# “Assessment and mitigation of credit risks in project financing”


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# ASSESSMENT AND MITIGATION OF CREDIT RISKS IN PROJECT FINANCING

## Abstract

Lending to long-term investment projects in fragile countries requires additional financial instruments to control the sustainability of project cash flows and to increase the borrower's financial discipline in debt servicing. This paper analyzes the special aspects of using financial covenants as credit risk mitigation instruments in project financing in Ukraine. It also argues that regulatory requirements to maintain financial strength indicators at the appropriate level have an indirect impact on the change in project finance loan rates. The study primarily aims at developing approaches to defining a credit rate corridor for an investment project, depending on changes in the values of financial sustainability indicators. The implementation of the proposed approach allows increasing the validity of credit risk components for investors and optimizing capital value for borrowers.

As required by international practice, violation of covenant terms is the trigger for satisfying the creditors' claims. According to the authors' conclusions, the use of financial covenants as a tool for protecting the creditors' interests should not be an instrument of unreasonable financial pressure on borrowers. The study reveals benefits and drawbacks of using financial covenants to mitigate credit risk and reduce the probability of a borrower default in the field of project financing in Ukraine.

**Keywords** project financing, credit risk, covenants, CC&Rs, debt-service coverage ratio, loan life coverage ratio, Ukraine

**JEL Classification** G28, G32, O22

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## INTRODUCTION

The need to intensify investment activities in order to stimulate the development of the real sector, industrial and social infrastructure is an urgent task at the current stage of economic development in Ukraine. One way to deal with the issue is to use project financing to generate large manufacturing and infrastructure facilities in various economic realms. Project financing is a complex investment activity involving a number of risks, most of which have specific manifestations; this requires appropriate techniques to manage them.

When financing investment projects, credit risk assessment is one of the most important components of a project risk management system and, therefore, requires special attention. The key documents governing the credit risk assessment process in banking lending are Basel Committee on Banking Supervision (BCBS, 2005) and National Bank of Ukraine (NBU, 2016) requirements and recommendations.

An investment project loan is defined as a long-term loan, which is aimed at financing the construction of enterprises, industrial and social infrastructure (NBU, 2016). A key feature of this loan is its compliance with the specific characteristics and conditions of investment project implementation and, above all, the strength requirements.



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To evaluate the financial impact of certain events, monitor the sustainability of project cash flow, and enhance the borrower's financial discipline in terms of servicing project debt over a specified period, lenders may represent the need to meet certain conditions in credit agreements, including maintaining the values of specific financial ratios at the appropriate level. Financial terms are usually shaped into financial ratios that, according to the debt covenant, the borrower is forced to maintain at the creditor's level. Financial covenants are an important component of a loan agreement and are increasingly being used to reduce the likelihood of a borrower defaulting and protect creditors' interests. Violation of the covenant conditions can be seen as a basis for satisfying the claims of creditors.

Recently, financial covenants have been used by central banks to formulate supervisory requirements for credit risk assessment. Considering this, the mechanism for using this tool in regulatory practice in Ukraine needs more scrutiny, given the need to standardize supervisory requirements to international practice and to harmonize the mechanism of dispute settlement between creditors and borrowers.

## 1. LITERATURE REVIEW

International financial institutions pay considerable attention to risk management. In this regard, the best known recommendations are those by the Basel Committee on Banking Supervision (BCBS, 2005) on banking risk management, the Bank for International Settlements (Ehlers, 2014) on infrastructure financing features, the World Economic Forum (WEF, 2016) as to the use of risk mitigation tools for investing in infrastructure, the Project Management Institute (PMI, 2013) and the Committee on Sponsoring Organizations of the Treadway Commission (COSO, 2017) on enhancing the role of the risk management system in value creation and its integration with the strategic planning and performance management of the organization, and the European Financial Services Round Table's (EFR, 2015) recommendations that contain requirements for disclosure and reporting when investing in infrastructure in EU countries. National banking regulators, in particular, the National Bank of Ukraine (2016), significantly contribute to the development of credit risk management mechanisms.

Boberski (2010), Docherty and Viort (2013), Ghosh (2012), and King (2014) explore the methodological principles and practices of credit risk assessment and management in banks. Golin and Delhaise (2013), in their guide for analysts, bankers and investors, summarize practical guidelines for bank credit analysis.

Recent studies have paid much attention to regulating and monitoring the credit risk of banks by banking market regulators (Bessis, 2015; Docherty & Viort, 2013; and Moenjak, 2014). Sorge (2004), Gatti (2008), and Srivastava and Dashottar (2019) analyze theoretical and practical aspects of credit risk assessment and management in project financing.

Many authors discuss the issues of project cash flow analysis and credit risk assessment using financial models (Haskell, 2005; Gatti, 2008; Kong, Tiong, Cheah, & Permana, 2008; Kurniawan, Mudjanarko, & Ogunlana, 2015). Thus, Kong et al. (2008) consider the use of a quantitative model to forecast the risk of borrower's default when lending to infrastructure projects, while Kurniawan et al. (2015), and Rowey, Bliss, Bonser, & Carver (2008) summarize best practices for using financial models for public-private partnership (PPP) projects.

Khan and Parra (2003) and Yescombe (2014) explored funding features of large projects. Tinsley (2002), using Asia Pacific countries as an example, and Pettis (2013) in China discovered project risk management. Thumann and Woodroof (2009), Miller and Lessard (2001) highlighted the features of project risk management and arrangement for energy plants.

Theoretical and practical aspects of designing, structuring and managing project risks for PPP projects are reflected in the documents of the Bank for International Settlements (2014), Organization for Economic Cooperation and Development (2012), as well as in Gatti (2008), Finnerty (2013), and Kurniawan et al. (2015). Scientific studies pay much attention to the use of financial instruments to en-

sure the long-term financing of investment projects and the project risk management. Thus, Chinwuba and Pettinelli (2017), Belyaev (2015), Billett, King and Mauer (2007), Babiak and Savochka (2015) have characterized and disclosed the special aspects of using financial covenants in project financing. Finnerty (2013) considers the features of project bond issue, rating and circulation for energy and infrastructure investment projects, while Mishchenko, Naumenkova, Ivanov, and Tishchenko (2018) analyze the possibilities of using hybrid financial instruments in project financing in Ukraine.

Denis and Wang (2014) draw attention to the lender's control over the borrower's operating and financial policies through a review of the terms of the loan agreement. Christensen and Nikolaev (2012) revealed the peculiarities of the use of covenants in solving the problem of agency relations. Roberts and Sufi (2009) have concluded that the effect of creditor actions on debt policy is strongest when the borrower's alternative sources of finance are costly. Demiroglu and James (2010) examine the determinants of financial covenant thresholds in bank loan agreements.

## 2. DATA AND METHODS

The Basel Committee on Banking Supervision and the National Bank of Ukraine's recommendations on assessing and managing credit risks in banks when financing investment projects make the methodological basis for the study. Approaches to credit risk assessment by banks in financing investment projects are based on the Basel Committee on Banking Supervision (BCBS, 2005) recommendations. The expected loss (*EL*) is calculated based on main credit risk components: *EAD*, *PD*, and *LGD*.

$$EL = PD \cdot LGD \cdot EAD, \quad (1)$$

where *EL* – the amount of expected loan losses for an investment project; *PD* – the probability of default; *LGD* – the loss given default; and *EAD* – the exposure at default.

Figure 1 shows the main stages of calculating the interest rate corridor by reference to financial covenants.

According to the authors, the calculation of the probability of default deserves special attention when assessing project finance risks. The National Bank of Ukraine has established a range of *RD* values when assessing credit risks of project financing in Ukraine for five classes of borrowers (Figure 1).

It should be noted that the probability of a borrower's default on a loan for an investment project in Ukraine is assessed in accordance with the NBU requirements in the following areas:

- the borrower's solvency;
- conditions that affect or may affect the investment project execution;
- the investment project characteristics;
- characteristics of the investment project initiator; and
- conditions ensuring the investment project implementation (NBU, 2016).

When determining the probability of a borrower defaulting on an investment project loan, the bank may also consider:

- results from the analysis of the effectiveness of the investment project business plan and monitoring the main stages of project implementation;
- the debtor's ability to effectively continue with such a project and achieve the expected results;
- risks that may arise during the loan period;
- other events and circumstances that may adversely affect the debtor in the performance of his/her obligations (NBU, 2016).

In Ukraine, there exist differences in approaches to credit risk assessment when compared to the Basel Committee on Banking Supervision's recommendations. According to Basel II (BCBS, 2005), when calculating the borrower default probability (PD), the supervisory requirements in project financing cover the following areas: a borrower's solvency


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Source: Developed by the authors.

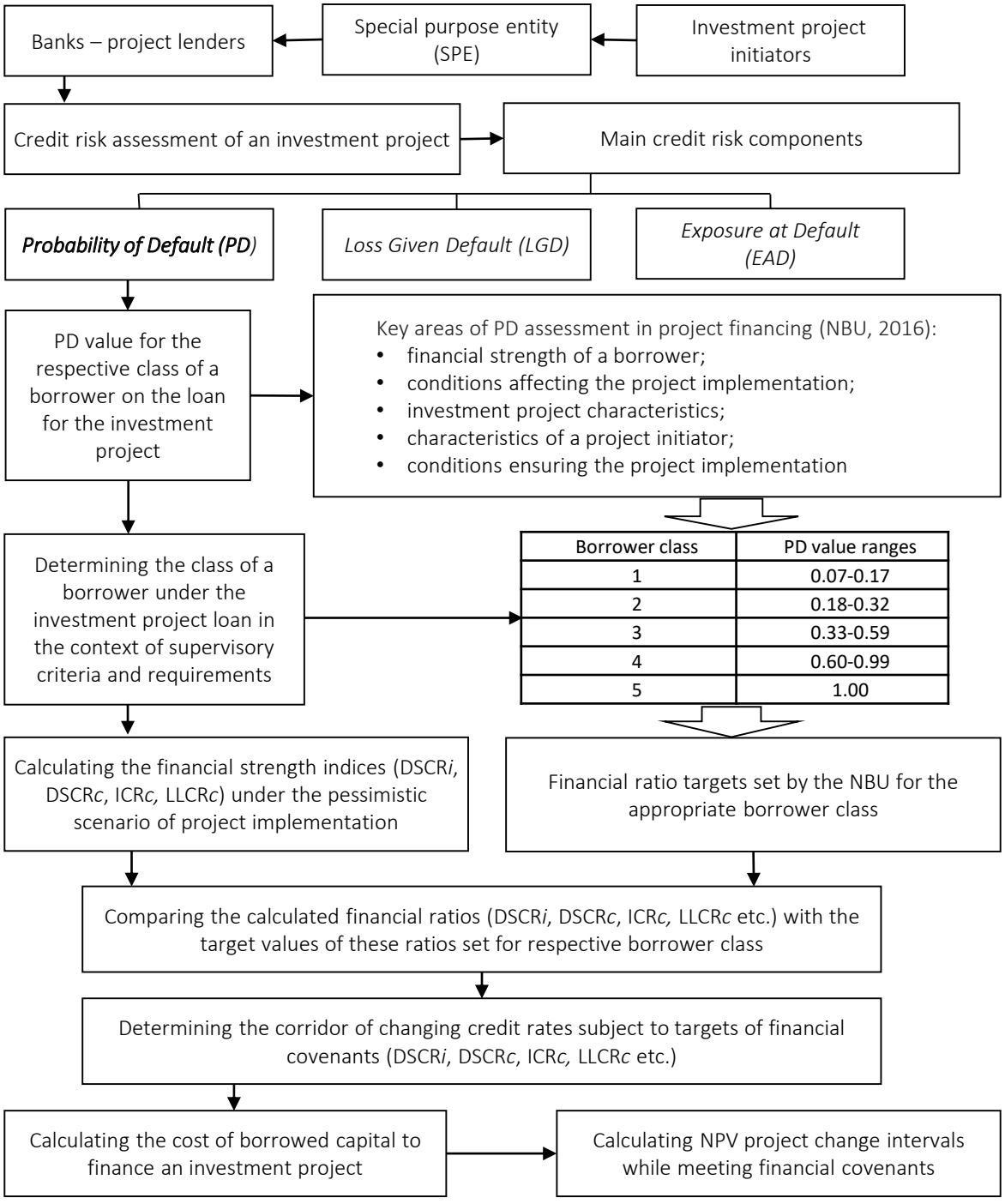


**Figure 1.** Main stages of determining the value of borrowed capital to finance an investment project by reference to financial targets

(financial strength), political and legal environment, the agreement characteristics, strength of sponsors, and security package (Table 1).

Each of these areas is assessed according to the criteria list based on the following ratings: strong, good, satisfactory, and weak. However, the National Bank of Ukraine's (NBU, 2016) supervisory requirements, in contrast to the Basel Committee on Banking Supervision's (BCBS, 2005) approaches to project credit risk assessment, do not cover a policy and legal environment that is relevant in Ukraine

**Table 1.** Supervisory grades for project finance exposures according to Basel II

Source: Compiled based on BCBS (2005).

| Supervisory grades for project finance | |
|---|---|
| Financial strength* | Market conditions |
| | Financial ratios (DSCR, LLCR, PLCR, D/E) |
| | Financial structure:<br>duration of the credit compared to the project duration;<br>amortization schedule |
| | Stress analysis |
| Political and legal environment | Political risk (transfer risk, considering project type and mitigants) |
| | Force majeure risk (war, civil unrest, etc.) |
| | Government support and project's importance for the country over the long term |
| | Stability of legal and regulatory environment (risk of change in law) |
| | Acquisition of all necessary supports and approvals for such relief from local content laws |
| | Enforceability of contracts, collateral and security |
| Transaction characteristics* | Design and technology risk |
| | Construction risk<br>permitting and siting<br>type of construction contract<br>track record and financial strength of contractor in constructing similar projects;<br>completion guarantees |
| | Operating risk<br>scope and nature of operations and maintenance (O&M) contracts;<br>operator's expertise, track record and financial strength |
| | Off-take risk<br>if there is a take-or-pay or fixed-price off-take contract;<br>if there is no take-or-pay or fixed-price off-take contract |
| | Supply risk<br>price, volume and transportation risk of feed-stocks;<br>supplier's track record and financial strength;<br>reserve risks (e.g. natural resource development) |
| Strength of a sponsor* | Sponsor's track record, financial strength, and country/sector experience |
| | Sponsor support, as evidenced by equity, ownership clause and incentive to inject additional cash if necessary |
| Security package* | Assignment of contracts and accounts |
| | Pledge of assets, taking into account quality, value and liquidity of assets |
| | Lender's control over cash flow (e.g., cash sweeps, independent escrow accounts) |
| | Strength of the covenant package (mandatory prepayments, payment deferrals, payment cascade, dividend restrictions) |
| | Reserve funds (debt service, O&M, renewal and replacement, unforeseen events, etc.) |

*Note:* * Represented in the National Bank of Ukraine's regulatory documents.

and can significantly affect the investors' position. It should be noted that the requirements for disclosure of information on the political and regulatory environment in financing infrastructure are also shown in other official documents (Ehlers, 2014; WEF, 2016; EFR, 2015).

To reduce the probability of a borrower's default and to control over the sustainability of the project cash flow by creditors, the National Bank of Ukraine has set DSCR, ICR, and LLCR financial targets, which are the main indicators of the financial strength of an investment project. According to the NBU requirements, when determining a borrower class based on a loan for an investment project, financial covenants (DSCR, ICR, LLCR and D/E) should be considered in full, and other evaluation criteria should be at least 70% of the list established.

The debt service coverage ratio (DSCR) is the ratio of the borrower's cash flow available for servicing its debt to the debt of the borrower. The objective of the DSCR is to ensure that the project's cash flow is sufficient to cover the debt service obligations over an agreed set timeframe (Chinwuba & Pettinelli, 2017).


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DSCR is calculated by the formula:

$$DSCR = CFADS / \left(P + I\right), \quad (2)$$

where *CFADS* means cash flow available for debt service; *P* – principal; *I* – interests.

The debt service coverage ratio interval (DSCR*i*) can be calculated using several methods:

- Quarterly CFADS/quarterly debt service;
- Semi-annual CFADS/semi-annual debt service;
- Annual CFADS/annual debt service.

The interest coverage ratio (*ICR*) serves as a measure of the borrower's ability to meet its interest payments under its project debt.

*ICR* is calculated as follows:

$$ICR = EBIT / I, \quad (3)$$

where *EBIT* – Earnings Before Interest and Taxes, and *I* – interests.

The loan life coverage ratio (*LLCR*) is a measure used by lenders to determine the number of times the cash flow, generated by the project over the term of the loan, can repay the aggregate outstanding amount of the project debt (Chinwuba & Pettinelli, 2017). Lenders use this ratio to evaluate the debt servicing capacity of the project's operating cash flows (Gatti, 2008).

*LLCR*c is calculated by the formula:

$$LLCR = \left(PV\left(CFADS\right) + DSRA\right) / D, \quad (4)$$

where *PV(CFADS)* – the present value of cash flow available for debt service; *DSRA* – the debt service reserve account; and *D* – the residual debt at the end of the settlement period.

## 3. RESULTS

To test the impact of financial covenants on changes in the cost of capital in financing an investment project, five Ukrainian banks were chosen; in 2019, they offered investors the most favorable terms for long-term bank lending to investment projects. These banks are Crédit Agricole, KredoBank, Ukrgasbank, Oschadbank, and Ukreximbank. Besides, five types of credit products were selected, namely, Equipment on Credit, Investment Loan, SME Customer Equipment, Term Loan, and ECO Equipment Purchase Loans.

The preliminary analysis made it possible to define that the interest rate in the investigated banks is not fixed and depends on the project characteristics, in particular, its financial strength and the validity of the data on the expected cash flows. For example, Oschadbank's credit terms (Equipment on Credit) indicate that the loan rate is minimal but may be increased. Ukreximbank warns that rates depend on the loan life and the borrower's financial situation. Thus, an investor cannot specify in advance what interest rate he/she should focus on. Therefore, the task is to define the interest rate corridor and to optimize the cost of loan capital to finance the project.

An investment project related to obtaining a USD 50 million bank loan for five years is a case study for calculating the range of interest rates, depending on the target values of financial covenants; a set of economic and statistical methods and the Excel application software product was used.

The borrower must fulfill his/her obligations in a timely and full manner based on the stress test results subject to the pessimistic scenario. With this in mind, the assumptions under the pessimistic scenario used in constructing the financial model are: sales (quarterly) – USD 14.350 million; sales growth – 0%; cost (present of sales) – 70%; cash flow from operating activities – USD 4.305 million; investment in fixed assets – USD 100 million; and debt – USD 50 million.

In the course of the research, the following calcu was achieved:

1) project cash flows from operating and investment activities were analyzed;
2) the financial sustainability of the investment project according to DSCR*i*, ICR*c*, ICRi, and LLCR*c* criteria was evaluated;

3) an interest rate corridor has been defined taking into account the target values of financial covenants;

4) bank project lending terms were compared and an acceptable value of the interest rate in view of meeting the financial covenants was found;

5) at the final stage, the project performance was analyzed and the NPV thresholds depending on the borrower class change and more stringent covariance conditions were calculated.

Project cash flow analysis was performed by constructing a financial model; this made it possible to define the amount of cash flow available for debt service (CFADS), residual cumulative cash flow and to calculate the main indicators of the project financial strength: DSCR*i*, LLCR*c*, ICR*i*, and ICR*c*.

The minimum and maximum lending rates for different borrower classes were calculated using the financial model with the Excel application software product, while simultaneously meeting the LLCR*c* та DSCR**i** target values. Figure 2 presents the results.

For example, for a borrower who, by a set of supervisory criteria, is assigned to Class 2 (good), the following DSCRi values are set: 1.2 ≤ DSCR*i* < 1.3. Such covenant terms can be fulfilled if the loan rate for the investment project is within 11.36-14.86%. But it is also necessary to confirm the project sustainability by the LLCR*c* criterion for a Class 2 borrower: 1.3 ≤ LLCR*c* < 1.5. This can only happen when the value of the loan rate changes from 6.19% to 12.01%. Therefore, the simultaneous fulfillment of requirements under two financial criteria (DSCR*i* та LLCR*c*) is possible if the loan rate (*i*) is within 11.36% to 12.01% (see Figure 2).

According to the calculation results, the loan rate corridors for debtors of other classes are defined, namely, 1, 3, and 4. The results indicate that the requirement strengthening for the project financial strength leads to a significant increase in the cost of raising funds.

Having the loan terms analyzed, one can conclude that the highest level of the borrower's financial sustainability is achieved when lending the project at a rate not exceeding 6.19%. In this case, the risks of the lender will be the lowest, and the standard value of the probability of a borrower's default (PD) will range between 0.07 and 0.17. It is clear that banks are focused on prioritizing lending to the most efficient and financially strong projects, which are placed into classes 1 and 2.

Thus, the use of financial covenants has an indirect impact on the change in interest rates when lending to borrowers for an investment project and is an effective instrument for mitigating credit risks. To confirm the conclusions based on the proposed method, quarterly values of indicators of

Source: Developed by the authors.

| Borrower class | DSCR*i* target | Loan rate *i* thresholds, % | | LLCR*c* target | Loan rate *i* thresholds, % | |
|---|---|---|---|---|---|---|
| | | *i* (min) | *i* (max) | | *i* (min) | *i* (max) |
| 1 | DSCR*i* ≥ 1.3 | – | 11.36 | LLCR*c* ≥ 1.5 | – | 6.19 |
| 2 | 1.2 ≤ DSCR*i* < 1.3 | 11.36 | 14.86 | 1.3 ≤ LLCR*c* < 1.5 | 6.19 | 12.01 |
| 3 | 1.1 ≤ DSCR*i* < 1.2 | 14.86 | 18.83 | 1.2 ≤ LLCR*c* < 1.3 | 12.01 | 15.39 |
| 4 | 1.0 ≤ DSCR*i* < 1.1 | 18.83 | 23.37 | 1.0 ≤ LLCR*c* < 1.2 | 15.39 | 23.37 |

| Debtor class | Estimated loan rate corridor while meeting the targets of the DSCR*i* and LLCR*c* ratios, % |
|---|---|
| 1 (strong) | *i* < 6.19 |
| 2 (good) | 11.36 ≤ *i* < 12.01 |
| 3 (satisfactory) | 14.86 ≤ *i* < 15.39 |
| 4 (weak) | 18.83 ≤ *i* < 23.37 |

**Figure 2.** Determining the loan rate change corridor for an investment project adjusted for the DSCR*i* and LLCR*c* targets (to achieve target DSCR*i* and LLCR*c*)



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**Table 2.** Test results for banking institutions' compliance with covenant terms for 5-year lending to an investment project in Ukraine

Source: Developed by the authors.

| Bank name/ Loan name | Real annual interest rate, % | Estimated quarterly values of DSCR*i* and LLCR | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 … 18 | 19 | 20 |
| By the selected group of banks | 9.19 | | | | | | | | | | |
| DSCRq | | 1.37 | 1.37 | 1.37 | 1.37 | 1.37 | 1.37 | 1.37 | 1.37 | 1.37 | 1.37 |
| LLCR | | 1.39 | 1.42 | 1.45 | 1.48 | 1.51 | 1.55 | 1.60 | 1.65...4.80 | 8.53 | – |
| Crédit Agricole/ Equipment on Credit | 5.89 | | | | | | | | | | |
| DSCRq | | 1.48 | 1.48 | 1.48 | 1.48 | 1.48 | 1.48 | 1.48 | 1.48 | .48 | 1.48 |
| LLCR | | 1.51 | 1.54 | 1.58 | 1.62 | 1.66 | 1.71 | 1.77 | 1.84...5.92 | 10.78 | – |
| KredoBank/ Investment Loan | 8.23 | | | | | | | | | | |
| DSCRq | | 1.40 | 1.40 | 1.40 | 1.40 | 1.40 | 1.40 | 1.40 | 1.40 | 1.40 | 1.40 |
| LLCR | | 1.42 | 1.44 | 1.48 | 1.51 | 1.55 | 1.59 | 1.64 | 1.69 ..5.03 | 9.00 | – |
| Ukrgasbank/ SME Customer Equipment | 9.47 | | | | | | | | | | |
| DSCRq | | 1.36 | 1.36 | 1.36 | 1.36 | 1.36 | 1.36 | 1.36 | 1.36 | 1.36 | 1.36 |
| LLCR | | 1.38 | 1.41 | 1.44 | 1.47 | 1.50 | 1.54 | 1.59 | 1.64...4.71 | 8.35 | – |
| Ukrgasbank/ECO Equipment Purchase Loans | 10.81 | | | | | | | | | | |
| DSCRq | | 1.32 | 1.32 | 1.32 | 1.32 | 1.32 | 1.32 | 1.32 | 1.32 | 1.32 | 1.32 |
| LLCR | | 1.34 | 1.36 | 1.39 | 1.42 | 1.45 | 1.48 | 1.52 | 1.57...4.29 | 7.5 | – |
| Oschadbank/ Equipment on Credit | 10.57 | | | | | | | | | | |
| DSCRq | | 1.32 | 1.32 | 1.32 | 1.32 | 1.32 | 1.32 | 1.32 | 1.32 | 1.32 | 1.32 |
| LLCR | | 1.35 | 1.37 | 1.40 | 1.42 | 1.46 | 1.49 | 1.53 | 1.58...4.36 | 7.65 | – |
| Ukreximbank/Term Loan | 10.16 | | | | | | | | | | |
| DSCRq | | 1.31 | 1.31 | 1.31 | 1.31 | 1.31 | 1.31 | 1.31 | 1.31 | 1.31 | 1.31 |
| LLCR | | 1.36 | 1.38 | 1.41 | 1.44 | 1.47 | 1.51 | 1.55 | 1.60...4.49 | 7.91 | – |

the investment project financial strength subject to its crediting by banking institutions in Ukraine are calculated (Table 2).

Project cash flows under the pessimistic scenario were analyzed by constructing a financial model using the Excel application software product. The results of the quarterly values of DSCRi and LLCR indicate that, among the selected banks, only the Crédit Agricole's terms under the Equipment on Credit can meet certain targets for the project financial strength (see Table 2).

The findings confirm that requirements to maintain the desired level of financial soundness of an investment project while meeting the set values of DSCRi, LLCR and ICRi in full, can be met by obtaining funds from Crédit Agricole under the Equipment on Credit scheme at a real rate of 5.89% (Figure 3).

After determining the lenders to a project and specifying the loan rate, taking into account the covenant terms regarding the level of financial strength, the project performance thresholds (NPVmin and NPVmax) were calculated.

According to preliminary calculations, the value of the project's IRR is 21.36%, which, at first glance, creates a wrong idea about the threshold value of the project capital, since the interest rate on the credit programs of the selected banks does not exceed the IRR value (Figure 4). The study has defined a corridor of interest rates for project lending, which varies depending on the borrower class and the target values of financial strength ratios (financial covenants) (Figure 4).

Thus, when receiving a loan at a 5.89% rate, the estimated value of the project's NPV will equal USD

Source: Developed by the authors.

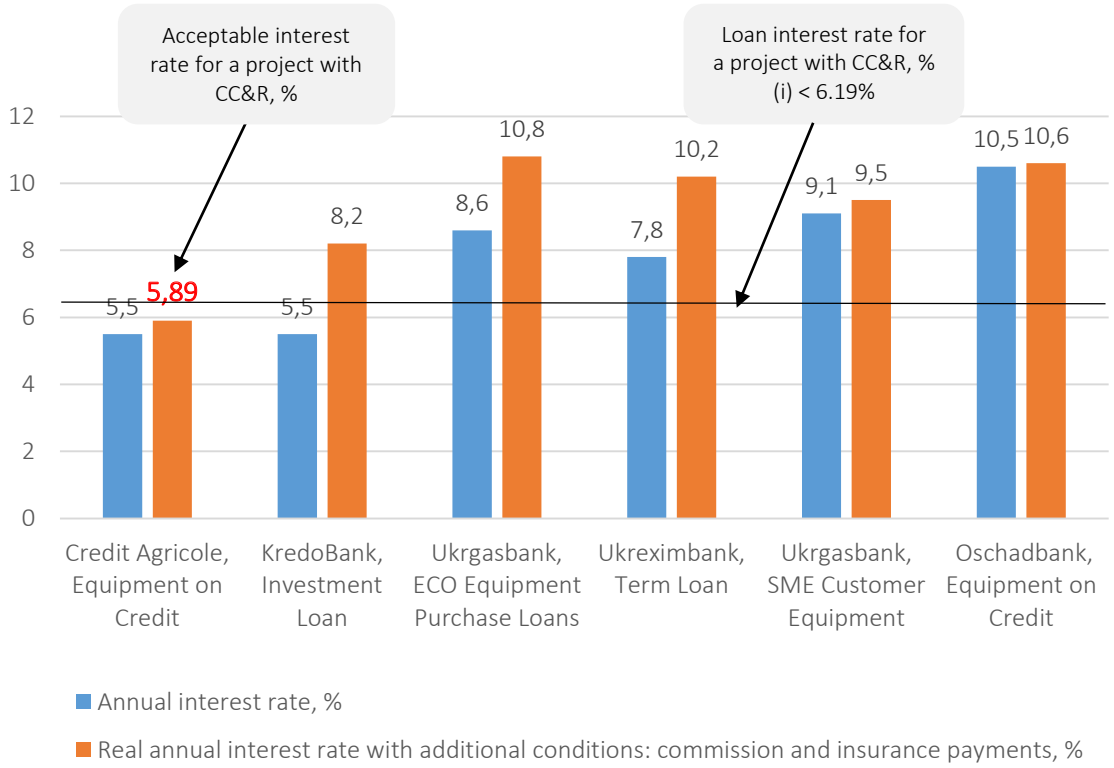


**Figure 3.** Acceptable interest rate for a project with financial covenants, %

Source: Developed by the authors.

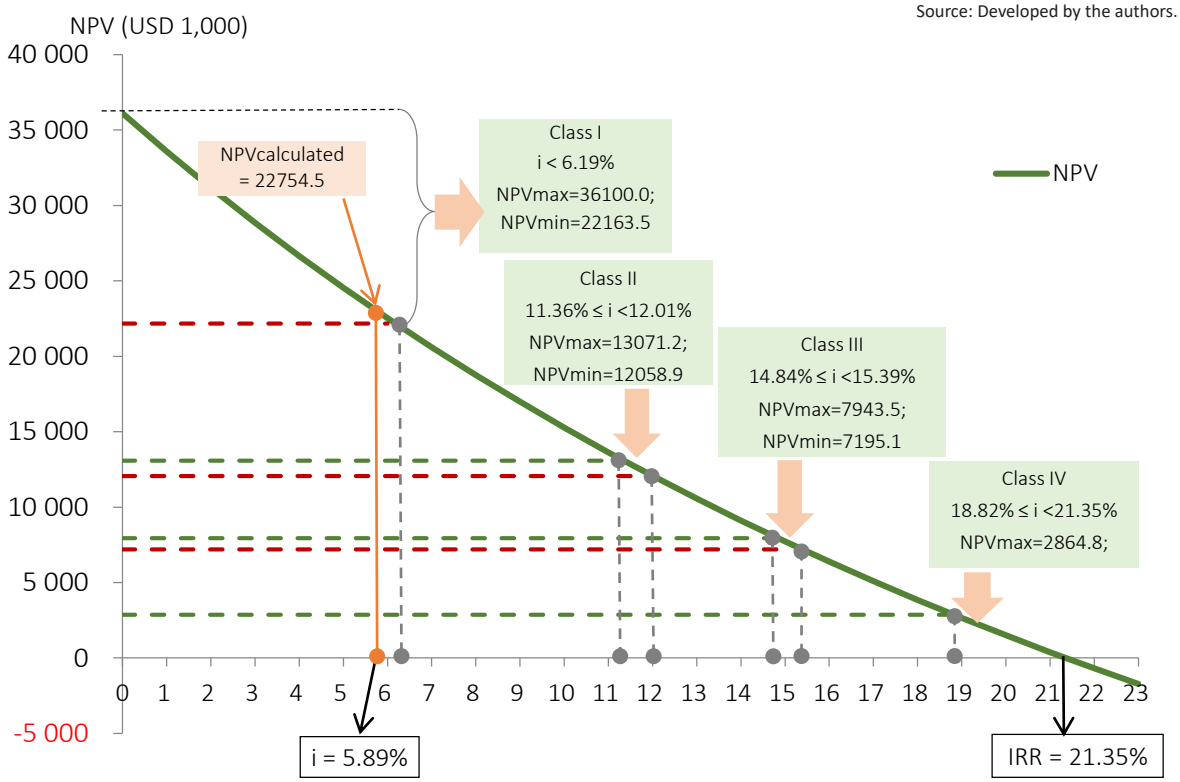


**Figure 4.** Interval changes of the annual NPV of an investment project while meeting the target financial covenants



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**Table 3.** Range of increasing the loan rate for an investment project based on the target financial covenants (DSCR*i* and LLCR), % of borrowers

Source: Developed by the authors.

| No. | Bank | Loan program | Real annual interest rate*, % | Increase in the interest rate, % | | | |
|---|---|---|---|---|---|---|---|
| | | | | Strong | Good | Satisfactory | Weak |
| 1 | Credit Agricole | Equipment on Credit | 5.89 | 0.30 | 5.47-6.12 | 8.97-9.50 | 12.94-17.48 |
| 2 | KredoBank | Investment Loan | 8.47 | 2.28 | 2.89-3.54 | 6.39-6.92 | 10.36-14.9 |
| 4 | Ukrgasbank | ECO Equipment Purchase Loans | 10.81 | 4.62 | 0.55-1.20 | 4.05-4.58 | 8.02-12.50 |
| 6 | Ukreximbank | Term Loan | 11.06 | 4.87 | 0.30-0.95 | 3.30-4.33 | 7.77-12.31 |
| 3 | Ukrgasbank | SME Customer Equipment | 9.47 | 3.28 | 1.89-2.54 | 5.39-5.92 | 9.36-13.87 |
| 5 | Oschadbank | Equipment on Credit | 10.57 | 4.38 | 0.79-1.44 | 4.29-4.82 | 8.26-12.80 |

*Note:* * Real annual interest rate with additional conditions: commission and insurance payments.

22,754.5 thousand at the minimum possible value of USD 22,163.5 thousand. The maximum possible NPV value will be USD 36,100.0 thousand.

The use of the approach proposed allows optimizing the cost of capital at the pre-investment stage of the project implementation by its initiator while minimizing credit risk by banking institutions and taking into account the need to comply with the National Bank of Ukraine's covenant terms. This increases the validity and realism of the calculations made and increases the chances of obtaining a loan for an investment project.

## 4. DISCUSSION

It is also advisable to pay attention to the need to increase the flexibility and validity of supervisory approaches when applying financial covenants in project financing. The results of the calculations indicate an increase in the loan growth margin with an increase in the borrower class (Table 3). Thus, the loan rate growth for the same project differs significantly from bank to bank, ranging from 0.30 to 4.87%. The lowest value is for the credit conditions of the Credit Agricole Equipment on Credit program.

The use of financial covenants as a tool to protect the creditors' interests should not become an instrument of excessive financial pressure on borrowers in the absence of proper coordination between credit and monetary policies in Ukraine (Mishchenko, Naumenkova, & Lon, 2016; and S. Mishchenko, & V. Mishchenko, 2016). In this context, with the introduction of NBU targets for financial covenants, depending on the borrower class, it is advisable to set a margin for potential credit rate fluctuations in project financing.

In determining the probability of a borrower default (PD) in project financing, the NBU's (NBU, 2016) supervisory requirements, unlike the Basel Committee on Banking Supervision (BCBS, 2005) approaches, do not cover the political and legal environment, which is relevant to Ukraine and can significantly impact the position of investors.

## CONCLUSION

The results obtained have allowed concluding that it is necessary to calculate the interest rate corridor in determining the value of borrowed capital for the implementation of an investment project, given the target values of the project financial strength. The implementation of this approach contributes to the validity of credit risk components for investors and optimizes the cost of capital for borrowers.

When assessing credit risk in calculating the project financial soundness based on the analysis of projected cash flows, many practical issues arise. According to the authors, some National Bank of Ukraine's approaches do not fully correspond to the current international practice and require adjustments.

## RECOMMENDATION

To increase the flexibility and validity of banking supervision decisions, it is advisable, along with the differentiation of the target financial covenants, to set a margin for interest rate fluctuations in project financing.

The main financial indicators used by banks to estimate project cash flows (DSCR, LLCR, ICR) should be differentiated according to sectoral focus in the areas of project implementation that is in line with current international practice.

Financial monitoring of the investment project implementation deserves special attention. The extension of the bank's powers to monitor compliance with the technical, economic and technological conditions of the project (NBU, 2016) does not correspond to the direction of the bank as a financial institution. According to the authors, the lending bank should have control over the cash flows and financial terms of the project.

The regulatory requirements for the SPE (SPV) as an institution that will be able to borrow funds and finance their use in Ukraine need to be specified. Besides, the Ukrainian environment requires a legislative settlement of the SPE residency issue with an appropriate restriction on the registration of this institution outside Ukraine.

Since the public-private partnership (PPP) project financing can be initiated by a government agency or local communities, the characteristics of the investment project initiator in terms of his/her ability to provide financial support to the borrower, including in the form of guarantees, need more detailed settlement. Given the Ukraine's credit downgrade, this issue needs particular attention.

For projects involving the use of funds from public partners, it is additionally necessary to carry out fiscal risk assessments (identification, calculation and registration of fiscal risks by state investment projects, in particular, concessions and PPPs).

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