Development of civil engineering financing forms and their influence on the development’s economy

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Abstract. The purpose of this work is to study the influence of financing housing construction methods on the financial and economic characteristics of projects for apartment buildings construction (AB) and on price level of the primary Residential Real Estate Market. The methodological foundations of the research work are the rules for financing housing construction and other standards in this area, tax standards, rules for developing construction schedules, methods for assessing the investments effectiveness. Theoretical foundations of work are the work of leading scientists in the field of real estate development, provisions on the rules of pricing in the primary Real Estate Market, provisions of the finance and entrepreneurship theories. Information bases of work are market information on the primary Real Estate Market state (Novosibirsk) and the estimated cost of apartment buildings. The evolution of financing housing construction methods in the Russian Federation is described. Two modern methods are considered: financing with the use of agreements for participation in shared construction and financing, using real estate purchase and sale agreements (PSA). On the example of an apartment building, created in the city of Novosibirsk, calculations were made of the project implementation results for the AB construction, using both funding methods: (PAShC and PSA). The contradictions of the indicators describing these results are shown and explained (using PSA, the profit is higher; however, the internal rate is higher, using PAShC). The assessment of the initiative implementation consequences to ban PAShC is given.

1. Introduction

The state of the primary and secondary housing markets is of very important economic and social significance with its significant affects on urban planning, individual firms behavior, and, as a result, the entire investment and construction complex [1, 2, 3, 4, 5, 6]. Much attention is paid to the management of housing development from the science and the State point of view [3, 4, 5, 6]. National project “Housing and Urban Environment” [7] has been approved, including the federal project “Housing” at the federal level In Russia [8]. The number of targets, including the volume of housing construction in the period of 2019 - 2024 is described in this document. In general, in 2024 it is planned to increase the volume of housing commissioning to 120 million square meters (per year) rather, then 79.2 million sq.m. in 2017 in Russia. It is planned to build mainly apartment buildings (AB). In other words, an increase of 6% is planned per year (in relation to the previous year) in the period up to 2024 in this economic activity area.

One of the key issues, related to the implementation of these projects, is financing (such problem was noted by many scientists [9, 10, 11, 12, 13]). The indicated volumes of construction are supposed to be financed mainly at the housing end-users’ expense, i.e. individuals. Funding rules are periodically
changed. It’s due to the fact that the transition from a socialist to a market economy began relatively not so long ago (about 30 years ago). Legislation in this area can not be other countries’ legislation copy, since it should reflect national specifics. This means that evolutionary changes in regulations are inevitable.

It is worth noting here that for several decades in our country, housing was provided to citizens for free, and the rent was subsidized. On April 17, 1986, the Central Committee of the Communist Party of the Soviet Union adopted a resolution "On the main directions for accelerating the solution of the housing problem in the country", according to which by 2000 all families were to be provided with separate housing. However, in the process of transformations of the Union of Soviet Socialist Republics, this document de facto ceased to be valid.

In 1991, the law of the Russian Soviet Federative Socialist Republic (RSFSR) "On investment activities in the RSFSR" (dated 26.06.1991 No. 1488-1) appeared, which created the legal basis for the formation of the primary Real Estate Market. We should note that these foundations were the most general and, in fact, only gave citizen the right to conclude an agreement with a developer for the purchase of housing under construction, but did not regulate anything. Prior to this law, citizens could join a housing cooperative, but could not enter into a contract directly with a developer. Around 1995, the primary real estate market began to form, and the provision of free housing began to be episodic from 2000. Since that time, housing has been purchased mainly at the expense of citizens' personal funds and the loans they received.

In 1999, a new Law "On investment activities in the Russian Federation, carried out in the form of capital investments" (adopted from February 25, 1999 N 39-FL). It was more detailed in comparison with the above-mentioned RSFSR Law (and did not cancel it). However, there was still no regulation of the relationship between a developer and a citizen in Russian Law, this led to frequent abuse by developers. Here are the most common ones:

- presentation of requirements to citizens for additional payment in excess of the contractual price;
- a long-term postponement of AB commissioning or even construction freezing;
- change unilaterally important for the consumer characteristics of AB (lowering the height of the premises, excluding the second bathroom, etc.).

In order to eliminate these problems, the federal Law "On Participation in Shared Construction of Apartment Buildings and Other Real Estate Objects and on Amendments to Certain Legislative Acts of the Russian Federation", dated 30.12.2004 N 214-FL (hereinafter 214-FL) was adopted. It significantly changed the situation, but did not completely eliminate the freezing of construction projects and the appearance for this reason of the so-called “Defrauded equity holders”. One of this blocks’ law is the rules, governing the procedure for attracting funds from citizens - future end users of housing. Recently, the rules for financing AB construction have changed in Russia. In accordance with these changes, from July 01, 2019, there were only two ways for the developer to take individuals’ money:

1) to sign contracts for participation in shared construction (PASHC) prior to the AB commissioning with the obligatory use of escrow accounts and the bank participation (escrow agent);
2) to sign contracts for the purchase and sale of apartments after the AB commissioning.

There is a business and government bodies’ discussion whether there is any sense in this method of financing, we will call it “project escrow financing” (PEF). The developers’ representatives insist on PEF ban and return to the previous rules for PASHC signing. This is due to the fact that the cost of an apartment building creating is increased by the amount of interest paid to banks. Some representatives of the authorities believe that PASHC should be completely canceled, since buying already built housing can the problem of frozen construction and defrauded real estate investors be solved.

However, both the first and the second points do not substantiate their proposals with calculations of how this or that financing method will affect the financial condition of developers and prices in the primary Real Estate Market. The author of this work substantiated that PEF did not create problems for developers, on the contrary, generated certain benefits for them [14]. The substantiation of the inexpediency of PASHC prohibiting is carried out in this work.
2. Materials and Methods
According to the new rules, the PAShC conclusion is possible only if the bank participates in a project to create AB. Bank interacts with all the main subjects of a project: developer, participants in shared construction (hereinafter - equity holders), contractors. The bank issues a loan to the developer in the amount of an apartment building creating cost. However, this loan is not issued directly, but by transferring to the accounts of contractors in accordance with the signed acts of work performed. The developer can receive only small amounts on his account within the framework of this loan under the cost item “developer services”.

A bank opens escrow accounts for shareholders (with money deposited according to PAShC). Money of shareholders is kept in escrow accounts until the obtaining permission to operate the apartment building. After that, the bank transfers money from the escrow accounts to the developer, while keeping the loan amount and interest on it. If the AB is not created, the bank will return the money to the shareholders and get the unfinished construction object.

Banks usually offer a variable rate of interest on the loan. It depends on the ratio of the issued loan amount and the amounts on escrow accounts - the larger they are, the lower the rate. With regard to a loan which is not covered by funds in escrow accounts, so-called the base rate is implemented, and, so-called special rate is implemented for a loan, covered by funds on escrow accounts.

We will build a financial model for an apartment building creating in one of the Novosibirsk districts. This AB is a free-standing, single-entrance 25-storey residential building with a monolithic reinforced concrete frame and brick exterior walls with a curtain facade. Initial data for calculations are shown in Table 1.

![Table 1. Initial data on the project for AB construction.](image)

In order to calculate loan payments, we will assume the base rate on the loan is 10% per annum, the deposit rate is 4.25% per annum:

The calculation of the interest rate on a loan (IR) we will do to the formulas of JSC "Bank DOM.RF", using the data in Table 2. In a situation when the amount on escrow accounts (E) is not more than the amount of the loan (L):

\[ IR = \frac{(FA \times SR + (C – FA) \times BR)}{C} \]  
(1)

where FA is the funds amount on all escrow accounts, opened for shareholders of this apartment building;

C is the balance of the loan debt under the credit line;

BR is the base rate on the credit line (the rate, applied to the part of the loan debt in excess of the funds amount on escrow accounts);

SR is the special interest rate on the Credit Line (the rate, applied to the part of the outstanding loan within the funds amount, deposited in escrow accounts).

Other words, when the amount on the escrow accounts is greater than the loan amount, the loan rate is equal to the maximum value of two:

\[ IR = \frac{(C \times SR – (FA – C) \times DR)}{C}; \]
\[
IR = 0.01\% \quad (2)
\]

where DR is the deposit rate.

The numbers, used in the calculation of operating results in the case of PASHC funding are described in table 2. In the case of PSA using, the numbers, indicated in lines 1-3 of this table remain unchanged, while others are differ. It is accepted for sure, that apartments’ sale starts from the 8th quarter and ends in the 9th one. At the same time, 70% of real estate (8750 sq.m.) is being sold in the 8th quarter, and 30% (3750 sq.m.) in the 9th quarter. Accordingly, the proceeds under the contracts, concluded in the 8th quarter will amount to RUB 444,169, in the 9th quarter will be RUB 190,358, totally it is RUB 634,527.

3. Results

Cash flows for PASHC financing method and PSA financing method respectively are described in the tables 3, 4. General financial and economic characteristics of the project for AB construction with financing, using PASHC and PSA are described in the table 5. Let us compare the obtained results. We should note that the comparison of two alternative financing methods was carried out for the same market conditions - real estate prices at the time of commissioning were 50.762 thousand rubles. / sq.m. (line 1).

The costs of the developer, using the DLC are more than when using the DCT by 20,065 thousand rubles. (lines 3, 4). The proceeds from the concluded PSA are greater than those from PASHC (line 5), since PASHC at the early stages of construction are concluded at prices lower than those that are formed at the time of AB commissioning (see table 2, line 4). Such dynamics of prices for an apartment building under construction is the primary real estate market law. Using PEF, the developer's investments are differing sharply from those of PSA (page 6). This is due to the fact that the developer needs to invest 15% of the estimated cost of an apartment building, using PEF and in the second case, it is necessary to fully finance the apartment building construction. Net profit (line 7) turns out to be significantly higher, using PSA, but profitability (line 8) is much higher, using PASHC.

In order to compare the results of the AB project implementation under different funding conditions, along with the known IRR, an indicator developed by the author of this work (IS) will be used. This indicator is described in detail in [15].
Table 2. Operational activity dynamics of the project for AB construction using PASHC

| Category                                                                 | Quarter | 0  | 1  | 2  | 3  | 4  | 5  | 6  | 7  |
|-------------------------------------------------------------------------|---------|----|----|----|----|----|----|----|----|
| 1. Payment schedule for the cost of land plot and design and survey work|         |    |    |    |    |    |    |    |    |
|                                                                         |         | 100%|    |    |    |    |    |    |    |
| 2. Schedule for payment of other SSR costs                              |         | 14.3%| 14.3%| 14.3%| 14.3%| 14.3%| 14.3%| 14.3%| 14.3%|
| 3. Schedule of space realization                                        |         | 25% | 25% | 25% | 25% |    |    |    |    |
| 4. Index of the realizable areas price (ICt)                            |         | 85% | 90% |    |    |    |    |    |
| 5. The average price of the areas sold, thousand rubles per sq.m.       |         | 43.15 | 45.69 | 48.22 | 50.76 |    |    |    |
| 6. The volume of realizable areas, sq. m.                               |         | 3 125 | 3 125 | 3 125 | 3 125 | 3 125 | 3 125 | 3 125 | 3 125 |
| 7. Proceeds from the sale of areas, thousand rubles per sq.m.            |         | 134 837 | 142 769 | 150 700 | 158 632 |    |    |    |
| 8. Financing the cost of creating an apartment building, thousand rubles.|         | 30 000 | 70 000 | 70 000 | 70 000 | 70 000 | 70 000 | 70 000 | 70 000 |

Note. Line 2 shows the share of costs from the consolidated estimate, excluding the land plot value (line 3 of Table 1), financed in the corresponding quarter. Line 3 reflects the share of real estate (total volume, specified in line 1 of Table 1), sold in the corresponding quarter (the condition is laid down, when the developer offers a market price in each quarter, i.e. the sales volumes in each period must be equal). Line 4 shows the price indices of real estate for sale in the respective quarters in relation to the price at the time of AB commissioning. Line 5 shows the prices in the respective quarters; the price in the 7th quarter was obtained by enumerating its possible values, performed in spreadsheets; prices for individual quarters were obtained by multiplying this price, indicated (line 4). Line 6 is calculated as the product of the number from line 1 of the table 1 by the numbers in line 3. Line 7 is defined as the product of line 5 and line 6. Line 8 is calculated by multiplying the numbers in line 2 and line 3 of the table 1 by the corresponding numbers in line 1 and line 2 of this table.
Table 3. Calculation of the developer's net cash flow, using PAShC.

| Category                                                                 | Quarter 0 | Quarter 1 | Quarter 2 | Quarter 3 | Quarter 4 | Quarter 5 | Quarter 6 | Quarter 7 | Quarter 8 |
|--------------------------------------------------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| 1. Schedule of financing the cost of an apartment building creating      | 30 000    | 70 000    | 70 000    | 70 000    | 70 000    | 70 000    | 70 000    | 70 000    | 30 000    |
| 2. Contribution of the developer                                         | 30 000    | 48 000    |           |           |           |           |           |           | 30 000    |
| 3. Loan issued in the current period                                     | 22 000    | 70 000    | 70 000    | 70 000    | 70 000    | 70 000    | 70 000    | 70 000    | 70 000    |
| 4. Credit, total                                                         | 22 000    | 92 000    | 162 000   | 232 000   | 302 000   | 372 000   | 442 000   |           |           |
| 5. Amounts on escrow accounts, total                                     |           |           |           |           |           |           |           |           | 134 837   |
| 6. Credit rate (including funds on escrow accounts)                      | 10,0%     | 10,0%     | 10,0%     | 6,5%      | 4,5%      | 3,4%      | 2,6%      |           |           |
| 7. Interest on the loan, total                                           | 550       | 2 300     | 4 050     | 3 777     | 3 386     | 3 122     | 2 880     |           |           |
| 8. Payments, total                                                       | 30 000    | 48 000    | 0         | 0         | 0         | 0         | 0         | 0         | 477 689   |
| 9. Financing of AB construction                                          | 30 000    | 48 000    | 0         | 0         | 0         | 0         | 0         | 0         |           |
| 10. Repayment of the loan                                               |           |           |           |           |           |           |           |           | 442 000   |
| 11. Return of interest on a loan                                         |           |           |           |           |           |           |           |           | 20 065    |
| 12. Taxes                                                                |           |           |           |           |           |           |           |           | 15 624    |
| 13. Income, total, including:                                            | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 586 938   |
| disclosure of escrow accounts                                           |           |           |           |           |           |           |           |           |           |
| 14. Total, NCF developer                                                 | -30 000   | -48 000   | 0         | 0         | 0         | 0         | 0         | 0         | 109 248   |

Table 4. Calculation of the developer's net cash flow using PSA.

| Category                                                                 | Quarter 0 | Quarter 1 | Quarter 2 | Quarter 3 | ... | Quarter 6 | Quarter 7 | Quarter 8 | Quarter 9 |
|--------------------------------------------------------------------------|-----------|-----------|-----------|-----------|-----|-----------|-----------|-----------|-----------|
| 1. Schedule of financing the cost of an apartment building creating      | 30 000    | 70 000    | 70 000    | 70 000    | ... | 70 000    | 70 000    |           |           |
| 2. Contribution of the developer                                         | 30 000    | 70 000    | 70 000    | 70 000    | ... | 70 000    | 70 000    |           |           |
| 3. Loan issued in the current period                                     | 30 000    | 70 000    | 70 000    | 70 000    | ... | 70 000    | 70 000    |           |           |
| 4. Credit, total                                                         |           |           |           |           |     |           |           |           |           |
| 5. Amounts on escrow accounts, total                                     |           |           |           |           |     |           |           |           |           |
| 6. Credit rate (including funds on escrow accounts)                      |           |           |           |           |     |           |           |           |           |
| 7. Interest on the loan, total                                           |           |           |           |           |     |           |           |           |           |
|   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|
| 8. Payments, total | 30 000 | 70 000 | 70 000 | 70 000 | ... | 70 000 | 70 000 | 16 034 | 6 872 |
| 9. Financing of AB construction | 30 000 | 70 000 | 70 000 | 70 000 | ... | 70 000 | 70 000 |   |   |
| 10. Repayment of the loan |   |   |   |   |   |   |   |   |   |
| 11. Return of interest on a loan |   |   |   |   |   |   |   |   |   |
| 12. Taxes |   |   |   |   |   |   |   | 16 034 | 6 872 |
| 13. Income, total |   |   |   |   |   |   |   | 444 169 | 190 358 |
|   | disclosure of escrow accounts |   |   |   |   |   |   |   |   |
| 14. Total, NCF developer | -30 000 | -70 000 | -70 000 | -70 000 |   | -70 000 | -70 000 | 428 135 | 183 487 |
Table 5. Financial and economic characteristics of the AB project construction with various methods of financing

| Category                                                                 | Method of financing | PAShC  | PSA   |
|--------------------------------------------------------------------------|---------------------|--------|-------|
| 1. Price of real estate th.r./sq.m.                                      | PAShC               | 50.76  | 50.76 |
| 2. SSR Costs, th.r.                                                     | PAShC               | 520 000| 520 000|
| 3. Costs as an interest on the loan, th.r.                              | PAShC               | 20 065 | 0     |
| 4. In total, the cost of an apartment building construction, th.r.       | PAShC               | 540 065| 520 000|
| 5. Incomes under concluded contracts, th.r.                             | PAShC               | 586 938| 634 257|
| 6. Investments of the developer, th.r.                                  | PAShC               | 78 000 | 520 000|
| 7. Net profit, th.r.                                                    | PAShC               | 31 248 | 95 439|
| 8. IRR (% per a year)                                                   | PAShC               | 20%    | 15%   |
| 9. IS, r./r. per a year                                                  | PAShC               | 10.03  | 0.124 |

4. Conclusions
The obtained results are very interesting in the way they illustrate the discrepancy between the estimates of a product profitability (in our case, this is AB) and the profitability of a product’s project creation. These results also refute the argumentation of those who initiate PAShC prohibition the level of law (this was noted at the beginning of this work).

Indeed, PSA use allows you to get a much higher profitability of the product (18.4%) than using PAShC one (5.8%). Let us show this using the numbers from the table 5. PSA return will be 95,349 / 520,000 = 18.4%; PAShC profitability will be 31,248 / 540,065 = 5.8%. However, the return on investment in a project is much higher with the use of PAShC than with PSA: IRR is 20% and 15%, respectively. This is due to the fact, the developer's investment increases sharply with PSA using, (line 6).

We should note that in the case of PAShC prohibition, developers have a need to either increase prices or reduce costs by reducing the quality of real estate in an apartment building. However, the latter can be done without prejudice to the architectural façade only in relation to real estate in those areas where the price level is high. In other areas, AB is designed as close as possible to the border of technical requirements, with a slight deviation to ensure a pleasant facade and equip the adjacent territory with modern sports and playgrounds.

In order to understand the real estate price increase limit in the newly ABs should, in case of PAShC refusal, we will perform a reverse calculation. Its essence is to change the price until the IRR under PSA equals 20% per annum. After performing this search, we find that the price should increase to 53.823 th.r./sq.m. This amount (given the above dynamics of project financing and proceeds from sales), ensures the equality of IRR with a monetary policy of 20%. Thus, PAShC banning is not advisable.

The introduction of PEF will not cause urban planning problems either. In work [2] it is shown that, for example, in Novosibirsk, banks will refuse to finance the creation of apartment buildings in only one region.

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