of behavior in the presence of some restrictions arising from the theoretical model.

3.3. Economic Policy as the Optimal Rules

The consequence of the Lucas critique was the understanding that the economic policy, first, is not a one-time decision, and second, should be presented in the form of a rule, which is a behavioral equation for the government. Rules should be transparent and publicly available. The government must follow them and not deviate significantly from them in order to shape the expectations of agents about the policy and streamline their actions in the direction they want.

Inflation targeting with its principles of transparency and open communication, explicit target values has not yet moved to open recognition of the rules and their parameters, but the rules can be traced in the behavior of the largest central banks, with slight deviations.

3.4. Calibration as a Response to the Lucas Critique

The calibration method proposed and carried out by Kydland and Prescott (1982) was another response to the Lucas critique of the method for selecting parameter values. Calibration means the choice of macromodel parameter values based on the results of microdata analysis using the same agent task model as in the macromodel. A structural model is a model in which the agent's behavior is derived as a solution to an optimization problem with constraints. The use of parameter estimates obtained in other studies in the model is possible only if the parameterization of the agent's task is really sufficiently general and includes other parameterizations as special cases (encompassing) so that, with fixed parameters, the model recreates all the observed diversity of the agent's behaviors as an optimal response in a given environment.

The similarity of calibration and macroeconometric estimation is that the values in both cases are selected by choosing the best fit to the data. The difference is in relation to which data a match is sought. In a macroeconometric assessment, the choice of parameters provides the best fit to the aggregated data. That is why this method ensures the realistic behavior of the model in short-term forecasts and while maintaining the economic policy that was in effect at the time of the sample. Prescott (1986) lists the elasticity of substitution between consumption between periods and the synchronous elasticity between consumption and rest as the most important parameters. To assess these parameters, there are good data independent of macroeconomic dynamics from individual household surveys, panel data, and longitudinal surveys.

In calibration, the parameters are also evaluated as providing the best fit, but the subject of the fit is microdata describing the behavior of individual agents within a structured micro theory with a clear difference between structural parameters and policy parameters. The test of the entire model, including the parameter calibration stage, is the correspondence to the aggregated data at the level of proximity of the distribution moments of the actual data and the data generated by the model. The power of such test to validate the model is much greater than the Fisher test for a measure of fit in a macroeconometric model, because good fit with microdata does not mean good fit with aggregated data, except in the rare case that, first, the model parameters are indeed structural and therefore stable and describe the behavior of agents well, and, second, if the structure of the model, which describes the connections between different agents, describes their interaction really well.

The problem of methodological choice in favor of calibration is historically associated with obtaining a very strong negative result in the theory of general equilibrium, namely, with the “everything is possible” theorem by Sonnenschein-Mantel-Debrue. A number of results from Sonnenschein (1973) and Mantel (1974) indicate that the assumption that agents behave as optimizations under a budget constraint does not provide any structure for aggregate demand other than the most trivial ones⁶, which does not allow for any powerful test of this theory. The behavioral equivalence of multiple models that describe aggregated behavior has been one of the reasons macroeconomists have turned to micro data. Kyldand and Prescott say that if the correspondence of the model to macro data (aggregate series) is not informative for assessing the structural parameters of the model, then one should turn to micro data and in no case use a macroeconomic model for this.

The problem of calibration is the issue of choosing a sufficiently capacious structural model of the agent’s behavior and the problem of obtaining empirical estimates of the structural parameters of the model. Its solution will require the availability of either ready-made empirical studies of the agents’ behavior or the availability of data that allow these studies to be carried out.

⁶ These constraints on the aggregated net demand function are trivial. Sonnenschein (1973) showed that the within-budget optimization, with an appropriate choice of preferences, can rationalize any arbitrary form of dependence of aggregate demand for goods on commodity prices, but only if this dependence is continuous, homogeneous at zero-order prices, and does not violate the budget constraint. Mantel (1976) reinforced this result by showing that “everything is possible” even in the special case of homothetic agent preferences. This assumption was widespread in macroeconomic models up until the global financial crisis, as it is equivalent to the representative consumer assumption from an observer’s point of view. It simplifies the analysis of the model behavior by making aggregate demand independent of income distribution as a scaled version of individual demand. However, simplification of the analysis is not a basis for accepting the assumption, especially if there is a reason to believe that it does not correspond to reality. An even stronger result was obtained by Kirman and Koch (1986), showing that “everything is possible”, even if we assume the same preferences of agents. The assumption of equality of preferences does not imply equality of income and wealth. It can be seen as the first minimal step towards household heterogeneity, while preserving the interesting properties of aggregate demand. Currently, in the arsenal of the central bank, models with heterogeneous households (HANK) have become standard.

3.5. State Variables

Departing from the main idea, it is worth noting that dollarization is a state variable in another, more mechanical sense, associated with maturity. The funding structure by maturity determines the bank's need for refinancing in future periods and limits the pace of change in dollarization.

This aspect of deposits certainly deserves to be included in the analysis, but the term of deposits is not the subject of analysis, and the limited resources of the model should be directed to modeling the currency structure. Of course, it should be recognized that the maturity of deposits is also endogenous in relation to exchange rate expectations: the greater the uncertainty in the exchange rate, the faster the tenge-dollar rate spread required by depositors widens as the deposit term lengthens.

That is why the terms of deposits in Kazakhstan rarely exceed 2-3 years. And that is why we do not see the need to model the term structure of deposits when analyzing the causes of dollarization and the long-term impact of regulatory measures on dollarization. Consequently, the inertia of dollarization associated with maturity of foreign currency deposits is much lower than the inertia of mechanisms for building exchange rate expectations, which are associated with the structure of the economy, and mechanisms for information distribution and the decision-making.

These mechanisms and institutions are the most important in the formation of exchange rate expectations, and their modeling is the most difficult in the analysis of economic policy. Lack of transparency in decision-making mechanisms and lack of public rules are a major source of uncertainty. In such environment, any action of the regulator requires rationalization and interpretation by the market; it turns into a signal about the state of these mechanisms and rules.

Let us consider this with a simple example, where the choice of an expectation mechanism has a huge impact on the complexity of the model and its usefulness for the policy analysis. In this model, dollarization is the choice of deposit currency by depositors. In his portfolio task, the investor, faced with given deposit rates and exchange rate expectations, must distribute savings by deposit currencies, trying to maximize the expected value of the criterion. Banks for each currency offer rates on deposits and distribution between the loan portfolio and money, having their own expectations on the exchange rate, having some idea of the reaction of depositors and trying to maximize the expected value of their own criterion. Both banks and their clients make decisions based on exchange rate expectations and using their own pricing models in the foreign exchange market.

The better banks know how depositors will react to offered rates, the more accurately they will be able to manage the currency structure of the deposit base. With rational expectations, when choosing rates, banks know in advance the level of dollarization that depositors will choose. Thus, the choice by the bank of the spread between tenge and foreign currency deposits reflects the balance between the dollar and tenge funding, taking into account the yield on interest-earning assets for each currency, the dependence of the cost of risk on foreign currency loans from the actual realization of the exchange rate, based on rates for currency swaps and rates on deposits in the tenge and foreign currency.

The stronger the expectations of the exchange rate depreciation, the more investors are prone to dollarization, the higher the rates on currency swaps, the wider the spread on rates, the greater the cost of risk on foreign currency loans, the more banks are forced to attract foreign exchange funds and place them in foreign currency liquidity, converting into the tenge via swaps, and the less banks are able to lend in the tenge. Based on this perception, the monetary policy aimed at managing the exchange rate to neutralize depreciation expectations could be considered preferable to inaction or a floating exchange rate policy.

However, taking into account the longer-term consequences debunks such a naive notion of the benefits of a managed course. The mechanism of building expectations and the demand for foreign currency deposits is sensitive to exchange rate expectations, the formation of expectations is associated with the monetary policy declared and pursued. Conversely,

depositors' foreign exchange preferences are the private sector's response to the macroeconomic environment and the rules of the game that are formulated by macroeconomic policies, including the monetary policy. Therefore, dollarization should be taken into account when modeling the credit channel and developing a macroeconomic model for the monetary policy analysis.

Answers to questions related to the choice of the base rate will have an inflationary bias if we leave out the relationship between money market rates and the market of the possibility of an undesirable equilibrium with a low interest rate where the expectations about depreciation of the tenge justify themselves since they cause short sales of the tenge, which lead to depreciation on the spot.

4. Reliability and Complexity

4.1. Futility of Constructing a Universal Model

The understanding that any model has limited applicability is more common among developers, despite the obvious conflict of interest. There are implicit expectations among some customers and users of some universal, the only correct model that can answer any questions for any country. Naive and far from harmless, these ideas motivate discussion of the problem of a universal model, including the possibility of its construction, the possibility of understanding and interpreting the results as arising from causal chains and networks typical for the model.

The analyzed policy shall mean any macroeconomic policy – fiscal policy, monetary policy, currency exchange regulation and exchange rate policy, the policy for operations in the currency hedging market, rules for regulating rates in the deposit market. The inclusion of each of these policies in the model is not only unnecessary but is also not advisable. To analyze economic policy, it is enough to include only one type of policy endogenously in the model, but to model its influence on the agents' behavior as completely and deeply as possible.

Building a model that can analyze multiple kinds of policies can be useful, for example, in terms of generality or lower maintenance costs. However, in practice, attempts to create a universal model are counterproductive: an increase in the number of policies that the model is designed to analyze will inevitably worsen the completeness and reliability of reflecting the channels of their influence, especially if the policies analyzed in the model use different mechanisms and channels.

The decisions made at this stage are the most questionable and controversial, because they reflect the fundamental limitations of the principle of complex systems modeling – the choice between oversimplification of the agent's behavior and the inability of developers and users to evaluate, develop, solve, interpret and understand a more complex model. Decisions at this stage are often made implicitly, by default, which is partly due to their controversial and inconsistent nature. When the problem is formulated explicitly, the developer is faced with a marginal choice between the reliability at the micro level, on the one hand, and the solvability of the macro model and the traceability of its results, on the other.

The complication of the model beyond a certain threshold progressively increases the difficulties of its construction, operation and interpretation, which are in the nature of resource, technical, technological, methodological and cognitive limitations. All this reduces the practical value of the model as a policy analysis tool. For each developer, these limitations are individual, subjective and rarely formulated explicitly. However, at the level of discipline, they appear as a set of the most advanced models, which, in their simplicity, reliability and ability to explain and reproduce economic phenomena of interest to the developer, expand the technological boundaries of macromodeling.

The complexity of the modeling object, associated with the dimension and variety of its constituent agents, factors, processes, mutual influences, is too great for one model. Consequently, in order to analyze a wider range of issues, the macroeconomic model cannot be universal and must be one out of the arsenal of models, each of which is capable of providing answers to a limited range of questions. As a rule, the contradiction is resolved by constructing

several models, each of them reflecting two or three interrelated phenomena, and together they give a fairly good idea of the system behavior.

4.2. Issues to be Discussed between the Developer and the Customer

Effective communication between the customer and the developer is critical for the success of a project to develop any fairly complex product, the creation of which makes the compromises inevitable and whose correct operation requires the user to understand the structure of the model, methodological concessions, limits of applicability, reservations and assumptions that determine the correspondence between the model and the modeled economy.

Effective communication is especially useful for the formation of tasks and contracting, as it allows making timely decisions on the choice of structure, elements and modeling methods and formalizing them in the form of product requirements. At this early stage, there are many more opportunities to choose a structure that reflects the features of the modeled economy in the fullest and most accurate way. Communication is also important for making decisions about the selection and operation of ready-made models, but in this case, the possibilities of adapting the structure of the model are extremely limited, and the decisions are actually binary in nature.

The questions presented below allow structuring the communication between the customer and the developer. The same questions should be asked by the user of the model in order to be able to interpret its results.

Correct documentation of models both in the academic environment and among consultants suggests that the answers to these questions are presented in the most transparent and complete form. In academic practice, however, only the structure of the model, the tasks of agents, and the methodology for choosing parameter values are well documented. Justifications are often missing or are presented by reference to precedent. The negative choice, i.e. the decision not to include one or another type of agent, is usually rarely discussed, to forestall criticism.

- What policy issues is the model intended to analyze?
- To what extent is the model consistent with the data? How well it forecasts?
- Is the model structural?
- What parameters is the agent characterized by? How are they calibrated and estimated? How deep are they? Is there any macroeconomic proof of their depth? How stable are they?
- What agents are inhabiting the model? Do the banks serve as agents? What choice do they face? Can an agent default?
- What state variables are included in the model? How lawful their movements are? What state variables are relevant for an agent?
- How the agents' expectations are presented?
- Heterogeneity – what is its cause, availability of data?
- How the economic policy and the choice of economic policy are presented? Is the economic policy authority an optimizing agent?
- What does the model overlook? What agents are missing in the model? What choice did you decide not to give to the agents? What state variables did you decide not to include into the model?

We recommend that the customer pose these questions to the developer, especially at an early stage. Even if the customer and developer are the same person, these questions are useful for structuring the decision-making process about the purpose of building the model, the questions the model is intended to answer, and, consequently, about the structure of the model.

5. Conclusion

The development of macroeconomic modeling techniques has gone hand in hand with an improved understanding of the role of economic policy and what constitutes good policy. On this

path, the understanding that changes in the economic policy also change the behavior of agents and the parameters describing their interaction has become a milestone. An economic policy designed without taking into account its influence on the behavior of agents turns out to be shortsighted and counterproductive. Therefore, only structural models, which most fully and reliably reflect the impact of policy on the expectations, behavior, and welfare of agents, are useful for the policy analysis. The recommendations regarding the methods for constructing and using macroeconomic models for policy analysis presented in the paper can be summarized as the following set of methodological principles.

First, the model must be able to explain the country's recent economic history; its elements should, with a reasonable degree of certainty, describe critical points and institutions where systematic anomalies or market and regulatory failures have been observed. In Kazakhstan, such facts include (1) a high share of primary exports, (2) a high share of the government in production of raw materials and in proceeds from their sale, (3) high loan losses, *ex ante* and *ex post*, low efficiency of financial intermediation, dependence of quality on capital adequacy, (4) high dollarization of liabilities and hierarchy of money, (5) symptoms of the Dutch disease and low productivity in the non-tradable sector, (6) heterogeneous households, (7) capital structure, the possibility of default and the operating efficiency of corporate borrowers of domestic banks.

Second, in order to reflect the behavior of agents in the model, it must be individually rational, especially in relation to the analyzed policy. One of the consequences of this principle includes constraints on the form of presentation of the analyzed policy. If the government economic policy authority is presented as another type of agent, then the consistent application of the principle of rationality requires that policy acts as the rules of conduct, which depend on the state of the economy and are the optimal strategy for the government. Any other form of representation of economic policy, such as a shock, a one-time intervention or incompleteness of the rules, brings uncertainty into interpretation of the rules, the agents' expectations, prediction of their behavior and, therefore, usefulness of the model for the economic policy analysis.

Third, the parameterization of the agents' task should be based on independent microeconomic data, and the parameters themselves should be invariant with respect to the policy, especially with respect to the analyzed policy. In practice, with the current level of development of economic modeling techniques and understanding of the economy, it is almost impossible to create a model that satisfies at least one of these principles in full. All models take shortcuts both in terms of the principle of rationalization of behavior and in terms of choosing a parameterization with stable parameters. The developer is forced to make arbitrary assumptions that do not find confirmation in the micro data, but improve the fit with the macro dynamics on a sample from the past. However, the use of arbitrary assumptions and the presentation of behavior in a contracted form, especially of such behavior that depends on the analyzed policy, makes the model useless for the policy analysis.

That is why it is so important to disclose the degree model's compliance with methodological principles when communicating with developers. People who make decisions based on the model should be aware of its ability to reflect reality. This means that the model testing, verification and validation must be integrated into the design process of the model and interpretation of its results. Results should be accompanied by sensitivity estimates to assumptions, structure choices, and parameter values. The developer must indicate the scope of its application, the degree of confidence in the results obtained, on what and how it depends. It is desirable to subject the structure of the model, assumptions and parameterization to an independent analysis for compliance with the methodological principles specified.

Finally, the complexity of modeling optimal behavior in relation to the economic policy forces developers to limit the range of aspects that can be analyzed correctly. With the current state of development in the modeling technology, national accounting practices and the availability of micro-level data, a useful model for the policy analysis can only be built to answer a limited range of questions. Good utility models are always domain experts. A model built to

analyze the rules of intervention in the foreign exchange market and exchange rate management regimes should allow for many equilibria, describe in detail the dynamics of information and financial flows at a high frequency. These qualities of the model fade into the background when analyzing the interest rate policy. A model that is positioned as universal can at best be useful for short-term forecasting but not for policymaking, and even more so will not be able to point to a set of reforms.

References

1. Aiyagari, S. Rao, Wallace, 1991. "Existence of Steady-States with Positive Consumption in the Kiyotaki–Wright Model." *Review of Economic Studies*. 58 (5): 901–916.
2. Akerlof, George A., Yellen, Janet L. 1985. "Can Small Deviations from Rationality Make Significant Differences to Economic Equilibria?". *American Economic Review*. 75 (4): 708–720.
3. Blanchard Oliver, N. Kiyotaki, 1987. "Monopolistic Competition and the Effects of Aggregate Demand". *American Economic Review*. 77 (4): 647–666.
4. Bernanke, Ben S., Mark Gertler, 1995. "Inside the Black Box: The Credit Channel of Monetary Policy Transmission," *Journal of Economic Perspectives*, 9(4): 27-48.
5. Bernanke, Ben S., Alan S. Blinder. 1988. "Credit, Money, and Aggregate Demand," *American Economic Review*, vol. 78(2), 435-439.
6. Calvo, Guillermo, 1983. "Staggered Prices in a Utility-Maximizing Framework." *Journal of Monetary Economics* 12, 383-398.
7. Chari, V.V., Patrick J. Kehoe, Ellen R. McGrattan. 2009. "New Keynesian Models: Not Yet Useful for Policy Analysis." *American Economic Journal: Macroeconomics*, 1 (1): 242-66.
8. Christiano, Lawrence, Martin Eichenbaum, Charles Evans, 2005. "Nominal Rigidities and the Dynamic Effects of a Shock to Monetary Policy," *Journal of Political Economy* 113, 1-45.
9. Clower, Robert (1967). "A Reconsideration of the Microfoundations of Monetary Theory". *Western Economic Journal*. 6 (1): 1–9.
10. Kashyap, Anil K, Stein, Jeremy C. "What Do A Million Observations on Banks Say About the Transmission of Monetary Policy?" NBER April 1999.
11. Parker, Jonathan, 2017. "Why Don't Households Smooth Consumption? Evidence from a \$25 Million Experiment", *American Economic Journal: Macroeconomics*, 9(4): 153–183.
12. Ricardo Marto, *Swiss Journal of Economics and Statistics*, 2014 Vol 150(4).
13. Sergi, Francesco. DSGE Models and the Lucas Critique. A Historical Appraisal.
14. Smets, Frank R., and Raf Wouters, "Shocks and frictions in U.S. business cycles: a Bayesian DSGE approach," *American Economic Review* 97, 2007, 586-606.
15. Joseph E. Stiglitz. 2018. "Where Modern Macroeconomics Went Wrong." *Oxford Review of Economic Policy*, Vol 34 (1-2), 70–106.
16. Taylor, John B. 1979, "Staggered wage setting in a macro model". *American Economic Review, Papers and Proceedings* 69 (2), 108–13.
17. Taylor, John B. 1980. "Aggregate Dynamics and Staggered Contracts," *Journal of Political Economy*, 88(1), 1-23.
18. Colander, David, H. Su, 2015. "Making sense of economists' normative-positive distinction." *Journal of economic methodology*, Vol 22 (2).

CENTRAL BANK'S COMMUNICATION POLICY

*Turekhanova N.E. – Head, Macroeconomic Research and Forecasting Division.
Monetary Policy Department, National Bank of the Republic of Kazakhstan.*

*Mekenbayeva K.B. – Deputy Head, Macroeconomic Research and Forecasting Division.
Monetary Policy Department, National Bank of the Republic of Kazakhstan.*

When I was at the Federal Reserve, I occasionally observed that monetary policy is 98 percent talk and only two percent action. The ability to shape market expectations of future policy through public statements is one of the most powerful tools the Fed has.

Ben Bernanke⁷

This paper is devoted to the communication policy of a central bank. In recent years, central banks have shown tangible progress in improving the methods and ways of communication. Today they provide more information that is focused on the monetary policy. Communication policy today has a more structured form, which implies the provision of regular information not only as part of the announcement of the monetary policy decisions but also related to other aspects of the economic development.

An effective monetary policy is possible, inter alia, owing to a central bank's transparency and efficient information exchange since expectation management plays an important role in the monetary policy.

In the academic literature and practice of central banks, special attention is paid to the study of the tone and content of monetary policy statements, how they are shaped and how they can change with the increasing transparency of the central bank operation.

In the paper, the authors made an attempt to study the existing methods and techniques of assessing the information published by central banks.

Key Words: central bank, communication policy, monetary policy.

JEL-Classification: E52, E58.

1. Preamble

In the last two decades, the development and improvement of communication policy has become increasingly relevant and is included in the main agenda of many central banks.

Communication policy of a central bank allows evaluating its openness and transparency, which gained special importance given the transition to the inflation targeting regime by many central banks.

Today, central banks are more open about their goals, tools, and strategies, inflation and growth forecasts, and interest rates. The communication tools used by central banks are generally similar – they include press releases, speeches by the central bank's top management, regular publications, reports and information materials on social media, etc.

Meanwhile, despite similar tools, the strategies of communication policy pursued by central banks differ significantly. The strengthening of the role of communications in the central bank operations has become an impetus for the development of discussions in the global scientific community on this issue. Moreover, the assessment of quality and effectiveness of

⁷ <https://www.brookings.edu/blog/ben-bernanke/2015/03/30/inaugurating-a-new-blog/>

communication policy has acquired particular importance, since the “proper” communication is designed to help the central bank in achieving its goals.

Until the 1990s, central banks were quite secretive institutions, with little or no disclosure about their policies and the measures they are taking or intend to take. It was believed that those responsible for development and implementation of the monetary policy should disclose information as little as possible. The secrecy of intentions of central banks was common, and sometimes considered useful in maintaining their independence. It used to be thought that, in order to be effective in the real economy, the central bank decisions on the monetary policy must surprise economic agents.

Gradually, the understanding came that an effective monetary policy is possible, also due to greater transparency of a central bank and effective exchange of information, since the management of expectations plays an important role in the monetary policy. In terms of the macroeconomic stability, it is now widely believed that there is more to be gained from managing expectations through open dialogue with the market participants than from surprising them.

Nonetheless, central banks remain extremely cautious about how, when and what they report. There are good reasons for this, as poor communication can lead to misunderstanding in financial markets and among the public, whereby the effectiveness of monetary policy can be significantly reduced.

The development of communication policy has given a significant impetus to the study of methods and techniques for its assessment, namely, how clear it is to the general public, and who is the main recipient of information from the central bank. Researchers analyze both quantitative and qualitative characteristics of the texts of documents and reports published by central banks.

2. Literature Review

Historically, a central bank was shrouded in mystery. Until the late 1980s, the secrecy of central banks' intentions was commonplace and even considered useful in maintaining their independence. Conventional wisdom in central banking circles held the monetary policymakers should “say as little as possible, and say it cryptically” (Blinder et al. 2008).

Central banks did not publish information on their goals and actions in the field of monetary policy, did not announce the results of meetings at which they made decisions on the level of interest rates. The market participants had only to guess the intentions of the central bank, based on the operations that it carried out on the open market.

At present, the policy of central banks is no longer a secret, especially in countries with developed financial markets, since central banks regularly provide information on macroeconomic conditions, policy strategies, targets, inflation and growth forecasts, as well as the reasons for making monetary policy decisions (Tobias et al. 2018). The consequences of the global financial crisis of 2008-2009 have intensified the process of development and evolution of the central banks' communication policy; in particular, forecasting and evaluating future actions and measures of the central bank have become even more important for achieving the main goals and ensuring financial stability.

Therefore, many central banks both in developed and developing countries now pay more attention to their communication policy.

Transparency and expectation management are now key indicators of an independent central bank, and communication is a critical tool to achieve these goals (Blinder et al. 2008). Transparency and openness of central banks increase the credibility of policy, flexibility and predictability of the central bank's actions, depending on the prevailing conditions in the economy, allow the market participants to respond to policy decisions more smoothly.

By increasing the transparency of its policy, the central bank thereby reduces the information asymmetry between politicians and the market participants. Transparency can improve the effectiveness of monetary policy and increase predictability of monetary policy decisions. Influencing market expectations is a key channel through which the monetary policy

operates, and policy transparency can enable better anticipation of central bank action (Woodford 2005). The monetary policy will be more effective and risks in financial markets will be reduced if central bank communication helps financial markets shape more accurate expectations about the likely future policy stance (Bernanke, 2004).

Improving the effectiveness of monetary policy is an important issue for every central bank without exception. Central banks around the world are constantly looking for possible methods and ways that would allow them to increase the effectiveness and efficiency of their policies.

Having a high degree of credibility, central banks can cause changes in interest rates by changing the target rate even without open market operations (Taylor 2001, Thornton 2004).

A number of empirical studies have been devoted to evaluating the effectiveness of monetary policy communications. Empirical analysis shows that the predictability of major central banks' rate-setting decisions has improved significantly in recent years, so that financial market expectations are generally in good agreement with actual monetary policy decisions (Bernoth and von Hagen, 2003).

Regular and better communications from the central bank improve the predictability of monetary policy and help reduce noise in monetary policy information (Blinder et al, 2008). As a medium-term framework for the monetary policy, the central bank should provide information on key trends in the economy and inflation and how the monetary policy will relate to these trends. The accumulation of such information allows market participants to build a correct understanding of these trends. In other words, by providing its vision of the emerging macroeconomic situation, the central bank can help economic actors anticipate the direction of monetary policy and respond accordingly. Market participants will be less surprised by monetary policy decisions, which in turn will lead to smoother asset price movements and reduce the likelihood of a financial crisis (Pescatori, 2018).

It is also necessary to align a communication chain in such a way that communication of the central bank's objectives and the decision-making process does not compromise its flexibility in responding to economic shocks and upheavals. That is, the central bank should have the opportunity to adjust its actions if this is required by the existing macroeconomic conditions.

Thus, central banks now provide much more information about the decisions they make and the reasons for those decisions. They also try to be more clear and understandable to different categories of readers by issuing well-articulated statements and providing the accompanying background and analysis materials that attempt to give clarification on the decisions that are being made and have been made.

In general, the process of declaring policy settings is a well-structured mechanism. Not all central banks officially adhere to specific time frames for making their decisions, but in practice, most central banks make decisions at regular intervals. Many central banks make decisions on pre-announced dates, most often the decision-making schedule is published a year in advance. At present, decisions usually coincide with regular meetings of decision-making committees. In addition, it is worth mentioning that this is a relatively recent change. For example, the Federal Open Market Committee (FOMC) started making most of its decisions in regular meetings only in 1994 (Poole and Robert Rasche 2003).

Information about the decisions taken and changes in the policy settings of the central bank, as a rule, is published quite quickly. Some central banks announce their decision after the end of the meeting on the same day but several hours after the meeting, allowing more time to prepare quality materials for distribution. Several central banks announce their decisions on the next business day (as, for example, the National Bank of Kazakhstan).

However, the central bank's transparency does not mean that the central bank should strive for perfect symmetry. In essence, the central bank's communication efforts should focus on quality rather than quantity. It is much more important that the information conveyed to the market by the central bank had value (Vayid 2013).

It is necessary to distinguish between quality and quantity of information. The former is, of course, much more difficult to assess than the latter. Following Blinder et al. (2008), central bank communications should only be used to the extent that they improve the signal-to-noise ratio by increasing the predictability of the central bank's actions, allowing the market participants to make better decisions. In other words, if the central bank issues some information, it must correspond to reality, and must be consistent with its real actions.

When analyzing the communication policy of a regulator, some studies point to the importance of not only the readability and clarity of texts, but also targeting, that is, the choice of the target audience. This, in turn, necessitates the selection of specific semantic texts. However, it is worth considering that the central bank does not communicate directly with economic agents, but does so through the media. Only the professional market participants, financial analysts, economists who directly follow published press releases, reports and read the minutes of meetings of monetary policy committees, can be an exception.

According to a study by the Bank of England (Munday, Brookes, 2021), in order to publish the central bank information by a larger number of media and communicate information to a wider audience, it is necessary to adhere to five principles:

- 1) texts should be as simple as possible for perception, without complex syntactic constructions;
- 2) publications should be in the first person whenever possible (I/we/us);
- 3) one should avoid using long sentences;
- 4) the main idea of the text should be formulated in the first sentence (top-down approach);
- 5) it is desirable to support the theses with facts and numbers.

Alongside with the work on the text content of published documents, the central bank is expanding the channels and formats of communication, as the widespread use of social media, instant messengers, YouTube channels, etc. increases their popularity among readers as a source of information.

Thus, the central banks of both developed and developing countries resort to rather non-standard methods of explaining their decisions to the general public, as well as in order to increase financial literacy. For example, Jamaica's central bank posted a reggae-style inflation video to explain its monetary policy. The Governor of the Central Bank of Finland is actively explaining the decisions made with tweets. The US Federal Reserve launched an online game in which anyone can play the governor of a central bank.

3. A Summary of Methods and Techniques for Evaluating the Effectiveness of Central Banks' Communication Policy

The National Bank of Kazakhstan, alongside with other central banks pursuing the inflation targeting regime, has also made a significant progress in developing its communication policy.

In 2015, the National Bank of Kazakhstan moved to the inflation targeting regime. This regime involves, among other things, a balanced and open communication policy. In this regard, starting from 2015, the National Bank of Kazakhstan has significantly improved the decision-making mechanism on monetary policy matters and the procedure for information disclosure based on the results of meetings at which decisions on the base rate are made.

Specifically, the National Bank of Kazakhstan began publishing a schedule of meetings to decide on the base rate for the coming year, and a press release is published at the end of each meeting. In addition, the Monetary Policy Report is published quarterly. Studies are published on a wide range of issues, analytical materials that contain information on the current macroeconomic situation, the development of the money market, foreign exchange and financial markets.

Meanwhile, the evaluation of effectiveness of the communication policy of the National Bank of Kazakhstan has not yet been studied enough. One of the reasons for this is the relatively

small quantity of data to obtain statistically significant estimates. This is especially true for assessing the quality of communication materials.

With the development and improvement of communication policy, the emergence of its new tools, central banks and analysts are increasingly wondering about the effectiveness of communication policy. A huge variety of published materials, such as press releases, statements and interviews of central bankers, analytical reports and studies become the main objects for assessing the transparency of central banks and the effectiveness of their communication policies.

Moreover, the subject for study is the quantity and quality of materials published by central banks. Speaking about the number of materials, transparency of the communication policy is being studied. Evaluation of the quality of materials is associated with the study of readability (clarity) of texts.

The Transparency Index

Dincer, Eichengreen (2007, 2014) developed an index to measure central bank transparency that is widely used by many analysts. The index was designed on the basis of an assessment of answers to 15 questions, which were divided into the following categories:

1) policy transparency (openness about policy objectives, including formal statement of objectives, explicit definition of primary objective in case of multiple objectives, quantification of primary objective);

2) economic transparency (availability of statistical data on macroeconomic indicators, the use of models to build forecasts and assess the impact of their decisions, as well as the publication of forecasts);

3) procedural transparency (implies the procedures for making decisions in the field of monetary policy, including the provision of an explicit policy rule or strategy, a report (minutes, explanations) on policy discussions);

4) transparency of politics (disclosure of political decisions, with an explanation of the decision, and an explicit direction or indication of likely future policy actions);

5) operational transparency (monetary policy implementation, including analysis of achievement of operational targets and (unanticipated) macroeconomic shocks that affected the monetary policy transmission).

Thus, the overall index ranges from 0 to 15. Data for the study was collected from the websites of 100 central banks, their charters, annual reports and other published documents. Initially, the estimates were based on the data from 1998 to 2005; in 2014, the authors updated the results with the extension of the time horizon to 2010 and the number of central banks to 120.

The average transparency score across the sample increased from 3.4 in 1998 to 5.2 in 2005. None of the 100 central banks showed a decline in transparency. For 11 countries, the transparency index did not change over the analyzed period, while the remaining 89 central banks demonstrated an increased transparency index.

The results of assessments made in 2007 showed that central banks in developed countries are more transparent than central banks in emerging markets (middle-income countries with significant links to international financial markets), which, in turn, are more transparent than central banks in developing countries.

Thus, the most transparent central banks in 2005 were the Reserve Bank of New Zealand, the Bank of Sweden, the Bank of England, the National Bank of the Czech Republic, the Bank of Canada, the ECB and the Central Bank of the Philippines (scores from 13.5 to 10). The least transparent central banks were 7 central banks that scored 1 or less: Aruba, Bermuda, Ethiopia, Kuwait, Libya, Saudi Arabia and Yemen.

Kazakhstan entered the group of central banks of Central Asian countries together with Kyrgyzstan and Tajikistan. In its group, during 1998-2005 Kazakhstan received the highest scores (with the exception of 2004). In 2005, the transparency index of the National Bank of Kazakhstan, according to the authors, increased to 5.5 points, like that of the Organization of Eastern Caribbean States, Trinidad and Tobago, Mexico, and Argentina.

To further assess the transparency of central banks, the authors used a regression analysis of the impact of such macroeconomic indicators as GDP per capita, inflation, the exchange rate regime (de facto) and financial depth (the ratio of M2 to GDP) on transparency of a central bank. In addition, political variables such as the rule of law, political stability, voting rights and accountability, and government effectiveness were included (each of these indicators was included separately in the model to avoid autocorrelation due to their interdependence).

Overall, the analysis confirmed that transparency is higher in countries with more stable and developed political systems and deeper and more developed financial markets. The strongest relationship with transparency was shown by the GDP per capita. Countries with more flexible exchange rates tend to be more transparent in their conduct of monetary policy. A number of political variables showed statistical significance, albeit at different levels. In particular, greater transparency is typical of central banks in the countries with a higher level of the rule of law, more stable political systems, greater voting rights and accountability, higher government efficiency.

Assessing the impact of central bank transparency on macroeconomic indicators, the authors came to the following conclusions. The transparency index and inflation have a statistically significant negative relationship. This is consistent with theories suggesting that more transparent monetary policy allows the public to respond more quickly to policy changes, which in turn hinders the authorities' attempts to manipulate inflation to achieve other goals. In addition, greater transparency in monetary policy allows society to adjust more quickly, which limits the incentive for the central bank to pursue persistent inflationary policies in an attempt to achieve goals other than price stability.

In 2007, based on the results of the study, the authors came to the following main conclusions. Increasing the transparency of central banks is a recent change in the conduct of monetary policy. It is a way to hold politicians accountable when traditional mechanisms for doing so, including public enforcement of exchange rate commitments and direct government oversight, are declining, reflecting a move towards more flexible exchange rates and greater central bank independence.

The results showed that this trend is general, most of central banks have moved towards greater transparency in recent years. Preliminary analysis suggests generally favorable, albeit relatively weak, impact on inflation and GDP.

In 2014, the authors updated results of the study. В выборку были включены данные до 2010 года. The data before 2010 on 120 central banks were included into the sample.

The highest score of the transparency index in 2010 was assigned to the Bank of Sweden, the Reserve Bank of New Zealand, the Central Bank of Hungary, the National Bank of the Czech Republic, the Bank of England and the Bank of Israel (scores from 14.5 to 11.5). Some central banks retained their top positions from the previous assessment but other central banks also made it into the top 10, which, as the authors believe, reflects the benefits of using a larger sample of countries (unlike other similar studies), as well as a move towards greater transparency of central banks.

Meanwhile, the list of central banks with the lowest transparency index in 2010 included the central banks of countries such as Angola, Aruba, Bermuda, Cayman Islands, Libya, Syria and Tonga.

In 2010, the transparency index of Kazakhstan scored 6, which equaled 3.5 in 1998-2004 (Table 1). Central banks of Armenia and Moldova were regarded as the most transparent ones among the CIS countries.

Table 1

Transparency by country, index range from 0 to 15

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Kazakhstan	3.5	3.5	3.5	3.5	3.5	3.5	3.5	6	6	6	6	6	6
Armenia	4	4	4	4	4	4	4	4	7.5	7.5	7.5	7.5	8.5
Moldova	5	5	5	6	6.5	6.5	6.5	6.5	6.5	6.5	7	7	8
Georgia	3	3	3	3	3	4	4	4	4.5	5.5	6.5	7.5	7.5
Kyrgyzstan	3	3	3	4	4	3	5	5	5	5.5	5.5	5.5	5.5
Belarus	1.5	3.5	5	5	5	5	5	5	5	5	5	5	5
Ukraine	2	2	2	2	3	3	3	3	3.5	3.5	3.5	3.5	5
Azerbaijan	1	1	1	3	3	3	3	3.5	3.5	3.5	3.5	3.5	3.5
Russia	1.5	1.5	1.5	1.5	1.5	1.5	3	3	3	3	3	3	3
Tajikistan	1.5	1.5	1.5	1.5	1.5	1.5	1.5	2.5	2.5	2.5	2.5	2.5	2.5

Source: N. Nergiz Dincer & Barry Eichengreen, 2014. "Central Bank Transparency and Independence: Updates and New Measures," *International Journal of Central Banking*, *International Journal of Central Banking*, vol. 10(1), pages 189-259, March.

In 110 countries out of the 120 examined, the transparency index in the reviewed period increased; in the remaining 10 cases (Angola, Bahamas, Bermuda, Cayman Islands, Cuba, Iran, Lebanon, Libya, the Solomon Islands and Syria), the transparency index has not changed.

The results of the study, which was updated in 2014, reaffirmed the growth in transparency in both developed and developing countries. Meanwhile, developing countries that showed the most impressive results in 2006 in terms of the transparency dynamics, somewhat slowed down in subsequent years. In particular, this can be seen from the index dynamics for a number of large emerging markets – Brazil and China in 2007, and Brazil, Colombia and Poland in 2008.

Conclusions have been proved that countries with higher per capita income, more developed financial markets, more open economies, and stronger political institutions have more transparent central banks. Countries with more flexible exchange rate regimes also tend to have higher levels of central bank transparency.

The Readability Index

Since the publication of Alan Blinder's book, *The Quiet Revolution* (2004), the central bank communication policy has evolved into a monetary policy tool in its own right. An increasing number of central banks in both developed and developing countries are expanding the "range" and degree of disclosure of published information about the decisions made.

At the same time, the content of the texts and the presentation style of the central bank's official information are quite difficult for the perception of the general public. Researchers in the field of text analysis and mathematical linguistics have developed various metrics to assess readers' understanding of texts.

One of the first works in this area are studies of the texts of Rudolf Flesch (Flesch R. (1948)), based on which the Flesch readability index was proposed. This index evaluates how easy a text is to perceive and understand based on two metrics, namely, the number of words in a sentence and the length of words in syllables.

Later, the Flesch index was supplemented by the level of education parameter (number of years of study) necessary for understanding texts, and was called the Flesch-Kincaid Readability Index (Kincaid et al., 1975).

The Flesch index is calculated under the following formula:

$$K = 206,835 - 1,015 * ASL - 84,6 * ASW \text{ (for the English language),}$$

where: K – an assessment of text complexity,

ASL – an average sentence length (number of words in a sentence),

ASW – average number of syllables per word.

The index ranges from 0 to 100. The larger the number, the easier the text: 70-80 points – the text is read quite easily, 60-65 – medium text complexity, less than 30 – complex texts.

The formula for calculating the Flesch-Kincaid index for the level of education required to understand a certain text is:

$$0,39 * ASL + 11,8 * ASW - 15,59.$$

The result obtained directly determines the required level of education, expressed in years of study, starting from primary school.

Despite the simplicity of the calculation, the Flesch-Kincaid index is still a popular method for evaluating text characteristics⁸.

However, it is worth noting that these indexes were originally developed for the English language. Oborneva (2006) adapted the classic Flesch-Kincaid readability index for the Russian language by changing the parameters of coefficients in the equation taking into account the specifics of the Russian language (based on a study of word length in Russian and English). This formula is the most popular for assessing the complexity of the Russian language (Evstigneeva, Sidorovskiy, 2021).

The obtained equation for the Russian language looks as follows:

$$K = 206,835 - 1,3 * ASL - 60,1 * ASW$$

It should be noted that the analysis of the text quality (readability) in Russian has been little studied. The authors of the paper, unfortunately, did not find any research addressing the readability of texts in the Kazakh language.

Along with the Flesch-Kincaid index, there are a number of other classical methods for assessing readability (Coleman-Liau Index, Automatic Readability Index / ARI), Dale-Chall Readability Formula, etc.). However, all classic readability indices are based on statistical text metrics to assess the complexity of understanding and perception, which limits their use for analyzing the linguistic characteristics of texts.

Methods of Text Assessments based on Big Data Analytics

The development of technologies in the field of big data analytics and machine learning methods has led to a significant expansion in the parameters used for assessing the complexity of texts, based on their content. The most popular methods include such techniques as random forest, neural network, support vector machines. As in the case of classical readability indices, these techniques are more often used to analyze texts in English (the availability of ready-made libraries, etc.).

The existing models for assessing readability in Russian are developed based on the analysis of the text content by using machine learning methods, which are designed to classify educational texts without specific terminology (Evstigneeva, Sidorovskiy, 2021). In turn, the materials published by central banks contain certain terminology designed more for professional users and not always accessible to an average person, which requires the “fine tuning” of readability assessment models.

Thus, Evstigneeva, Sidorovskiy, 2021, using the neural network algorithm, designed a tool for automated assessment of the readability of communication on the monetary policy, based on linguistic and textual analysis. Thus, this method allows analyzing the “complexity of perception” of economic texts in the Russian language.

The results of the study showed that the existing level of communication of the Bank of Russia is difficult for a wide audience to understand. The texts contain a significant number of terms; there is a high “proportion of nouns and polynomial complex sentences.” According to the authors, “the active use of specialized terms and scientific style by the Bank of Russia when explaining its decisions makes it difficult for a wide audience to perceive texts and hinders the increase in the public confidence”.

⁸ This index is “embedded” in standard text editor software packages, including Microsoft Word. However, the index works correctly only for texts in English. For the Russian language and some European languages, the test provides information only about the total and average values.

Conclusion

Recent years have been characterized by a more open monetary policy pursued by central banks, which has been observed in many countries around the world. One of the reasons was an active development of communication policy, where central banks use a wide range of tools and strategies.

The main result of these changes has been a gradual increase in predictability of the central bank actions, which can be of great help in shaping market expectations for a future monetary policy. It can also improve the quality of decision-making. In any case, both of these factors are aimed at improving the effectiveness of monetary policy.

Although generally central banks have made some progress in developing communication policies, their strategies differ significantly from country to country, indicating that the best option for this strategy has not yet been determined, if at all. The communication process is not the same, since countries have different levels of economic development, different depths of their financial and money markets, and different institutional environments. However, completely different structures can be equally efficient in transmitting the monetary policy signals.

Thus, an important task is to evaluate the effectiveness of central bank communications. Researchers working in this field have been solving this problem for many years, using various methods and techniques, and their further development is relevant. These studies can help in finding answers, including to questions regarding the optimal balance between the quantity and quality of central bank communications. Central banks should be careful about providing too much information or, conversely, abbreviated information that could mislead the main recipient of this information and reduce the effectiveness of monetary policy.

Central banks began to communicate in new and different ways, including press conferences and statements, the release of minutes and transcripts. Analysis of the communication policy of various central banks shows the breadth and diversity of communication structures in modern central banks. While all central banks communicate through speeches and press releases, the timing of press conferences varies by central bank. There is a big difference between central banks in publishing protocols. Similarly, although central banks publish forecasts, the variables and horizons of these forecasts differ. In general, it can be assumed that the means of communication will continue to evolve in the future as central banks try to communicate their messages more clearly.

References

1. Adrian, Tobias, Douglas Laxton, and Maurice Obstfeld, eds (2018). "Advancing the Frontiers of Monetary Policy". Washington, DC: International Monetary Fund.
2. Andrea, Pescatori (2018). "Central Bank Communication and Monetary Policy Surprises in Chile," IMF Working Paper No. 18/156.
3. Ben S. Bernanke (2004). Speech "Central Bank Talk and Monetary Policy" At the Japan Society Corporate Luncheon, New York.
4. Bernoth, Kerstin & von Hagen, Jürgen (2003). "The performance of the Euribor futures market: Efficiency and the impact of ECB policy announcements," ZEI Working Papers B 27-2003, University of Bonn, ZEI - Center for European Integration Studies.
5. Blinder, A. S., M. Ehrmann, M. Fratzscher, J. De Haan and D. J. Jansen (2008). "Central Bank Communication and Monetary Policy: A Survey of Theory and Evidence", NBER Working Paper, No. 13932.
6. Blinder A. S. (2004) "The Quiet Revolution: Central Banking Goes Modern", Yale University Press, doi: 10.12987/yale/9780300100877.001.0001.
7. Dincer, N., and B. Eichengreen (2007). "Central Bank Transparency: Where, Why and with What Effects?", NBER Working Paper No. 13003.
8. Dincer, N., and B. Eichengreen (2014). "Central Bank Transparency and Independence; Updates and New Measures," International Journal of Central Banking, Vol. 10, Issue 1, p. 189-259.

9. Evstigneeva, A. and Sidorovsky, M. (2021). "Assessment of Clarity of Bank of Russia Monetary Policy Communication by Neural Network Approach", *Russian Journal of Money and Finance*, 80(3), pp. 3-33. doi: 10.31477/rjmf.202103.03.
10. Flesch R. A. (1948) "New Readability Yardstick", *Journal of Applied Psychology*. Vol. 32(3). – pp. 221–233. doi: 10.1037/h0057532.
11. Ioana-Iuliana Tomuleasa (2015). "Central Bank Communication and its Role in Ensuring Financial Stability", *Procedia Economics and Finance*, Volume 20, p. 637-644.
12. Kincaid J. P., Fishburne R. P. Jr., Rogers R. L., Chissom B. S. (1975). "Derivation of New Readability Formulas (Automated Readability Index, Fog Count and Flesch Reading Ease Formula) For Navy Enlisted Personnel", *Naval Technical Training Command: Research Branch Report*. No 8.
13. Munday, T. and Brookes, J. (2021). "Mark my words: the transmission of central bank communication to the general public via the print media", *Staff Working Paper No. 944*. Bank of EnglandWoodford.
14. Michael (2005). "Central Bank Communication and Policy Effectiveness". NBER Working Paper, No. 11898.
15. Osborneva I.V. (2006). "Automated Assessment of Academic Text Complexity based on Statistical Parameters", *Ph.D. Thesis*. Moscow, 2006.
16. Poole, William, and Robert H. Rasche (2003). "The Impact of Changes in FOMC Disclosure Practices on the Transparency of Monetary Policy: Are Markets and the FOMC Better "Synched"?", *Federal Reserve Bank of St. Louis Review*, Vol. 85, Issue 1, p. 1-10.
17. Serge Jeanneau (2009). "Communication of monetary policy decisions by central banks: what is revealed and why", *BIS Papers*, No. 47.
18. Taylor, J. (2001). "Expectations, Open Market Operations, and Changes in the Federal Funds Rate", *Federal Reserve Bank of St. Louis Review*, July/August, p. 33-47.
19. Thornton, D. (2004). "The Fed and short-term rates: Is it open market operations, open mouth operations or interest rate smoothing?", *Journal of Banking & Finance*, 28, p. 475-498.
20. Vayid, I. (2013). "Central Bank Communications Before, During and After the Crisis: From Open-Market Operations to Open-Mouth Policy", *Bank of Canada Working Paper* 2013-41.

DEVELOPMENT PROSPECTS OF THE NATIONAL BANK'S BULLION COINS AND MINTED BARS AS AN INSTRUMENT OF INVESTMENT

Kazhmuratov Zh.T. – Director, Cash Circulation Department, National Bank of the Republic of Kazakhstan.

Shalgynbayev K.U. – Deputy Director, Cash Circulation Department, National Bank of the Republic of Kazakhstan.

Maidanov S.Zh. – Head, Analysis and Funds Planning Division, Cash Circulation Department, National Bank of the Republic of Kazakhstan.

Tabarak Y.Zh. – Chief Specialist-Analyst, Analysis and Funds Planning Division, Cash Circulation Department, National Bank of the Republic of Kazakhstan.

The purpose of this study is to analyze the market for the National Bank's bullion coins and certified minted bars of refined gold and consider the possibility of using international experience in the development of this market. The paper discusses the current situation in the bullion coins and minted bars market, the advantages of investing in minted bars and bullion coins of the National Bank and international experience in the development of the bullion coins and minted bars market.

As a result of the study, potential areas of the market development both within the country and abroad were identified.

Key Words: minted bars, bullion coins, “ALTYN BARYS”, “KUMIS BARYS”, bullion coins market, minted bars market, market research.

JEL-Classification: O3, L1, L2, M3.

1. Preamble

Since ancient times, gold and silver have been precious metals that are in demand around the world and today they make an integral part of the investment portfolio for many investors. Investing in gold and silver takes place in a variety of ways, from investing in physical gold and silver to securities (financial derivatives, mutual funds, mining stocks, and exchange-traded funds (ETFs)) that are linked to gold and silver (Palmer, 2021). One can invest in physical gold and silver by purchasing bullion coins made of gold and silver, as well as gold minted bars.

Since 2017, the National Bank has been selling certified minted bars of refined gold (the “minted bars”) to the population⁹. The main goal of this initiative is to provide the population with an additional investment instrument for saving and accumulating their own funds. Minted bars are available in five varieties: 5, 10, 20, 50 and 100 g. Minted bars are designed with a smooth surface, embossed edge and microtext, which are also the protective elements of minted bars. In addition, minted bars are produced in special protective packaging, whose integrity is a proof of authenticity of a minted bar. At present, the sale and repurchase of minted bars is carried out through 4 second-tier banks – “Halyk Bank Kazakhstan” JSC, “Jusan Bank” JSC, “Eurasian Bank” JSC, and “Bank CenterCredit” JSC – and some non-bank exchange offices.

First Kazakhstani bullion coins, “Silk Way”, were issued into circulation in 1996. Since November 2009, “ALTYN BARYS” and “KUMIS BARYS” bullion coins with different weight characteristics began to be issued¹⁰. In August 2020, “ALTYN BARYS” and “KUMIS BARYS” bullion coins in the Roman script were put into circulation. Investment coins of the National Bank are a legal tender and represent a historical and traditional value for the general public. The front side of bullion coins depicts a snow leopard, which is a totem animal and is considered sacred for all Turkic people (Brussilovskaya, 2020).

⁹ <https://nationalbank.kz/ru/page/prodazha-i-vykup-mernyh-slitkov>

¹⁰ <https://nationalbank.kz/ru/catalog/categories/detail/5>

Gold bullion coins, "ALTYN BARYS", are issued in the following denominations: 10 tenge (3.11 g), 20 tenge (7.78 g), 50 tenge (15.55 g), 100 tenge (31.1 g), 200 tenge (62.2 g), and 500 tenge (155.5 g). Silver bullion coins, "KUMIS BARYS", are issued in the following denominations: 1 tenge (31.1 g), 2 tenge (62.2 g), 5 tenge (155.5 g) and 10 tenge (311 g). Bullion coins are sold and repurchased by regional branches of the National Bank.

The cost of minted bars and investment coins depends on the morning fixing for one troy ounce of metal in the US dollars set by the London Bullion Market Association (LBMA), and the official exchange rate of the tenge against the US dollar on the business day preceding the day of sale, and changes daily. The selling price of gold and silver investment coins also includes production costs, the face value of the coin and a fixed spread (from 1% to 9%). The margin for the sale of minted bars is determined by the second-tier banks and individual non-bank exchange offices independently.

Minted bars market is expanding every year. Distribution channels are also expanding. In 2017, minted bars were sold through 3 second-tier banks – Halyk Bank, Eurasian Bank and Jusan Bank. Since 2018, minted bars have been sold through exchange offices. In 2020, the sale of bars began to be carried out through the branches of Bank CenterCredit. The demand for investment coins resumed again in 2020-2021 after the suspension of their production due to the issue of an additional investment instrument – minted bars.

In general, the market of the National Bank's bullion coins and minted bars has been established only recently and does not have a long history, as in some developed countries. In addition, now minted bars and bullion coins of the National Bank are sold exclusively within the territory of the Republic of Kazakhstan. At the same time, the National Bank's investment instruments have the potential for development and are in demand in foreign markets. Therefore, the analysis of the National Bank's investment instrument market allows assessing the market opportunities.

The purpose of the study is to identify trends and opportunities for the development of the market of the National Bank's minted bars and bullion coins. Realization of the set goal requires that the following tasks are solved:

- analyzing the current situation in the market of bullion coins and minted bars in Kazakhstan;
- determining the advantages of investing in the National Bank's minted bars and bullion coins;
- studying the international experience of how the market of minted bars and bullion coins has been developing.

The study consists of several sections. The first section provides an analytical overview of the current situation in the market of the National Bank's bullion coins and minted bars. The second section reveals the benefits of investing in minted bars and bullion coins of the National Bank. The third section is devoted to the international experience in development of the bullion coins and minted bars market. Conclusion section sums up the results of the study.

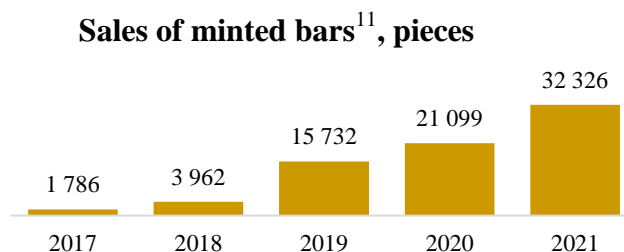
2. An Insight into the Current Situation in the Bullion Coins and Minted Bars Market

2.1 Minted Bars

Minted bars market covers all regions of Kazakhstan. The demand for minted bars is growing every year. The aggregate average annual growth rate accounts for 69% (Figure 1). In total, since the start of minted bars issuance, as of January 1, 2022, 74,905 minted bars with a total weight of 2.7 tons have been sold. The largest quantity of minted bars was sold in the cities of Almaty, Nur-Sultan and Atyrau and accounts for 58%, 11% and 8% of the total volume of sales, respectively (Figure 2). If the demand for minted bars on the part of the population increases, the National Bank produces an additional volume of minted bars.

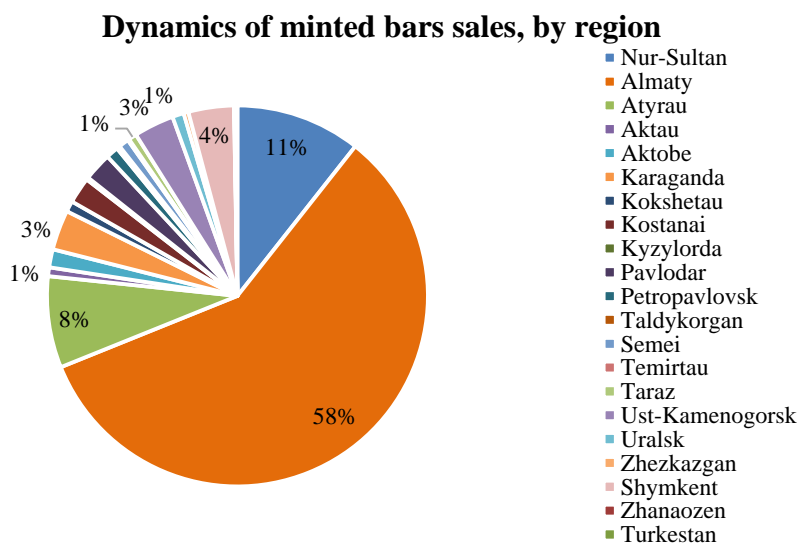
The 10-gram and 100-gram bars are the most popular among minted bars. Their sales volumes are way above the sales volumes of other types of minted bars (Figure 3).

Figure 1



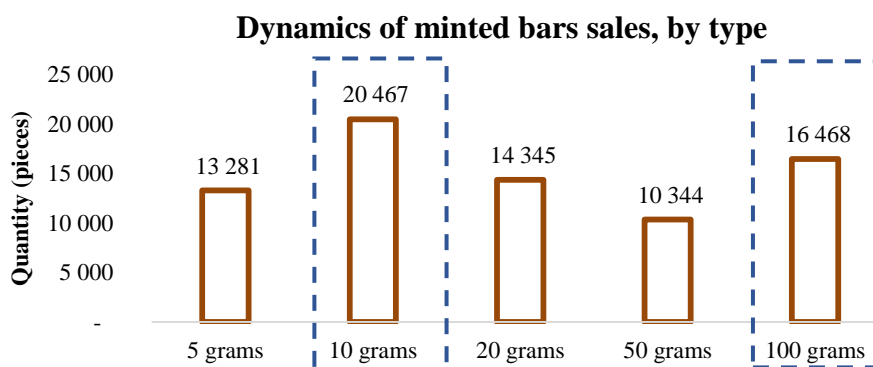
Source: NBK.

Figure 2



Source: NBK.

Figure 3



Source: NBK.

2.2 Bullion Coins

Bullion coins of the National Bank are manufactured from gold and silver. As compared to collectible coins, “ALTYN BARYS” and “KUMIS BARYS” coins are minted using a simplified technology. If in most cases, the minting standards “proof” and “uncirculated” are used in the production of collectible coins, the minting standard “bullion” is used in the production of bullion coins. Proof coins undergo special processing, polishing and cleaning to ensure high quality minting (The Royal Mint, 2021). These coins are suitable for collectors who want to own coins of the highest level of craftsmanship and detailed design. Whereas the quality of bullion coins is on par with the quality of circulation coins that are in everyday use. Bullion

¹¹As of January 1, 2022.

coins made according to the bullion standard are attractive because of the precious metal that makes up the coin. In order to maintain the optimal price range in the manufacture of bullion coins, the usual type of minting is used and great attention is paid to production efficiency (The Royal Mint, 2021).

Moreover, bullion coins are legal tender. In this regard, the turnovers on the sale of bullion coins are not subject to value added tax, they can be exported outside the country at face value, since, first of all, it is the national currency.

Issuance of silver bullion coins gives an investment opportunity to the general public with a small startup capital since on average their cost is smaller than the cost of minted bars and gold investment coins.

The National Bank calculates the need for bullion coins on an annual basis depending on demand. With an increase in demand for bullion coins from the population, the National Bank manufactures an additional volume of bullion coins. For example, in 2021, due to a high demand for silver investment coins, in October-November 2021, an additional volume of "KÚMIS BARYS" bullion was minted.

The National Bank's bullion coins are the most attractive investment instrument compared to foreign bullion coins. Bullion coins of foreign manufacturers sold via their online stores and through secondary markets (yes-coin.kz, sberbank.kz, AliExpress.com, etc.) are competing with the National Bank's bullion coins in the Kazakh market.

The selling price of gold and silver bullion coins, in addition to the cost of the metal itself, includes the cost of manufacturing, face value of the coin and a fixed markup percentage. The fixed markup percentage for "ALTYN BARYS" gold coins with denominations of 500 tenge – 1%, 200 tenge – 2%, 100 tenge – 3%, 50 tenge – 5%, 20 tenge – 7% and 10 tenge – 9%; for "KÚMIS BARYS" silver coins with denominations of 10 tenge – 1%, 5 tenge – 2%, 2 tenge – 3% and 1 tenge – 5%.

Prices of the National Bank's bullion coins are competitive compared to well-known international bullion coins (Table 1).

Table 1

Comparative price analysis of bullion coins, tenge¹²

Manufacturing country	Coins	Gold coins				Silver coins
Weight (in ounces)		1	0,5	0,25	0,1	1
Austria	"Wiener Philharmoniker"	809 092	417 092	213 837	88 435	14 215
UK	"Britania"	831 853	429 716	222 443	92 673	13 280
South African Republic	"Kruggerand"	1 223 061	-	305 661	166 661	36 001
Australia	"Australian kangaroo"	831 672	429 697	227 720	102 969	11 693
USA	"American eagle"	1 145 542	583 578	303 677	134 007	31 556
Kazakhstan	"ALTYN BARYS" and "KÚMIS BARYS"	818 807	417 149	212 827	87 212	12 257

Sources: NBK, US Mint, Royal Mint (UK), Perth Mint, Austrian Mint and South African Mint.

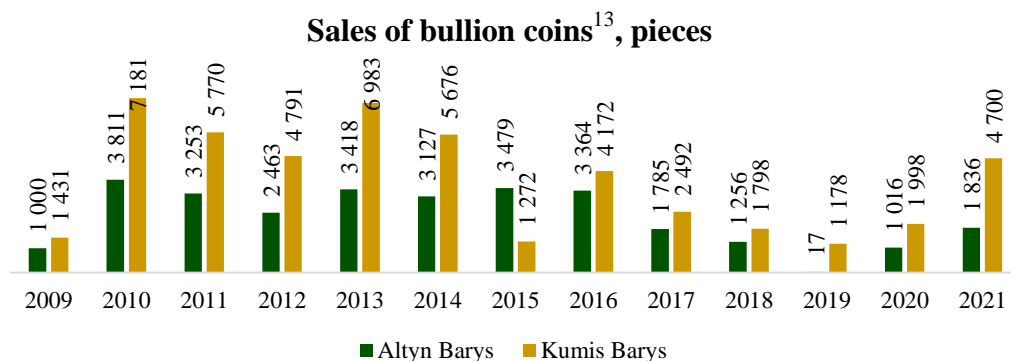
Note: The cost of bullion coins of manufacturing countries is shown according to the prices specified in online stores, excluding delivery costs (official exchange rates as of December 27, 2021).

¹² Prices are given in the tenge as of December 27, 2021.

Currently, the bullion coins market covers all regions of Kazakhstan. The total sales volume from 2009 to 2021 amounted to 29.8 thousand pieces of gold coins and 49.4 thousand pieces of silver coins (Figure 4).

In 2009-2016, the demand for investment coins remained at the same level with a slight fluctuation. The average annual sales volume for the period was: “ALTYN BARYS” gold coins – 3 thousand pieces, “KUMIS BARYS” silver coins – 4.7 thousand pieces.

Figure 4

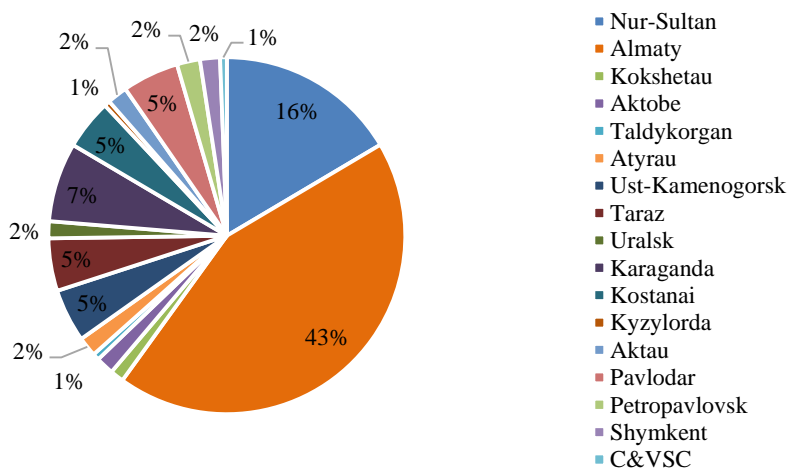


Source: NBK.

The largest demand for bullion coins is in the cities of Almaty and Nur-Sultan (Figures 5 and 6).

Figure 5

**Dynamics of sales of “ALTYN BARYS” gold investment coins,
by region¹⁴**

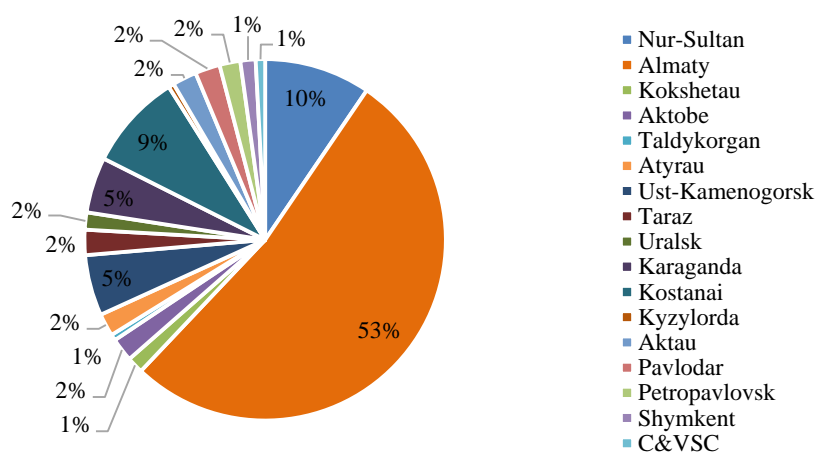


Source: NBK /C&VSC – Cash and Valuables Storage Center/.

¹³ The statistics also includes the sales volumes of “Altyn Barys” and “Kumis Barys” bullion coins issued earlier.

¹⁴ The statistics on investment coins is presented as of January 1, 2022.

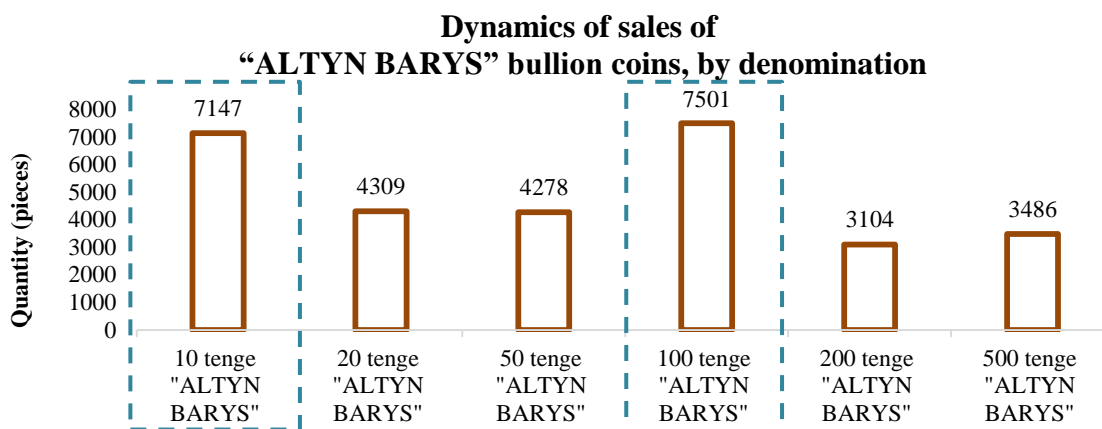
Figure 6

**Dynamics of sales of "KÚMIS BARYS" silver investment coins,
by region**

Source: NBK.

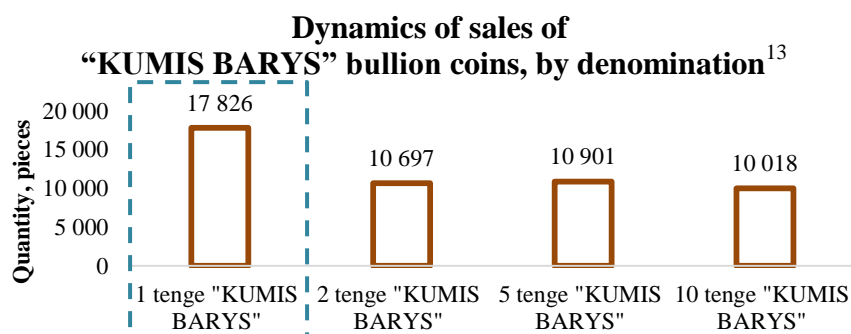
Among denominations of "ALTYN BARYS" gold bullion coins, the most demanded are coins with denominations of 10 tenge and 100 tenge. Demand for other coins is relatively balanced (Figure 7). "KÚMIS BARYS" silver bullion coins with a face value of 1 tenge are the most popular among the general public (Figure 8).

Figure 7



Source: NBK.

Figure 8



Source: NBK.

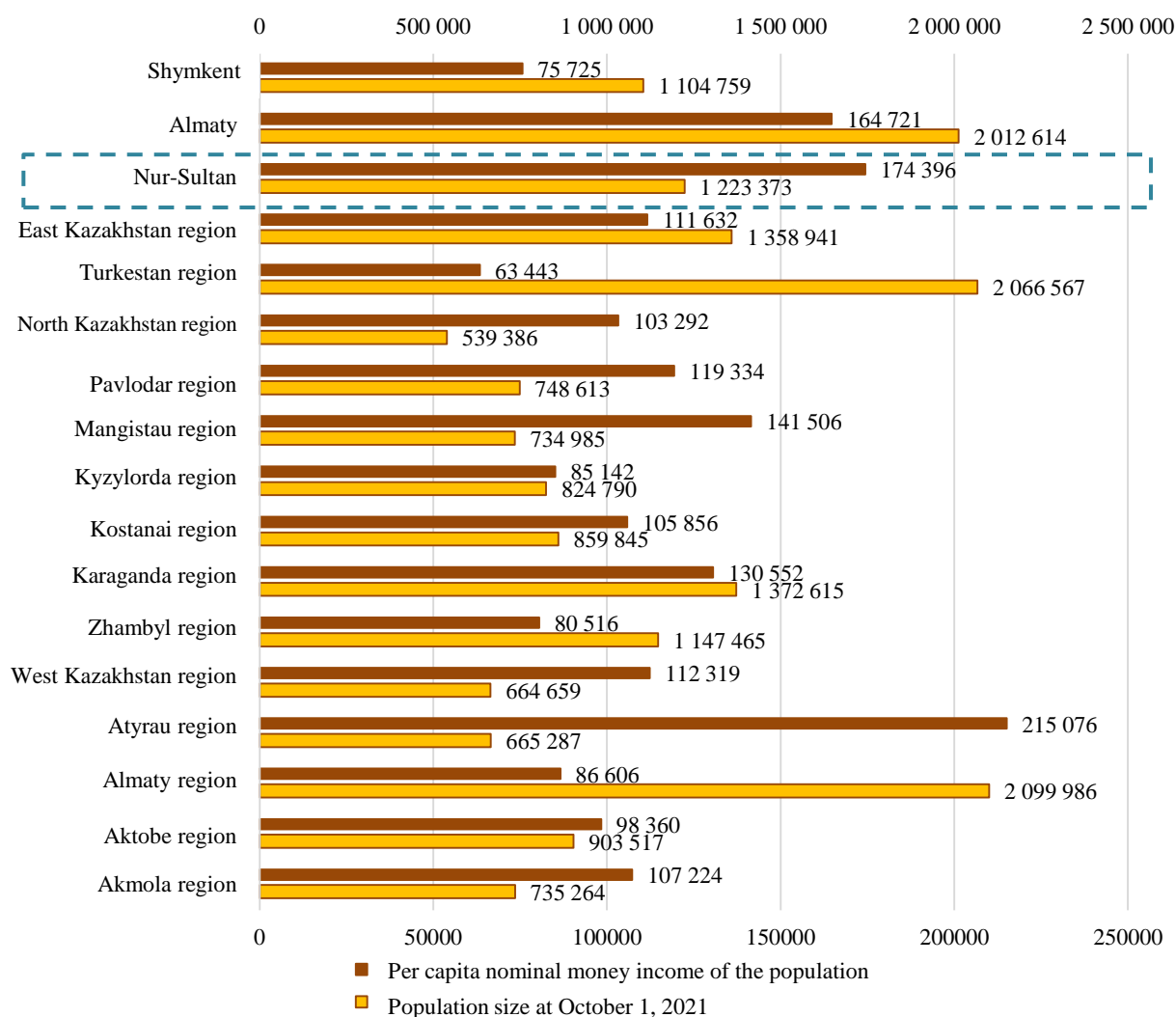
According to the presented data, the demand for the National Bank's investment instruments is mainly observed in the city of Almaty and accounts for approximately 53% of

total sales volume. One of possible reasons for a high demand for investment instruments in the city of Almaty is a relatively high population as well as the per capita nominal income (Figure 9). In addition, the largest number of head offices, an expanded network of branches of financial organizations are concentrated in Almaty (Figure 10).

Moreover, according to the results of the analysis, it is evident that the sales volumes of minted bars exceed those of bullion coins (Figures 1 and 4). This is explained by an extensive network of retail outlets and the sale of minted bars through branches of the second-tier banks and non-bank exchange offices.

Figure 9

Per capita nominal money income of the population (tenge)¹⁵ and the population size at October 1, 2021, by region

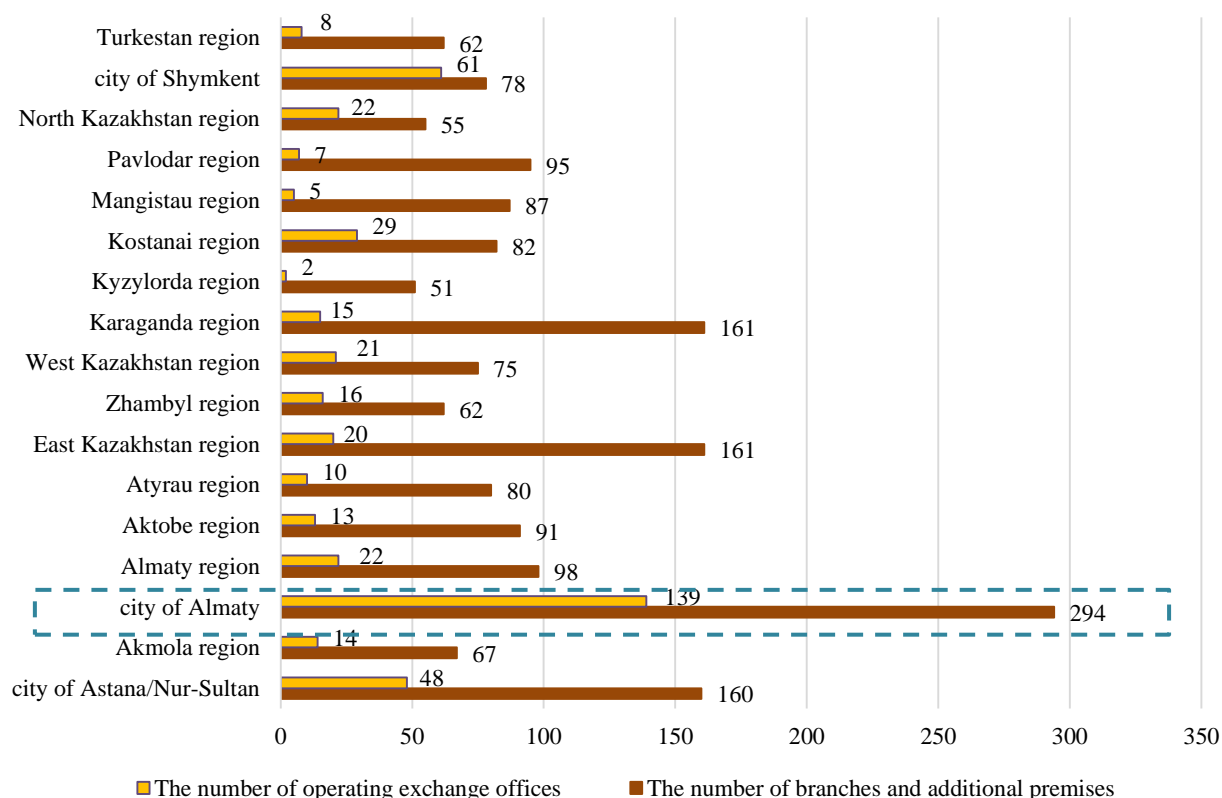


Sources: Bureau of National Statistics with the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan.

¹⁵ The 2020 statistics.

Figure 10

The number of branches, additional premises of the second-tier banks¹⁶ and the number of operating exchange offices¹⁷, by regions of Kazakhstan (units)



Sources: NBK, Agency of the Republic of Kazakhstan for Regulation and Development of the Financial Market (ARDFM).

3. Advantages of Investing in the National Bank's Minted Bars and Bullion Coins

Gold is the easiest investment vehicle and offers competitive returns compared to other major investment vehicles such as stocks and bonds. When investing in the shares of individual companies, knowledge and skills in a particular industry in which the company operates are required. It is also necessary to study the history, management, financial statements and plans for the company's future. Whereas investing in gold does not require in-depth knowledge of financial statement analysis and risk assessment.

With an aim to compare the return on long-term investment in minted bars and bullion coins of the National Bank and in the Kazakhstan Stock Exchange (KASE) index¹⁸, a comparative analysis of returns during the period from October 2007 through August 2021 was performed¹⁹. Figure 12 shows the dynamics of the cost of gold and silver in the tenge as determined by the London Bullion Market Association (LBMA) for one troy ounce of the respective metal, compared to the KASE index. A total average annual growth rate of the KASE index is 0.21%, of the cost of gold – 17.39%, and of the cost of silver – 15.34%. Therefore, in

¹⁶The statistics as of October 4, 2021.

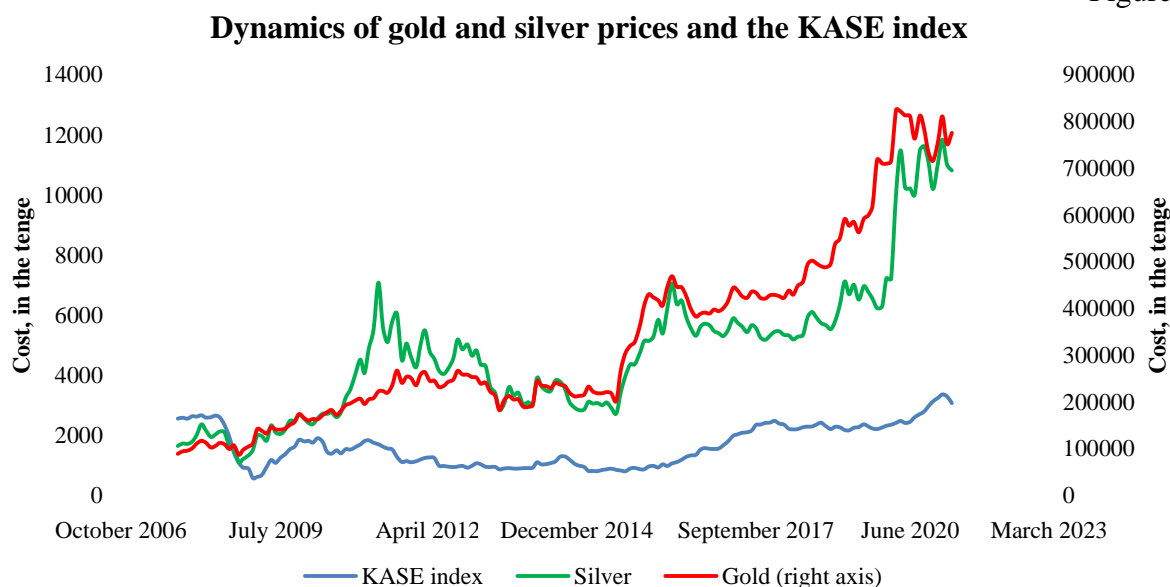
¹⁷Valid licenses as of November 1, 2021.

¹⁸The stock market index, which reflects the change in total market value of the most liquid shares in the official Stock Exchange listing and issued by the largest and financially sound resident companies of the Republic of Kazakhstan. Companies included in the KASE index are Bank CenterCredit, Halyk Bank, Kcell. KEGOC, "Kazatomprom" NJSC, Kazakhtelecom and KazTransOil.

¹⁹The period for which the analysis is carried out was chosen based on the availability of historical data on the Kazakhstan Stock Exchange (KASE) official website.

the long term, investments into the National Bank's minted bars and bullion coins demonstrate higher returns (Figure 11).

Figure 11



Sources: Kazakhstan Stock Exchange (KASE), London Bullion Market Association (LBMA) and the National Bank of Kazakhstan.

For example, on January 6, 2020, it was possible to purchase minted bars weighing 10 grams (0.321 tr. ounces) for 200,243 tenge and to repurchase them on January 6, 2021 for 247,306 tenge with the integrity of the package, including the maximum margin of the second-tier banks and exchange offices. Thus, the annual return on this investment reaches 23.5%, which is more than the deposit rate in the second-tier banks of Kazakhstan.

Compared to such types of investment in gold as futures and gold ETFs²⁰, investing in physical gold is a reliable and simple type of investment. Complex financial investment instruments require an in-depth study of the risks they represent. For example, unlike physical gold bullion, which is a tangible asset, ETFs are a financial product that carries counterparty risk (Garret, 2021). In many cases, these counterparties are large financial institutions or large banks. During an economic crisis, counterparties may go bankrupt and fail to fulfill their obligations to the investor (Garret, 2021). Given the above, investing in physical gold has certain advantages compared to investing in ETFs in the long run.

In addition, one of the advantages of investing in the National Bank investment vehicles is the market liquidity, which is maintained by the National Bank by providing the opportunity to sell minted bars for intraday repurchase. In the event that minted bars are repurchased with unopened packaging, the owner will receive a same-day payout for minted bars. In addition, sales of minted bars and bullion coins of the National Bank in the Republic of Kazakhstan are exempt from value added tax, which is also a great advantage.

4. International Experience

The Bank of Russia issues bullion coins from gold – “Saint George the Victorious” – in denominations of 25 rubles (0.1 ounce), 50 rubles (0.25 ounces), 100 rubles (0.5 ounces), 200 rubles (1 ounce) and from silver – “Saint George the Victorious” – with a face value of 3 rubles (1 ounce). They, along with collectible coins, are sold through organizations with which the Bank of Russia has entered into an agreement. Now, the Bank of Russia sells its bullion and

²⁰Exchange traded funds mean a basket of securities, which are traded on the exchange in the same way as shares.

collectible coins through 99 organizations, including organizations located abroad. When distributing coins, preference is given to organizations that have branches throughout the country. Thus, bullion and collectible coins of the Bank of Russia are distributed across the territory of the Russian Federation, as well as beyond its borders (Bank of Russia, 2021).

The US Mint (a bureau of the US Department of the Treasury) issues bullion coins made of gold: "American Eagle" in denominations of \$5 (0.1 ounce), \$10 (0.25 ounce), \$25 (0.5 ounce), \$50 (1 ounce); "American Buffalo" in denominations of \$5 (0.1 ounce), \$10 (0.25 ounce) and \$25 (0.5 ounce); and in silver, the \$1 (1 ounce) "American Eagle".

According to the US Mint's Annual Report, in 2020, due to uncertainty driven by the pandemic, the US population has begun buying more "American Eagle" and "American Buffalo" bullion coins. As a result, in 2020 their sales increased from 241 thousand ounces to 860 thousand ounces (an increase of 256.8%). Profit from the sale of gold bullion coins went up from \$5.6 million in 2019 to \$31.5 million (United States Mint 2020 Annual Report).

The sales of silver bullion coins also increased. Sales of silver bullion coins went up from 18,535 thousand ounces to 23,797 thousand ounces (an increase of 28.4%). Consequently, the profit from sale of bullion coins increased from 4.6 to 20.3 million dollars (an increase of 341.3%). The most popular silver bullion coins of the US Mint are "American Eagle" and "America the Beautiful".

The US Mint sells bullion coins through its official website, as well as through authorized buyers who distribute them in the US, Europe and the Far East. In order to promote its products, the US Mint produces educational materials and online games for children related to coins. In addition, there is a loyalty program, whereby after three deliveries during the year, buyers do not pay for the delivery of Mint products to the United States until the end of the year. Authorized product buyers maintain an open two-way market to ensure the liquidity of coins. The secondary market for coins and minted bars in the US is also well developed.

Popular Austrian bullion coins issued by the Austrian Mint (Muenze Oesterreich) are the Wiener Philharmoniker gold bullion coins in denominations of 4 euros (0.04 ounce), 10 euros (0.1 ounce), 25 euros (0.25 ounce), 50 euros (0.5 ounce) and 100 euros (1 ounce) and the Wiener Philharmoniker silver bullion coins with a face value of 1.5 euros (1 ounce).

Just like in the USA, in 2020, due to the pandemic, the demand for Austrian bullion coins as a reliable investment vehicle has grown. The demand for the Wiener Philharmoniker gold bullion coins increased from 210.6 thousand ounces in 2019 to 839.5 thousand ounces (an increase of almost 4 times) in 2020. The income from their sale amounted to 1,255.4 million euros. The Wiener Philharmoniker gold coins were the best-selling bullion coins in Europe and Japan in 2020. The Wiener Philharmoniker silver bullion coins are also in demand, reaching 7.2 million ounces, exceeding that of 2019 by 4.3 million ounces. Sales revenue in 2020 amounted to 138.7 million euros (47.3 million euros in 2019). The main markets for the Wiener Philharmoniker silver bullion coins are Europe and North America (Muenze Oesterreich 2020 Annual Report).

The Austrian Mint also sells gold minted bars. Minted bars from the Austrian Mint are available in 10 varieties (1, 2, 5, 10, 20, 50, 100, 250, 500 and 1000 grams). Demand for gold minted bars has also grown. The sales volume of gold minted bars in 2020 reached 403,929 pieces, which is 2.9 times more than the sales volumes in 2019. Revenue from the sale of gold minted bars reached 729 million euros, which is way above the income in 2019 (127.2 million euros).

According to Gerhard Starsich, Director General at the Austrian Mint, the above growth in the sale of bullion coins and gold minted bars of the Austrian Mint would not have been possible if the Mint had not invested in the development of online trading. In Austria, during the "Covid" crisis, online sales of non-food products increased by 30%. The Mint also changed logistics partners. At present, logistics within Austria is handled by the Austrian Post as a postal operator, while logistics abroad is handled by the United Parcel Service (UPS) LLP. Another

factor that contributed to the growth in sales of bullion coins is the transformation of internal logistics at the Austrian Mint. The coin shipment department was expanded and the number of product packing tables was doubled, allowing the company to increase its internal logistics capacity by 50%. In addition, since 2020, customers have had the opportunity to store gold in the vaults of the Mint (Muenze Oesterreich 2020 Annual Report).

The above innovations in work of the Austrian Mint enabled it to meet the heightened demand that has arisen in connection with the pandemic. The growth in demand was especially observed in the USA, Japan and Germany. The strategic focus of the Austrian Mint was to develop the market in Germany. The mint's promotional costs have increased, and profits in the German market have gradually more than doubled (Muenze Oesterreich 2020 Annual Report). The Austrian Mint sells its investment instruments in 30 countries in Europe, Asia and Australia.

The Royal Mint of the United Kingdom produces popular gold bullion coins "Britannia" in denominations of 10 pounds sterling (0.1 ounce), 25 pounds sterling (0.25 ounce), 50 pounds sterling (0.5 ounces) and 100 pounds sterling (1 ounce) and silver bullion coins "Britannia" with a face value of 2 pounds sterling (1 ounce). The "Queen's Beast" gold bullion coins are also issued in denominations of 25 pounds sterling (0.25 ounce), 50 pounds sterling (0.5 ounce), 100 pounds sterling (1 ounce); silver bullion coins are issued in denominations of 5 pounds sterling (2 ounces) and 10 pounds sterling (10 ounces), as well as gold bullion coins "Sovereign", which are presented in 4 varieties: 0.25 ounces, 0.5 ounces, 1 ounce and 2 ounces and have no face value (The Royal Mint Limited Annual Report 2020-2021, 2021).

The demand for the Royal Mint's precious metal products is also strong. Demand for bullion coins and bars has increased due to the pandemic, the income from their sale has doubled from 356.9 million pounds in 2019 to 843.8 million pounds in 2020.

A geographical analysis of profitability showed that the largest markets for the Royal Mint products are the UK (41.7%), the USA (27.6%) and Germany (10.3%). The 999.9 gold fine "Britannia" and "Queen's beast" coins are the most popular bullion coins issued by the Royal Mint (The Royal Mint Limited Annual Report 2020-2021, 2021).

The Royal Mint accepts minted bars and bullion coins for repurchase online. Within 24 hours of accepting an application, the Mint offers a price for an investment instrument based on the value of the respective precious metal as set by the London Bullion Market Association (LBMA). If the price satisfies a potential buyer, the seller sends its investment instruments by mail for examination. Within 7 working days after the acceptance of investment instruments for examination, the seller receives payment for the products. Thus, the short buyback period maintains a liquid market for investment instruments in England. It is worth mentioning that the Royal Mint buys not only coins and minted bars of its own production, but also investment vehicles from other countries. Among bullion coins, the Royal Mint buys such coins as the Krugerrand, Canadian Maple Leaf, Wiener Philharmoniker and others.

The South African Mint produces the world's most famous gold bullion coins, the Krugerrand. They come in 4 varieties: 0.1 ounce, 0.25 ounce, 0.5 ounce and 1 ounce and have no face value. Currently, the South African Mint coins are sold only through the online store due to quarantine measures during the pandemic. Outside the country, official dealers are involved in the sale of coins (International Services - The South African Mint Company, 2021). The Krugerrand bullion coins are also sold in the secondary market through such online stores as Amazon.com, eBay.com and others. Bullion coins are accepted for repurchase by the South African Reserve Bank (Resbank, 2021).

The Perth Mint produces well-known gold bullion coins – the "Australian Gold Kangaroo" with a face value of 100 Australian dollars (1 ounce) and minted bars from gold and silver. The Mint's investment instruments are currently sold through the online store and official distributors. The Mint accepts investment instruments for repurchase by mail within Australia.

The Perth Mint was one of the first to implement the digitalization of physical assets – minted bars. The Mint has launched a program to sell minted bars through the GoldPass mobile

application. It is possible to invest in precious metals (gold and silver) weighing from 0.00001 ounces on the online platform. Platform users also have the opportunity to trade the precious metal around the clock and, if necessary, the opportunity to receive minted bars by mail or through the cash desk of the Perth Mint. When investing through the GoldPass mobile application, a unique digital certificate is issued. All digital certificates are backed by physical gold or silver held in the Australian central bank vaults and guaranteed by the Australian government. Besides, in the GoldPass application you can see the buy/sell prices of gold, account balances in troy ounces and US dollars in real time (GoldPass Trading App The Perth Mint, 2021).

Table 2

International experience in selling investment vehicles

Country	Manufacturer	Popular products	Sales channels	Support to market liquidity
Russia	Bank of Russia	“Saint George the Victorious” from gold, silver and platinum	Official distributors	Official distributors accept for repurchase
USA	US Mint	“American Eagle” and “American Buffalo”	Online store and official distributors	Official distributors accept for repurchase
Austria	Austrian Mint	“Wiener Philharmoniker” from gold, silver and platinum	Online store and official distributors	Official distributors accept for repurchase
UK	The Royal Mint	“Britannia” and “Queen’s beast”	Online store and official distributors	Repurchases are made via the official website
South African Republic	South African Mint	“Krugerrand”	Online store (within the country) and official distributors (outside the country)	Repurchases are made via official distributors. In addition, there is a developed secondary market on Amazon.com and eBay.com platforms
Australia	Perth Mint	“Australian Gold Kangaroo” from gold and silver	Online store and official distributors	The Mint accepts coins and minted bars for repurchase. In addition, a possibility of selling and buying minted bars via the GoldPass™ application supports the market liquidity.
Kazakhstan	National Bank of the Republic of Kazakhstan	“ALTYN BARYS” gold coin, “KUMIS BARYS” silver coin, minted bars	Official distributors	Repurchases are made via the National Bank’s branches (coins) and the second-tier banks and exchange offices (minted bars)

5. Conclusion

As part of this study, the dynamics of sales of the National Bank's minted bars and bullion coins were analyzed and the international experience of such organizations as the Bank of Russia, US Mint, Austrian Mint, the Royal Mint, South African Mint and the Perth Mint was explored.

An analytical review of the current situation in the market for bullion coins and minted bars showed that the market is developing year after year. The minted bars market is developing rapidly, while the market for bullion coins has seen a slight increase in the demand for bullion coins in recent years.

In Kazakhstan, approximately half of the minted bars and bullion coins were sold in Almaty. This is explained by the fact that, in comparison with other cities, Almaty is a city with a high population and a high per capita nominal income at the same time. In addition, the largest number of financial institutions is located in the city of Almaty.

Investing in minted bars and bullion coins of the National Bank has several advantages. First, the potential return on investment in minted bars and bullion coins of the National Bank is higher compared to the Kazakhstan Stock Exchange index. This is explained by the fact that prices for gold and silver had been growing in retrospect, exceeding the growth of the KASE index in the aggregate average annual terms. Among the gold related investment instruments, investing in physical gold is considered a preferred investment over securities that are pegged to the price of gold. Assessing the risks of securities as exchange-traded funds is much more difficult, as they represent risks of counterparties, which in many cases are large banks or large financial institutions. In the event of another economic crisis, counterparties may fail to fulfill their obligations to investors.

The analysis of international experience in developing the market for bullion coins and minted bars showed that during the pandemic, the markets of the USA, Japan, Germany, Austria and the UK saw an increase in demand for products made from precious metals, including bullion coins and minted bars. In order to develop the market for products from precious metals, the Mints and the Bank of Russia have taken such measures as expanding the distribution network, developing online stores, increasing internal and external logistics capacity, investing in marketing activities such as online games and books for children related to coins and implementation of a digital asset.

Some of activities aimed at developing the market of bullion coins and minted bars of the National Bank based on the international experience include:

1) expanding the geographical coverage and sales channels for bullion coins and minted bars:

- consider the possibility of designing an Internet platform for electronic trading in investment instruments within the country and abroad based on the example of foreign mints that directly sell investment instruments;

- develop the functionality of the NBK online store to be able to sell minted bars and bullion coins, including the provision of possibility for foreign citizens to place their orders;

- enter into agreements with international courier services to deliver investment vehicles sold through the Internet platform to foreign countries;

- involve other second-tier banks – ForteBank JSC, Nurbank JSC, Kaspi Bank JSC, SB Sberbank of Russia JSC, SB Home Credit and Finance Bank JSC – and the national postal operator (Kazpost JSC), which have an extensive branch network throughout the country, for selling minted bars in their offices and branches;

2) implementing a digital asset using the example of the Perth Mint of Australia:

- designing an online platform – a mobile application for purchase/sale of a digital certificate about buying minted bars;

- designing the storage system for minted bars, which are sold as a digital asset;

- creating an option in the mobile application for an automatic conversion of the cost of minted bars into the currency of the customer's country;
- determining minimum and maximum sales volumes of gold;
- ensuring that the National Bank of the Republic of Kazakhstan guarantees the respective volumes of physical gold for digital certificate holders.

References

1. Palmer, B., 2021. A Beginner's Guide to Precious Metals. Investopedia. Available at: <<https://www.investopedia.com/articles/basics/09/precious-metals-gold-silver-platinum.asp>>.
2. Brussilovskaya, E., 2020. The Symbol of Nobility and Strength. Kazpravda.kz. Available at: <<https://kazpravda.kz/articles/view/simvol-blagorodstva-i-sili>>.
3. Stat.gov.kz. 2021. Available at: <<https://stat.gov.kz/official/industry/61/statistic/6>>.
4. Garret, O., 2021. 3 Reasons Why Investors Should Avoid Gold ETFs. Forbes. Available at: <<https://www.forbes.com/sites/oliviergarret/2017/03/09/3-reasons-why-investors-should-avoid-gold-etfs/>>.
5. Cbr.ru. 2021. Organizations with which the Bank of Russia Have Entered into Agreements (Contracts) about Dissemination of Commemorative and Bullion Coins of the Bank of Russia. Available at: <https://www.cbr.ru/cash_circulation/memorable_coins/list_org_coins/>.
6. Usmint.gov. 2021. Annual Report. Available at: <<https://www.usmint.gov/wordpress/wp-content/uploads/2021/02/2020-Annual-Report.pdf>>.
7. Muenzeoesterreich.at. n.d. Annual Report 2020. Available at: <https://www.muenzeoesterreich.at/eng/content/download/211269/file/Muenze_GB_2020_DS.pdf>.
8. Royalmint.com. 2021. The Royal Mint Limited |Annual Report 2020-2021. Available at: <https://www.royalmint.com/globalassets/__rebrand/_structure/about-us/annual-reports/reports/2020_21-royal_mint_limited_annual_report-p1-web.pdf>.
9. Resbank.co.za. 2021. Gold Coins Purchased from the Public. Available at: <<https://www.resbank.co.za/en/home/what-we-do/financial-markets/gold-coins-purchased-from-the-public>>.
10. Perthmint.com. 2021. GoldPass© Trading App | The Perth Mint. Available at: <<https://www.perthmint.com/invest/goldpass/>>.