BUSINESS PERSPECTIVES

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ASSESSMENT OF FINANCIAL AND ECONOMIC SECURITY OF UKRAINE IN CONDITIONS OF FOREIGN BANKING DEVELOPMENT

Abstract

The article assesses the influence of foreign banks on the financial and economic security of Ukraine. A scientific and methodological approach to the determination of the influence of foreign banks on the financial and economic security of the state using the correlation and regression analysis as well as scenario approach is offered. Such approach reflects mutual links between the indicators of foreign banking and the main indicators of financial and economic security of Ukraine. On the basis of analysis of foreign banking development, the indicators of financial and economic security of Ukraine have been forecasted. Positive and negative consequences of such influence in conditions of cyclic and crisis development of the national economy and bank system have been substantiated.

Keywords	foreign banking, bank with foreign capital, financial and economic security of the state, bank system
JEL Classification	G17, G21, O16

INTRODUCTION

Foreign bank capital influences the development of the country's economy and its financial and economic security. Development of an efficient system of financial and economic security of Ukraine through engagement of foreign investors constitutes one of the key aspects of state regulation. It becomes important to identify the changes brought by foreign banks capital in the conditions of cyclic economic development.

Foreign banking is defined as a special type of international business activity, consisting in the organizing and functioning of banks which are established fully or partially out of foreign capital, which perform their functions in the territory of the recipient country to arrange client bank servicing for profit gaining purposes, thus contributing to bank system development and satisfaction of economy's needs. Foreign banking is related to the processes of foreign investment into the internal bank system via establishing of banks with foreign capital that contributes to its development and establishment of competitive environment. On the other hand, activity of foreign banks in external markets may considerably affect the level of financial and economic security.

Therefore, the problem of determining quantitative and qualitative characteristics of foreign banking in Ukraine is undoubtedly relevant.

In order to assess the impact of foreign banking on Ukraine's financial and economic security, the correlation and regression analysis, as well as scenario approach, have been used. This approach reflects the relations between foreign banking indicators and the core indicators of state's financial and economic security (GDP, inflation rate, budget deficit, gross external debt, level of shadow economy, money supply, international central bank's reserves, cost of credits, the share of non-performing loans to total loans, profitability of the bank system's capital and assets). Such analysis allows to forecast the values of the core indicators of state's financial and economic security, which are influenced by foreign banking development, as well as to substantiate positive and negative outcomes of such impact in the conditions of cyclic-and-crisis development of Ukraine's economy and bank system.

1. LITERATURE REVIEW

Analysis of scientific literature has shown that the problem of influence of foreign capital on state's financial and economic security requires additional research. Many scientists and bankers try to identify advantages and disadvantages of foreign capital involvement in the country's bank system (Heyets, 2006; Kornyliuk, 2012; Bongini, 2017), show pros and cons of foreign banks' activity (Chub, 2009; Levin, 1996), as well as determine the efficiency of the functioning of the country's bank system when foreign investors are engaged (Kolodiziev & Shvets, 2008; Nezhurin & Podchesova, 2013; Bruno, 2012).

Analysis of foreign studies concerning the efficiency of banks with foreign capital looks controversial. While in some countries the efficiency of banking increased with appearance of foreign bank capital (Czech Republic, Croatia, Slovenia), in others it did not undergo significant changes (Poland, Lithuania, Latvia, Hungary), or even led to the deterioration of the financial performance of banks (Estonia, Bulgaria, Romania) (Kuznyetsova et al., 2007; Yershov, 2005). Some scientists claim that banks with foreign capital are more efficient than state banks of countries and banks with private national capitals (Fernandez et al., 2010; Bonin et al., 2004). Assessment of the efficiency of foreign bank performance in Poland, made by Havrylchuk (2006), testified to increased efficiency of activity of only newly setup banks with foreign capital, while functioning Polish banks acquired by foreign investors did not show any significant changes in their performance (Havrylchuk, 2006), or even, according to some estimates, showed some performance deterioration (Yershov, 2005).

To assess the efficiency of foreign capital investment, the scientists suggest using different methodologies. Thus, to determine relative efficiency of banks, Dolgikh (2013) applies nonparametric technique of Data Envelopment Analysis (DEA) and assesses overall technical efficiency, pure technical efficiency and scale efficiency of different groups of banks. Estimations have shown that by their average overall technical efficiency foreign banks have exceeded the efficiency of other groups of banks insignificantly. Hirniak (2013) suggests applying the methodology of constructing dynamic standard models that enables to get one figure that characterizes the efficiency of bank performance in a comprehensive way. And it is considered that within the analysis there is a need to identify not just efficiency of the performance of banks with foreign capital, but also to show their role in the state's economic development in general as well as to identify their influence on the country's financial and economic security.

The problems of financial and economic security of banks, some regions of the country and the state in general have been covered rather actively over the recent years in the papers of both Ukrainian and foreign scholars (Naaborg, 2016; Varnalii, 2011, 2018). Some studies of scholars refer to financial and economic security of state at the macro-level, the methodologies of determining the degree of the country's economic security, evaluation of different components of economic security (production, demographic, foreign economic, energy, foodstuff, investment, financial security, etc.) (Kharazishvili, 2014; Bogma, 2016; Ivashko, 2015).

The study of methodological approaches to assessment of the degree of the country's economic security, conducted by Kharazishvili, deserves attention. The author points out the drawbacks and challenges related to integral evaluation of

the degree of Ukraine's economic security, studies the procedure of indicator regulation as the necessary stage of integral index determination, as well as suggests different approaches to the determination of weight coefficients (simulation, key component method, game methods). Based on of the critical view of the current methodologies of integral assessment of the economic security level, the scholar suggests the methodology using multiplicative integral index forms (Kharazishvili, 2014). Ivashko (2015) analyzes the values of the core indicators of Ukraine's financial security level and suggests a system of activities aimed at its strengthening through the prism of banking, budget, debt, currency, and monetary security. Varenyk (2006) analyzes the challenges of determining the level of Ukraine's economic security following two methodologies: the methodology of global competitive ability index and the methodological recommendations for estimating Ukraine's economic security. He concludes that the methodological recommendations for estimating economic security are based on due account of the specific features of Ukraine's development, however, no attention is paid there to indicators such as ethics and corruption, abuse of power, spend thrifting in public expenses, the quality of the system of education, use of information technologies, etc.

The impact of banks with foreign capital on financial security of Ukraine's bank system has been studied by Vasylchyshyn (2016). The author makes comparative analysis of the indicators of performance efficiency of banks with foreign, Ukrainian private and public capital, outlines the core directions of the negative impact of bank performance on the financial security of Ukraine's bank system. The researcher concludes that the most substantial threat to the security of the country's bank system is posed not by a high share of foreign capital, but the environment and conditions of activity of the banks which have been established by the state represented by legislative, monetary, and fiscal authorities. Dependence of the positive effect of foreign banking capital on Ukraine's financial security on the well-balanced public policy is pointed out by Pilipenko (2016). The author characterizes the determinants of the effect of foreign capital engagement in Ukraine's bank system on the state's financial security, as well as calculates the integral financial security index.

There are many reservations and ongoing discussions related to the negative impact of foreign bank capital on the economy of the recipient country. Many controversial issues also refer to opening of the national borders for branches of foreign banks. The article constitutes an attempt to show that foreign capital attraction in Ukrainian bank system, as well as functioning of foreign bank institutions, do not have any clearly negative impact on the core indicators of the state's financial and economic security.

The present research aims to identify the effect of key parameters of foreign bank performance in the recipient country on the indicators of state's financial and economic security through economic and mathematical methods and prediction of their values, as well as through construction of different scenarios of Ukraine's economic development under the influence of foreign banking development.

2. METHODS

The research is based on the use of the integrity of scientific methods which include: systemic, induction and deduction, analysis and synthesis, simulation and forecasting methods. The role of systemic methods is in a comprehensive study of the influence of foreign banking on the development of Ukraine's economy, it also enables to identify the need for efficient interaction between banks with foreign capital and all the elements of the system. Induction and deduction enable to trace the regularities and develop general conclusions on the influence of foreign bank capital on the state's financial and economic security. Via the method of analysis, the essence and characteristics of each element of foreign banking is clarified, quantitative influence on the financial and economic security is assessed, while the method of synthesis enables to combine separate parts of the system into one whole. Simulation helps make correlation and regression analysis and is used to construct a model of influence of the foreign banking main indicators on the state's financial and economic security. The method of forecasting enables to trace future changes in the main indicators of the state's economic development under the influence of foreign bank capitals.

Development of the model of influence of foreign banking on the main indicators of financial and economic security of Ukraine must be based on a certain methodology and consistency of its reflection. The determined model should be constructed using the correlation and regression analysis, the sequence of which is shown in Figure 1.

To make analysis in the first stage, it is necessary to specify the model, that is to select its structure and to determine the set of explanatory variables. Using assessment under different methodological approaches (Kharazishvili, 2014) and methodological recommendations (Pyrizhkov, 2003; Ministry of Economic Development and Trade of Ukraine, 2013) related to estimation of the degree of the level of the country's economic security, the key indicators of the state's financial and economic security have been selected as performance indicators (y). Ten indicators have been included there: GDP, inflation rate, budget deficit, gross foreign debt, shadow economy level, money supply, international reserves of the NBU, etc. In the next stage, the most significant factor variables have been selected for the analysis – foreign banking development indicators that may influence state's financial and economic security (x). These include 19 indicators, among which is the main data on the activity of banks with foreign capital in Ukraine. The time interval for comparing the influence of the indicators is the period of January 1, 2007 – January 1, 2017, that is 11 complete years. Factor and performance indicators and their values over the period selected for the correlation and regression analysis are provided in Tables 1A and 2A (see Appendix).

Using the indicators of financial and economic security, as well as the factors influencing it, the state of financial and economic security during the selected period should be analyzed. And it is necessary to determine the best-case, realistic and worst-case scenarios for the change in those indicators under the influence of changes in the main indicators of foreign banking, to study the maximum influence of factor indicators and to trace negative consequences of such influence, to formulate the directions of negative trend prevention development and determine the need for making adjustments, setting restrictions or applying stimulating factors and predicting future changes in the economy.
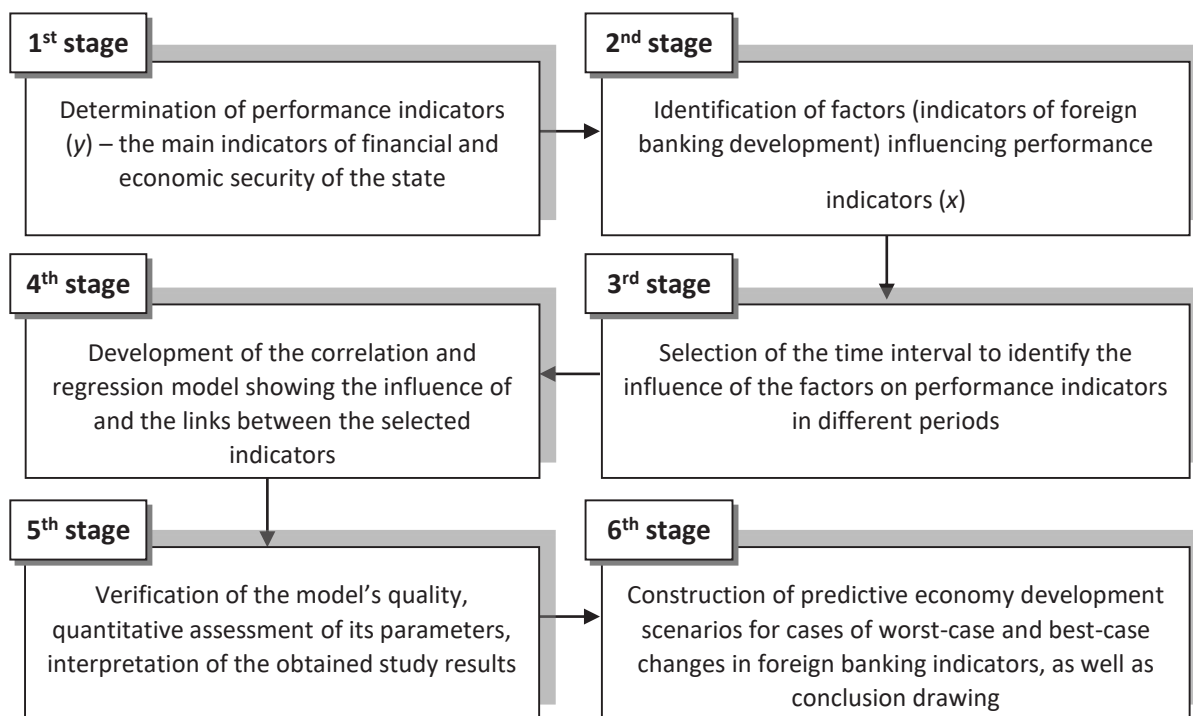
Figure 1. The sequence of the correlation and regression analysis of the influence of foreign banking indicators on the main indicators of financial and economic security of Ukraine

3. RESULTS

Interdependence between factor and performance variables can be represented by the function (Stepanyshyn & Tysovskyi, 2012):

$$\widehat{Y} = f(X_1, X_2, X_3, ..., X_n), \qquad (1)$$

where $\widehat{Y}$ – performance feature, X_1, X_2, X_3, …, X_n – factor variables.

It is assumed that variable y depends on the multitude of independent variables of x_1, x_2, …, x_n. Then in case of a linear relation form, interaction of all factor indicators (x_1, x_2, …, x_n) with the performance indicator (y) can be represented as the multiple regression equation (Ivashchuk, 2008):

$$y = b_0 + b_1 x_1 + b_2 x_2 + ... + b_n x_n + \varepsilon, \qquad (2)$$

where y – dependent variable; x_1, x_2, …, x_n – independent variables; b_0 – absolute term; b_1, b_2, …, b_n – unknown model parameters; ε – random value (perturbation); $n = 1, 2, …, 7$.

To assess unknown parameters (b_1, b_2, …, b_n) in the equation for each dependent variable y, the least square method is used, under which those parameters are selected in the way for the sum of squared deviations of the values found by the equation from empirical values y to be a minimum one. To make the correlation and regression analysis and to construct a model, let us check the availability of multi-collinearity, that is linear dependence between factor variables. If the phenomenon of multi-collinearity can be traced, different factors (x_i) duplicate each other. With this in view, the matrix of pair correlations for factor variables is constructed (see Table 3A in Appendix).

Analysis has identified the availability of multi-collinearity between independent variables (when the value of the pair correlation factor exceeds 0.8 at significance value p < 0.05). In order to remove the phenomenon of multi-collinearity, for further analysis only seven factor indicators (x_2, x_3, x_5, x_{11}, x_{14}, x_{15}, x_{17}) have been left, while the others have been excluded from the model.

A repeated multi-collinearity check has confirmed absence of high linear dependences between factor variables (Table 1).

Using the integrated system of statistical analysis and data processing, Statistica, let us make the correlation and regression analysis of the influence of foreign banking on the indicators of financial and economic security of Ukraine. Using the multiple regression function, dependent variables (y) and independent variables (x) are selected. Identification of the links of each factor indicator (x) and each performance indicator (y) has shown that different independent variables have different degree of connection with dependent variables (see Table 4A in Appendix).

Determination of the degree of connection between dependent variables is made according to the Cheddock scale, according to which if the absolute value of a pair correlation factor is under 0.3, the linear connection between two random values is almost not there, if 0.31-0.5 – the connection is poor, and if 0.51-0.7, then the connection is noticeable, the range of 0.71-0.9 points to a strong connection, and 0.91-0.99 – to a highly strong connection.

From the data provided in Table 4A, it can be seen that by the criterion of the nature of connection,

Table 1. Matrix of pair correlations for factor indicators (x) of the model after the multi-collinearity check

Source: Calculated by the authors.

	x_2	x_3	x_5	x_{11}	x_{14}	x_{15}	x_{17}
x_2	1.0000						
x_3	–0.0816	1.0000					
x_5	0.6067	–0.3989	1.0000				
x_{11}	–0.1304	–0.5117	0.2040	1.0000			
x_{14}	–0.6221	0.6524	–0.5554	–0.1113	1.0000		
x_{15}	0.2905	–0.7950	0.7424	0.6357	–0.6489	1.0000	
x_{17}	–0.4562	0.1306	–0.7053	–0.0140	0.5975	–0.4859	1.0000

the influence of independent values (foreign banking indicators) on the dependent ones is both direct and reverse. However, in most cases no serious degree of connection with performance indicators can be traced. Thus, there is almost no influence on the inflation rate (y_2) made by foreign banking indicators such as: the share of the authorized capital stock of banks with foreign capital in the authorized capital stock of the bank system (x_2), foreign capital growth rate in the authorized capital stocks of banks with foreign capital (x_3), the share of commitments of banks with foreign capital in foreign currency in the commitments of Ukraine's bank system (x_{11}), the growth rate of assets of banks with foreign capital (x_{14}), the volume of assets of banks with foreign capital in foreign currency (x_{15}). The largest influence out of the selected factor indicators on performance indicators is exerted by the volume of financial performance of banks with foreign capital (x_{17}), in particular, a very strong one – on the gross foreign debt (y_4), a strong one – on the inflation rate (y_2), shadow economy level (y_5), the share of non-performing loans to total loans (y_8), return on equity (y_9) and return on assets of Ukraine's bank system (y_{10}).

Since independent variables have got a different degree of connection to different performance indicators, most illustrative will be inclusion of not all factor variables into the regression equation (that is the ones that have a strong influence and the ones the influence of which is insignificant), but only of those ones that are most influential. Therefore, through selection of the method of step-by-step inclusion, first the independent variables that have the maximum degree of correlation with the performance indicator are included into the regression equation. They will be included until the statistical value of beta-factor starts exceeding 0.1. If the level of significance equals 0.1, the variables are not included further on. The results of the analysis made and the equations obtained for performance indicators (y_1, y_2, ..., y_{10}) are provided in Table 5A (see Appendix).

Evaluation equations for each dependent variable will be recorded as follows:

$$y_1 = 462606.1 + 12438.6x_5 - 53136.1x_{11} - \tag{3}$$
$$-1092.0x_{14} + 4.0x_{15} + 24579.8x_2,$$

$$y_2 = -22.0429 - 0.0008x_{17} + 0.1783x_{14} + \tag{4}$$
$$+0.0001x_{15} + 0.0924x_3,$$

$$y_3 = 8.263210 - 0.017806x_3 - \tag{5}$$
$$-0.020639x_{14} - 0.077946x_5,$$

$$y_4 = 54.69912 - 0.00085x_{17} - \tag{6}$$
$$-0.18642x_{14} + 0.44232x_2 +$$
$$+0.49758x_5 - 0.47203x_{11},$$

$$y_5 = 41.83864 + 0.00003x_{15} - \tag{7}$$
$$-0.00026x_{17} - 0.29944x_5 -$$
$$-0.03296x_3,$$

$$y_6 = 564925.9 + 1261.8x_5 + 619.6x_{14} - \tag{8}$$
$$-31935.6x_{11} + 2.8x_{15} - 0.6x_{17} +$$
$$+10508.2x_2 - 1358.9x_3,$$

$$y_7 = -18836.9 + 0.2x_{17} + 1294.8x_{11} - \tag{9}$$
$$-0.1x_{15} + 743.4x_2,$$

$$y_8 = 0.913193 - 0.000195x_{17} + \tag{10}$$
$$+0.241245x_2 - 0.055665x_{14} -$$
$$-0.247664x_{11} + 0.157976x_5,$$

$$y_9 = -3.13067 - 0.64592x_2 + \tag{11}$$
$$+0.00023x_{17} + 2.27571x_{11} +$$
$$+0.57504x_{14} - 0.52090x_3 -$$
$$-0.00020x_{15},$$

$$y_{10} = -1.61614 + 0.00008x_{17} - \tag{12}$$
$$-0.10324x_2 + 0.12672x_{11} +$$
$$+0.05890x_{14} - 0.02977x_3.$$

The next stage is verification of the model's quality. To assess the significance and adequacy of multiple regression equations, it is necessary to analyze the following indicators:

1) multiple correlation factor (R) showing the density of correlation connections between the dependent variable and independent variables;

2) determination factor (R^2) which provides quantitative assessment of the degree of connection under analysis (shows the share of variation in the performance feature influenced by factors under study, and the closer the value of R^2 is to 1, the better the regression equation explains the factor under analysis, for instance, if value $R^2 \cdot 100$, it shows what the percentage of impact of the factor on the performance indicator is, while if R^2 is heading for 0, the selection does not contain any interrelation between the dependent variable and independent variables);

3) p-level characterizes statistical significance of the study results (the value of p-level 0.05 is the minimum permissible one, the lower the value of p-level (0.01, 0.005, 0.001) is, the more statistically significant the results are);

4) Fisher *F*-criterion (estimated value ($F_{calc.}$) is compared to the table one ($F_{tabl.}$) (Horoneskul, 2009), if $F_{calc.} > F_{tabl.}$, then the zero hypothesis is refuted and the alternative one is accepted, which proves the adequacy of the constructed model, i.e. confirms the availability of a considerable connection between the dependent variable and independent variables of the constructed model);

5) Student's *t*-statistics helps identify the significance of estimates of a multi-factor model's parameters (estimated values of *t*-criteria are compared to critical values found by the tables according to the values of p-level of statistical significance);

6) standard error in the assessment of the regression parameter is used to assess the quality of regression function selection (Ivashchuk, 2008) (the wider the dispersion of values of the explanatory variable and the larger the volume of the selection, the smaller the standard error, and the larger the share of variation in the value of variable y, which is not accounted for by dependence on x, the larger the standard error in the regression factor).

Verification of the models and multiple regression equations constructed by us has confirmed the assumption on availability of connections between dependent and independent variables. The statistics of the model is shown in Table 5A (see Appendix). Estimated values of Fisher *F*-criterion exceed the table values, Student's *t*-statistics in correspondence with the minimum permissible values of p-level points to statistical significance of the study results. Multiple correlation factor *R* exceeds the value of 0.9, and determination factor R^2 values close to 1 confirm the adequacy of the

Table 2. The results of the correlation regression analysis of the indicators of financial and economic security of the state as influenced by foreign banking indicators and verification of the regression model adequacy

Source: Calculated by the authors.

No.	Performance indicators, for which correlation connections are described	Assessment of the regression model adequacy
1	GDP (in real prices), UAH mln (y_1)	$F(5,5)_{calc.} = 219.09$; $F_{tabl.} = 10.97$ R = 0.99772557; $R^2 = 0.99545632$; $p = 0.00001$
2	Inflation rate, % (y_2)	$F(4,6)_{calc.} = 38.129$; $F_{tabl.} = 9.15$ R = 0.98089197; $R^2 = 0.96214907$; $p = 0.00021$
3	Budget deficit, % to GDP (y_3)	$F(3,7)_{calc.} = 8.4281$; $F_{tabl.} = 5.89$ R = 0.88497206; $R^2 = 0.78317554$; $p = 0.01007$
4	Gross foreign debt in % to GDP (y_4)	$F(5,5)_{calc.} = 983.34$; $F_{tabl.} = 10.97$ R = 0.99949192; $R^2 = 0.99898409$; $p = 0.000001$
5	Shadow economy level, % to GDP (y_5)	$F(4,6)_{calc.} = 46.028$; $F_{tabl.} = 9.15$ R = 0.98409323; $R^2 = 0.96843949$; $p = 0.00012$
6	Money supply, UAH mln (y_6)	$F(7,3)_{calc.} = 22140.0$; $F_{tabl.} = 27.67$ R = 0.99999032; $R^2 = 0.99998064$; $p = 0.000001$
7	International reserves of the NBU, USD mln (y_7)	$F(4,6)_{calc.} = 14.935$; $F_{tabl.} = 9.15$ R = 0.95327294; $R^2 = 0.90872929$; $p = 0.00283$
8	The share of non-performing loans to total loans, % (y_8)	$F(5,5)_{calc.} = 91.174$; $F_{tabl.} = 10.97$ R = 0.99456067; $R^2 = 0.98915093$; $p = 0.00007$
9	Return on equity of Ukraine's bank system (ROE), % (y_9)	$F(6,4)_{calc.} = 9.9287$; $F_{tabl.} = 6.16$ R = 0.96802852; $R^2 = 0.93707922$; $p = 0.02181$
10	Return on assets of Ukraine's bank system (ROA), % (y_{10})	$F(5,5)_{calc.} = 8.3349$; $F_{tabl.} = 10.97$ R = 0.94492054; $R^2 = 0.89287482$; $p = 0.01811$

constructed model (Table 2). The estimated values of determination factor R^2 are significant in their performance indicators.

4. DISCUSSION

The parameters of equations b_0 determine the level of dependent indicators provided that all the factors are equal to zero (see Table 5A in Appendix). Parameters b_1, b_2, ... b_7 are partial regression factors measuring the effect of the respective variable. In the analysis of the connection of foreign banking indicators with GDP there can be traced a strong influence of the share of the authorized capital stock of banks with foreign capital in the authorized capital stock of Ukraine's bank system (x_2), as well as a strong influence can be observed for the share of owned capital of banks with foreign capital in the owned capital of the domestic bank system (x_5) and the growth rate of the assets of banks with foreign capital (x_{14}). The constructed regression equation has shown that growth of the share of the authorized capital stock of banks with foreign capital in the authorized capital stock of Ukraine's bank system as well as increase in the share of owned capital of banks with foreign capital in the owned capital of Ukraine's bank system will lead to GDP growth (see Table 4A in Appendix). Dependence of the inflation rate on foreign banking indicators is insignificant; in particular, the degree of connection is weak and almost non-available by some independent variables. The mathematical model shows that the inflation rate in Ukraine is influenced to a greater extent by other factors than by foreign banking, therefore, a conclusion may be drawn that there is no negative influence of the activity of banks with foreign capital in Ukraine on the inflation rate. Budget deficit of Ukraine, besides other factors, changes in reverse proportion under the influence of the change in the growth rate of foreign capital in the authorized capital stocks of banks with foreign capital (x_3) and the growth rate of assets of banks with foreign capital (x_{14}), and this indicator is also noticeably connected with the volume of assets of banks with foreign capital in foreign currency (x_{15}). Connection with other factor variables and budget deficit is almost non-available. The selected independent variables exert some influence on the change of the gross foreign debt in Ukraine.

The change of the growth rate of foreign capital in the authorized capital stocks of banks with foreign capital (x_3), of the share of commitments of banks with foreign capital in foreign currency (x_{11}), of the growth rate of assets of banks with foreign capital (x_{14}), of the volume of financial performance (profit/losses) of banks with foreign capital (x_{17}) have a reverse influence on the gross foreign debt. Thus, on condition those indicators rise, it will show a downward trend.

The constructed regression equations show that the change of the growth rate of assets of banks with foreign capital (x_{14}) and the volume of financial performance (profit/losses) of banks with foreign capital (x_{17}) influence the majority of the variables selected, in particular, shadow economy level, money supply, the share of non-performing loans to total loans, return on equity (ROE) and return on assets of Ukraine's bank system (ROA). The estimated values of pair correlation factors show a different degree of linear connections between independent and dependent variables (see Table 4A in Appendix). Thus, while the volume of financial performance (profit/losses) of banks with foreign capital (x_{17}) has a very strong influence on the gross foreign debt and a strong one on the inflation rate, shadow economy level, the share of non-performing loans to total loans, ROE and ROA. There is almost no influence on the budget deficit.

The regression models also show that gross foreign debt, shadow economy level, money supply are influenced by all of the independent variables under study, but with a different degree and nature of the connection. Along with that, some indicators of financial and economic security of Ukraine (the share of non-performing loans to total loans, return on equity and assets of the bank system) are influenced significantly only by some independent variables included into the regression equation.

Using the regression equations obtained, different scenario for the development and change of the main indicators of financial and economic security of the state can be built. After positive values of foreign banking indicators are set, future values of the indicators of financial and economic security can be estimated, and also for the conditions of negative development and unfavorable changes

in the values of foreign banking indicators it can be estimated how that will influence financial and economic security of Ukraine. The realistic prognosis will be made on the basis of determination of the change of the main foreign banking indicators using trend analysis and trend model construction. That will enable to predict the values of independent variables for the three following periods and to take their influence on performance indicators into account.

To construct the worst-case scenario, the following is assumed: the development of Ukraine's bank system slows down, the country loses its investment attractiveness for foreign investors, the risks of doing banking are high, hryvnia devaluates, corruption and bureaucracy grow, the level of dollarization of the economy grows, shadow business grows, residents lose trust in banks and in the national currency, bankruptcy of banks becomes a trend, there can be traced capital outflow abroad, etc. In such conditions, there takes place reduction of the share of the authorized capital stock of banks with foreign capital in the authorized capital of Ukraine's bank system, the growth rate of foreign capital in the authorized capital stocks of banks with foreign capital goes down, the share of owned capital of banks with foreign capital in the

owned capital of the domestic bank system goes down, the share of commitments of banks with foreign capital in foreign currency in the overall commitments of Ukraine's bank system increases, the growth rate of assets of banks with foreign capital slows down, the volume of assets of banks with foreign capital in foreign currency goes up and negative financial performance of banks with foreign capital, that is losses from activity in the Ukrainian market, can be traced.

To construct the best-case scenario, the following assumption is made: the rating of Ukraine's competitive ability and its investment attractiveness for foreign investors goes up, the country's bank system becomes free from financially unstable banks, its reliability and attractiveness go up, the trust in banks by residents is revived, there takes place reinforcement of the national currency, the reforms made considerably reduce the level of corruption, shadow economy, bureaucratization, the quality and transparency of the banking business improve, the bank system actively provides credits for and invests into the real economy sector development, national projects are funded, the profitability of banks goes up, etc. In such conditions, the interest of foreign investors in the bank system will go up and the

Table 3. The value of independent variables for predicting their influence on the indicators of financial and economic security of Ukraine by different scenarios

Source: Calculated by the authors.

Indicator	Predicted values of factor indicators			
	Worst-case scenario	Best-case scenario	Realistic scenario as of the end of 2019 (predicted values of foreign banking indicators, calculated under the trend mathematical model)	
			calculation by the linear regression	calculation by the linear trend
The share of authorized capital stock of banks with foreign capital in the authorized capital stock of Ukraine's bank system, % (x_2)	25	60	48.11	47.34
Foreign capital growth rate in authorized capital stocks of banks with foreign capital, % (x_3)	–20	15	52.12	44.35
The share of owned capital of banks with foreign capital in owned capital of Ukraine's bank system, % (x_5)	35	60	67.06	66.28
The share of commitments of banks with foreign capital in foreign currency in the commitments of Ukraine's bank system, % (x_{11})	50	27	23.35	20.02
The growth rate of assets of banks with foreign capital, % (x_{14})	–12	65	–24.63	–38.78
The volume of assets of banks with foreign capital in foreign currency, UAH mln (x_{15})	450,000.00	400,000.00	313,634.01	322,925.00
The volume of financial performance (profit/losses) of banks with foreign capital, UAH mln (x_{17})	–30,000.00	8,000.00	–34,105.11	–39,278.88

share of foreign capital in the authorized capital stocks of the bank system will rise, the growth rate of foreign capital in the authorized capital stocks of banks with foreign capital will go up, the same as the growth rate of assets of banks with foreign capital, the share of owned capital of banks with foreign capital in the owned capital of Ukraine's bank system will go up, the share of commitments of banks with foreign capital in foreign currency in the overall commitments of Ukraine's bank system and the volume of assets of banks with foreign capital in foreign currency will go down, the volume of profits of banks with foreign capital will go up. The given worst-case and best-case as well as calculated realistic values of independent variables x_2, x_3, x_5, x_{11}, x_{14}, x_{15}, x_{17} are provided in Table 3.

The realistic forecast of independent variables has been constructed using Microsoft Excel functions on the basis of calculation of linear trends by two methods, in particular, calculation by the linear regression and calculation by the linear trend using the graphic method and quantitative estimation (see Table 3 and Figures 2, 3, 4).

Based on the obtained predicted values of independent variables and assumptions made for the worst-case and best-case scenarios of foreign banking development, a forecast has been made as to the influence of foreign banking indicators on financial and economic security of Ukraine. The consolidated results of estimations are provided in Table 4.

The worst-case scenario in the conditions when foreign banking development indicators worsen has shown the following negative results: the level of shadow economy will go up considerably (it will make up 44.02% of GDP), money supply will go down to UAH 606,405 mln as compared to UAH 1,102,700 mln as of the end of 2016 (and that may be related to complete lack of trust in the bank system and the national currency and, as the result, resident investment into purchases of different commodities and conversion of savings into foreign currencies), the return on assets will go down to –13.46%, which testifies to the inefficiency of capital investment, under-received profit, unprofitable activity of banks and the threat of bankruptcy. Along with that, in case of worst-case changes in factor indicators, certain negative changes are expected in the volume of GDP (it will go down and make up UAH 1,645,607 mln as compared to UAH 2,383,182 mln as of the end of 2016), the inflation rate and budget deficit will increase, the volume of international reserves of the NBU will go down as compared to the indicator of the end of 2016 (to USD 14,688.2 mln), and the share of non-performing loans to total loans will go down almost 3.5 times (reaching 6.9 %). Thus, one can see that under the influence of negative foreign banking development trends there take place considerable negative changes in the indicators of economic development of the state in general.

In the forecast of the best-case economy development scenario and changes in the foreign banking indicators, mathematical calculations have brought the following results as compared to the values of the end

Table 4. The results of predicting the influence of foreign banking indicators on the basic indicators of financial and economic security of Ukraine

Source: Calculated by the authors.

Indicator	Calculated predicted values of performance indicators			
	Worst-case scenario	Best-case scenario	Under the realistic scenario as of the end of 2019	
			calculation by the linear regression	calculation by the linear trend
y_1	1,645,607	1,632,348	2,507,254	2,707,808
y_2	23.6	24.07	28.49	29.98
y_3	3.7	2.62	2.62	3.11
y_4	108.77	73.38	131.99	139.88
y_5	44.02	31.5	37.22	39.28
y_6	606,405	1,547,404	1,230,619	1,359,051
y_7	14,688.2	62,410.6	9,195.7	2,168.9
y_8	6.90	5.31	25.34	27.65
y_9	–68.16	41.22	–92.8	–107.02
y_{10}	–13.46	7.91	–9.47	–10.85
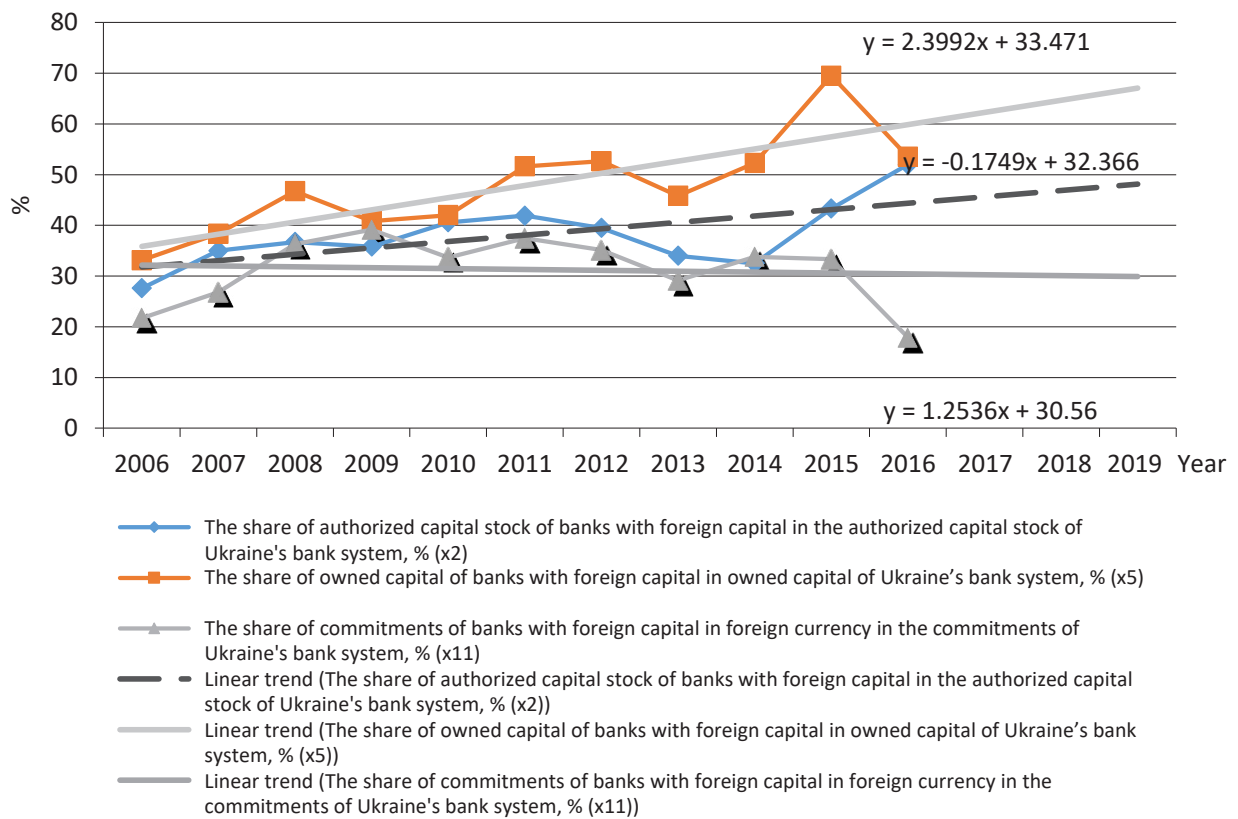
Figure 2. Trend analysis of foreign banks capital and commitments via construction of diagram reflecting the linear trend
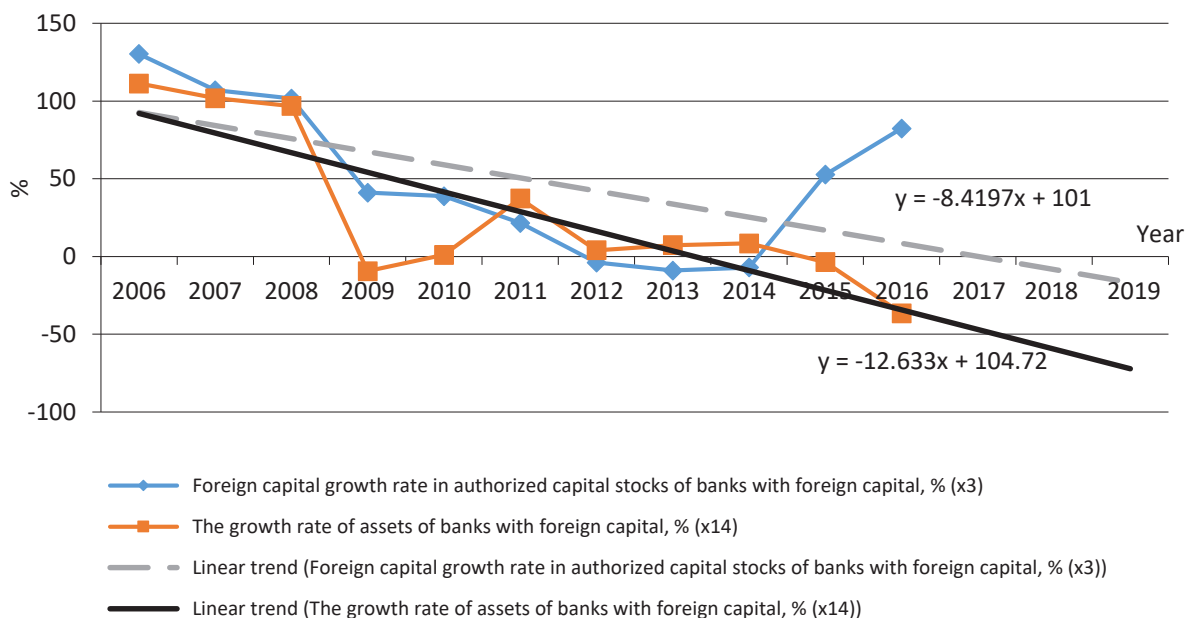
Figure 3. Trend analysis of growth rates of foreign banking indicators via construction of diagram reflecting the linear trend
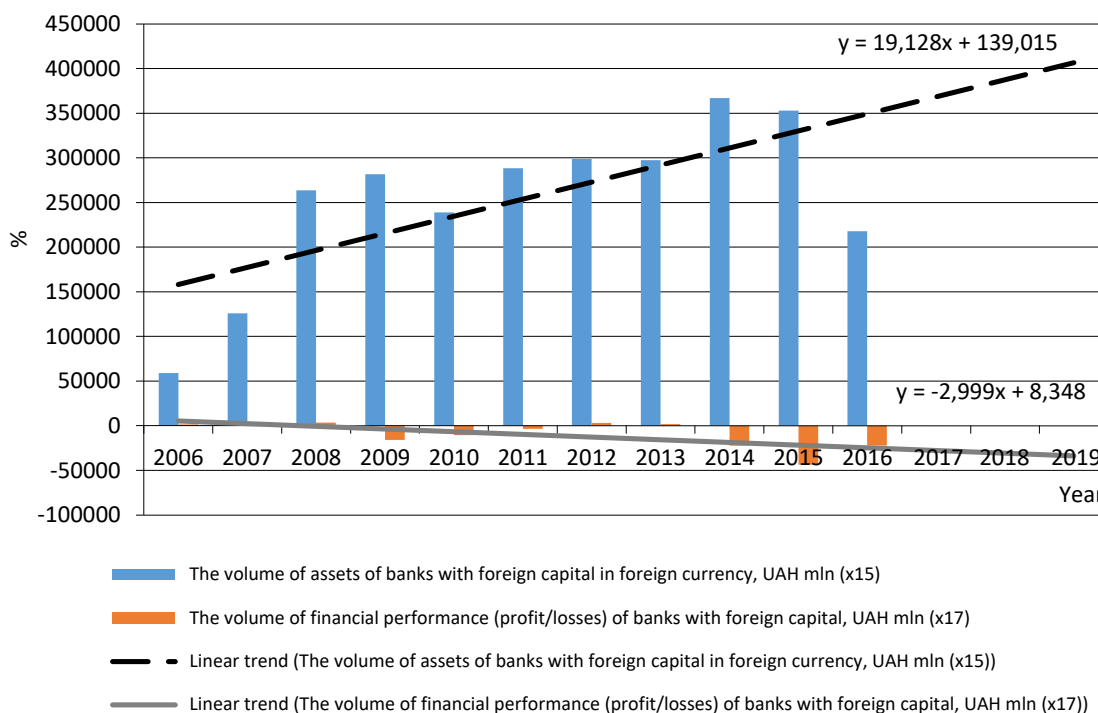
Figure 4. Trend analysis of foreign banks assets and financial performances via construction of diagram reflecting the linear trend

of 2016: though not considerably, budget deficit will go down and make up 2.62% of GDP, the level of dollarization will go down by 48.32% and will make up 73.38% as compared to 121.7% in 2016, shadow economy level will go down to 31.5%, money supply will go up reaching UAH 1,547,404 mln, the NBU's international reserves will grow considerably (making up USD 62,410.6 mln as compared to USD 15,539.33 mln as of the end of 2016), the share of non-performing loans to total loans will go down more than 4.5 times (to 5.31% as compared to 24.2% as of the end of 2016), the return on equity of the bank system will go up (ROE) and will make up 41.22% (which considerably exceeds the marginal value (no less than 15%) and will testify to the efficiency of capital investment by banks), and the return on assets indicator (ROA), the best value of which must exceed 1%, is predicted at the rate of 7.91%, which proves efficiency of the banks' asset and liability management. And even under the best-case foreign banking development scenario, the volume of GDP will go down, while the inflation rate will go up. This fact confirms availability of some third factors influencing those indicators.

Given the data of factor foreign banking development indicators calculated for 2019 using the trend analysis on condition current trends in changes of the indicators of financial and economic security of

the state still remain in effect, the calculated values of performance indicators as of the end of 2019 will be as follows:

1) calculation by the linear regression method has shown that GDP volume will grow and will make up UAH 2,507,254 mln, but the inflation rate will also grow up to 28.49%, there will be, though not a considerable one, reduction in the budget deficit – up to 2.62% to GDP (as compared to 2.9 in 2016), also, dollarization rate (131.99 % as compared to 121.7% in 2016) and shadow economy level (to 37.22%) will grow, money supply will increase and make up UAH 1,230,619 mln, the amount of NBU's international reserves will go down to USD 9,195.7 mln, the share of non-performing loans to total loans will increase and reach 25.34%, profitability indicators ROE and ROA will improve, though will still remain negative (–92.8% and –9.47%, respectively);

2) calculation by the method of linear trend construction has also shown certain predicted negative changes in some financial and economic indicators, in particular, inflation rate growth to 29.98% and dollarization to 139.88% (as compared to 12.4% and 121.7% in 2016, respectively),

increase in the share of non-performing loans to total loans up to 27.65% (as compared to 24.2% as of the end of 2016), budget deficit growth to 3.11%, shadow economy level growth up to 39.28%, though not a significant one as compared to 2016, considerable reduction in the volume of NBU's international reserves – up to USD 2,168.9 mln. In other performance indicators under study positive changes will be traced: the volume of GDP will increase up to UAH 2,707,808 mln as compared to the indicator of the end of 2016, money supply will grow and make up UAH 1,359,051 mln, return of bank capital will improve a bit up to –107.02%, ROA indicator will reach –10.85% as compared to –12.60% as of the end of 2016.

Predicted values of the indicators of financial and economic security of Ukraine in the conditions of preservation of the current trends in foreign bank-ing development are not highly attractive. Some values of the indicators in the realistic scenario are even worse than under the negative scenario of foreign banking development in Ukraine. And, vice versa, under optimistic changes in the indicators of the activity of banks with foreign capital, the growth in the country's economy in general can be traced. Taking into account all the factors influencing sustainable development and improvement of the state's economy, a conclusion can be drawn that in the conditions of preservation of the current trends in the change in the foreign banking indicators, the level of financial and economic security of the state gets worse. Therefore, state authorities should put a special emphasis on the promotion of foreign banking development, investment climate improvement in the state, involvement of foreign bank capitals and their direction to real economy funding as well as support of Ukraine's bank system sustainability in general.

CONCLUSION

Thus, predicted changes in the indicators of financial and economic security of Ukraine under the influence of foreign banking development indicators characterize both positive and some negative trends. That is related to the fact that not all factor indicators correlate equally well with performance indicators, in particular, some of them influence some indicators more and do not exert a strong influence on other ones, and vice versa, a number of factor indicators may be closely connected with some performance variables without having any connection with the other ones. One can stress that besides foreign banking indicators selected for analysis, performance variables are also influenced by other factors not taken into account in the model, and the degree of connection between them can be rather significant.

The numerical values received cannot be unambiguously interpreted as the only objective forecast. The constructed models also provide the opportunity for variation of indicators within the set intervals of values, with the permissible confidence interval of 95%. In such conditions, as well as under the influence of other indicators not studied in this research, fluctuation of the performance variables within the set interval of values is possible. To interpret the results obtained, the regression analysis should be supplemented with economic logic. Due to this, the constructed correlation and regression model enables to draw a conclusion that foreign banking does not have a substantial negative impact on the development of the state's economy and its financial and economic security, and changes in some indicators of foreign banking development even improve the values of the basic indicators of financial and economic security of the state. In unfavorable conditions of economic development, the indicators of foreign banking development change negatively, which makes the financial and economic security of the state even worse. It is suggested that state regulatory authorities should, with due account of all the factors, apply liberal approaches to state regulation of foreign banking, but use a well-balanced approach and take most efficient measures to improve the functioning of the bank system and economy of Ukraine in general.

Further scientific studies will be directed at substantiation and achievement of the best values of the core indicators of Ukraine's financial and economic security, development of the criteria and mecha-

nisms of ensuring economic growth of the state, along with minimizing threats and using the opportunities provided by foreign bank investors.

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APPENDIX

Table 1A. Indicators of the state's financial and economic security (performance indicators) to be used for the construction of the correlation and regression model

Source: Constructed by authors according to the data of the State Statistics Service of Ukraine (2017), the National Bank of Ukraine (2017), the Ministry of Finance, the Ministry of Economic Development and Trade of Ukraine (2017).

Indicators of the state's financial and economic security	Year (data at the end of period)										
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
GDP (in real prices), UAH mln (y_1)	544,153	720,731	948,056	913,345	1,082,569	1,302,079	1,411,238	1,454,931	1,586,915	1,988,544	2,383,182
Inflation rate, % (y_2)	11.6	16.6	22.3	12.3	9.1	4.6	–0.2	0.5	24.9	43.3	12.4
Budget deficit, % to GDP (y_3)	0.7	1.4	1.3	3.9	5.9	1.8	3.8	4.5	4.9	2.3	2.9
Gross foreign debt in % to GDP (y_4)	50.6	56.0	56.5	88.2	86.0	77.4	76.8	77.5	95.8	131.0	121.7
Shadow economy level, % to GDP (y_5)	29.8	28.8	31.1	39	38	34	34	35	43	40	34
Money supply, UAH mln (y_6)	261,063	396,156	515,727	487,298	597,872	685,515	773,199	908,994	956,728	994,062	1,102,700
International reserves of the NBU, USD mln (y_7)	22,358.1	32,479.06	31,543.2	26,505.11	34,576.4	31,794.61	24,546.19	20,415.71	7,533.33	13,299.99	15,539.33
The share of non-performing loans to total loans, % (y_8)	1.7	1.3	2.3	9.4	11.2	9.6	8.9	7.7	13.5	22.1	24.2
Return on equity of Ukraine's bank system (ROE), % (y_9)	13.52	12.67	8.51	–32.52	–10.19	–5.27	3.03	0.81	–30.46	–51.91	–116.74
Return on assets of Ukraine's bank system (ROA), % (y_{10})	1.61	1.50	1.03	–4.38	–1.45	–0.76	0.45	0.12	–4.07	–5.46	–12.60

Table 2A. Indicators of foreign banking that may influence the state's financial and economic security (factor indicators/exposure) to be used for the construction of the correlation and regression model

Source: Calculated and developed by authors according to the data of the National Bank of Ukraine (2017), the National Rating Agency 'Riuryk'.

Indicators of foreign banking that may influence the state's financial and economic security	Year (data at the end of period)										
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
The volume of foreign capital in authorized capital stocks of banks with foreign capital, UAH mln (x_1)	7,249.42	15,005.55	30,260.62	42,669.66	59,217.94	72,011.44	69,205.58	62,981.26	58,548.75	89,365.57	162,900.48
The share of authorized capital stock of banks with foreign capital in the authorized capital stock of Ukraine's bank system, % (x_2)	27.6	35	36.7	35.8	40.6	41.9	39.5	34	32.5	43.3	52
Foreign capital growth rate in authorized capital stocks of banks with foreign capital, % (x_3)	130.28	106.99	101.66	41.01	38.78	21.60	-3.90	-8.99	-7.04	52.63	82.29
The volume of owned capital of banks with foreign capital, UAH mln (x_4)	14,107.54	26,686.26	55,734.92	49,096.15	57,861.42	80,315.37	89,612.48	88,246.17	77,421.11	65,979.95	66,735.81
The share of owned capital of banks with foreign capital in owned capital of Ukraine's bank system, % (x_5)	33.14	38.35	46.73	40.84	42.01	51.65	52.65	45.82	52.29	69.52	53.53
Owned capital growth rate in banks with foreign capital, % (x_6)	139.56	89.16	108.85	-11.91	17.85	38.81	11.58	-1.52	-12.27	-14.78	1.15
The volume of commitments of banks with foreign capital, UAH mln (x_7)	113,646.45	231,135.96	451,565.43	408,992.35	406,067.93	556,624.37	572,566.90	622,271.20	692,892.52	676,513.42	402,415.1
The share of commitments of banks with foreign capital in the commitments of Ukraine's bank system, % (x_8)	38.19	43.63	55.97	54.3	50.48	61.93	59.83	57.36	59.29	58.44	34.99
The growth rate of commitments of banks with foreign capital, % (x_9)	108.24	103.38	95.37	-9.43	-0.72	37.08	2.86	8.68	11.35	-2.36	-40.52
The volume of commitments of banks with foreign capital in foreign currency, UAH mln (x_{10})	64,641.81	142,165.57	292,758.73	295,011.39	270,992.89	337,011.95	336,209.14	315,789.314	395,200.48	385,864.92	205,791.19
The share of commitments of banks with foreign capital in foreign currency in the commitments of Ukraine's bank system, % (x_{11})	21.72	26.83	36.29	39.17	33.69	37.5	35.13	29.11	33.82	33.33	17.89
The volume of assets of banks with foreign capital, UAH mln (x_{12})	127,753.99	257,822.21	507,300.36	459,258.50	463,929.36	636,939.75	662,179.39	710,517.38	770,313.63	742,493.37	470,801.87
The share of assets of banks with foreign capital in the assets of Ukraine's bank system, % (x_{13})	37.55	43.01	54.78	52.58	49.25	60.42	58.75	55.62	58.5	59.28	36.93
The growth rate of assets of banks with foreign capital, % (x_{14})	111.29	101.81	96.76	-9.47	1.02	37.29	3.96	7.30	8.42	-3.61	-36.59
The volume of assets of banks with foreign capital in foreign currency, UAH mln (x_{15})	58,960.26	125,840.59	263,677.43	281,773.86	239,033.79	288,356.99	298,715.83	297,411.335	366,972.691	352,861.35	217,980.46
The share of assets of banks with foreign capital in foreign currency in the assets of Ukraine's bank system, % (x_{16})	17.33	20.99	28.47	32.26	25.37	27.35	26.5	23.28	27.87	28.17	17.1
The volume of financial performance (profit/losses) of banks with foreign capital, UAH mln (x_{17})	1,496.82	2,121.95	3,355.29	-15,988.25	-10,570.64	-3,360.60	3,313.9	1,926.40	-22,371.79	-43,686.02	-22,340.6
Return on equity of banks with foreign capital (ROE), % (x_{18})	10.61	7.95	6.02	-32.57	-18.27	-4.18	3.70	2.18	-28.90	-66.21	-33.48
Return on assets of banks with foreign capital (ROA), % (x_{19})	1.17	0.82	0.66	-3.48	-2.28	-0.53	0.50	0.27	-2.90	-5.88	-4.75

Table 3A. Matrix of pair correlations for factor indicators of the model

	x_1	x_2	x_3	x_4	x_5	x_6	x_7	x_8	x_9	x_{10}	x_{11}	x_{12}	x_{13}	x_{14}	x_{15}	x_{16}	x_{17}	x_{18}	x_{19}
x_1	1.0000																		
x_2	0.8866	1.0000																	
x_3	−0.2767	−0.0816	1.0000																
x_4	0.5593	0.4110	−0.8695	1.0000															
x_5	0.6479	0.6067	−0.3989	0.6334	1.0000														
x_6	−0.6329	−0.4660	0.7765	−0.7130	−0.6047	1.0000													
x_7	0.4248	0.2742	−0.8214	0.8897	0.7846	−0.7475	1.0000												
x_8	−0.1075	−0.1015	−0.7389	0.6754	0.4543	−0.4201	0.7967	1.0000											
x_9	−0.7979	−0.6369	0.6321	−0.6568	−0.5455	0.9281	−0.5820	−0.1864	1.0000										
x_{10}	0.3176	0.2487	−0.8010	0.8274	0.7258	−0.7286	0.9617	0.8734	−0.5555	1.0000									
x_{11}	−0.2833	−0.1304	−0.5117	0.3818	0.2040	−0.2838	0.5106	0.8729	−0.0921	0.7063	1.0000								
x_{12}	0.4476	0.2953	−0.8366	0.9134	0.7761	−0.7534	0.9985	0.7905	−0.5994	0.9569	0.5005	1.0000							
x_{13}	−0.0251	−0.0250	−0.7405	0.7086	0.5480	−0.4658	0.8434	0.9940	−0.2376	0.9089	0.8453	0.8363	1.0000						
x_{14}	−0.7862	−0.6221	0.6524	−0.6676	−0.5554	0.9425	−0.6044	−0.2118	0.9992	−0.5778	−0.1113	−0.6207	−0.2628	1.0000					
x_{15}	0.3956	0.2905	−0.7950	0.8336	0.7424	−0.7851	0.9665	0.8101	−0.6276	0.9901	0.6357	0.9623	0.8516	−0.6489	1.0000				
x_{16}	−0.1638	−0.0611	−0.5049	0.3884	0.3197	−0.4208	0.5818	0.8339	−0.2257	0.7696	0.9597	0.5654	0.8237	−0.2464	0.7320	1.0000			
x_{17}	−0.5418	−0.4562	0.1306	−0.1533	−0.7053	0.6192	−0.4339	−0.0600	0.5897	−0.4264	−0.0140	−0.4068	−0.1434	0.5975	−0.4859	−0.2248	1.0000		
x_{18}	−0.5648	−0.5022	0.1999	−0.2156	−0.7011	0.6984	−0.4694	−0.1212	0.6743	−0.4868	−0.1103	−0.4461	−0.1992	0.6816	−0.5481	−0.3235	0.9842	1.0000	
x_{19}	−0.6718	−0.6020	0.1712	−0.2164	−0.6407	0.7103	−0.4023	0.0024	0.7410	−0.4134	−0.0099	−0.3866	−0.0758	0.7430	−0.4893	−0.2259	0.9557	0.9777	1.0000

Source: Calculated by authors.

Table 4A. The nature and value of influence of foreign banking indicators (factors) on the indicators of financial and economic security of Ukraine (indicators under study)

Source: Calculated by authors.

Performance indicator (dependent variable y)	Factor indicator (independent variable)	Pair correlation factor value (r)	Characteristics (degree) of linear connection	Nature of connection	Determination factor value (R^2)	Statistical value (p-level)	Regression equation
y_1	x_2	0.7668	Strong	Direct	0.5880	0.0059	$y = -1{,}167{,}343.85 + 64{,}875.9259x$
	x_3	-0.3754	Poor	Reverse	0.1409	0.2552	$y = 1{,}514{,}635.83 - 4{,}187.30282x$
	x_5	0.8152	Strong	Direct	0.6645	0.0022	$y = -882{,}161.262 + 45{,}656.4999x$
	x_{11}	-0.2118	Almost not there	Reverse	0.0448	0.5319	$y = 1{,}842{,}652.55 - 17{,}224.3237x$
	x_{14}	-0.7645	Strong	Reverse	0.5844	0.0061	$y = 1{,}541{,}061.43 - 8{,}221.54975x$
	x_{15}	0.5649	Noticeable	Direct	0.3191	0.0702	$y = 449{,}775.962 + 3.36303885x$
	x_{17}	-0.6605	Noticeable	Reverse	0.4362	0.0270	$y = 1{,}073{,}219.03 - 23.8477781x$
y_2	x_2	0.0818	Almost not there	Direct	0.0067	0.8110	$y = 8.29216794 + 0.157999887x$
	x_3	0.2751	Almost not there	Direct	0.0757	0.4129	$y = 10.7731198 + 0.0700431866x$
	x_5	0.5243	Noticeable	Direct	0.2749	0.0978	$y = -17.7699166 + 0.670178495x$
	x_{11}	0.0630	Almost not there	Direct	0.0040	0.8539	$y = 10.6450802 + 0.116999878x$
	x_{14}	0.0398	Almost not there	Direct	0.0016	0.9076	$y = 14.0266689 + 0.00976378658x$
	x_{15}	0.2513	Almost not there	Direct	0.0631	0.4560	$y = 5.6433073 + 0.00003341467782x$
	x_{17}	-0.7336	Strong	Reverse	0.5381	0.0102	$y = 8.47769552 - 0.0006060455428x$
y_3	x_2	0.1048	Almost not there	Direct	0.0110	0.7591	$y = 1.99663365 + 0.02730253x$
	x_3	-0.7447	Strong	Reverse	0.5546	0.0086	$y = 4.32766834 - 0.0255791391x$
	x_5	0.1010	Almost not there	Direct	0.0102	0.7677	$y = 2.20275229 + 0.0174153891x$
	x_{11}	0.2802	Almost not there	Direct	0.0785	0.4040	$y = 0.838549864 + 0.0701810018x$
	x_{14}	-0.7104	Strong	Reverse	0.5047	0.0143	$y = 3.71688519 - 0.0235267368x$
	x_{15}	0.5345	Noticeable	Direct	0.2857	0.0903	$y = 0.549450542 + 0.000000979946808x$
	x_{17}	-0.2109	Almost not there	Reverse	0.0445	0.5336	$y = 2.81014484 - 0.0000234526266x$
y_4	x_2	0.7023	Noticeable	Direct	0.4932	0.0160	$y = -22.6889007 + 2.78605373x$
	x_3	-0.3281	Poor	Reverse	0.1076	0.3247	$y = 92.0702481 - 0.171566745x$
	x_5	0.7924	Strong	Direct	0.6278	0.0036	$y = -16.1897364 + 2.08076862x$
	x_{11}	-0.0515	Almost not there	Reverse	0.0026	0.8805	$y = 89.5563093 - 0.196294132x$
	x_{14}	-0.8314	Strong	Reverse	0.6912	0.0015	$y = 95.5348393 - 0.419206839x$
	x_{15}	0.5817	Noticeable	Direct	0.3383	0.0605	$y = 42.2021412 + 0.000162372456x$
	x_{17}	-0.9072	Highly strong	Reverse	0.8230	0.0001	$y = 68.5942898 - 0.00153588478x$

Table 4A (cont.). The nature and value of influence of foreign banking indicators (factors) on the indicators of financial and economic security of Ukraine (indicators under study)

Performance indicator (dependent variable y)	Factor indicator (independent variable)	Pair correlation factor value (r)	Characteristics (degree) of linear connection	Nature of connection	Determination factor value (R^2)	Statistical value (p-level)	Regression equation
y_5	x_2	0.1382	Almost not there	Direct	0.0191	0.6853	$y = 31.5382157 + 0.0949621082x$
	x_3	−0.6588	Noticeable	Reverse	0.4340	0.0275	$y = 38.1672431 − 0.0596777901x$
	x_5	0.5155	Noticeable	Direct	0.2658	0.1046	$y = 23.9309103 + 0.234478542x$
	x_{11}	0.4362	Poor	Direct	0.1903	0.1798	$y = 26.1313551 + 0.288130207x$
	x_{14}	−0.7196	Strong	Reverse	0.5178	0.0125	$y = 36.9724071 − 0.062846433x$
	x_{15}	0.7819	Strong	Direct	0.6113	0.0045	$y = 25.5605361 + 0.0000378043722x$
	x_{17}	−0.7253	Strong	Reverse	0.5260	0.0115	$y = 33.1030685 − 0.00021268 1371x$
y_6	x_2	0.6216	Noticeable	Direct	0.3863	0.0412	$y = −296,488.826 + 26,117.6679x$
	x_3	−0.5682	Noticeable	Reverse	0.3229	0.0682	$y = 857,024.899 − 3,147.7191x$
	x_5	0.8028	Strong	Direct	0.6444	0.0029	$y = −370,716.737 + 22,329.5883x$
	x_{11}	−0.0929	Almost not there	Reverse	0.0086	0.7859	$y = 815,596.588 − 3,751.30187x$
	x_{14}	−0.7774	Strong	Reverse	0.6043	0.0049	$y = 818,217.578 − 4,151.98744x$
	x_{15}	0.6960	Noticeable	Direct	0.4844	0.0174	$y = 175,842.162 + 2.05798895x$
	x_{17}	−0.5958	Noticeable	Reverse	0.3550	0.0531	$y = 595,056.689 − 10.6847559x$
7	x_2	−0.0612	Almost not there	Reverse	0.0037	0.8582	$y = 26,871.8255 − 83.5498926x$
	x_3	0.2771	Almost not there	Direct	0.0768	0.4094	$y = 21,172.0735 + 49.8788448x$
	x_5	−0.5305	Noticeable	Reverse	0.2815	0.0932	$y = 46,644.6925 − 479.555936x$
	x_{11}	0.2846	Almost not there	Direct	0.0810	0.3964	$y = 11,992.4544 + 373.531212x$
	x_{14}	0.4390	Poor	Direct	0.1928	0.1767	$y = 21,485.9463 + 76.2009569x$
	x_{15}	−0.4017	Poor	Reverse	0.1614	0.2207	$y = 33,485.3416 − 0.0385973358x$
	x_{17}	0.6350	Noticeable	Direct	0.4033	0.0358	$y = 27,259.7006 + 0.370069427x$
y_8	x_2	0.7694	Strong	Direct	0.5919	0.0056	$y = −24.1032603 + 0.90006174x$
	x_3	−0.2889	Almost not there	Reverse	0.0834	0.3890	$y = 12.4217107 − 0.0445495636x$
	x_5	0.7670	Strong	Direct	0.5882	0.0059	$y = −18.2575583 + 0.59395123x$
	x_{11}	−0.1584	Almost not there	Reverse	0.0251	0.6418	$y = 15.7507559 − 0.178118656x$
	x_{14}	−0.8243	Strong	Reverse	0.6794	0.0018	$y = 13.718079 − 0.122568575x$
	x_{15}	0.5096	Noticeable	Direct	0.2596	0.1094	$y = −0.472465468 + 0.0000419464704x$
	x_{17}	−0.8483	Strong	Reverse	0.7195	0.0010	$y = 6.08768416 − 0.000423505891x$

Table 4A (cont.). The nature and value of influence of foreign banking indicators (factors) on the indicators of financial and economic security of Ukraine (indicators under study)

Performance indicator (dependent variable y)	Factor indicator (independent variable)	Pair correlation factor value (r)	Characteristics (degree) of linear connection	Nature of connection	Determination factor value (R^2)	Statistical value (p-level)	Regression equation
y_9	x_2	–0.7564	Strong	Reverse	0.5721	0.0071	$y = 153.044296 - 4.51668x$
	x_3	0.0277	Almost not there	Direct	0.0008	0.9356	$y = -20.0593391 + 0.021794547x$
	x_5	–0.5218	Noticeable	Reverse	0.2722	0.0997	$y = 79.7648772 - 2.0624915x$
	x_{11}	0.3618	Poor	Direct	0.1309	0.2742	$y = -84.0086886 + 2.07717596x$
	x_{14}	0.7112	Strong	Direct	0.5058	0.0141	$y = -34.5733971 + 0.539811956x$
	x_{15}	–0.2636	Almost not there	Reverse	0.0695	0.4336	$y = 9.14804208 - 0.000110753751x$
	x_{17}	0.7312	Strong	Direct	0.5346	0.0106	$y = -0.985418719 + 0.0018637227x$
y_{10}	x_2	–0.7293	Strong	Reverse	0.5318	0.0109	$y = 16.0737689 - 0.479401905x$
	x_3	0.0654	Almost not there	Direct	0.0043	0.8485	$y = -2.46885541 + 0.00566784234x$
	x_5	–0.5020	Poor	Reverse	0.2520	0.1157	$y = 8.27289827 - 0.218433671x$
	x_{11}	0.3142	Poor	Direct	0.0987	0.3467	$y = -8.40036679 + 0.198542832x$
	x_{14}	0.7337	Strong	Direct	0.5384	0.0102	$y = -3.95612127 + 0.0613091141x$
	x_{15}	–0.2939	Almost not there	Reverse	0.0864	0.3804	$y = 1.26710307 - 0.0000135937611x$
	x_{17}	0.7423	Strong	Direct	0.5510	0.0089	$y = -0.173904459 + 0.00020825939x$

Table 5A. The statistics of the model of researching the change of financial and economic security indicators under the influence of foreign banking indicators

Multiple regression equation for a dependent variable	Factors	Factor value	Standard deviation	t-statistics	p-level	Fisher factor, F	Multiple correlation factor, R	Determination factor, R^2
$y_1 = 462{,}606.1 + 12{,}438.6x_5 - 53{,}136.1x_{11} - 1{,}092.0x_{14} + 4.0x_{15} + 24{,}579.8x_2$	b_0	462,606.1	177,494.8	2.6063	0.047883	219.09	0.99772557	0.99545632
	b_1	12,438.6	4,055.0	3.0675	0.027864			
	b_2	-53,136.1	4,500.3	-11.8072	0.000077			
	b_3	-1,092.0	675.3	-1.6171	0.166780			
	b_4	4.0	0.6	6.4355	0.001346			
	b_5	24,579.8	4,574.5	5.3732	0.003007			
$y_2 = -22.0429 - 0.0008x_{17} + 0.1783x_{14} + 0.0001x_{15} + 0.0924x_3$	b_0	-22.0429	7.251143	-3.03992	0.022805	38.129	0.98089197	0.96214907
	b_1	-0.0008	0.000116	-6.71850	0.000529			
	b_2	0.1783	0.036464	4.89063	0.002737			
	b_3	0.0001	0.000024	3.13373	0.020229			
	b_4	0.0924	0.049030	1.88424	0.108515			
$y_3 = 8.263210 - 0.017806x_3 - 0.020639x_{14} - 0.077946x_5$	b_0	8.263210	1.923803	4.29525	0.003587	8.4281	0.88497206	0.78317554
	b_1	-0.017806	0.007990	-2.22856	0.061101			
	b_2	-0.020639	0.008495	-2.42962	0.045446			
	b_3	-0.077946	0.036562	-2.13186	0.070477			
$y_4 = 54.69912 - 0.000085x_{17} - 0.18642x_{14} + 0.44232x_2 + 0.49758x_5 - 0.47203x_{11}$	b_0	54.69912	3.937255	13.8927	0.000035	983.34	0.99949192	0.99898409
	b_1	-0.00085	0.000038	-22.4936	0.000003			
	b_2	-0.18642	0.010617	-17.5591	0.000011			
	b_3	0.44232	0.086437	5.1173	0.003716			
	b_4	0.49758	0.064477	7.7171	0.000583			
	b_5	-0.47203	0.061673	-7.6537	0.000606			
$y_5 = 41.83864 + 0.00003x_{15} - 0.00026x_{17} - 0.29944x_5 - 0.03296x_3$	b_0	41.83864	2.694658	15.52651	0.000005	46.028	0.98409323	0.96843949
	b_1	0.00003	0.000009	2.95394	0.025482			
	b_2	-0.00026	0.000031	-8.12647	0.000186			
	b_3	-0.29944	0.063145	-4.74210	0.003185			
	b_4	-0.03296	0.012816	-2.57173	0.042237			

Table 5A (cont.). The statistics of the model of researching the change of financial and economic security indicators under the influence of foreign banking indicators

Multiple regression equation for a dependent variable	Factors	Factor value	Standard deviation	t-statistics	p-level	Fisher factor, F	Multiple correlation factor, R	Determination factor, R²
$y_6 = 564{,}925.9 + 1{,}261.8x_5 + 619.6x_{14} - 31{,}935.6x_{11} + 2.8x_{15} - 0.6x_{17} + 10{,}508.2x_2 - 1{,}358.9x_3$	b_0	564,925.9	7443.503	75.895	0.000005	22140.0	0.99999032	0.99998064
	b_1	1261.8	236.283	5.340	0.012838			
	b_2	619.6	54.148	11.443	0.001432			
	b_3	-31,935.6	191.944	-166.380	0.000000			
	b_4	2.8	0.029	97.855	0.000002			
	b_5	-0.6	0.122	-4.904	0.016230			
	b_6	10,508.2	285.106	36.857	0.000044			
	b_7	-1,358.9	48.548	-27.991	0.000100			
$y_7 = -18{,}836.9 + 0.2x_{17} + 1{,}294.8x_{11} - 0.1x_{15} + 743.4x_2$	b_0	-18,836.9	9,858.325	-1.91076	0.104597	14.935	0.95327294	0.90872929
	b_1	0.2	0.094	2.59987	0.040669			
	b_2	1294.8	245.647	5.27109	0.001881			
	b_3	-0.1	0.020	-4.62902	0.003581			
	b_4	743.4	200.144	3.71414	0.009921			
$y_8 = 0.913193 - 0.000195x_{17} + 0.241245x_2 - 0.055665x_{14} - 0.247664x_{11} + 0.157976x_5$	b_0	0.913193	3.794335	0.24067	0.819366	91.174	0.99456067	0.98915093
	b_1	-0.000195	0.000037	-5.32742	0.003121			
	b_2	0.241245	0.083299	2.89613	0.033943			
	b_3	-0.055665	0.010231	-5.44071	0.002847			
	b_4	-0.247664	0.059435	-4.16699	0.008765			
	b_5	0.157976	0.062136	2.54241	0.051742			
$y_9 = -3.13067 - 0.64592x_2 + 0.00023x_{17} + 2.27571x_{11} + 0.57504x_{14} - 0.52090x_3 - 0.00020x_{15}$	b_0	-3.13067	51.92785	-0.06029	0.954818	9.9287	0.96802852	0.93707922
	b_1	-0.64592	1.29868	-0.49737	0.645028			
	b_2	0.00023	0.00064	0.36341	0.734691			
	b_3	2.27571	1.14954	1.97967	0.118847			
	b_4	0.57504	0.26987	2.13082	0.100116			
	b_5	-0.52090	0.31157	-1.67184	0.169874			
	b_6	-0.00020	0.00016	-1.24289	0.281789			
$y_{10} = -1.61614 + 0.00008x_{17} - 0.10324x_2 + 0.12672x_{11} + 0.05890x_{14} - 0.02977x_3$	b_0	-1.61614	6.666221	-0.24244	0.818072	8.3349	0.94492054	0.89287482
	b_1	0.00008	0.000059	1.40876	0.217951			
	b_2	-0.10324	0.149255	-0.69167	0.519942			
	b_3	0.12672	0.119274	1.06243	0.336640			
	b_4	0.05890	0.032740	1.79889	0.131946			
	b_5	-0.02977	0.027337	-1.08895	0.325856			