The minimisation of risks in project finance: approaches to financial modelling and structuring

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Abstract. Complex investment projects require detailed and thorough analysis of numerous aspects and proper actions taken on all stages of their development. The article considers peculiarities of project finance, major risks of projects for the main participants, provides practical recommendations on approaches to project financial models, and brief review of recourse and debt service undertaking mechanism. The article is the result of practical experience and analysis of the problems of project finance based on implementation of the largest investment projects.

1 Introduction

One of the most urgent issues for the business community today is implementation of investment projects in the major sectors of the economy. Speaking about large-scale projects it can be argued that their implementation and financing depends on the success of specific actions of the largest companies and authorities in a given region or even country-wide actions, and often is handled on a manual basis.

At the same time, complex projects bear high risks due to their scale and numerous parties involved, cross-industry nature, timeline, therefore in any case it is necessary to work out the risks of investment projects in the most detailed and timely manner, and undertake proper structuring of the financing transaction. Lack and cost of expertise is also one of the major factors in the area.

Financing of projects can be organised in the form of corporate finance or project finance. Project finance is a special form of organisation of project financing, which assumes clear separation and allocation of assets and liabilities of the project, traditionally by creating a SPV / SPE - special purpose vehicle / entity, with the return of investment expected from the cash flows of the given project / company. This clearly distinguishes the project finance mechanism from corporate financing, in which the loan is granted to the current company (ongoing business) mainly taking into account its financial status and rating, based on understating of this company financial positions, value of its assets and the properties created etc.

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The total volume of project financing transactions in the world falls in the range from approximately 200 to 250 billion US dollars a year and depends on the closing period of the transaction. According to data for 2016, the volume approached 230.9 billion US dollars [4, p. 6], the total volume of transactions for 2017 according to preliminary data should be comparable.

Therefore, even insignificant changes in project parameters (decrease of flows, shift in timeline etc.) may have significant effect on the financial position of sponsor or project initiator, industry, sometimes - development of the region.

Every projects has numerous risks, that need to be analysed and taken into account appropriately. In the theory of investment analysis, there are different approaches to the classification of project risks, for example: risks of (pre-)investment and operating phases, external risks and internal inherent to a particular project, particular categories of risks due to their nature: financial, operational, tax and legal risks etc.

In the most visible form the risks of investment project may be considered based on areas for detailed expert review of large and complex project, including: technological and technical aspects of the potential project, marketing issues (prices, volumes, discounts), transportation and logistics, tax (rates, terms, benefits) and legal issues (possible restrictions on imports / exports, the duration of the license and changes in legislation, etc.), and other.

In case of a large and complex project financed by a syndicate or consortium of banks independent expert opinions and detailed analysis for each of these issues will be potentially required. In some cases different consultants may be needed to support each group of the participants – sponsors and also the lenders' side. Due to complex nature of projects, number of participants the process is often managed by specific legal project consultants who are experienced in structuring the comparable deals.

Most clearly, the impact of possible risks and uncertainties can be represented by conducting a sensitivity analysis or constructing a number of scenarios of the potential project development. Obviously, a detailed financial model of the project is required to quantify and sort out the effects.

We will consider the role of the financial model in identifying, monitoring and minimising a number of risks inherent in large investment projects, as well as possible structuring of transactions taking into account these risks. Without revealing the specifics of particular projects, the article includes author practical experience gained in the role of head of the financial modeling function of the investment block of the state corporation Vnesheconombank, as well as studies on this topic; experience obtained on international conferences on project finance and financial modeling is also used in our conclusions.

2 Financial model and its role in risk mitigation and management

The financial model should be used to analyse the sensitivity of the project's most important ratios and investor indicators to the key input factors. As noted, factors can be aggregated into several categories and depend on the project industry, the stage of its implementation and the specifics of the project itself.

Each project has its own specifics, strengths and weaknesses, which depends on the current status of its implementation and financing, prospects for the industry and project development, activities and efforts of competitors, government support etc. Therefore, business plan and financial model must take into account the whole spectrum of related assumptions and forecasts: marketing and pricing issues, technical, technological, transportation and shipping aspects, taxes etc.

Financial model should reflect all quantified aspects of the proposed project. It is a part of a business plan containing financial forecasts and their preliminary analysis including: input data and assumptions required for financial forecasts, interim financial forecasts and

calculations, financial forecast results in the form of projected financial statements and financial indicators (ratios), analysis of the key sensitivity factors and the financial forecasts results.

Therefore, financial model is a decision-making tool at all stages of reviewing and financing a project in a bank: express analysis of preliminary documentation and presentation materials, preliminary and complex review, stage of financing and monitoring, if needed – subsequent restructuring and refinancing options analysis. However, neither large commercial nor state banks do have proper and detailed requirements to financial models: uniform templates, single function for their preparation or verification.

Financial model may be prepared by the borrower, its consultant or the bank itself. Evidently the borrower has more information and deeper understanding of its business, however it may have lack of competences in financial analysis and modelling. Some independent consultants may help with the model preparation. The bank specialists may also help to adjust the model. Therefore, in order to avoid conflicts of interest and maintain clear investment process responsibility for model preparation should be on the borrower's side. The bank will normally provide comments to the financial model in order to accept final version of acceptable quality.

Let us consider example of Vnesheconombank, that paid significant attention to the work with financial models compared to other private and public banks in 2016-2018. After the management of Vnesheconombank change in 2016, the bank started reformatting the investment process, including reorganisation of work with financial models for current and new portfolio. As it is known, the old portfolio included a significant portion of problematic and non-performing assets, financial models could be not up-to-date or irrelevant, their quality depended significantly on skills and qualification of specialists responsible for specific projects (project managers).

One of the ideas that time was development and application of a single financial model template for the maximum number of projects. However, this option was rejected as it would be practically impossible taking into account the specifics of projects and industries. The bank had a very wide range of projects from nurturing turkeys to space vehicles, from liquefied natural gas (megaproject Yamal LNG with a total capex of more than 1.5 trillion rubles) to JSC Avtovaz. In addition, there are direct instructions from the Government and federal agencies to verify individual projects and financial models, and this is all are certainly very specific and unique tasks.

Additionally, it is necessary to remember that models differ even for projects in the same industry. Therefore it was decided that we needed not one ideal model, but high quality unified and specific financial models that will help make right decisions. At the same time we needed revision of individual models, and an increase in the overall level of financial modeling quality. For this you need to work in three major areas:

- *The first* is development of templates, examples, improvement of the methodological base.
- *The second* is the improvement of the competencies of all specialists in the bank that are faced with financial models.
- *The third* is the detailed testing of specific financial models by specially selected specialists.

As for the *development of templates*, we have applied the following approach, which appears to be a compromise option. On the one hand, each updated or new financial model that needed review should contain a summary sheet - Results or Outputs, which contains all the main forecast indicators and ratios. On the other hand, internal content is developed independently by the company or by consultants involved, taking into account the specifics and stage of the particular project. We also developed additional examples and templates for such sheets, scenarios, sensitivity analysis for important indicators for the bank etc.

In addition, recommendations and requirements for the preparation and provision of financial models were amended. All examples, templates and requirements are now presented on the official Vnesheconombank website in the public domain.

One of our requirements is simplification of the internal model calculations without losing its logic and functionality where possible. It is necessary to simplify formulas if there are more than 2-3 built-in functions, use additional lines, flags, sheets etc. We specifically included such example of acceptable and unacceptable presentation of formulas in the bank templates mentioned above, and also demonstrated how inaccuracies invisible at first glance can be hidden in the complicated formula.

The second area relates to *increase the overall level of competencies* and should be implemented in the bank through a series of full-time trainings on issues of investment and financial modeling, a number of master-classes on specific issues. Master classes can be conducted by both bank employees with experience in specific aspects, and leading consulting companies. Special review of methodological issues, e.g. regular bulletin, which examines five topics of financial modeling in each paper could also be useful to increase overall level of competence.

The third block of tasks is a *detailed review of specific models*. This is generally the task of project managers, leading their projects. Additional review could be performed to double check of the most significant and complex financial models for the current and new projects of the bank, and also help to rebuild the models in case of insufficient skills of the clients. Here you can find examples of the most typical errors:

- Contradictory forecasts: simultaneous weakening of the ruble and rising of oil prices.
- Underestimated discount rate: selection of a minimum level of components from different sources and application in calculation of discount rate.
- Not representative sensitivity analysis is applied to the standard, not the most important factors in a given business or project.
- Financial model architecture. Assumptions, calculations and results are not separated.
- Immobility of the model. The calculations use values without references. Model contains links to external sources without confirmation.
- Nontransparent calculations. The cell contains more than 2-3 built-in formulas. A row of rows and sheets is hidden.

Certainly this is just most example, real model may need 20-100 issues for adjustment.

A separate block, which needs to be mentioned, is work with *forecasts and assumptions*. One of the main problematic areas for even a properly constructed model is reasonableness, confirmation and consistency of forecasts. The analysis of actual historical prices and changes in forecast could be presented based on real example of the coal prices, changed from year to year of forecasts for a certain product. Based on historical data, the actual price fell in 2011-2015 from approximately 112 to 60 USD per tonne. However, the pattern of forecasts was rather specific. The starting point of every year forecast was decreasing, but the price recovery and further increase was again planned year by year, simply from a lower base. Such statistics and analysis can help bank's specialists in disputes with borrowers / consultants who present overly optimistic forecasts for their investment projects.

In general, following approach appears to be the most reasonable: for the major macroeconomic forecasts companies need to apply the forecast of the bank (Vnesheconombank in our example), additional macroeconomic assumptions and specific inputs e.g. sectoral and specific project data – based on client justified analysis reviewed and adjusted by the bank if needed, reports of independent consultants also approved by the bank.

We have considered several project finance risks, discussed above the use of templates and examples, work with assumptions and forecasts. The risk should be quantified in the financial model and managed by regular monitoring of specific financial ratios discussed below.

3 Monitoring of specific project finance ratios

An important factor in the successful implementation of the project and the key monitoring issue is harmonisation of the covenants. In order to improve the quality of the process, development and the earliest possible coordination of the requirements to the financial model format and the calculation of individual indicators may be needed.

The issue is one of the most specific and controversial for any sector, particularly for capital-intensive projects and their long terms of implementation and payback. Among the main ratios that are important for the initiator of the project and the financing side are the classic (Net Present Value, Payback period, Discounted payback period), and specific ones - DSCR (Debt Service Coverage Ratio) and specific coefficients of Project Loan Life Coverage Ratio and Loan Life Coverage Ratio. The ratios differ in the requirements by Russian / foreign banks. Approaches to their monitoring, regular and occasional updates based on financial model may also differ. For details on requirements to EBITDA calculations see article by D. Tikhomirov [9].

Project financing also assumes a special order of using money, often with the use of reserve accounts (DSRA - Debt service reserve account), reserving funds on deposits or by acquiring bank bills. Obviously, this may be required to cover unforeseen expenses of a capital or operational nature or simply to control the use of funds [10].

It should be noted that domestic banks and investors are generally less conservative in the requirements for major ratios, e.g. DSCR. With this respect traditionally the borrower is obliged to maintain the DSCR debt service ratio at a level not less than 1.3 starting from the quarter of the project's operational stage (the beginning of receipt of proceeds from sales of products) until the date of full repayment of obligations to the bank. The calculation of the DSCR is provided by the borrower to the bank annually as part of the updated financial model of the project, agreed in writing with the supervisory consultant company. At the same time, Russian banks often require maintaining the DSCR coefficient at the level of 1.1-1.3 and in some cases allow the inclusion of balances of cash in its calculation. Western banks and export credit agencies (ECA) traditionally require ratio at the level up to 1.25-2 at initial stages and apply more conservative approaches and additional restrictions and covenants (although foreign analysts note that the actual value of DSCR in the amount of not less than 1.1 is a positive characteristic of the project, see for example [3]).

At the same time, it should be noted that in the theory and practice of project finance, there is no generally accepted definition and approach to calculating DSCR in terms of including cash balances at the beginning of each period, calculating DSCR for a particular tranche / bank, or for all loans together. Thus, the concept of Total DSCR used in the methodology of the European Bank for Reconstruction and Development [2, p. 488] has not been described in details, the concept is not presented in the generally accepted literature and is interpreted freely, depending on the methodology of the particular organisation and the needs of the analysis.

In general, an important stage of the project is its monitoring after the examination and provision of finance. At the same time, the instruments should be worked out in detail when structuring the transaction and fixed in the credit support documentation. Therefore, the major issues to consider when structuring the deal are as follows:

- Specification of the covenants described above, clear definitions and approaches to their calculations and minimum benchmarks.
- Requirements to the sponsors' participation, including maintaining proportion of equity share in total finance of the project. Additional cost overrun may be required from the sponsors.
- Different types of put and call options.

- Different types of other guarantees recourse. Specific type of such kind of guarantee i.e. Debt service undertaking is discussed below.

4 Recourse and Debt service undertaking

Classical project finance deal usually implies that project initiator and external investors jointly participate in the elaboration, examination, implementation and financing of the project, and the initiator expects the reduction of its obligations (guarantees, sureties, pledges of its shares etc.) to the creditor(s). Limiting the recourse of the sponsor or initiator of the project to the borrower, as well as the distribution of risks, imply a lower liability of the sponsor or initiator than traditional corporate financing. At the same time, recourse of some type and extent is still one of the most significant issues in structuring of project finance transactions.

There are several options for minimizing the risks based on recourse to the sponsors of the project, including direct guarantees. However, measures could be different based on the risk, e.g. requirement of cost overrun guarantee for risk of capex increase, general loan agreement or hedging for risk of price decrease, Debt service undertaking for complex project that may be subject to the delay or high technological risk.

Considering risk of price decrease, the following measures could be implemented in specific cases (we need to note they may be considered as a direct recourse or very costly, and so not appropriate for the sponsors):

1. Conclusion of the general loan agreement between the borrower and the sponsor (or other sponsor-related company), under which the sponsor undertakes to provide the borrower with loans for the performance of the borrower's obligations under the loan agreement concluded with the bank for the implementation of the project.

Within the framework of the main terms of the general loan agreement, the following measures appear to be reasonable:

- Providing specific additional finance (loans) by separate tranches to the project company in the forecast period.
- Subordination of loans in relation to the main loan facility of the bank.
- Calculation of the size of each tranche of the loan to secure the amount of money necessary and sufficient to ensure the DSCR ratio at a certain level (for example, 1.1 - 1.3).
- The borrower's right to fully or partially repay the whole of the tranches of the loan ahead of schedule agreed with the bank.
- Payment of interest on the date of full repayment by the borrower of the relevant tranche of the loan.

2. Develop a hedging program and respond to the risks of price reduction.

In some cases, the amount of funding for the project is so great that even a large initiator cannot fully guarantee its success, achievement of the planned targets and full repayment of the obligations on time. For example, it is obvious that JSC NOVATEK could not solely guarantee in full the fulfillment of all obligations under the Yamal-LNG project for the entire lifetime of the project, both taking into account the current and forecast financial indicators of the company, and the need to be able to attract new loans in the future. E.g. EBITDA for 2016 according to the reporting data was approximately 4 billion USD, whereas the total amount of capital investments in the project was much more than 20 billion US dollars; similarly, PJSC Gazprom may have some limitations regarding the project "The Power of Siberia" and so on. At the same time, even if independent experts are involved in all major aspects of the project (technological, technical, marketing, environmental, tax, legal and other

aspects), banks / creditors do not have full expertise and confidence in the success of the project, and, naturally, try to reduce their risks.

Therefore, hybrid approaches and tools, such as Debt Service Undertaking (DSU) arise. DSU guarantee is an obligation of each project sponsor to the borrower's creditors to pay the principal amount in accordance with the financing plan and loan agreements, as well as interest and other payments under the agreements.

Currently, the concept, types and approaches to the calculation of DSU are absent in the domestic literature, very briefly looked at in the foreign sources: in general, as a possible recourse are stated in the methodology of the international consultant Dentons (1, p. 14-15, 27, etc.), also noted in the article Milbank Tweed Hadley and partners Alexander Borisoff and Phillip Fletcher in the International Financial Law Review (5, p. 37).

Lenders may require payment under the DSU guarantee until the date of termination of the guarantee provided in the cases:

- The borrower (SPV / SPE) did not pay any part of the debt under any of the contracts, and failure to pay was not agreed on.
- In the event one of the sponsors default in amount of outstanding principal and accrued interest, corresponding to the share of the sponsor in the project.

Obviously, this mechanism requires the specification of many details, for example:

- Distribution of the guarantee between the sponsors, the possibility of releasing some of the sponsors or a disproportionate distribution of the guarantee. If there are several sponsors of a project under the DSU, each sponsor, acting individually, will pay its proportional share in all senior debt obligations.
- The date of the guarantee withdrawal (the completion of the entire facility, the technical testing of the plant, the launch of the plant, the production output of the plant at specified capacities etc., proportional withdrawal of the guarantee), many other issues.

5 Conclusion

In the article above we have considered the main peculiarities and difficulties in project finance mechanism and risk the sponsors, banks and other participants may face. We have also emphasized that a number of areas are not described and agreed on in the theory and practical business sources, and need to be agreed in each particular case. This relates to the work with financial model, requirements to financial covenants, different types of guarantees incl. specific type – Debt service undertaking. These issues and problems are not exhaustive. Currently there is active work on the formation of a regulatory framework in syndicated financing, asset securitization, valuation of collateral etc. We would also like to draw attention to a number of positive trends in the experience of different participants and work on approaches to the organization of project financing during the last decades. The successful launch of the first lines of the Yamal LNG project is a good example of such projects.

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