DETERMINANTS OF HOUSING CONSTRUCTION IN UKRAINE

Olena Bochko
Department of Marketing and Logistics
Lviv Polytechnic National University, Ukraine
e-mail: bochkoolena@ukr.net
ORCID ID: 0000-0003-3422-4654

Nataliia Kosar
Department of Marketing and Logistics
Lviv Polytechnic National University, Ukraine
e-mail: nataliia.s.kosar@lpnu.ua
ORCID ID: 0000-0003-0180-2630

Nataliia Kuzo
Department of Marketing and Logistics
Lviv Polytechnic National University, Ukraine
e-mail: natalia.y.kyzjo@lpnu.ua
ORCID ID: 0000-0003-0640-3276

Iryna Bilyk
Department of Marketing and Logistics
Lviv Polytechnic National University, Ukraine
e-mail: iryna.i.bilyk@lpnu.ua
ORCID ID: 0000-0002-2513-078X

Olena Zarichna
Department of Business-administration,
Marketing and Management
Uzhhorod National University, Ukraine
e-mail: zarichna32@gmail.com
ORCID ID: 0000-0002-2947-8732

Abstract

The work presents an analysis of the housing construction market in Ukraine. An economic and mathematic model was built to determine that the growth of the volume of housing construction in Ukraine had a positive impact on its GDP, due of a close relation between the two values. It is important to identify factors influencing the volume of housing construction. The obtained results prove that the greatest impact is made by consumer income, deposit rates in foreign currency, and the amount of consumer loans for buying, building and reconstruction of real estate assets; the numbers of marriages, investments in housing construction and interest rates for mortgage credits in UAH also have a significant impact. The elasticity coefficients reveal a positive impact of such factors as an increase of consumer income, growth of investments in housing construction, reduction of interest rates for mortgage credits and deposit rates in foreign currency, reduction of the amount of consumer loans for buying, building and reconstruction of real estate assets, and reduction of the number of marriages. Further development of the housing construction market requires appropriate conditions for the development of the banking sector in Ukraine and the growth of investments in the studied industry.

1. Introduction

Development of the housing construction market in Ukraine positively influences the social and economic development of the country; above all, it creates demand for construction products and equipment, increases the employment of the country's population and supplies tax revenues to the state budget. A negative impact on the market is caused by deficient legislation, low purchasing capacity of citizens and low investment potential of legal entities. In spite of the problems, the government stimulates the development of housing construction in Ukraine, with more and more physical and legal entities actively participating. A rise of demand in the studied market is fueled by the restart of mortgage crediting by commercial banks of Ukraine. There are, however, some factors which have a negative influence on its development.

Companies, operating on the housing construction market in Ukraine should make forecasts about the prospects of their development as well as analyzing their opportunities and threats regarding future performance. Therefore, they should first identify the factors influencing demand and supply on the market. Forecasting the changes of those factors, the building companies also make suggestions about the conjuncture of the housing construction market in Ukraine. The above-mentioned aspects determine relevance and necessity of the present research, which aims to identify and systemize the main determinants influencing housing construction in Ukraine.

The findings of the authors' research are supplemented with studies of domestic and foreign scientists concerning theoretical and methodological aspects of identifying the determinants of the housing construction market development. The present research covers three directions: first, studying the impact of the volume of housing construction in Ukraine on its GDP; second, an analysis of determinants of the real estate market development; third, identification of such directions of impact and determinants which, to some extent, influence real estate market development in Ukraine and directions of such impact.

The article has four chapters. The first one presents the findings of the research on the dynamics of the housing construction market of Ukraine and determines the impact of its volume on the economy of Ukraine. The second chapter supplies analysis of the main determinants influencing housing construction in Ukraine. The third chapter studies the impact of the main factors on the volume of housing construction in Ukraine. Determinants which to some extent determine the real estate market development are indicated in the fourth chapter.

2. Literature review

The housing construction market is notably integrated in all fields of economic and social life of society and takes an important position in the modern economy. The growth in demand for real estate assets in particular contributes to positive changes because of the increase of tax payments from purchase and sales acts. A cut in housing prices creates negative capital traps (situations when a house costs less than the paid mortgage). This leads to decreasing prices and thwarts any possibility to pull capital. Therefore, a house price crash negatively influences the construction of new buildings, as confirmed by Pettinger (2021). The authors of the present research consider this statement to be rather disputable because lower housing prices contribute to its availability for the population and stimulate demand.

Considering the multiplicative effect of housing construction, its significant impact on other spheres of economic activities and living conditions of populations, one can expect intensification of those dependencies in the future. Scientists made numerous attempts to study conditions of the housing construction market and to define the directions for solving its main problems. However, they faced some difficulties because the construction branch is rather localized and characterized by different regional features, which are influenced by the social and economic conditions of each area.

The scientific literature contains many works which study the housing construction market in different countries and compare them in order to define common problems and find ways to solve them. More specifically, Polish scientists made a comparative analysis of the housing construction markets in Poland and Bulgaria (Rącka et al., 2015), as well as identifying factors making positive and negative impacts on housing construction in the studied countries. Investigation of the housing construction market in China was conducted by Jian et al. (2007), who named reasons behind the constant rise of prices of real estate assets and made proposals to improve housing availability for citizens, as well as for the application of land value added taxes. The research was later continued and

extended by Just and Levinger (2021).These researchers determined that the growth in demand on the housing construction market is fueled by an increase of consumer income, the number of urban residents and better access of potential investors to capital. Wang et al. (2020) analyzed regional and branch factors influencing the development of the construction industry in China. Studying the housing construction market in China, Zhai et al. (2014) identified 6 factors, influencing its development, namely "constructability implementation", "social climate and attitudes", "architectural performance", "costs", "supply chain" and "preparatory stage". Analysis of the housing construction market is a complex process because it should be studied as an integral system with consideration of the multi-aspect determinants of the studied market development. Studying the investment processes on the housing construction market in Poland, Sobieraj and Metelski (2020) named four main factors which made a particular impact on the process of its management, i.e. the activity of companies in the market environment (1), pro-social policy of the state (2), highly advanced technologies, and (3) the use of appropriate market relations (4).

Scientists made attempts to study indirect factors influencing housing construction, particularly the level to which energy intensity impacts the market price of residential buildings (Foryś et al., 2020), how a woman's opinion influences the final decision whether or not to make a purchase on the real estate market (Źróbek et al., 2020); how the globalization processes and free trade agreement influence the housing construction market (Cariaga & El-Diraby, 2013). Political uncertainty has a particularly strong impact on the housing market. To reduce the level of political uncertainty among the Ukrainian society, it is necessary to identify the hidden sources that generate it (Vinnichuk, 2016).

Pricing policy is another determinant on the housing construction market which influences the degree of crediting and economic transformations in the country (Catteet al., 2004). However, pricing factors, namely the correlation of price and rent, and the correlation of price and income, do not always clearly reveal the housing price conditions (Himmelberg et al., 2005).

A significant impact on housing construction is made by the quality of performed works and supplied services, degree of their work productivity, labor and contract relations, as well as the staff's skills. These main constituents of the housing construction market in England, Scotland, Denmark and Germany were studied by Clarke and Herrmann (2004).

The levels of supply on the housing construction market in Ukraine in 2000-2015, tendencies of its development and influencing factors were studied by Seliuchenko and Kosar (2016). However, the researchers based their studies only on applying trend models. Moreover, the development of factors of the marketing environment under the current conditions should be also considered while determining the factors influencing development of housing construction in Ukraine. It is also necessary to mark the directions of the research (Ye & Iu, 2003) of the housing construction market, which was conducted online (using 3D technologies) and was initiated in the 2000s. The scientists stress the importance of the traffic infrastructure (availability of roads in regions, as well as airports, taxi routes, buses) to housing construction (Bujanda & Fullerton, 2017), because they raise the prices of real estate assets, creating competition for private builders and owners of adjacent industries (Szopińska et al., 2020). The location of an object is another aspect determining its investment attractiveness (Maletska et al., 2020; Ofori, 2019; Chan, 2019).

The quality of products and supplied services is of great importance for the development of the housing construction market. Therefore, the introduction of the ISO 9000 system of quality by the Department for housing construction has led to many countries already implementing its principles in their practical activities. In particular, most building organizations of Hong Kong introduced the system of quality in their processes in 2000 (Tam et al., 2000). However, the expected permanent improvement of the quality of construction did not happen very quickly. It is important to implement the corresponding standards at enterprises and maintain their corporative culture (Tutesigensi et al., 2021).

Adams and Füss (2010) studied the long-lasting impact and short-term dynamics of macro-economic variables on international housing prices and determined that housing prices would increase in the long-term prospect by 0.6%. A rise in housing prices may also negatively influence the development of housing construction.

It is therefore necessary to study the determinants of housing construction market development in each country. In the present research, the authors studied it on the example of Ukraine.

3. Methodology

To make quantitative estimation of the impact of different factors on the development of the housing construction market in Ukraine, it is justified to use the correlation matrix R_y

$$R_y = \begin{pmatrix} r_{x_1x_1} & r_{x_1x_2} & \cdots & r_{x_1x_m} & r_{x_1y} \\ r_{x_2x_1} & r_{x_2x_2} & \cdots & r_{x_1x_1} & r_{x_2y} \\ \cdots & \cdots & \cdots & \cdots & \cdots \\ r_{x_mx_1} & r_{x_mx_2} & \cdots & r_{x_mx_m} & r_{x_my} \\ r_{yx_1} & r_{yx_2} & \cdots & r_{yx_m} & r_{yy} \end{pmatrix} \tag{1}$$

and a one-factor econometric linear model, which is applied to estimate the impact of each factor on an economic process or phenomenon, and generally takes the form of (Nakonechnyi et al., 2004)

$$y = a_0 + a_1 x + u. \tag{2}$$

To determine the parameters a_0, a_1, the method of least squares is used (Nakonechnyi et al., 2004)

$$\vec{A} = \left(X^T X\right)^{-1} \left(X^T \vec{Y}\right), \tag{3}$$

where:

$\vec{Y}$ - index of the data vector,

X - matrix of the factor data,

$\vec{A}$ - vector of the model parameters.

To check the adequacy of the developed model, the determination coefficient (R^2) and F-test (F) can be used

$$R^2 = \frac{\sum (\hat{y}_i - \overline{y})^2}{\sum (y_i - \overline{y})^2}, \tag{4}$$

where:

$\overline{y}$ - average value,

y_i - actual value,

$\hat{y}_i$ - theoretical value,

$$F = \frac{R^2/m}{(1 - R^2)/(n - m - 1)}. \tag{5}$$

An adequate linear econometric model can be used to analyze economic phenomena or processes and make forecasts.

4. Empirical results

4.1. Study of the dynamics of housing construction in Ukraine and estimation of the impact made by their volume on the economy of Ukraine

The analysis of the housing construction market in Ukraine confirms that, during 2010-2019, the country experienced a growth tendency of its capacity in cost indicators (Table 1). However, it is worth considering that, in 2014-2015, there was a great devaluation of Ukrainian currency that also influenced the growth of the volume of produced building products by 12.42%.

Housing construction development is also significantly influenced by the level of inflation, seeing as how it stimulates price rises. Differences in the dynamics of inflation and housing produced a problem for the monetary policy, as it was focused both on inflation and on housing-related employment. Inflation is persistent and should be combated daily (Leamer, 2007). Thus, the authors adjusted the indicators for the inflation index.

Development of the housing construction market positively influences the economy of Ukraine, particularly its GDP. To determine the figures of that impact, Table 1 has been compiled to show the dynamics of the housing construction volume, GDP and consumer price index.

Dynamics of the housing construction volume, GDP and consumer price index

Year	Volume of produced building products (housing construction), million UAH		GDP, billion UAH		Consumer price index (inflation index)
	Actual	Adjusted (y_1)	Actual	Adjusted (y_2)	
2010	6 876.5	6 285.6	1 079.35	986.6	109.4
2011	8 137.1	7 534.4	1 299.99	1 203.7	108
2012	8 523.0	8 472.2	1 404.67	1 396.3	100.6
2013	9 953.1	9 983.0	1 465.20	1 469.6	99.7
2014	11 292.4	10 073.5	1 586.92	1 415.6	112.1
2015	13 908.8	9 353.6	1 988.54	1 337.3	148.7
2016	18 012.8	15 814.6	2 385.37	2 094.3	113.9
2017	23 730.0	20 743.1	2 983.88	2 608.3	114.4
2018	29 344.8	26 460.6	3 560.30	3 210.4	110.9
2019	33 208.8	30 777.4	3 978.40	3 687.1	107.9
2020	29 083.6	28 319.0	4 194.10	4 083.8	102.7

Source: www.ukrstat.gov.ua accessed on 15.10.2021.

To estimate the impact of the volume of housing construction on the GDP basing on data adjusted for the inflation index, the authors of the research have developed the following model

$$y_2 = b_0 + b_1 y_1 + v. \tag{6}$$

The calculation results are

$$\hat{y}_2 = 280.3 + 0.1174 y_1. \tag{7}$$

Considering the calculated statistical indices (r=0.986, R²=0.971, F=309.02), one can conclude about a close direct dependency between the volume of housing construction and the GDP, a model adequate to the general population data. The calculated elasticity coefficient accounted for 0.814; particularly, a growth of the volume of housing construction by 1% results in 0.814% growth of GDP under constant other conditions.

4.2. Study of the determinants influencing housing construction in Ukraine

Investments in the housing construction of Ukraine are often considered as a means of protecting and increasing personal income. Therefore, a situation when commercial banks of Ukraine started reducing their deposit rates, particularly those in foreign currency, should contribute to such growth, because people more actively invest in real estate assets, anticipating additional income from renting them out (Fig. 1).

However, in spite of a significant reduction of deposit rates in 2020 (e.g. in foreign currency, they were reduced by 38.46% in 2020 as compared to 2019), another factor which was expected to contribute to the Ukraine's housing construction development, i.e. interest rates for mortgage credits in UAH (their volume was influenced by deposit rates), was insufficiently reduced in 2020 by 0.61% as compared to 2019, making the mortgages prohibitive to the majority of the Ukrainian population. In 2020, the volume of consumer loans for buying, building and reconstruction of real estate assets was reduced by 11.31% as compared to 2019.

Uncertainty about the future because of the Covid-19 pandemic resulted in a situation where, in spite of a 6.1% increase of the population's income in 2020 as compared to 2019, the total investments in housing construction were reduced by 39.86%. The growth of the Ukrainian population's income in 2020 as compared to 2019 was primarily forced by an increase of the level of the average salary rising from 10 497 UAH to 11 591 UAH, i.e. by 10.42%. Generally, the constant growth of the Ukrainian population's income that was noted in 2005-2020 (with the exception of 2014) was a factor having a positive impact on housing construction development in Ukraine.

In Ukraine, the demand for housing construction is influenced by the increase in the number of

marriages and new families. In 2020, there were 119.8 thousand marriages, whereas in 2019 – 138 thousand, i.e. the number fell by 29.38%. The figure correlates with the number of divorces. Table 2 presents the dynamics of the main factors influencing the volume of housn construction in Ukraine.
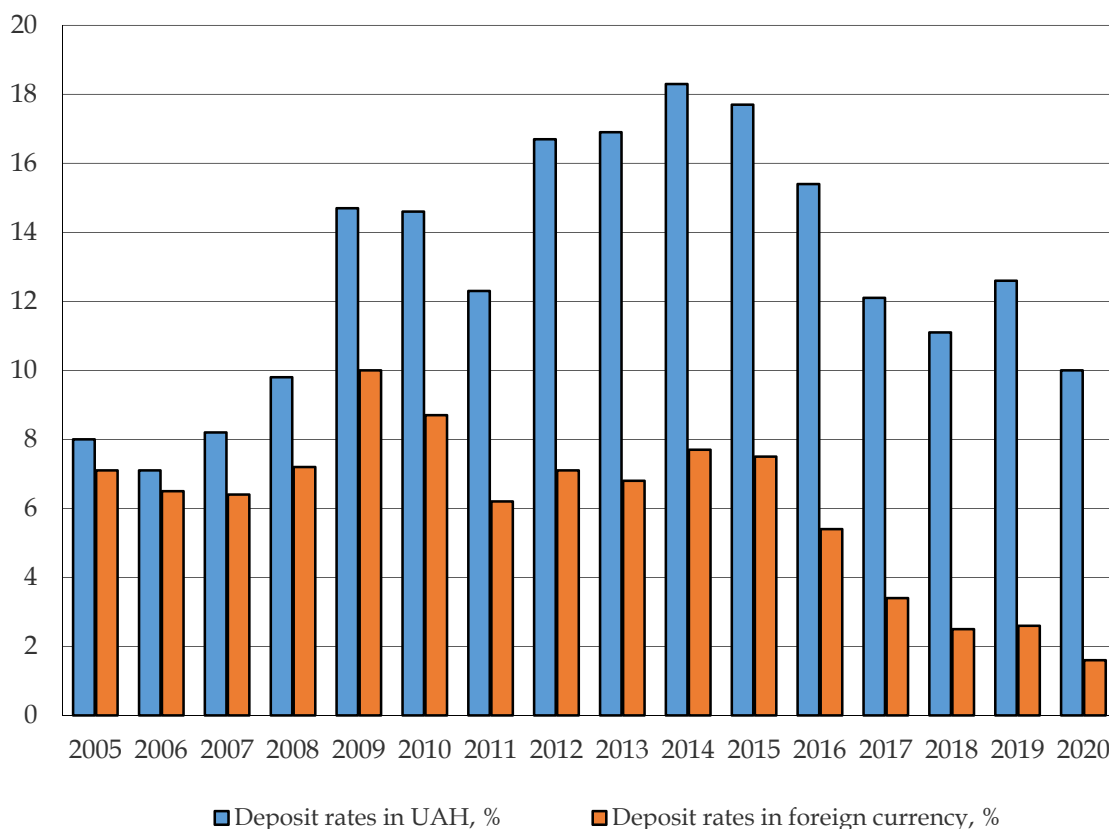

Fig. 1. Dynamics of deposit rates in UAH and in foreign currency in 2005 -2020. *Source:* (www.bank.gov.ua available at 15.10.2021)

Table 2

Dynamics of the main factors influencing the volume of the housing construction in Ukraine

Year	Consumer income, million UAH	Investments in housing construction, million UAH	Interest rates for mortgage credits in UAH, %	Deposit rates in foreign currency, %	Amount of consumer loans for buying, building and reconstruction of real estate assets, million UAH	Number of marriages, thousand units	Number of divorces, thousand units
	x_1	x_2	x_3	x_4	x_5	x_6	x_7
2010	1 101 175	25 753.7	27.4	8.7	81 953	305.9	126.1
2011	1 251 005	26 582.3	28.8	6.2	70 447	355.9	182.5
2012	1 457 864	34 256	29.0	7.1	58 427	278.3	168.5
2013	1 548 733	36 128.9	28.5	6.8	51 447	304.2	164.9
2014	1 516 768	33 177	27.8	7.7	71 803	295.0	130.7
2015	1 772 016	45 609.8	29.8	7.5	66 169	299.0	129.4
2016	2 051 331	44 864.9	31.6	5.4	58 549	229.5	130.0
2017	2 652 082	53 371.8	30	3.4	48 268	249.5	128.7
2018	3 248 730	57 395.9	31.3	2.5	44 458	228.4	153.9
2019	3 744 060	58 014.9	32.6	2.6	32 611	237.9	138.0
2020	3 972 428	34 885.7	32.4	1.6	28 924	168.0	119.8

Source: www.ukrstat.gov.ua available at 15.10.2021, www.bank.gov.ua available at 15.10.2021.

According to the data in Table 2, it is determined that, in 2010-2020, consumer income increased 3.6 times, whereas in the previous year - by 6.1%. It was the only index among those studied which had positive dynamics in the previous year. The results of the research for 2019-2020 show that investments in housing construction, the number of marriages, divorces and interest rates for mortgage credits were reduced in 2019 by 39.9 %, 29.4 %, 13.2 % and 0.6 % respectively. In 2020, deposit rates in foreign currency also fell by 38.5% as compared to the previous year. Analyzing the mentioned indices in 2010-2020, the authors of the research concluded that the number of marriages and divorces decreased by 45.1% and 5% respectively, while the deposit rates in foreign dropped significantly, i.e. by 81.6%. All other indices increased, particularly interest rates for mortgage credits – by 18.2%, consumer income – by 35.5%, investments in housing construction – by 35.5%.

4.3. Determination of the impact made by the main factors on the volume of housing construction in Ukraine

To determine the impact of the main factors on the volume of housing construction in Ukraine, it is necessary to adjust statistical data in cost indicators for the consumer price index (Table 3).

Table 3

Adjusted statistical data

Year	Consumer income, million UAH	Investments in housing construction, million UAH	Amount of consumer loans for buying, building and reconstruction of real estate assets, million UAH
	x_1	x_2	x_5
2010	1 006 558.5	23 540.9	74 911.3
2011	1 158 338.0	24 613.2	65 228.7
2012	1 449 169.0	34 051.7	58 078.5
2013	1 553 393.2	36 237.6	51 601.8
2014	1 353 049.1	29 595.9	64 052.6
2015	1 191 671.8	30 672.4	44 498.3
2016	1 800 993.0	39 389.7	51 403.9
2017	2 318 253.5	46 653.7	42 192.3
2018	2 929 422.9	51 754.6	40 088.4
2019	3 469 935.1	53 767.3	30 223.4
2020	3 867 992.2	33 968.5	28 163.6

Source: authors' personal studies.

Information about dependencies between the main factors, factors and the index (volume of housing construction in Ukraine) can be obtained from the correlation matrix R_y.

$$R_y = \begin{pmatrix} 1.000 & 0.697 & -0.732 & -0.947 & -0.879 & -0.861 & -0.307 & 0.973 \\ 0.697 & 1.000 & -0.413 & -0.747 & -0.730 & -0.590 & -0.093 & 0.809 \\ -0.732 & -0.413 & 1.000 & 0.826 & 0.512 & 0.525 & 0.049 & -0.718 \\ -0.947 & -0.747 & 0.826 & 1.000 & 0.863 & 0.792 & 0.179 & -0.954 \\ -0.879 & -0.730 & 0.512 & 0.863 & 1.000 & 0.775 & 0.297 & -0.880 \\ -0.861 & -0.590 & 0.525 & 0.792 & 0.775 & 1.000 & 0.551 & -0.835 \\ -0.307 & -0.093 & 0.049 & 0.179 & 0.297 & 0.551 & 1.000 & -0.335 \\ 0.973 & 0.809 & -0.718 & -0.954 & -0.880 & -0.835 & -0.335 & 1.000 \end{pmatrix},$$

Data of the correlation matrix R_y confirm that almost all factors, with the exception of the number of divorces, are interdependent. Therefore, the authors of the research studied the impact of each factor separately by applying one-factor linear regression. The results of the studies have been presented in Table 4.

To sum up, the greatest impact on the volume of housing construction in Ukraine is made by consumer income, deposit rates in foreign currency, and the amount of consumer loans for buying, building and reconstruction of real estate assets, whereas a significant impact is also made by the

number of marriages, investments in housing construction and interest rates for mortgage credits in UAH.

Results of research on the main factors influencing the volume of housing construction in Ukraine

Main factors of impact	Form of dependency	Statistical indicators	Result (for probability 0.95, degrees of freedom 9 and 1, Fкр=5.12)	Rank
Consumer income	$\hat{y}_1 = -2182.4+ +0.009x_1$	r=0.973 R^2=0.9469 F=160.49	A close direct dependency between consumer income and volume of housing construction, a model adequate to the general population data (F> Fкр)	1
Deposit rates in foreign currency	$\hat{y}_1 = 34995- -3548.4x_4$	r=-0.954 R^2=0.911 F=92.124	A close reverse dependency between the deposit rates in foreign currency and volume of housing construction, a model adequate to the general population data (F> Fкр)	2
Amount of consumer loans for buying, building and reconstruction of real estate assets	$\hat{y}_1 = 43158- -0.5467x_5$	r=-0.88 R^2=0.775 F=30.947	A close reverse dependency between the amount of consumer loans for buying, building and reconstruction of real estate assets and the volume of housing construction in Ukraine, a model adequate to the general population data (F> Fкр)	3
Number of marriages	$\hat{y}_1 = 55642- -148.48x_6$	r=-0.835 R^2=0.6973 F=20.732	A close reverse dependency between the number of marriages and volume of housing construction, a model adequate to the general population data (F> Fкр)	4
Investments in housing construction	$\hat{y}_1 = -10853+ +0.7253x_2$	r=0.809 R^2=0.6545 F=17.05	A close direct dependency between investments in housing construction and volume of housing construction, a model adequate to the general population data (F> Fкр)	5
Interest rates for mortgage credits in UAH	$\hat{y}_1 = 48762- -2299.1x_3$	r=-0.718 R^2=0.515 F=9.557	A significant reverse dependency between the interest rates for mortgage credits in UAH and the volume of housing construction, a model adequate to the general population data (F> Fкр)	6
Number of divorces	$\hat{y}_1 = 36810- -146.96x_7$	r=-0.335 R^2=0.1123 F=1.139	A weak reverse dependency between the number of divorces and volume of housing construction, a model not adequate to the general population data (F< Fкр)	7

Source: authors' personal studies.

4.4. Structure of determinants which to some extent influence the development of the real estate market in Ukraine

To determine the degree of impact made by the chosen factors on the volume of housing construction in Ukraine, it is important to consider elasticity coefficients, which show the percentage of the indicator change under one percent change of the factor. Elasticity coefficients for the factors which significantly influence the studied process are presented in the Table 5.

Thus, an analysis of Table 5 confirms that a positive impact on the volume of housing construction in Ukraine is made by such factors as an increase of consumer income, increase of the amount of investments in housing construction, reduction of interest rates for mortgage credits and deposit rates in foreign currency, reduction of the amount of consumer loans for buying, building and reconstruction of real estate assets, and reduction of the number of marriages. The last factor is related to the situations when young people who live separately before marriage start living together after getting married.

Table 5

Impact of changes of the identified factors on the volume of housing construction in Ukraine

Elasticity coefficients	Value	Result
Ex_1	1.229	An increase of consumer income by 1% results in the increase of the volume of housing construction by 1.229% under constant other conditions
Ex_2	0.87	An increase of the amount of investments in housing construction by 1% results in the increase of the volume of housing construction by 0.87% under constant other conditions
Ex_3	-0.812	An increase of the interest rates for mortgage credits in UAH results in the reduction of the volume of housing construction in Ukraine by 0.812% under constant other conditions
Ex_4	-0.2	An increase of the deposit rates in foreign currency results in the reduction of the volume of housing construction by 0.2% under constant other conditions
Ex_5	-0.544	An increase of the amount of consumer loans for buying, building and reconstruction of real estate assets results in the reduction of the volume of housing construction by 0.544% under constant other conditions
Ex_6	-0.881	An increase of the number of marriages results in the reduction of the volume of housing construction in Ukraine by 0.881% under constant other conditions

Source: authors' personal studies.

5. Conclusions

The conducted analysis of the housing construction in Ukraine confirms that, during 2010-2019, the country experienced a growth tendency of its capacity in cost indicators. However, one should consider that, in 2014-2015, there was a significant devaluation of Ukrainian currency that also influenced the growth of the volume of housing construction in Ukraine in 2014-2016. Adjusting the indicator for the inflation index, the authors of the research determined that the volume of housing construction in Ukraine in 2010-2014 increased, whereas in 2015, 2018, and 2020, the indicator decreased. Moreover, basing on the developed economic and mathematical model, it was determined that an increase in the volume of housing construction in Ukraine has a positive impact on the GDP of Ukraine (which should also be adjusted for the inflation index), because there is a close direct dependency between the factors. Particularly, an increase of the volume of housing construction in Ukraine by 1% results in a GDP growth by 0.814% under other conditions remaining constant. The research identifies the main determinants influencing the development of housing construction in Ukraine. The determinants include consumer income, deposit rates in foreign currency, amount of consumer loans for buying, building and reconstruction of real estate assets, number of marriages, investments in housing construction, interest rates for mortgage credits in UAH and the number of divorces. All mentioned cost indicators are also adjusted for the inflation index. The produced correlation matrix proves that almost all factors, but for the number of divorces, are interdependent and, therefore, each of the factors influencing the development of housing construction in Ukraine is studied separately by applying one-factor linear regressions. The results obtained on the base of the developed models show that the greatest impact on the volume of housing construction in Ukraine is made by consumer income, deposit rates in foreign currency and the amount of consumer loans for buying, building and reconstruction of real estate assets, whereas a significant impact is made by the number of marriages, investments in housing construction, interest rates for mortgage credits in UAH. To estimate the degree of impact of the above-mentioned factors on the volume of housing construction in Ukraine, the elasticity coefficients were calculated. Thus, it was determined that a positive impact on the volume of housing construction in Ukraine is made by such factors as growth of consumer income, growth of the amount of investments in housing construction, reduction of interest rates for mortgage credits and deposit rates in foreign currency, reduction of the amount of consumer loans for buying, building and reconstruction of real estate assets and reduction of the number of marriages. Making a forecast of how the factors may change, one can conclude about their impact on the development of housing construction in Ukraine under other conditions remaining constant.

A positive impact on development of the housing construction in Ukraine is made by its banking sector. The further development of the housing construction market in Ukraine primarily needs adequate conditions for the growth of the amount of investments in the mentioned industry. A 1% increase in the amount of investments in the housing construction industry of Ukraine will result in an increase in the volume of housing construction by 0.87% under other conditions remaining constant. However, the factor of the rising amount of investments in the housing construction in Ukraine suffers from the negative impact of political turbulence in the country.

6. References

Adams, Z., & Füss, R. (2010). Macroeconomic determinants of international housing markets. *Journal of Housing Economics, 19*(1), 38–50. https://doi.org/10.1016/j.jhe.2009.10.005

Banihashemi, S., Hosseini, M. R., Golizadeh, H., & Sankaran, S. (2017). Critical success factors (CSFs) for integration of sustainability into construction project management practices in developing countries. *International Journal of Project Management, 35*(6), 1103–1119. https://doi.org/10.1016/j.ijproman.2017.01.014

Bujanda, A. & Fullerton, T.M. (2017).Impacts of transportation infrastructure on single-family property values.*Applied Economics*, 49:51, 5183-5199.. 1302064 https://doi.org/10.1080/00036846.2017.1302064

Cariaga, I., & El-Diraby, T. E. (2013). Assessing the Market Potential for Housing Construction Products in Mexico. *Journal of Construction Engineering and Management, 139*(6), 717–725. https://doi.org/10.1061/(ASCE)CO.1943-7862.0000637

Catte, P., Girouard, N., Price, R., & André, C. (2004).Housing Markets, Wealth and the Business Cycle. *OECD Economics Department Working Papers,* 394, OECD Publishing.https://econpapers.repec.org/paper/oececoaaa/394-en.htmavailable at 30.12.2021.

Chan, P. (2019). Construction in the developing world: Where are the alternative frames of thinking? *ARCOM Newsletter*, 36(1): 5. http://www.arcom.ac.uk/-docs/newsletter/2019_36-1.pdf available at: 30.02.2022.

Clarke, L., & Herrmann, G. (2004). Cost vs. production: Labour deployment and productivity in social housing construction in England, Scotland, Denmark and Germany. *Construction Management and Economics, 22*(10), 1057–1066. https://doi.org/10.1080/0144619042000213300

Foryś, I., Putek-Szeląg, E., & Ziembicka, B. (2020). An Attempt to Determine the Impact of Energy Intensity on the Market Value of Residential Units on the Example of Selected Buildings in Szczecin. *Real Estate Management and Valuation, 28*(1), 64–79. https://doi.org/10.2478/remav-2020-0006

Himmelberg, C., Mayer, C., & Sinai, T. (2005). Assessing High House Prices: Bubbles, Fundamentals and Misperceptions. *The Journal of Economic Perspectives, 19*(4), 67–92. https://doi.org/10.1257/089533005775196769

Jian, C., Quiyue, H., & Yuanyuan, G. (2007). Analysis of Chinese real estate market development. *Proceedings of 2007 International Conference on Construction & Real Estate Management,1:2*, 1409-1411.

Just, T., & Levinger, H. (2021). China's Housing Markets. In B. Wang & T. Just (Eds.), *Understanding China's Real Estate Markets.* Management for Professionals (pp. 281–288). Springer., https://doi.org/10.1007/978-3-030-71748-3_20

Leamer, E. E. (2007). *Housing IS the Business Cycle.* https://www.nber.org/system/files/working_papers/w13428/w13428.pdf available at 30.01.2022. https://doi.org/10.3386/w13428

Maletska, O., Bochko, O., Stasyuk, N., Kuziak, V., & Struk, N. (2020). Modeling Of The Impact Of Investments On The Development Of The GDP In Ukraine. *Proceedings of the 35th International Business Information Management Association (IBIMA).* Seville, Spain https://ibima.org/accepted-paper/modeling-of-the-impact-of-investments-on-the-development-of-the-gdp-in-ukraine available at 18.10.2021.

Nakonechnyi, S., Tereshchenko, T., & Romaniuk, T. (2004). *Ekonometriia* [Econometrics]. KNEU.

National Bank of Ukraine. (2021). http://www.bank.gov.ua available at 15.10.2021.

Ofori, G. (2019). Reflection by Professor George Ofori, London South BankUniversity.*ARCOM Newsletter*, 36(1): 6. http://www.arcom.ac.uk/-docs/newsletter/2019_36-1.pdfavailable at 30.01.2022.

Pettinger, T. (2021). *How the housing market affects the economy.* https://www.economicshelp.org/blog/21636/housing/how-the-housing-market-affects-the-economy available at 20.10.2021.

Rącka, I., Palicki, S., & Kostov, I. (2015). State and Determinants of Real Estate Market Development in Central and Eastern European Countries on the Example of Poland and Bulgaria. *Real Estate Management and Valuation, 23*(2), 77–90. https://doi.org/10.1515/remav-2015-0017

Seliuchenko, N., & Kosar, N. (2016). Investigation of the main trends of the primary real estate market in Ukraine and peculiarities of the seller marketing activity. *Marketing and Management of Innovations, 4*, 143–158.

Site of State Statistics Service of Ukraine. (2021).http://www.ukrstat.gov.ua available at 15.10.2021.

Sobieraj, J., & Metelski, D. (2020). Identification of the key investment project management factors in the housing construction sector in Poland. *International Journal of Construction Management.* https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3733643 available at 29.12.2021. https://doi.org/10.1080/15623599.2020.1844855

Szopińska, K., Krajewska, M., & Kwiecień, J. (2020). The Impact of Road Traffic Noise on Housing Prices – Case Study in Poland. *Real Estate Management and Valuation, 28*(2), 21–36. https://doi.org/10.1515/remav-2020-0013

Tam, C. M., Deng, Z. M., Zeng, S. X., & Ho, C. S. (2000). Quest for continuous quality improvement for public housing construction in Hong Kong. *Construction Management and Economics, 18*(4), 437–446. https://doi.org/10.1080/01446190050024851

Tutesigensi, A., Kibwami, N., & Matege S. B. (2021). The Status of Value Management Practice on Construction Projects in Uganda and Strategies for Improvement. *Journal of Construction in Developing Countries, 26*(2), 251–267. https://doi.org/10.21315/jcdc2021.26.2.12

Vinnichuk, O. (2016). The political uncertainty as a part of Ukrainian society. *Humanitarian Vision, 2*(2), 7–12. https://doi.org/10.23939/shv2016.02.007

Wang, G., Xia, C., & Cao, D. (2020). State and determinants of inter-regional market entry practices in the Chinese construction industry: Evidence from national quality award projects. *Engineering, Construction, and Architectural Management, 27*(7), 1461–1477. https://doi.org/10.1108/ECAM-06-2019-0336

Ye, M., & Liu, R. (2003). Study on real estate Internet marketing. *Proceedings of the 2003 international conference on construction & real estate management*, 181-183.

Zhai, X., Reed, R., & Mills, A. (2014). Factors impeding the offsite production of housing construction in China: An investigation of current practice. *Construction Management and Economics, 32*(1–2), 40–52. https://doi.org/10.1080/01446193.2013.787491

Źróbek, S., Zysk, E., Bełej, M., & Lepkova, N. (2020). Do Women Affect the Final Decision on the Housing Market? *A Case Study. Sustainability (Basel), 12*(11), 4652. https://doi.org/10.3390/su12114652