

Investment Inclusion of the Credit Market of Ukraine

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Abstract

The article examines the peculiarities of investment inclusion in the credit market of Ukraine and the sources of turbulent processes in the banking ecosystem. The formalized model of the interrelation of endogenous factors of investment lending in the time horizon of multiple signs that reduce the manifestation of destabilization of the banking ecosystem (reduction of liquidity and regulatory capital of banks) and ensure the stability of the inclusion of the credit market is substantiated. A model of the distribution of investment lending risks over time, their assessment and limitation has been developed. For the period of martial law in Ukraine, donors of investment crediting of agriculture and its restoration in the future have been singled out. A multifactor model of investment inclusion of the credit market of Ukraine has been built, which has a set of variables that affect the stable state of the banking ecosystem and ensure the maximum efficiency of the distribution and use of investments in the projects of restoring the economic development of the country.

Keywords

Banking Ecosystem, Liquidity, Interest Rates, Loans, Deposits

JEL Classification

E22, E5

Introduction

The credit market is a source of manifestation of turbulent processes in the banking ecosystem, which affect the financial security of the state and the stability of the work of banking investment intermediation in the sectors of the economy of Ukraine. The intensification of competition on the domestic and foreign markets and the partial unsettlement of the financial and investment activities of Ukrainian banking institutions do not provide safe criteria for the implementation of preventive measures to respond to financial threats arising in Ukraine, and, especially, in conditions of martial law. The main reason is the critical state of the economy, and, in particular, the deterioration of the solvency of legal entities and individuals. This will provoke additional instability in the Ukrainian credit market. Due to the inability of economic entities to return a significant amount of financial assets, banks are forced to look for additional investment reserves in the European financial space to restore their own stability and continue banking business. The most problematic in this case were the representatives of the credit market, who provided a limited list of credit services and could not diversify their risks more carefully (Moskvin, 2022).

At the same time, the modern credit market becomes the center of formation of the transfer of investment resources for all economic entities that carry out their activities in the conflict (war) period and try to restore the high pace of financial and investment processes with the help of the banking ecosystem. At the same time, the main regulator of investment resources on the credit market is the National Bank as a regulator that supports market participants and provides an opportunity to focus on maintaining the stability of the banking ecosystem, with the appearance of

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new financial instruments and their intensive development.

The revision of the concept of the operation of the credit market in conditions of turbulence is reflected in the new cycle of development of investment activities of banks, which are subject to the new security investment policy of the state, which takes into account the current paradigm of functional priorities of the NBU's investment policy. It is based on the achievement of financial stability of banks, promotion of sustainable economic growth, in the conditions of existing institutional gaps, the monetary policy of the state, which should strongly contribute to the positive dynamics of the economy, while the possibilities of the NBU to achieve the stability of the banking ecosystem, with the help of regulation of interest rates, are significantly limited.

The main exogenous issues for the credit market of Ukraine are the abnormal budget deficit, a significant volume of problem loans, the need to compensate for the increased risks of investment lending and the implementation of measures for crediting the reconstruction of the economy, ensuring price stability taking into account the "price of stability" and overcoming unresolved issues regarding the volume of household deposits. on demand", in conditions of inhibition of bank lending. This leads to "hangover" of money in the banking ecosystem. In view of this, it is necessary to find a mechanism for transforming these liabilities into time deposits, insurance savings of citizens, and to promote the activation of banks' lending activities.

One of the key problems of the credit market in Ukraine is the priority for banks of high-yield investments in government securities. The solution to this problem involves, in particular, reducing the yield of NBU certificates of deposit, developing alternative proposals for banks to invest excess liquidity, determining the limits of banks' participation in the purchase of Domestic government loan bonds (OVDPs).

The most painful thing for banks in the conditions of war is the increase in the share of problem loans in the portfolio of investment lending. In this situation, the state, in coordination with banking institutions, should avoid "economic punishment" of war victims; solve the problem of loans granted to temporarily displaced persons; to prevent the seizure during the martial law of the main assets of the business, which are under pledge. There is also a need to redistribute the problem of "bad" loans to specialized financial institutions. The ultimate goal of these measures should be to free banks from the burden of problem loans (Bogrinovtseva & Kozii, 2023). Meanwhile, the effectiveness of the credit market in performing its main functions (mobilization of various financial assets, their accumulation and transformation into productive capital) largely depends on the orderliness of its infrastructure, the delineation of the institutional and legal field, the speed and reliability of investment operations carried out by market entities through modern forms and methods of the communication system on a global scale.

For Ukraine, the credit market model based on banking investment intermediation is of crucial importance in the conditions of martial law, since the protection of capital circulation is almost the only measure to avoid the default of the entire financial system of the country. Directing the bank's investment activities to the priority sectors of the country's economy allows them to accumulate and redistribute temporarily free credit resources into the production and technological cycle, to direct them to business recovery (purchase of the bank's fixed assets, investment in the latest banking technologies and services), to form an investment portfolio to ensure lending of investment projects. At the same time, limiting the ability of most banks to finance large-scale projects alone, the desire to diversify risks and reduce the negative impact of asymmetric lending leads to the expansion and integration of banks in the credit market of Europe and the world to obtain the effect of asset concentration.

The priority of our research is the substantiation of a formalized model of the interrelationship of endogenous factors in investment lending in a certain time period and multiple signs that reduce the manifestation of destabilization of the banking ecosystem (reduction of liquidity and regulatory capital of banks) and ensure the stability of the inclusion of the credit market.

Methods

In modern conditions of economic transformation and development, the most important area of the banking ecosystem is the effective management of financial resources. This is due to the need to increase the investment activity of the credit market, which has an adaptive property to the reproduction of capital gains and depends on investments. Investments, accumulating state, business capital and public funds, contribute to the introduction of modern technologies in the credit market, and thus activate internal and external sources of bank investment lending. Since investment lending has quite diverse forms, attention should be paid to the methods of risk management of the investment portfolio, which should be based on the following concept (Kravchenko et al., 2012):

- firstly, the future income from the implementation of the investment project is an uncertain event (Vozhzhov & Popova, 2003). This means that in the future, the financial result of project implementation may turn into profit, which is proposed to be called chances, or losses, which are risks. In existing models of investment loan portfolio management, as a rule, they talk about risks, but chances are often neglected. From a scientific point of view, when modelling a portfolio of investment loans, the bank needs to assess both chances and risks.
- secondly, the quantitative measure of the i -th risk (r_i) and chance (ch_i) is defined as the product of the

material assessment of profit (M_{chi}) or loss (M_{ri}) and the probability of actualization in the future of a profit event (P_{chi}) or a loss event (P_{ri}). Full chances (TCH) and risks (TR) are calculated according to formulas (1)-(2) (Dimakos & Aas, 2004):

$$TCH = \sum_{i=1}^n M_{chi} \times P_{chi} \quad (1)$$

$$TCH = \sum_{i=1}^m M_{ri} \times P_{ri} \quad (2)$$

where:

M_{chi} the chance of making a profit according to the i-th scenario;

P_{chi} the probability of realization of this chance;

M_{ri} the risk of receiving a loss under the i-th scenario;

P_{ri} probability of realization of this risk;

n number of chances;

m number of risks.

- thirdly, it is important to take into account the data on the profits and losses of projects of past periods when modeling the portfolio of investment loans, since their forecast values may repeat themselves in the future (Moroz et al., 2002).
- fourthly, the probability of realization of chances and risks is determined from the actualization of their occurrence in the future for individual investments, which have an uncertain nature in the environment of the banking ecosystem due to the behavior of recipients in past periods. Let us denote the possible future stable state of the banking ecosystem as $C_1, C_2, \dots, C_i, \dots, C_k$, the possible future unstable state of the banking ecosystem as S_1, S_2, \dots, S_k . We will also assume that the stable and unstable environment of the banking ecosystem are independent of each other in terms of their set of factors, and at the same time each of them forms complete groups of events (Dimakos & Aas, 2004).

Let's denote the past chances and risks as $ch_i^p \in X_{ch}^p$ and $r_i^p \in X_r^p$. This means the joint occurrence of a set of events (chances, risks, state of the economy and social state). Then the probability of chances and risks can have the following calculation algorithm (formula (3)-(4)) (Dimakos & Aas, 2004):

$$P_{chi} = P(C_{chi} \cup C_j \cup S_k, X_{ch}^p \cup X_r^p) \quad (3)$$

$$P_{ri} = P(r_i \cup C_j \cup S_k, X_{ch}^p \cup X_r^p) \quad (4)$$

At the same time, multiple signs of a stable state of the banking ecosystem $\cup C_j$ and an unstable state $\cup S_k$, as well as multiple signs of chances and risks for past periods are independent of each other and each of them forms a complete group of incompatible and independent events in the aggregate.

That is, when assessing the general level of risk of bank investment lending (TR) on the basis of scenario analysis, which takes into account not only potential losses, but also probable benefits from the investment project (forecasting the volume of cash flows under optimistic, realistic and pessimistic scenarios), it is necessary to use the following algorithm (formula (5)) (Dimakos & Aas, 2004):

$$TR = \sum_{i=1}^n B_i \times P_i^B (\cup E^p, \cup S^p, \cup B^p \cup L^p) - \sum_{i=1}^n L_i \times P_i^L (\cup E^p, \cup S^p, \cup B^p, \cup L^p) \quad (5)$$

where:

B_i the forecast amount of profit from the implementation of the investment project according to the i-th scenario;

L_i estimated amount of loss from the implementation of the investment project according to the i-th scenario;

n the number of investment project implementation scenarios;

P_i^B, P_i^L according to the probability of obtaining profits (losses) during the implementation of the investment project according to the i-th scenario.

Each scenario is determined by the predicted combination of the corresponding stable states of the banking ecosystem (E_p) and unstable states of the banking ecosystem (S_p), as well as potential results (profits (B_p) and losses (L_p) of banks' activities, regardless of the implementation of the investment project.

Thus, the above model, in contrast to the existing models of investment lending portfolio formation, takes into account not only risks, but also the chances of making a profit against the background of the probable realization of various scenarios of investment inclusion of the credit market. The differentiation of risks and chances by levels allows to optimize the adequacy of the assessment of the probable result from the implementation of the investment project at different time horizons, by excluding endogenous factors.

Minimization of possible options for failure to make a profit from the implementation of investment projects is the main goal of investment lending risk management. However, quite often, to reduce uncertainty, the bank must use certain financial resources, the size of which will be irrational compared to the cost of insuring such risks (Peresada & Mayorova, 2002). For this, the cost of uncertainty ($P \cup P$), is calculated, which is calculated as the maximum cost of expendable resources of the bank (money, labor, material), to minimize possible negative results of the implementation of the investment project (formula (6)) (Dimakos & Aas, 2004):

$$P \cup P = \sum_{i=1}^m (P_i \times \sum_{t=1}^T \frac{I_{it} - L_{it}}{(1+r)^t}) \quad (6)$$

where:

- I_{it} the forecast amount of income according to the j -th scenario of the implementation of the investment project in period t ;
- L_{it} potential costs under the j -th scenario of investment project implementation in period t ;
- r discount rate;
- T duration of the investment project;
- m the number of negative scenarios for the implementation of the investment project.

For a portfolio of bank investment loans, the value of uncertainty will be determined as the amount of risk (value of uncertainty) for each investment project from the total value of the portfolio. Costs for the elimination of risks (uncertainties) before the decision on project crediting and its implementation must be within the limits of the permissible set of signs (potential results) of the implementation of the investment project (Fig. 1).

The maximum amount of credit that a bank can provide to a specific borrower for financing investment activities is determined based on the borrower's creditworthiness. Most often, banks are based on the past financial results of the borrower and take into account the potential income from the investment project, which is supposed to be financed with loan funds (Peresada & Mayorova, 2002). However, this approach is not always justified, as it does not take into account the ratio of the amount of such a loan to the general limit of credit investment, determined by the bank's credit and investment policy. As a result, the principle of effective diversification of the portfolio of bank investment loans may be violated.

To resolve this inconsistency in the management of investment credit risks, it is necessary to use the so-called Kelly criterion (Peresada & Mayorova, 2002). The essence of this criterion boils down to determining the optimal amount of investment in a specific project, based on the risks and chances of this project, as well as the bank's general limit for investment loans.

With the help of this criterion, calculate the adjustment factor for determining the maximum amount of funds provided by the bank for lending to a separate investment project (IC_{max}), which provides the bank with an optimal balance between the risk of receiving losses and the probable benefit from bank investment lending. This allows you to focus not on the amount of regulatory and statutory capital, but on the potential effectiveness of the investment project, adjusted for the probability of its achievement (Peresada & Mayorova, 2002):

$$IC_{ch} \frac{1 - P_{ch}}{CH} \quad max \quad (7)$$

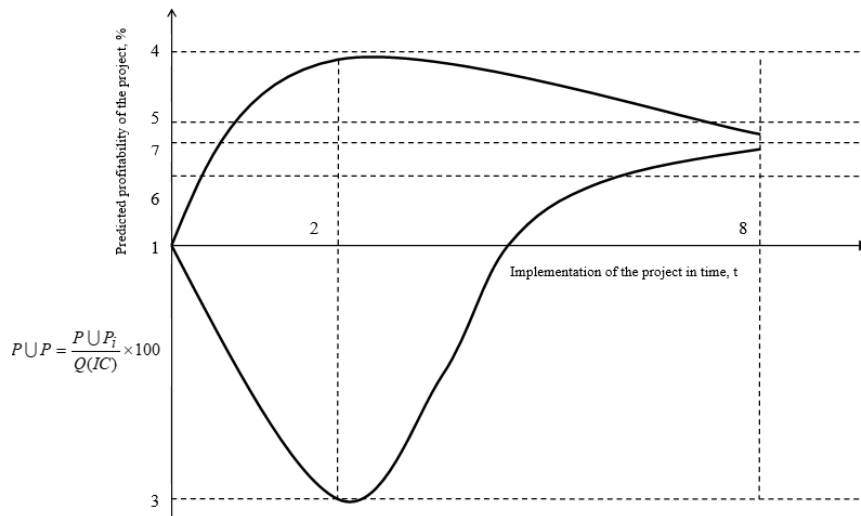
where:

- CH the ratio of the number of probable positive and negative results of lending by the bank of the investment project;
- P_{ch} the probability of successful repayment of the investment loan.

In Figure 2 depicts a model for assessing and limiting investment lending risks on the basis of scenario analysis, which reflects the likely nature of credit market inclusion and takes into account the borrower's resource needs for investment resources.

A high level of stability of the banking ecosystem ensures a low level of transaction costs of enterprises when attracting investments, as it minimizes the time lag for the mobilization and accumulation of financial resources. Banks ensure the maximization of the efficiency of the distribution and use of investments, because in the process of lending, the selection of investment projects with the maximum potential for ensuring economic development is

carried out. This is ensured due to directions and mechanisms of investment inclusion of the credit market (Rizhkov, 2008).



$$P \cup P = \frac{P \cup P_i}{Q(IC)} \times 100$$

Note. ~ – projected profitability of the project over time; 1 – submitting an application for an investment loan; 2 – making a decision on issuing an investment loan; 3 – the maximum loss that can be received as a result of the implementation of the investment project; 4 – the maximum profit that can be obtained as a result of the implementation of the investment project; 5-6 – a set of admissible results of crediting an investment project; 7 – the final result of the implementation of the investment project; 8 – completion of the investment project, fulfillment by the borrower of all requirements to the creditor.

Fig 1. Distribution of investment lending risks over time.
Source: by the authors

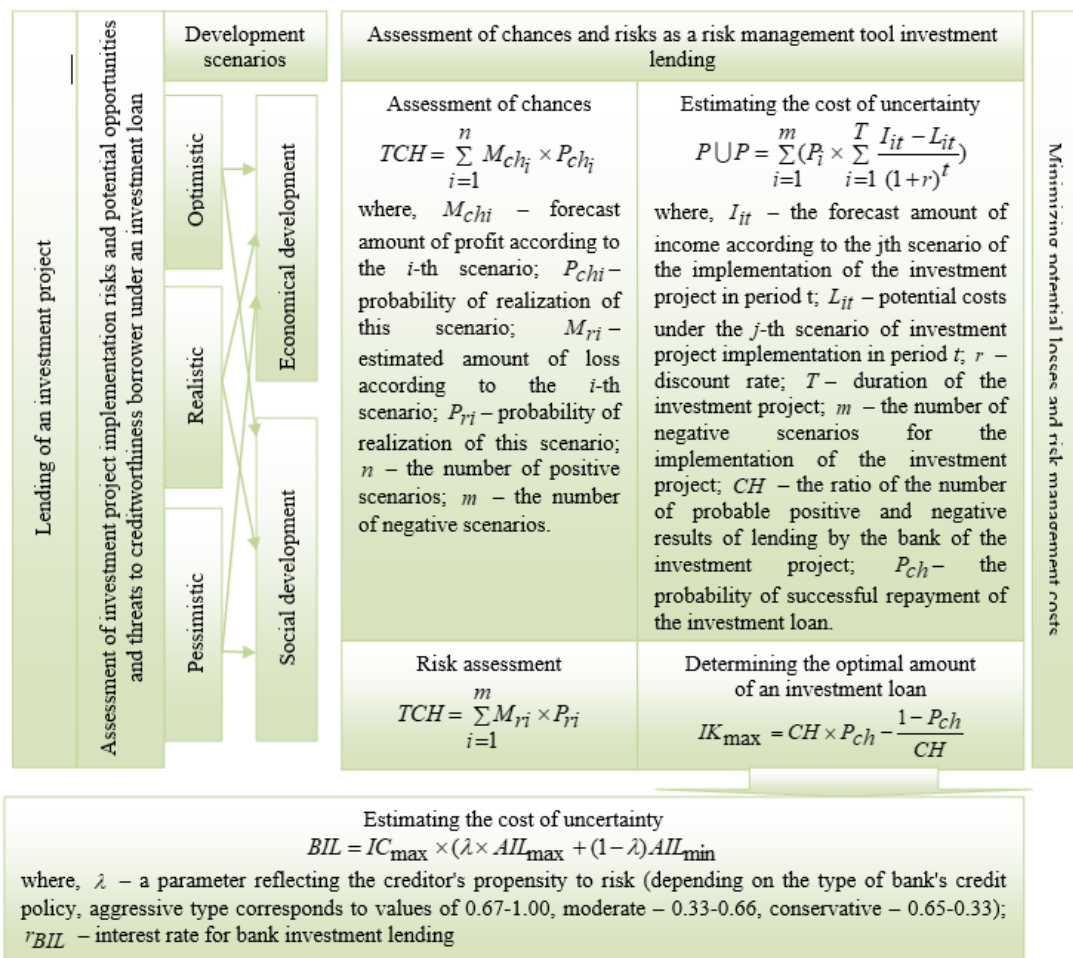


Fig 2. Assessment and limitation of the risk of investment lending.
Source: built by the authors based on data Rizhkov (2008), Peresada & Mayorova (2002), Dimakos & Aas (2004).

In view of the above, we can state that from a macroeconomic point of view, the stability of the banking ecosystem is the main factor of investment support for the development of the national economy.

Results

Given the growing deficit of the state budget and constant financial instability, for most business entities in Ukraine, credit funds are the main source of their investment support. Despite the existing restrictions on the targeted use of credit resources, as well as the complexity of the mechanisms for providing such financial support (the principle of timeliness, repayment, payment and security), the importance of bank investment lending for the activation of the development of the country's economy is extremely great. However, the open aggression of a terrorist country (russia) on Ukraine in 2022 led to the fact that the credit market in the country is forced to function in a regime of uncertainty and stress.

Despite this, banks continue to work stably, trying to fulfill all their functions and obligations to customers. Forced migration, rising unemployment, reduced consumption, extreme security threats have a negative impact on credit relations and the functioning of the credit market in general. Thus, with the beginning of a full-scale invasion, credit activity significantly decreased, because enterprises and the population became less interested in attracting loans for business expansion or personal purposes. Changes in the total assets of Ukrainian banks and loans provided by them for 2019-2023 are shown in Figure 3.

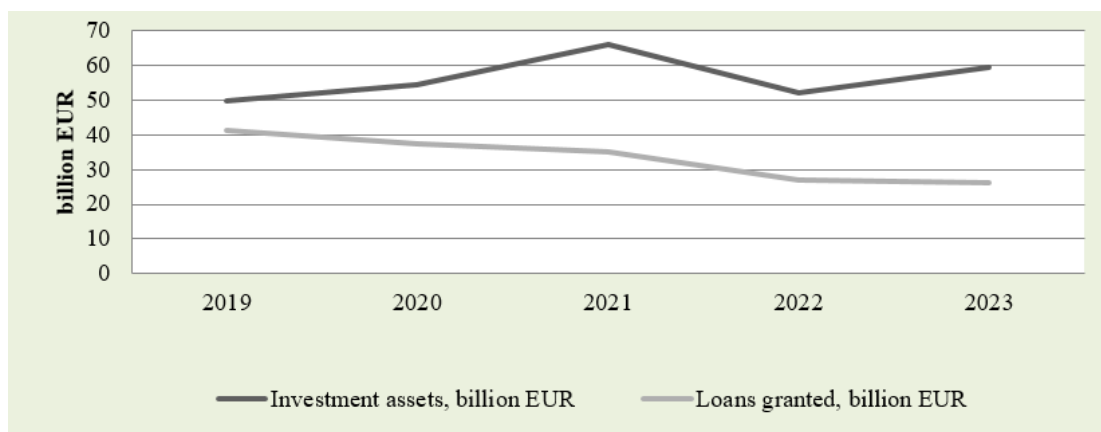


Fig 3. Volume of investment assets and loans in the banking ecosystem of Ukraine for 2019-2023, billion EUR.
Source: built by the authors based on data Ministry of Finance (2008-2023).

It should be noted that the total assets of Ukrainian banks for 2022-2023 are increasing. The biggest jump was recorded in 2021. In 2019-2021, total assets increased by 11.93 billion EUR, or by 22%. This was explained by the economic recovery of the state after the impact of the COVID-19 pandemic, which in turn led to an increase in the demand for financial services.

The dynamics of granted loans for 2019-2021 shows a decrease in their total number. That is, in 2019-2020, the amount of total loans decreased by 3.52 billion EUR, or by 8.6%, in 2020-2021 – by 2.55 billion USD, or by 6.8%. In 2022, the value of granted loans decreased compared to 2021 to 26.97 billion EUR, or by 8.07 billion EUR (by 23.1%). In 2023, we observe a slight decline in loans granted by 0.74 billion EUR, or by 2.7%.

The share of non-performing loans in the banking sector has increased. Before the full-scale invasion of a terrorist country (russia) into Ukraine, the share of non-performing loans (NPL) in Ukrainian banks steadily decreased from 2018 to the 1st quarter of 2022 (from 55% to 27%), but the volume of loans in banks was growing (Ministry of Finance, 2023b). The volume of non-performing loans for March-December 2022 increased 3.4 times (from 3.21 billion EUR to 10.94 billion EUR). In addition, in 2023, the share of non-performing loans (NPL) in the banking sector increased to 38%.

Meanwhile, in 2023, about 75% of the sector's NPLs were concentrated in state-owned banks, in particular, more than 40% were in JSC CB Privatbank. The credit market suffered significant losses. Since the beginning of the full-scale war, the amount of deductions to reserves for loans exceeded EUR 2.53 billion and accounted for more than 12% of the banks' loan portfolio. Potential losses of the credit portfolio as a result of the war, economic crisis and energy terror of the aggressor country reached 30%.

In September 2023, the National Bank of Ukraine reported that the share of non-performing loans (NPL) in the credit market is 38.5%, which is 0.8 percentage points lower than the indicator as of August 1, 2023. The amount of loans provided by banks increased by 303.8 million EUR for the month. At the same time, the volume of non-performing loans decreased by 96.7 million EUR for the month at the expense of foreign banking groups (National Bank of Ukraine, 2024b).

In Figure 4 presents 10 Ukrainian banks with the largest share of non-performing loans in the total loan portfolio in 2023.

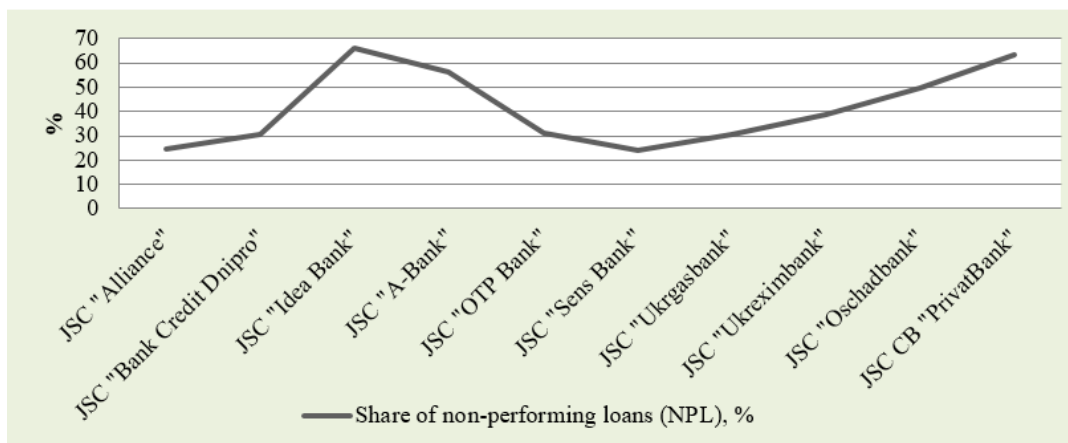


Fig 4. Rating of banks with the largest share of non-performing loans (NPL) in 2023 (%).

Source: built by the authors based on data National Bank of Ukraine (2024b)

JSC CB Privatbank has the largest share of non-performing loans (63.4%, or 4.55 billion EUR), which is explained by its popularity among consumers. In second place in terms of NPL is JSC Idea Bank – 56%, or 0.120 billion EUR. The third bank with the largest share of non-performing loans is JSC Oschadbank – 49.5%, or 1.76 billion EUR.

In addition to reducing credit activity and increasing NPLs, the full-scale incursion led to an increase in credit risks, as the military conflict created enough economic hardship, particularly in the war-torn regions of the country. This caused rather large credit losses of non-return of resources of banks that provided investment lending to enterprises in these regions. Bank credit investment has experienced significant turbulence due to a decrease in its volume and an increase in interest rates in the period from 06.01.2022 to 06.01.2023, which directly depend on the NBU discount rate, or the refinancing rate.

In Figure 5 presents the dynamics of the NBU discount rate since the beginning of the full-scale invasion of the terrorist country on the territory of Ukraine.

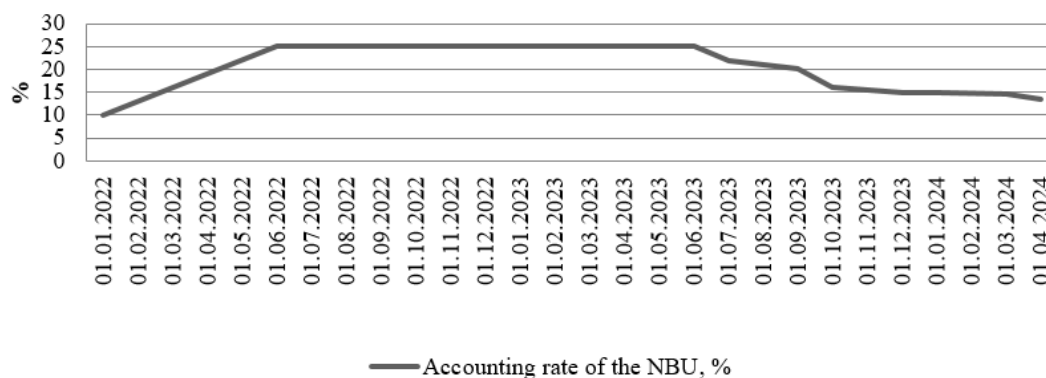


Fig 5. Dynamics of the NBU discount rate in 2022-2024 (%).

Source: built by the authors based on data National Bank of Ukraine (2024a).

Therefore, during the first three months, the NBU kept the discount rate at 10%, which is explained by the reduction of its role in the functioning of the credit market. However, the interest rate of the NBU in the II quarter of 2022 rose to 25% in order to preserve macroeconomic balances, reduce inflationary pressure and maintain the stability of the national currency, as well as for the needs of ensuring a stable state of the banking ecosystem, reducing the progressive deficit of resources in the foreign economic and budgetary spheres of the country, since during this period the real inflation rate was within 25%. The purpose of this step, along with other measures, was to protect national income and savings of citizens, increase the attractiveness of national assets, reduce pressure on the foreign exchange market and, as a result, strengthen the NBU's ability to ensure exchange rate stability and restrain inflationary processes during the war (Debit-Credit, 2022).

This rate lasted a little over a year. This was done in order to maintain exchange rate stability, a steady decrease in inflation, and to create the necessary prerequisites for the gradual easing of currency restrictions. As a result, during these months, citizens' interest in national deposits and OVDPs increased. In addition, the growth of the share of time deposits in the national currency resumed. In the third quarter of 2023, the NBU reduced the discount rate by 3%, i.e. to 22% per annum. From this period, the NBU discount rate began to decrease monthly, and by the beginning of the II quarter of 2024, it was 13.5%. Such actions were caused by a rapid slowdown in inflation

and a stable situation on the foreign exchange market. It is worth noting that such actions of the NBU did not endanger macro-financial stability, but supported the recovery of the Ukrainian economy (Petryk, 2022).

The NBU is a key regulator of stabilization of the investment inclusion of the credit market in the country during a full-scale invasion by a terrorist country. This made it possible to: increase the amount of refinancing of funds for the banking ecosystem by attracting the necessary financial resources, supporting the liquidity of banks, reducing their risk of insolvency and ensuring the needs of bank clients in investment resources; implement measures to stabilize the regulatory capital and credit portfolio of banks; simplify the credit process, reduce bureaucratic obstacles and ensure transparency of bank credit investment. This stimulated the restoration of customer confidence and improved access to credit resources; introduce restrictions on the foreign exchange market to protect the financial system of Ukraine, its reliable and stable functioning.

In addition, under the influence of the military conflict, the Law of Ukraine "On Amendments to the Tax Code of Ukraine and other legislative acts of Ukraine regarding the effect of norms during the period of martial law" was adopted. The law stipulated that during martial law and within 30 days after its termination, the service provider (consumer) is not liable to the creditor in case of late payment of credit obligations. If such a delay has occurred, the consumer of services is released from the obligation to pay fines, penalties and other payments for the delay in fulfilling obligations under the credit agreement (Verkhovna Rada of Ukraine, 2022).

Despite the negative trends in the credit market of Ukraine, gross savings, the foundation of which was formed in Ukraine during 2019-2021, became the economic basis for increasing investment lending in the banking ecosystem. This made it possible to support the credit potential of banks in the country. It is necessary to emphasize the phenomenon that the structural changes of the pre-war period in the country contributed to the gradual restoration of the role of the credit market during martial law (from 9.3 billion EUR in 2019 to 20.7 billion EUR in 2023). This trend indicates a relative weakening the role of the state in the formation of gross savings and strengthening the positions of the credit sector (Fig. 6).

The indicators shown in fig. 6 allow us to state that in the time period 2019-2021, the volume of the portfolio of bank investment loans in Ukraine was constantly increasing. Its growth was especially significant in 2020, when it grew by almost 81%.

In 2021, the growth rate of the portfolio began to decrease to 164.4%, in 2022 – to 58.4% (Fig. 7). This is due to the unfolding of a wave of financial crisis in the country due to martial law, which rapidly gained momentum starting from the II quarter of 2022 and affected, first of all, banking institutions that invested financial resources in the economy and the growth of population consumption. Since 2023, the portfolio of bank investment loans has increased by 28.6% in relation to the level of 2022. Accordingly, in 2023, the share of investments in investment lending in relation to the level of 2022 increased from 9.4% to 13.7%.

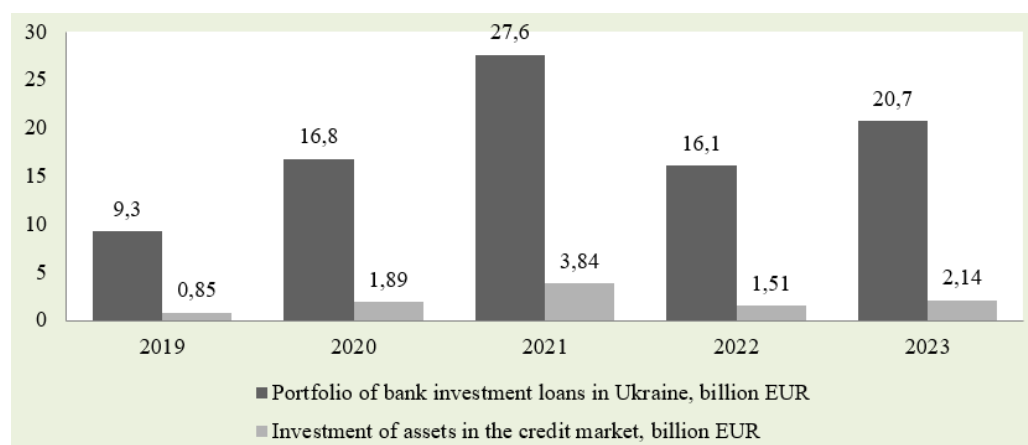


Fig 6. Portfolio of bank investment loans in Ukraine for 2019-2023, billion EUR.

Source: built by the authors based on data Ministry of Finance (2024).

This had a positive effect on the possibility of the credit market of Ukraine to cooperate with the European Investment Bank (EIB) on projects that affected the stable state of the banking ecosystem by increasing the profitability of investment loans in the state. The NBU's cooperation with the European Investment Bank (EIB), which not only provides credit, but also acts as the largest borrower of monetary resources on the international financial capital markets, allowed Ukraine to attract funds for the implementation of infrastructure, energy, environmental protection and other investment projects. At the stage of implementation of EIB initiatives, 19 projects with a total volume of 4513.5 million EUR are placed in the public sector of Ukraine.

In 2022, the EIB directed 5.3 times more loan funds to investment projects than in 2019. The main areas of financing were ensuring the restoration of damaged critical energy and road infrastructure, restoration of lending to small

and medium-sized enterprises with an average level of capitalization, restoration – 1030.64 million EUR. 2019 and 2020 were the most successful in terms of attracting EIB loan funds for the implementation of investment projects. In 2019, the EIB loan funds were raised to EUR 450 million, in 2020 to 840 million EUR (Ministry of Finance, 2023a).

If we consider bank loans according to the criterion of the targeted direction of investments, then, according to the NBU, the specific weight of the investment activity of Ukrainian banks in 2023 did not exceed the level of 2021. The vast majority of loans were provided by bank institutions to finance the current activities of economic entities, the share of debt for which in 2022 was 78.5%. In the first half of 2023, there was a tendency to reduce the investment activity of banks, which indicated the stagnation of the real sector of the economy.

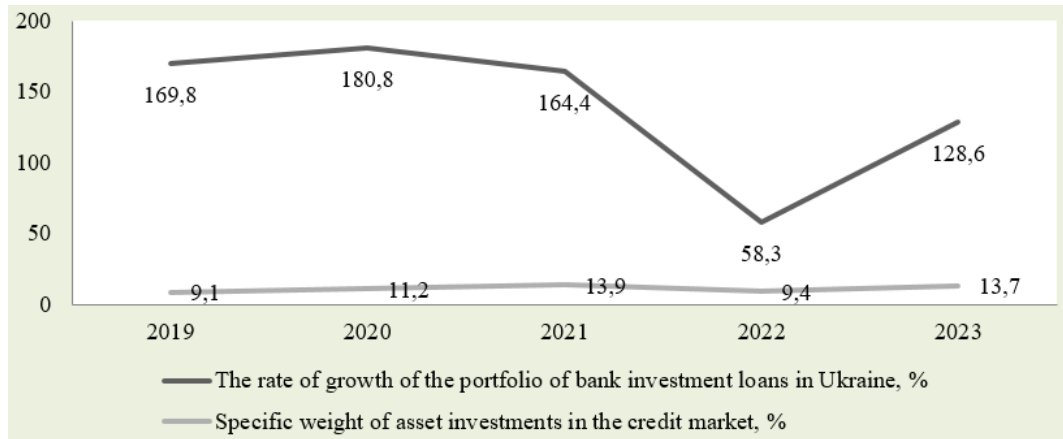


Fig 7. Growth rates of the portfolio of bank investment loans and the specific weight of asset investments in the credit market of Ukraine for 2019-2023 (%).

Source: built by the authors based on data Ministry of Finance (2024).

However, despite the above-mentioned factors of investment inclusion of the credit market in Ukraine, it is ahead of the rate of long-term loans compared to short-term loans. The volume of long-term crediting is twice as large as short-term credit obligations. Short-term investment lending in relation to long-term is only a fifth part (21.8%) according to the requirements of banks. JSC CB Privatbank is one of the most reliable institutions of the Ukrainian credit market. During 2019-2023 JSC CB Privatbank gradually increased the specific weight of financial investments and simultaneously decreased the specific weight of real investments (Fig. 8).

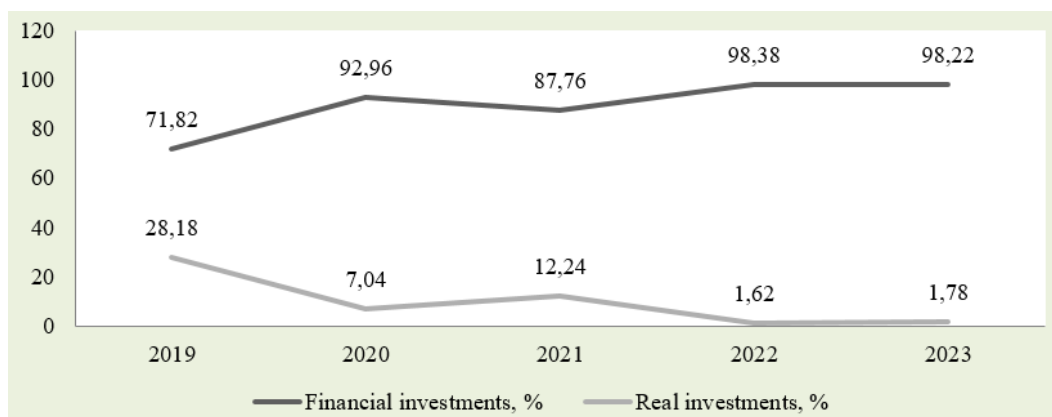


Fig 8. Structure of JSC KB Privatbank investments in Ukraine for 2019-2023 (%).

Source: built by the authors based on data Ministry of Finance (2024), Privatbank (2023).

During 2019-2023, the bank's portfolio of securities grew constantly – from 0.7 billion EUR in 2019 to 1.164 billion EUR in 2021. The increase in the volume of the securities portfolio occurred due to investment in government debt securities in the form of government bonds and in US Treasuries. JSC KB Privatbank has changed the principles of grouping financial instruments, i.e. evaluating debt financial assets according to: amortized cost; fair value with recognition of revaluation in other comprehensive income; at fair value with recognition of revaluation due to gains (losses). It was these changes that led to an increase in the value of securities in the bank's portfolio before maturity (up to 2.537 billion EUR), as NBU certificates of deposit began to be valued at amortized cost (Fig. 9).

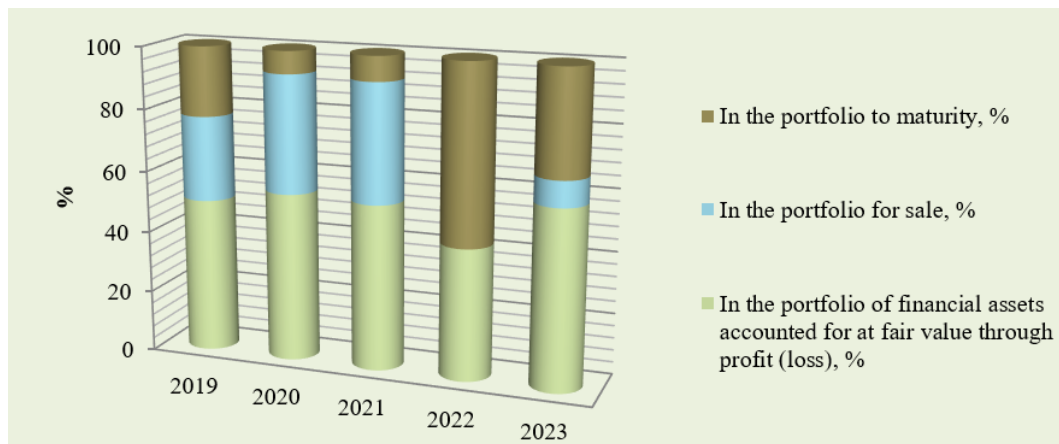


Fig 9. Structures of financial assets of the investment portfolio of JSC KB Privatbank in Ukraine for 2019-2023 (%).
Source: built by the authors based on data Privatbank (2023)

Changes in the share of certain types of financial assets were reflected in the structure of JSC CB Privatbank's investments. In the investment portfolio of JSC CB Privatbank for 2023, trading securities dominated, accounting for 33.6%: OVDPs and US Treasury bonds, NBU certificates of deposit in the portfolio until maturity. The share of securities in the portfolio for sale at the end of 2023 was 8.3%, in 2019 it did not exceed 28%, in 2020-2021 it was equal to an average of 38%, and in 2022 the bank did not form this type of securities portfolio at all papers. JSC "Raiffeisen Bank Aval" remained the main donors of investment lending for the restoration of agricultural industries in Ukraine during the war – it provided loans in the amount of 595 million EUR (the share of total agricultural investment lending is almost 20%), JSC "Oschadbank" (354 million EUR or 11.8%), JSC CB "Privatbank" (327 million EUR or 10.8%), JSC "PUMB" (238 million EUR or 7.9%), JSC "CREDI AGRICOLE BANK" (232 million EUR or 7.7%), (Fig. 10).

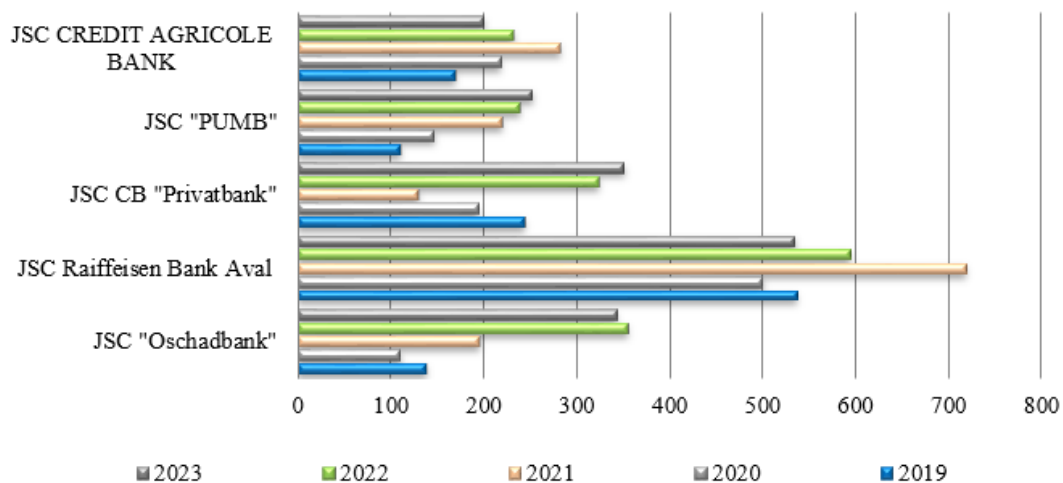


Fig 10. Donors of agricultural investment lending to Ukraine during martial law for 2019-2023, million EUR.
Source: built by the authors based on data Ministry of Finance (2024).

The effectiveness of the implementation of potential projects and the attraction of new investments in Ukraine will allow the development of mechanisms for the creation of new financial agreements and active initiatives in 2024.

Discussion

Bank investments are the fundamental basis of social reproduction and, unlike other types of investments, have specific features (Kim, 2011): the purpose of bank investments is to obtain a commercial result, that is, profit, and not any beneficial effect (social, environmental, etc.) characteristic of investments in general; investments have a long-term, short-term and medium-term nature, considering a large segment of the securities and other financial instruments market; bank investments emphasize only the monetary nature of investments, since loan capital is characterized by such a form of circulation of resources as "Money-Money"; the ability of funds to mediate the full circulation of capital with all its elements (main and circulating).

Considerable interest in modern areas of bank investment lending as a component of investment inclusion of the credit market is due to the need to ensure stable economic growth, structural shifts in the national economy, which are directed to the real sector. Under the conditions of low investment potential of the state, insufficient level of development of the credit market, limited opportunities of enterprises to independently finance investment projects,

the role of the banking ecosystem in the activation of investment activity increases, because it develops more dynamically than other sectors of the economy and remains the largest segment of the financial market of any country (Trusova et al., 2020). Banks, being intermediaries in the accumulation and redistribution of temporarily free funds, determine the directions and volumes of investment, mediating reproductive processes in the economy. However, ensuring the stability and sufficiency of the resource base of banks for investment lending to the real sector of the economy in order to eliminate territorial disparities in the credit market requires a theoretical and methodological platform that would allow for the formation of an investment lending portfolio and deepen the influence on the financing of investment projects (Vergelyuk, 2018).

The credit market as a set of credit relations, financial and credit institutions and certain established organizational and legal norms, in their unity and interaction, ensure the possibility of credit movement in various forms between economic entities at the national and international levels (Hlushchenko, 2015). At the same time, four key parameters of the credit market are distinguished: the measurement of monetary or market relations; measurement of interaction between market participants; part of the measurement of the financial (money) market; a measure of investment relations in the banking ecosystem between individuals, firms and governments (Sadchikova, 2021). That is, the credit market is a complex financial segment that includes all processes, agreements and instruments related to the provision and use of loans for the investment needs of market subjects, as well as risk management related to investment agreements in banking ecosystem and stimulation of economic growth of the state due to investments.

In modern realities, credit relations permeate all sectors of the economy, mediate the entire process of reproduction of social capital, penetrate deeply into the sphere of exchange, monetary relations, into the sphere of finance, as well as into the process of production and consumption. Credit and credit relations are an integral part of the banking ecosystem, because being at the center of the monetary and financial economy, banks serve the economic interests of the state, commodity producers, and the population. To highlight ways of influence of the credit market on the economy of the state (Chernychenko & Senishch, 2018):

- the credit market enables enterprises and the government to obtain the necessary capital for investment in new projects, technological development and expansion of production;
- loans for individuals stimulate personal spending on the purchase of goods and services, such as: cars, housing, education and entertainment;
- the credit market helps ensure the liquidity of the banking ecosystem and obtain resources for conducting its activities;
- loans and financial instruments reduce financial risks associated with fluctuations in the economy;
- the credit market expands financial services and the availability of investments for the population, small and medium-sized enterprises;
- effective regulation of the credit market helps to control inflation.

In general, the credit market is an important investment mechanism for the economic growth of the economy in the country. However, it is important to consider that the proper functioning of the credit market requires effective regulation and supervision to prevent excessive risks and ensure its stable inclusion. In the theory and practice of investment lending Ryzhanovska (2002) considers it as a form of project financing in two directions: as targeted lending to the borrower for the implementation of an investment project without recourse or with limited recourse of the lender and the borrower (the collateral for the payment obligations of the borrower is cash income generated by the object of investment activity (also assets, which are related to the investment project) as a way of mobilizing various sources of financing and the optimal distribution of financial risks related to the implementation of projects. In other words, the creditor has increased risks are formed in the process of operation of the object of investment activity.

It should be noted that maintaining ownership of the investment object financed by the loan is an important advantage for economic entities that form the demand for investment lending. According to Rizhkov (2008), the consideration of a bank loan as an investment and institutional lending ecosystem is determined, firstly, by the features of the content of the investment loan, and secondly, by the specific characteristics of its organizational and methodological, resource, informational and analytical and other types of provision, which are related to implementation by borrowers of their own investment projects of various scales and directions. A bank loan becomes an investment loan under the condition of guaranteeing a full (on an expanded scale) reproduction of the borrower's capital. At the same time, the scope of investment lending operations includes loans directed to objects of real capital investments, which are identified with the mechanism of creation and increase of not only fixed assets, but also intangible values and innovations.

The resource base for modeling the steady state of investment lending in the dynamic trend of changing the environment of the banking ecosystem may not meet the requirements and may not be able to fully use the existing potential of the credit market, according to the list of a group of factors that have an impact on the activity of lending

by banks for investment projects (Ilchuk & Shpomer, 2021).

The first group of factors are resource factors that form the supply of investment loans (bank deposits, loans from other banks and financial organizations, funds raised from bond issuance, banks' own capital, etc.). The growth rates of demand deposits, deposits with a term of up to 1 year, and deposits with a term of 1 to 2 years can be included in the model, taking into account the fact that they make up 95% of the deposit portfolio of banks and almost 60% of the resources attracted and borrowed by them (Trusova et al., 2021). The second group of factors are price factors (interest rates on deposits, loans, bonds, the general level of inflation, the level of consumer prices, etc.). Taking into account the fact that the most common form of bank investment lending is a bank loan, therefore the rate of growth of the average level of credit interest rates, as well as the level of inflation in the country, taking into account its significant impact on the socio-economic development of the country, can be included in the model (Pranajaya et al., 2024). The third group of factors determines the demand for investment loans (GDP, GNP, volumes of capital investments, level of depreciation of fixed assets, profitability of economic entities, indicators of bank credit activity, etc.). Taking into account the sufficiency of the array of information support, the rate of growth of the net profit of economic entities, GDP, the total volume of the portfolio of bank investment loans can be included in the model (Ogorodnyk, 2020).

That is, the first group of factors determines the very possibility of investment lending by banks, as it characterizes the structure of bank resources in the long-term period. When forming an investment lending portfolio, liquidity risk is taken into account. Therefore, these resources are considered decisive in the formation of the bank's investment and credit policy. The second group of factors determines the cost of both investment lending and lending in general. That is, on the one hand, these factors characterize the potential profitability of investment lending for banks, on the other hand, they determine the limits of the effectiveness of investment projects that can be financed with a loan. The last group of factors characterizes the economy's ability to develop, its readiness for effective investment development.

A linear multifactorial model of the dependence between the growth rates of the investment lending portfolio and asset investments in the credit market (IC), which have a set of variables that affect the stable state of the banking ecosystem (formula (8)) (Flannery, 1994):

$$IC = a_1 \times F_1 + a_2 \times F_2 + a_3 \times F_3 + a_4 \times F_4 + a_5 \times F_5 + a_6 \times F_6 + a_7 \times F_7 + a_8 \times F_8 + a_9 \quad (8)$$

where:

F_1	rate of growth of interest rates on loans;
F_2	inflation rate;
F_3	growth rate of demand deposits;
F_4	rate of growth of deposits with a term of up to 1 year;
F_5	growth rate of deposits for a period of 1 to 2 years;
F_6	rate of increase in net profit of economic entities;
F_7	GDP growth rate;
F_8	growth rate of bank investment lending portfolio in the country;
$a_1, a_2, a_3, a_4, a_5, a_6, a_7, a_8$	coefficients for the relevant variables; a_9 – a free member.

The value of Fisher's criterion for testing the statistical significance of the presented model is determined by the formula (9) (Flannery, 1994):

$$F = \frac{R^2 \times (n - k)}{(1 - R^2) \times (k - 1)} \quad (9)$$

where:

R^2	coefficient of determination;
n	number of observations;
k	is the number of degrees of freedom of the model.

Taking into account the set of effective signs, the model of the dependence of the indicators of the stable state of the country's banking ecosystem upon the change in the increase in the volume of investment lending is determined by the specified factors (formula (10)) (Flannery, 1994):

$$\Delta\omega_{cp}^{ll} = a_1 \times \Delta D^0 \pm a_2 \times \Delta D^1 \pm a_3 \times \Delta D^{1-2} \pm a_4 \times \Delta r^c \pm a_5 \times \Delta I \pm a_6 \times \Delta NP \pm a_7 \times \Delta GDP \pm a_8 \times \Delta CP \pm a_9 \quad (10)$$

where:

ΔD^0	growth rate of demand deposits;
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- ΔD^1 rate of growth of deposits with a term of up to 1 year;
 ΔD^{1-2} growth rate of deposits for a period of 1 to 2 years;
 Δr^c rate of growth of the average level of interest rates on loans;
 ΔI inflation rate;
 ΔNP rate of increase in net profit of economic entities;
 ΔGDP GDP growth rate;
 ΔC growth rate of bank investment lending portfolio in the country.

This model is proposed to be used to determine the possibilities of expanding (reducing) the volume of investment lending based on the current state of the banking ecosystem in order to reduce systemic risk according to the above factors. The built model can be considered: predicative and dynamic for forecasting the volume of bank investment lending; regression-differential for combining the elements of system analysis (establishes the relationship between the growth rate of the share of investment lending (IC) in the credit portfolio of the country's banks and the growth rates of the factors that determine the price of investment lending, as well as its elasticity (due to taking into account the growth rates of independent and dependent variables).

When determining the appropriate resource base of banks for investment lending requirements, the duration of deposits is taken into account: the duration of demand deposits is 1 month; deposits for up to 1 year – 12 months; deposits from one to 2 years – 24 months; deposits over 2 years – 36 months. Using formula (11), the weighted average duration of the deposit base of the country's banks is calculated (DD) (Flannery, 1994):

$$DD = \frac{D_0 + D_1 \times 12 + D_2 \times 24 + D_3 \times 36}{\sum_{i=1}^3 D_i} \quad (11)$$

where:

- D_0 amount of demand deposits;
 D_1 the amount of deposits with a term of up to 1 year;
 D_2 amount of deposits for up to 2 years;
 D_3 amount of deposits for up to 3 years.

Calculation of the average duration of deposits may be overestimated, as it does not take into account cases of early termination of deposit agreements. At the same time, the average duration of loans is calculated over a period of time based on the data provided by the National Bank of the country. At the same time, the amount of loans is displayed according to the residual principle on bank accounts according to the schedule of their full repayment. Thus, when calculating the average duration of loans, it is necessary to take into account the time lag of their use: loans up to 1 year have a duration of 6 months; loans with terms from 1 to 5 years – 36 months; loans over 5 years – 84 months. Using formula (12), the average duration of loans (CD) (Flannery, 1994):

$$CD = \frac{C_0 \times 6 + C_1 \times 36 + C_2 \times 84}{\sum_{i=0}^2 C_i} \quad (12)$$

where:

- C_0 the amount of loans for up to 1 year;
 C_1 the amount of loans with a term of 1 to 5 years;
 C_2 the amount of loans with a term of more than 5 years.

To determine the impact of investment lending on the stable state of the banking ecosystem in the country, the following indicators are chosen: the ratio of regulatory capital to risk-weighted assets (the main indicator that reflects the limit of bank protection against risk); the ratio of non-performing loans to total gross loans (the main indicator of the quality of the loan portfolio); return on assets (ROA) is an indicator of the efficiency of banking activity; return on capital (ROE) is an indicator of the effectiveness of investment activities carried out by banks in the country; the ratio of liquid assets to total assets (the main indicator of the riskiness of active operations); the ratio of liquid assets to short-term liabilities (the main indicator of the default risk of the banking ecosystem).

According to the presented indicators, the intensification of the influence of investment lending on the adequacy of regulatory capital (standard H2) is determined by formula (13) (Flannery, 1994):

$$IC = a_1 \times F_1 + a_2 \times F_2 + a_3 \times F_3 + a_4 \times F_4 + a_5 \times F_5 + a_6 \times F_6 + a_7 \times F_7 + a_8 \times F_8 + a_9 \quad (13)$$

where:

- F_1 rate of growth of interest rates on loans;

- F_2 inflation rate;
- F_3 growth rate of demand deposits;
- F_4 rate of growth of deposits with a term of up to 1 year;
- F_5 growth rate of deposits for a period of 1 to 2 years;
- F_6 rate of increase in net profit of enterprises;
- F_7 GDP growth rate;
- F_8 rate of growth of the loan portfolio of Ukrainian banks;
- $a_1, a_2, a_3, a_4, a_5, a_6, a_7, a_8$ coefficients for the relevant variables; a_9 – a free member.

Note that investment loans can belong to the group of assets with a 100% degree of systemic risk, and therefore their growth will be fully reflected in the norm of regulatory capital adequacy, which may lead to its decrease, and therefore to an increase in the degree of systemic risk, which is a financial burden for depositors and creditors of the bank. It is worth noting that excess liquidity causes banks to lose a certain part of their profit and stimulates them to look for additional investments of free resources. Therefore, the improvement of each indicator of the stable state of the banking ecosystem contributes to the activation of investment lending, the formalized form of which is given using the usual linear model, which has the form (Fig. 11).

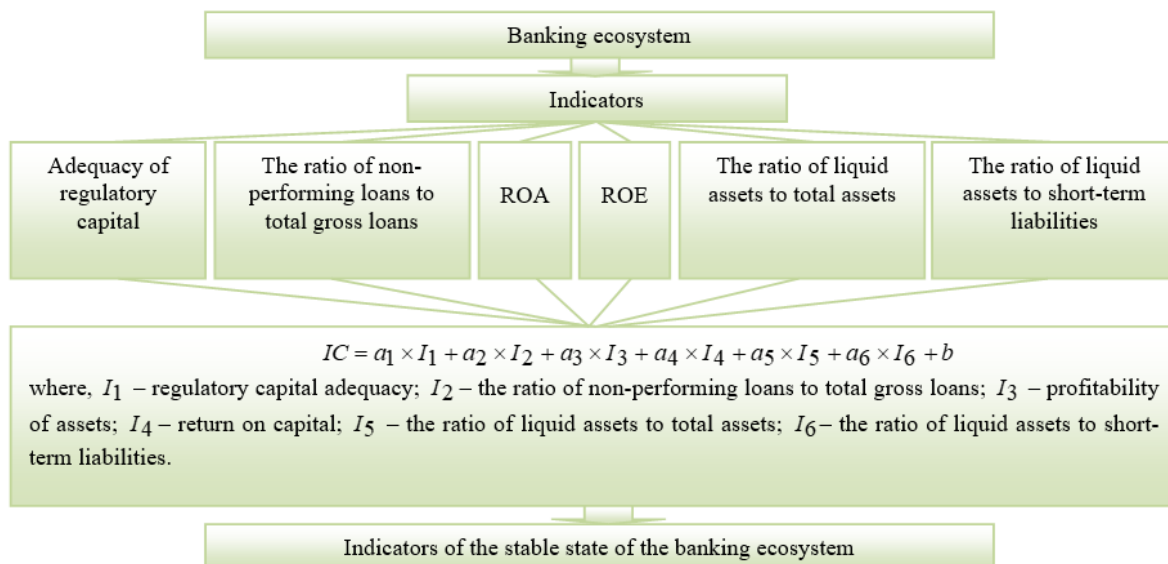


Fig 11. Formalization of the influence of the stable state of the banking ecosystem on the volume of investment lending in the country.

Source: built by the authors

Let us consider in more detail the relationship between investment lending and individual indicators of the stable state of the banking ecosystem of Ukraine (Fig. 12).

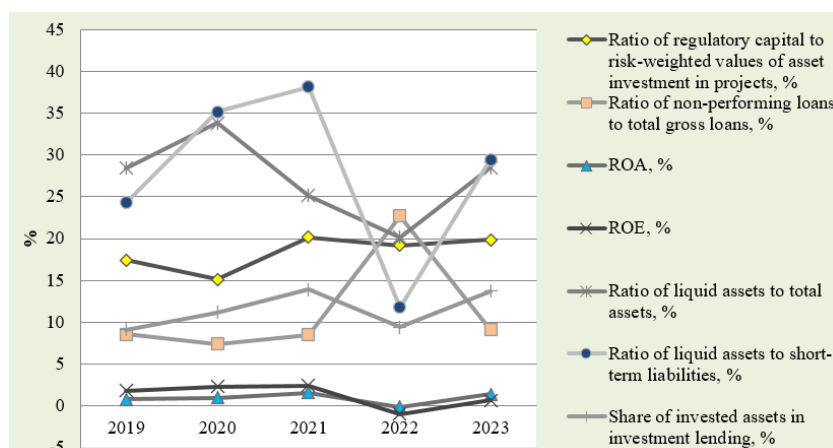
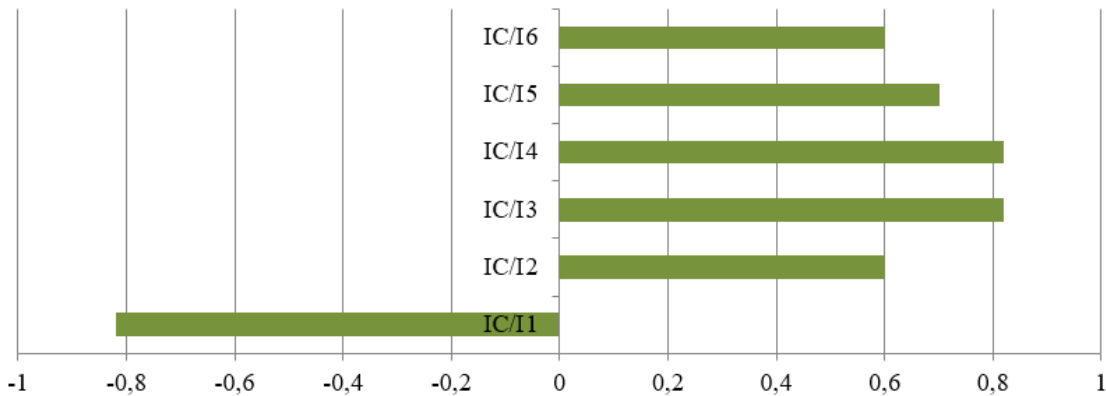


Fig 12. Dependence of the share of invested assets in investment lending on indicators of the stable state of the banking ecosystem of Ukraine for 2019-2023 (%).

Source: built by the authors from the Ministry of Finance (2024).

When determining the impact of investment lending on profitability indicators of the banking ecosystem of Ukraine (ROA and ROE) for 2019-2023, a negative relationship is observed, since the profitability of loans issued for investment purposes is usually lower than the profitability of other types of lending, primarily consumer credit. Therefore, the reorientation of banks' credit policy towards investment lending will reduce their profits in the short term, however, in the long term, it will lead to ensuring a sufficient level of profit at the expense of investment rather than interest income. In Fig. 13 shows the value of the correlation coefficients between the volume of investment lending and the corresponding indicators of the stable state of the banking ecosystem of Ukraine.



Note. IC/I1 – correlation coefficient between the volume of investment loans and the ratio of regulatory capital to weighted risk values for investing assets in projects; IC/I2 – correlation coefficient between the volume of investment loans and the ratio of non-performing loans to total gross loans; IC/I3 – the correlation coefficient between the volume of investment credit and the profitability of assets; IC/I4 – correlation coefficient between investment credit volumes and capital profitability; IC/I5 – correlation coefficient between investment credit volumes and the ratio of liquid assets to total assets; IC/I6 – is the correlation coefficient between the volume of investment credit and the ratio of liquid assets to short-term liabilities.

Fig 13. Correlation coefficients between the volume of investment lending and indicators of the stable state of the banking ecosystem of Ukraine.
Source: built by the authors

Thus, correlation calculations confirm the hypothesis about the negative impact of investment credit on the regulatory capital of the banking ecosystem and its positive impact on the profitability of capital and invested assets in the credit-investment process of banks. A high level of stability of the banking system ensures a low level of transaction costs borne by economic entities when attracting investments, as they allow to minimize the time lag for the mobilization and accumulation of loan investment resources. Banks ensure the maximum efficiency of allocation and use of investments in the process of crediting projects of economic development of the country. In view of the above, we can state that from a macroeconomic point of view, the stability of the banking ecosystem is a key factor in investment inclusion of the credit market and ensuring the development of the national economy.

Conclusion

Thus, with the help of the credit market, assets and resources are capitalized for investment lending, preferential conditions for refinancing reserve rates, insurance and guaranteeing investment loans are introduced. At the same time, economic conditions are created that contribute to the provision of a sufficient amount of money in the circulation of assets, as well as the formation of the added value of financial capital. This makes it possible to stabilize the exchange rate and minimize the rate of inflation, expand the field of investment planning and increase the efficiency of implementation of investment projects. The protection and regulation of the credit market is determined by the limit of stability of market participants who, with a high level of financial capacity, are able to ensure the long-term economic stability of any country, confidently integrating into the global financial and credit space.

The full-scale invasion of the terrorist country (Russia) on the territory of Ukraine negatively affected the development of the credit market in the first year of the war, which provoked a temporary destabilization of the banking ecosystem of the state and led to a decrease in credit activity of market participants, an increase in the share of non-performing loans, an increase in credit risks, and as a result - increase in the NBU discount rate. However, despite all the negative impact, the state made maximum efforts to stabilize the national economy, reduce the burden on investment lending interest rates through regulatory capital and financial capital pricing levers, both on the European and global financial and credit markets. Interest on loans was adjusted not only due to balancing the demand for the relevant banking products and their supply, but also due to specific individual costs and risks from credit operations of banking institutions. The latter were tied to the repayment terms of loans for investment lending facilities from the European Investment Bank.

It is the banking ecosystem in the conditions of the transitory economy of Ukraine at the current stage of credit market inclusion that is the catalyst of the investment lending process. At the same time, the additional costs of banks, as an integral characteristic of investment lending, are identified with a significant level of labor-intensive maintenance of financial assets invested by the EIB in long-term credit products. During the period of martial law, it was banks that made decisions regarding the further granting of loans to economic entities, and which had an ambiguous assessment of systemic risks, as there was a possibility of a decrease in the stable state of the banking ecosystem of Ukraine and the levelling of the possibility of timely coverage of debt obligations. Taking special regulatory measures in the field of bank investment lending requires state bodies to have a clear understanding of the demarcation of specific areas of investment investments.

This will make it possible to focus legislative efforts on the development of individual business sectors, branches and sub-branches of the state economy, to determine priority areas of support (the development of innovative technologies and methods of energy transmission, the introduction of resource-saving, energy-efficient technologies, the use of alternative sources of energy supply; the development of new industrial production technologies, processing and combination of various materials, the development of the nanomaterials industry and the development of the country's agro-industrial complex; the introduction of new technologies and equipment for the improvement of the quality of medical services provided to the population, the development of modern communication and information technologies). In accordance with this, we believe that grouping by belonging to one or another area of capital investments should be carried out with partial reimbursement of interest rates on investment loans received by structures in the banking ecosystem for capitalization of assets and reservation of resources for future projects.

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