Modeling the Escrow Financing Influence on the Efficiency of Development Project

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Abstract. The influence of financing forms on the development projects effectiveness for the creation of apartment buildings are examined in the article. The financial model of the project of creating an apartment building (PC AB) in terms of escrow financing is described. This method of financing appeared in Russia recently as a result of amendments to the Federal Law dated 30.12.2004 No. 214-FL. The study aim is to analyze the impact on PC AB financial characteristics of banks requirements for the minimum investments volume of developers' own funds in such projects. The calculations are based on the financial model of PC AB developed by the authors (it is described in the text, made according to the data of a specific PC AB in Novosibirsk). As the study result, a description of PC AB main financial results and indicators of its effectiveness was obtained for the traditional condition of escrow financing (investment by the developer of its own funds in the amount of more than 10% of PC AB cost) and for an alternative condition (investment less than 10%). It follows from the study that the bank's softening of the requirement on the amount of developers' investments leads to an increase in the efficiency of their investments, i.e. more active developers. Therefore, there is a potential for growth in banks' incomes both by increasing the average loan amount and by increasing the number of loans.

1. Introduction
The importance of the construction industry functioning is generally recognized and does not require additional justification. It is necessary to move from "construction industry" category to the "investment and construction complex" category (ICC), which includes development, design, survey, construction, manufacturing companies, as well as companies supporting their activities in order to improve the accuracy of reasoning. Among the latter: banks, real estate agencies, suppliers of electricity, heat, water, management companies, companies that process municipal waste and a number of other less significant entities.

ICC development in Russia is studied by many scientists. Its specificity lies in the fact that national standards and traditions are systematically updated. As a result, both the internal sphere of firms and the external one need updating. Thus, Kaverzina L., Koshevoi P., Dorofeeva V. noted the need to improve intra-firm planning [1]. Uvarova S., Kutsygina O., Smorodina E., Gumba Kh. offered an original method for forming a portfolio of construction projects, based on taking into account the risk ratio and these projects profitability [2].

Polovnikova N.A., Chepachenko N.V., Yudenko M.N. proposed authors’ method for assessing the competitiveness of a construction organization [3]. Uvarova S., Belyaeva S., Voronov D., Erypalov S. also offered their own methods for assessing the competitiveness [4, 5].
Much attention is paid to development issues in the works of Russian scientists. Thus, Endovitsky D.A., Lyubushin N.P., Babicheva N.E., Zotova E.S., Pozhidaeva T.A. considered the cyclical and balanced development of firms [6, 7]. Kaverzina L. substantiated the necessity and general procedure for restructuring ICC, aimed at supporting its innovative development [8]. The importance of this aspect (innovative development) was also substantiated by other authors, in particular Gumba K., Revunova S., Svetlana S., Belyaeva S. [9, 10]. Oparin S., Chepachenko T., Yudenko M., Kuzovleva I. described the negative impact mechanisms on economic growth of a number of factors and ways to counter this [11]. Among these factors, the greatest attention is paid to administrative barriers and transaction costs, which elimination increases the efficiency of firms.

Kogan A. offers his own methods for assessing financial and economic efficiency, applicable for evaluating individual projects (at the micro- or meso-level), or individual industries [12 - 14]. This article will touch upon another problem aspect of ICC functioning - its influence on modern methods and rules for financing projects for the creation of apartment buildings.

Financing costs are a separate cost item for both, apartment building creation and the purchase of apartments in an apartment building. Usually the mortgage rate is around 10% per annum. If a potential buyer receives a preferential loan, then this increases his purchasing power, i.e. increases demand. According to business representatives, about 70% of transactions in the residential real estate market are made using loans.

Let us note those types of lending for the residential real estate purchase, which can affect the demand in the primary real estate market. Firstly, this is a preferential mortgage for citizens who had a second or third child in the period from 01/01/2018 to 12/31/2022. This type of lending assumes a rate for the borrower at the level of 6% per annum, regulated by the Government Decree of the Russian Federation of December 30, 2017 No. 1711.

Secondly, let us touch on the so-called. "Rural mortgage". The rules for this type of lending are determined by the Government Decree of the Russian Federation, dated November 30, 2019 No. 1567. The interest rate can be 3% per annum for the entire period, which the mortgage loan is issued for. The loan is issued for the purchase of housing exclusively in rural areas. However, suburban areas can be included in this category, i.e. those that are not part of the city, but they are parts of the agglomeration. Often these are areas with elite buildings (or close ones to this class).

Along with this, there is a regional subsidization for the construction of individual residential buildings. For example, this type of support was introduced by the Governor’s decree of April 01, 2010 No. 102 in the Novosibirsk region. The share of this financing type in the total volume is not so large.

Russia has introduced a concessional lending program at a rate of about 6.5% per annum, as a part of business support during the period of restrictive measures in the context of a pandemic. The rules for this type of lending are described in the Government Decree of the Russian Federation, dated April 23, 2020 No. 566. We should note that there are no social signs (the number of children, etc.) in this program, among the requirements for creditors, and it played a significant positive role in enhancing demand in the market for housing under construction.

Obviously, all these types of financing stimulate demand. Within the framework of this work we will consider the special rules of financing, with an unknown nature of the impact on the housing under construction supply.

2. Materials and Methods

Recent amendments to the federal law of December 30, 2004 No. 214-FL (the main law regulating the creation and AB financing, hereinafter - 214-FL) formed a new type of financing for AB creation in Russia. Now the developer intending to sell the housing under construction is obliged to conclude an agreement with the bank, according to which the bank finances the construction by giving the developer a loan. Traditionally, banks put forward a requirement for the developer to invest at least 10% of their own funds before receiving this loan.
The loan is issued by transferring money to the contractors’ accounts of the developer, but not to himself. The only item in the consolidated budget calculation, according to which the developer will receive money on his account, is “developer services”. The composition of these services is not regulated by any specific document. Banks may have different requirements for the composition of these costs. In part, they are determined by Article 18 of 214-FL. Banks can no longer refuse, made a decision to participate in the construction project of an apartment building (AB). Taking into account the fact that apartment building construction is carried out, as a rule, using AShC (agreement in shared construction), the bank's decision to participate in the project (or refuse) acquired the force of the authority decision to authorize construction (or refuse).

A very important detail is the settlement procedure between the developer and the buyer of the housing under construction. In accordance with the current edition of 214-FL, the developer will receive money from buyers only after ICC is put into operation. Until the money will be kept in escrow accounts, opened by the bank for buyers. After the developer presents to the bank ownership certificate of the apartment in the newly created apartment block, the bank will "open" escrow accounts, it will transfer to the developer the difference between the amounts, received from buyers and the amounts of the loan.

Sections Materials and research methods, Results, Discussion, Conclusion were prepared by A.A. Chaetsky and A.B. Kogan.

This type of financing (let's call it "escrow financing") raises concerns from developers and objections from them, based on the fact that paying interest to the bank on this obligatory loan leads to an increase in costs. This gives rise to a predisposition on the demand side to price increases in the short run. If this is not possible, then a decrease in profitability (due to the described increase in costs) will lead to a decrease in supply in the short term, followed by an increase in prices in the long term.

For the banks part, they justify the expediency of escrow financing by the fact that this method brings the risks of equity holders to zero, which means that AB will not be put into operation (at least for more than a year after the planned date). According to the rules of 214-FL, the bank is obliged to return funds to buyers of housing under construction in the event of a delay in the apartment building commissioning for more than six months. At the same time, the bank receives from the developer an unfinished apartment building. Further, the bank has the right to sell this apartment building, or hire contractors to complete it and then sell it on the real estate market.

We have built a special model to analyze the impact of escrow financing on the financial results of projects to create AB (and hence on prices and supply volume). This model includes the following blocks: a consolidated estimate of the construction cost, a schedule for the work implementation on the creation of an apartment building and the appropriate resources supply, the receipts schedule from the sale of apartments in the newly created apartment building, a schedule for the issuance and repayment of an obligatory loan, a block for calculating the financial result of the developer and the net cash flow of AB project creation. This model is a voluminous spreadsheet and therefore can not be presented in full in this work. However, the authors are ready to provide this model to interested parties upon request. The individual blocks of this model are described below.

Note. Pricing in the primary real estate market is associated with two factors: the readiness degree of the newly created apartment block and the number of unsold apartments there. Accordingly, developers use one of two pricing strategies: increase prices per sq.m. real estate with an increase in the degree of AB readiness, or increase prices immediately after the implementation of the next object.

We should note. The costs of AB creating and their distribution by months of construction are taken from the blocks "consolidated estimate of construction cost" and "timetable for the implementation of work on AB creation and the supply of appropriate resources." Banks usually charge interest for reserving funds for a loan - this is reflected in the line with the same name. The line “Credited to escrow accounts” is calculated according to the data from the “Schedule of receipts from the apartments’ sale in AB newly created” block. Since the loan rate depends on the ratio of the amounts on the escrow accounts and AB creating cost, the corresponding lines have been entered in the described block (the amount of the loan. covered by funds on the escrow accounts).
Table 1. Block of the model "Schedule of receipts from the sale of apartments in AB created".

| Category                          | Month of the project implementation |
|-----------------------------------|-------------------------------------|
| 1-room apartments                 |                                     |
| Realizable area, sq.m.            |                                     |
| Price, Rub. per sq.m.             |                                     |
| Amounts from sales, Rub.          |                                     |
| 2-room apartments                 |                                     |
| Realizable area, sq.m.            |                                     |
| Price, Rub. per sq.m.             |                                     |
| Amounts from sales, Rub.          |                                     |
| ...                               |                                     |
| Office rooms                      |                                     |
| Realizable area, sq.m.            |                                     |
| Price, Rub. per sq.m.             |                                     |
| Amounts from sales, Rub.          |                                     |
| Total amounts from sales, Rub.    |                                     |

Table 2. Block of the model "Schedule of issuance and obligatory loan repayment ".

| Category                                                      | Month of the project implementation |
|---------------------------------------------------------------|-------------------------------------|
| The cost of AB creating                                       |                                     |
| The amount of funds, reserved by the bank for                 |                                     |
| a loan (at the beginning of the month)                        |                                     |
| The amount of interest for the bank’s                         |                                     |
| reservation of funds for a loan                              |                                     |
| Loans issued (cumulative)                                     |                                     |
| Credited to escrow accounts (cumulative)                      |                                     |
| Loan amount, covered by funds to escrow accounts              |                                     |
| Interest amount on the loan, covered by the                  |                                     |
| amounts to the escrow accounts                                |                                     |
| Loan amount, which is not covered by escrow                   |                                     |
| amounts                                                      |                                     |
| Interest amount on a loan, which is not covered by amounts    |                                     |
| on escrow accounts                                            |                                     |
| Total, the amount of interest on the loan                     |                                     |

Table 3. Block of the model "Calculation of the developer’s financial result and the net cash flow of the project for AB creation".

| Category                                                                 | Month of the project implementation |
|--------------------------------------------------------------------------|-------------------------------------|
| Proceeds from real estate transactions (including "developer services")   |                                     |
| Costs according to the consolidated estimate                              |                                     |
| (including “developer services”)                                          |                                     |
| Balance of flows from "developer services"                               |                                     |
| Loan receipt                                                              |                                     |
| Payment of interest on a loan                                             |                                     |
| Developer's profit (net of all costs, including interest on the loan)     |                                     |
| Payment of income tax for the developer                                   |                                     |
| Loan repayment to the bank                                                |                                     |
| The balance of flows for AB creation                                      |                                     |
| Cash flow for the project                                                 |                                     |

We should note. Receipts from real estate transactions are accepted according to the block “Schedule of receipts from the apartments’ sale in the newly created apartment building”. The costs for the consolidated estimate are taken according to the data of the block ", consolidated estimate of
the construction cost " and "the calendar schedule of work on AB creation and the corresponding resources supply." Receipt of a loan and payment of interest on a loan are accepted according to the data of the "Schedule of issuance and compulsory loan repayment " block. The income tax of a developer depends on the taxation system he uses.

3. Results
Further calculations were carried out for the project of creating AB reinforced concrete frame with brick filling, which has 25 floors with a selling area of 11 933 sq.m apartments. We consider two options for lending conditions put forward by banks:

a) investment by the developer of 10% or more of his own funds in the project of creating an apartment building (from the cost of creating this apartment building) before obtaining a loan;

b) investment by the developer of less than 10% of his own funds in the project of creating an apartment building (from the cost of creating this apartment building) before obtaining a loan.

The second option has a left border of 0%. This is a hypothetical value, in any case, developers invest some amounts, albeit much less than 10%. However, it is important for us to consider this extreme option in order to understand what a decrease in banks' requirements for the share of their own funds can lead to.

Table 4. Blocks "Consolidated estimated construction cost" and "Schedule of work on AB creation and the supply of relevant resources" (rubles).

| Name of works                                      | spending   | Month of the project implementation |
|---------------------------------------------------|------------|-------------------------------------|
| Land acquisition                                  | 24 000 000 | 81 000 81 000 ... 81 000            |
| Construction site security                        | 1 620 000  | 81 000 81 000 ... 81 000            |
| Design and survey work (ours and hired), expertise, engineering and geological surveys | 6 000 000  | ...                                 |
| Technological connection to resource supplying    | 20 102 401 | 4 020 480 ... 4 020 480            |
| Other                                             | 1 023 516  | 51 176 51 176 ... 51 176           |
| Electricity supply and lighting                   | 27 605 608 | ... 3 450 701                      |
| Elevator dispatching                              | 109 575    | ... 109 575                         |
| Commissioning works on signaling and electric     | 300 000    | ... 300 000                         |
| Installation of elevators                         | 8 972 959  | ... 2 990 986                       |
| Elevator commissioning                             | 476 837    | ... 158 946                         |
| Relocation of a cargo-passerenger lift, installation, | 338 983    | ... 169 492                         |
| ...                                               | ...        | ...                                 |
| Electricity                                       | 600 000    | 30 000 30 000 ... 30 000            |
| Insurance:                                        | 5 000 000  | 250 000 250 000 ... 250 000         |
| Total with VAT:                                   | 486 103 050| ...                                 |
| Incl. VAT 18%:                                    | 87 738 549 | ...                                 |
| Other costs (including under Article 18 214-FZ)   | 43 627 381 | 181 369 2 181 369 ... 2 181 369     |
| Costs by month                                    | 486 103 050| 8 900 954 24 035 470 ... 30 671 536 |
| Own investments to start project financing by the | 48 743 638 | ...                                 |
The consolidated estimate of construction cost is made on the basis of design calculations for the resources need and their market value. The schedule for the works implementation on AB creation and the supply of appropriate resources is based on the technological sequence of work and the number of teams. The schedule of receipts from the sale of apartments in the newly created apartment building was formed on the basis of the market prices forecast and the dynamics of apartments’ sales in the context of their types. The schedule for issuing and repaying a compulsory loan is calculated, taking into account the rules of banks, when the interest on a loan depends on the ratio of money in escrow accounts to the loan issued amount. In this case, the loan amount is determined by the work performed volume, i.e. the work schedule, described above. The financial result calculation of the developer was carried out subject to the tax payment by him under the simplified taxation system. The results are presented below.

Table 5. General financial and economic characteristics of AB project to create.

| Category                                      | The value for the option "with 10%", Rub. | The value for the option "no 10%", Rub. |
|-----------------------------------------------|------------------------------------------|----------------------------------------|
| Proceeds from the sale of real estate, including: | 623 248 301                              | 623 248 301                            |
| Developer services                            | 5 270 695                                | 5 270 695                              |
| Costs according to the consolidated estimate, including: | 486 103 050                              | 486 103 050                            |
| developer services                            | 5 217 988                                | 5 217 988                              |
| Credit amount                                 | 437 359 412                              | 455 953 050                            |
| Payment of interest on a loan                 | 17 581 093                               | 20 769 512                             |

Table 6. Effectiveness indicators of the project to create AB.

| Category                                      | Value for variant "with 10%" | Value for variant "without 10%" |
|-----------------------------------------------|-------------------------------|---------------------------------|
| ICC receipts                                  | 623 248 301                  | 623 248 301                     |
| Costs (for credit)                            | 503 684 144                  | 506 872 563                     |
| Investing money by the developer              | 48 743 638                   | 30 150 000                      |
| Net profit for the project                    | 113 019 629                  | 110 022 514                     |
| NPV                                           | 79 732 075                   | 80 895 202                      |
| PI                                            | 2.65                         | 3.68                            |
| IRR                                           | 102.24%                      | 140.63%                         |
| IS\(^{a}\)                                    | 7.435                        | 12.196                          |
| Project implementation period                 | 22                           | 22                              |

\(^{a}\)IS is described in [14].

4. Discussion
Let us describe the obtained results. In both cases, AB project has high performance indicators. Our goal was not to accurately predict market prices for real estate, so the calculated performance indicators had an optimistic bias. The purpose of this work is to compare the two financing options, and this is exactly what can be done on the basis of the tables described above.

In both cases, the market “does not see” the nuances of the relationship between the developer and the bank: the amount of proceeds remains unchanged (623,248,301 rubles). The costs of the consolidated estimate also remain unchanged - the project technology and market prices for resources do not depend on the agreements between the developer and the bank, which means that the numbers, used for the calculation, do not change either. But the performance indicators are changing. This is explained as follows.

It follows from the tables that the bank’s refusal to require the developer to invest 10% of its own funds (the “no 10%” option) entails an increase in the total costs of the developer to pay interest on the loan. This is because the loan amount increases. If lending to a project, when the developer does not invest his own funds, is considered, then the loan amount increases by these 10% of the cost of creating an apartment building. An increase in the loan amount leads to an increase in interest on it. However, despite the increase in total costs, the developer's investment efficiency increases, since the amount of his investments decreases much faster than profits (see table 6).
5. Conclusion

The refusal to require a developer to invest 10% of their own funds leads to an increase in the efficiency of the project to create an apartment building. This means that the bank's softening of the requirement for the amount of developers' investments leads to an increase in the efficiency of their investments, i.e. more active developers. Therefore, there is a potential for growth in banks' incomes both by increasing the average loan amount and by increasing the number of loans. Perhaps banks should accept this particular version of credit conditions as the main one.

We believe that the minimum requirement should be a permit for the apartment building construction and design estimates. Under escrow financing, a developer has virtually no opportunity for opportunistic behavior. In fact, banks control all of its activities. The fact is that the bank issues a loan not by transferring funds to the developer's accounts, but by paying money to its counterparties. Control is maximum, since the developer must conduct all settlements with contractors through a special account opened with this bank. The bank has its own experts with specialized education who control the volume and quality of the work performed, the bank has to pay for, i.e. loan issuance.

This is an interesting analysis of the changing possibility and other lending conditions. Banks have set similar rules for project compliance with the Loan Life Coverage Ratio (LLCR) requirement. In a simplified form, its formula looks like this:

$$\text{LLCR} = \frac{R}{C+P} \geq 1.25$$

Where

$R$ – receipts under contracts for participation in shared housing construction (rubles);

$C$ – amount of the loan issued by the bank to the developer (rubles);

$P$ – bank interest accrued on the loan to the developer (rubles).

LLCR for the option "with 10%" is 1.31, and for the option "without 10%" 1.31. In both cases, the value of this coefficient exceeds threshold, but we see that it decreases together with a decrease in the share of the developer's own funds. This means that the requirement for the investments amount of the developer's own funds may be indirectly due to LLCR.

It should be noted that the practice of creating apartment buildings by developers completely at their own expense, with the sale of apartments after the house is put into operation and is possible, but extremely rare. This means that without the consent of the banks to act as an escrow agent, the lion's share of AB will simply not be built. LLCR value depends on the level of market prices for real estate and the bank interest on the loan. The market prices for real estate depend on its location. From this point of view, many cities in Russia are monocentric. This means that real estate prices are maximum in one area (center), and they decrease as they move away. There are cities with several price centers, but for us it is not the number of price centers that is important, but the fact that the prices of other real estate decrease with in a distance.

All these circumstances lead to the fact that the requirements of banks form financial and legal commodity boundaries. In other words, the level of prices for real estate may be only in some areas of the city sufficient to meet the requirement of banks. In other districts of the city, AB creation will be impossible because banks simply will not agree to participate in such projects. This is a manifestation of financial and legal commodity boundaries. This study is ongoing and will be published as it is developed.

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