UKRAINE AND GERMANY: COMMON TENDECIES OF FINANCIAL MARKET DEVELOPMENT ACCORDING TO THE BANK-CENTERED MODEL

Sergey M. Kozmenko*, Tatyana A. Vasilyeva**, Sergey V. Leonov***

Abstract

In order to confirm the hypothesis about the bank-centered type of the financial market in Ukraine we conducted a comparative analysis of individual indicators of the financial development of Ukraine and Germany, because the financial market of the latter is considered to be the classic example of the bank-centered model. Assuming that the parameters of the development of the banking system, stock market and economy in general of Germany and Ukraine are incommensurable at the present time, the authors introduced the time intervals (lags) which arise between the extremes of the fluctuating tendencies for each indicator.

Keywords: Banking System, Financial Market, Germany, Ukraine

** Prof., Dr., Vice-Chancellor in Research, Ukrainian Academy of Banking, Ukraine*
*** Prof., Dr., Chair in Management, Ukrainian Academy of Banking, Ukraine*
**** Prof., Dr., Department of Accounting, Ukrainian Academy of Banking, Ukraine*

Today there are different kinds of financial market models according to the role that the banking system plays in the process of accumulation and investment of capital in all spheres of the economy and in providing the necessary conditions of economic growth.

The first model – so called ***bank-centered or continental*** (France, Germany, other countries of Europe, Japan) is based on the fact that that the basis of the financial market is the activity of banks, and their role in the mechanism of economic growth is vital.

The second model - so called ***stock-centered model*** (model "with wide participation" or Anglo-Saxon model) (USA, Great Britain) focuses on the functioning of stock markets, hence the role of banking system in the mechanism of economic growth is considered insignificant.

The third model - so called "***mixed***" model takes intermediate position between the bank-centered financial market model and the system with the domination of the stock market.

The fourth model - so called "***Islamic***" model, which is characterized by the relatively simplified institutional structure of financial markets, their limited liquidity, closed nature, unification of financial instruments, prevalence of big family investors, absence of mass small investors and speculators, fragmentary participation of banks.

The typical representative of countries with the bank-centered model of financial markets is Germany, while the USA is the typical country for the model "with wide participation". According to the typology of financial markets structure the arrangement of countries on "the scale of transition" from bank-centered financial markets to the system with the domination of stock markets is demonstrated on Fig.1.

Fig. 1. The arrangement of countries on "the scale of transition" from bank-centered to stock-market centered models of financial market

At the same time, we can not speak about the decline of the stock market in countries with bank-centered model of financial market. Modern financial systems of France and Germany combine the traditionally important financial intermediaries with the progressive role of financial markets.

In France the universal banking was restored in 1984 (investment and commercial banks were separated there since 1945). In Germany stock markets are actively developing in the recent time.

Bank-centered model of financial market (Roman-Germanic model) was historically established in the countries of continental Europe and Japan. It is characterized by the prevalence of credit (in different forms) in the aggregate of financial instruments and the priority of banks as financial institutions. In countries with this model of financial market banking has the universal character, i.e. banks simultaneously accomplish commercial and investment operations, and also some services are carried out under the active supervision of the state. Investors (mostly universal banks) minimize risks by establishing the control over the activity of corporations on the whole and over the realization of some investment projects. At present we can observe a close crossing of their interests, cross stockholding and mutual representation in managerial bodies of members in the Financial Industry Groups (FIGs).

A more coarse-grained structure of property in the European countries needs intensified administration and centralization of capital flows through the banking system (for this reason this market model was called bank-centered). The bank-centered model of financial market creates relatively more opportunities for regulation in the operational sense, because in this case the economy does not depend much on the institutional environment, it is less receptive to the asymmetry of economic information and does not limit the transformation of resources.

The bank-centered model means a considerable participation of commercial banks in the control over enterprises due to the developed system of crediting. The important factor behind the wide-spread borrowings by corporations in countries with the continental model is a relatively low cost of capital. For example, in Japan the usage of the cheap loan capital for financing large-scale investment programs was one of the peculiarities of the strategy during the initial phase of industrialization, which was achieved due to the close cooperation of the Central Bank of Japan, commercial banks, companies and the government. The low level of bank loan interest rates was ensured by its linkage to the official short-term deposit and loan discount rate, and the low level of the interest rate on banking bonds – to the official long- term deposit and loan discount rate. For this reason the access to the capital was accomplished mainly due to lending, the share of which in the volume of borrowed funds was nearly 90 per cent during the periods of high economic growth.

The bank-centered model of financial market became widespread in Germany, which industrialization in the XIX century was closely associated with the establishment of universal banks which provided assistance to companies both as creditors and co-owners of companies. In XIX century the German economy was developing rapidly and constantly required huge amounts of external finance. In such conditions the functioning of banks was extremely important. Moreover, the development of stock markets was held back by the conservatism of society, while banking was traditional. Taking it into account, banks of continental Europe developed actively, introduced new operations and by the beginning of the XIX century carried out deposit, credit, discount operations, securities trading, in particular, share emission of companies. Big banks closely co-operated with the biggest companies and thus were interested in obtaining a strategic control over them, which was possible by participating in the corporate management of companies. In 1978 banks of Germany owned almost 40 per cent of 100 biggest corporations, and bank representatives occupied two third of their managing positions[1]. It gave banks an

[1] Franklin A. Comparative Financial Systems: A Survey / A. Franklin, D. Gale. – N. Y., 2001. – 69 p.

opportunity to control the solvency of the borrowing companies, the effectiveness of using the borrowed money; to receive dividends from investing in shares; to receive stable income from clients who became regular customers of banks.

Within this model of financial market banks have a free access to the market of fictitious capital, they are allowed to combine usual banking operations (deposit of money, lending and payment operations) with the majority of investment operations on the stock market. According to this approach risk restriction of banking investment operations should be carried out not by "surgical" measures of direct divisions of functions, but by means of implementation of special "built-in" restraints which discourage banks' overinvestment in securities, by means of a proper state control over banking operations as well as increased attention to the problem of conflict of interests during the operations on financial markets.

While studying the development model of financial markets in any country one should take into account the whole number of political, legal, historical patterns, trajectory and traditions of the previous market development. Researchers of European Central Bank developed the economic-mathematical general equilibrium model that explains why financial systems of two countries can totally differ from one another, even if macroeconomic state growth parameters remain practically identical throughout the long period[2]. According to the model, the long-term existence of stock-centered financial market model in some countries is explained by the fact that in the past substantial fixed costs were incurred related to the creation of such financial structures, while their further operations and the maintenance of efficiency did not require such considerable expenditures. The use of this type of financial market structure for the transformation of savings into investments can be cheaper than in the case of the bank-centered financial market.

The deliberate slowing down of the banking system's development in the past was the main factor in the formation of the stock-centered financial market model. The striking example of that is the history of the financial market model formation in the USA. The result of restrictions on the territorial banking expansion in the USA from the middle of XIX century and the absence of a Central Bank in this country till 1913 led to a whole number of banking crises (1857, 1873, 1884, 1893, 1907) which made businessmen use alternative ways to finance their businesses – stock instruments. The usage of one or another mechanism for the slowing down of the development of a certain financial market segment is often stipulated by the peculiarity of this segment's functioning in the past. Experts say that historically English banks placed an emphasis on the maintenance of liquidity often to the detriment of lending to the real production sector on the assumption that banks had no interest in conducting a detailed monitoring of their potential customers.

The uneven economic development of different countries and disproportionate distribution of financial resources makes less developed countries adopt an intensive way of development for their national economies. The majority of developing countries follow the forms and methods of development of financial and economic relations of industrially advanced countries that give them an opportunity to pass some stages of economic establishment at a rapid pace.

Our analysis suggests that certain stages of transformation and reforms implementation in the Ukrainian economy duplicate certain stages of development of Western European countries. Such tendencies can be explained:

- firstly, by the course declared by the Ukrainian political elite concerning the country's potential entry into European Union and other international organizations;
- secondly, by the peculiarities of development of Ukrainian financial system and its infrastructure (after gaining its independence Ukraine took the European and American experience as the basis for the formation of its domestic financial system).

Researchers point out that ***Ukraine repeats the path of financial development of Germany***. At the same time one should mention that such a statement is empirical and was not confirmed by any serious economic research.

In this article we set an objective to conduct a research in this scientific area and to prove the existence of a single-type interconnection between different financial market segments and macroeconomic indicators of Ukraine and Germany. The confirmation of the fact gives us an opportunity to substantiate the evidence that in Ukraine just like in Germany the financial market is bank-centered, and banks play the leading role in ensuring the economic growth.

Let us analyze the general tendency of financial system development in Germany and in Ukraine in more detail.

The credit segment is the most developed and powerful sector on the German financial market. The biggest part of the country's financial resources is accumulated and reallocated through its infrastructure. Non-bank commercial institutions allocate and reallocate a considerably smaller part of the German financial resources. The only exception is insurance companies, because sizable investment resources in Germany are accumulated by life assurance. The volume of financial transactions that are carried out

[2] Monnet Z. Quintin E. Why Do Financial Systems Differ? History Matters / Z. Monnet, E. Quintin // ECB Working Paper. – 2005. – № 442. – P. 25–45.

on the German stock market keeps increasing at a slow pace, and for some kinds of operations even decreases. The weight of stock market transactions is insignificant in the aggregate volume of capital flows in Germany.

In ***Ukraine*** the banking system also predominates in resource allocation of the country, because it accumulates the biggest part of the country's financial capital. The minor influence of domestic non-bank commercial institutions on the development of the financial system in Ukraine is caused by the small volumes (in comparison with banks) of non-bank financial intermediaries and inadequate quality of services they offer. The weak impact of the domestic stock market on the development of the country's financial system is explained by the initial stage of its development. The Ukrainian stock market is not developed enough. There are significant problems concerning the growth of its infrastructure, formation of the legislative basis for stock-market transactions, implementation of technologies for stock trades, requirements to the listing procedures, extension of additional rights to the state supervisory bodies.

Therefore, in Germany and Ukraine the leading position in the expanded reproduction mechanism, distribution and re-distribution of financial resources belongs to the banking system.

Let us make the comparative analysis and determine the correlation between the main parameters of the banking system, stock market development and macroeconomic indicators of the economic development of these countries. The establishment of these correlations gives an opportunity to make the calculation of parameters of the banking system's functioning, the market of non-banking services, stock markets and the GDP of Ukraine on the basis of Germany's characteristics.

Table 1 provides the statistical data for such analysis. On the basis of the data shown in Table 1 we will calculate the statistical indicators that characterize the dynamics of the banking system's indicators, the market of non-banking services, stock market and the GDP of both Germany and Ukraine (Table 2).

Table 1. Data systematization for the comparative analysis of the banking system's parameters, the market of non-banking services, stock market functioning and the GDP in Germany and Ukraine, EUR millions*

Parameters	*Years*								
	2000	*2001*	*2002*	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*
Volume of loans issued by commercial banks to firms									
Germany	2445700	2497100	2505800	2497400	2479700	2504600	2536100	2556000	2686900
Ukraine	36.97	56.00	76.98	97.68	111.64	171.98	263.04	392.34	597.47
Total assets of Central Bank									
Germany	256916	239997	240083	267439	293272	343919	373535	483674	612563
Ukraine	84.92	101.78	113.85	119.46	132.57	193.06	219.91	282.29	462.02
Total assets of commercial banks									
Germany	6083900	6386110	6452299	6470882	6663797	6903169	7187714	7625737	7956390
Ukraine	66.82	107.46	134.74	166.38	203.27	334.71	536.82	866.44	1201.46
Total assets of non-bank commercial institutions									
Germany	2412565	2542032	2568394	2641858	2686451	2790995	2858361	2898840	2943570
Ukraine	4.03	6.25	10.60	18.60	33.15	39.43	51.54	59.84	68,.56
Assets of financial systems									
Germany	8753381	9168139	9260776	9380179	9643520	10038083	10419610	11008251	11512523
Ukraine	155.77	215.48	259.19	304.44	368.99	567.20	808.27	1208.57	1732.04
Stock market capitalization									
Germany	604409	413978	422058	418601	329756	460301	370735	376534	157330
Ukraine	18.85	16.75	46.28	42.52	107.54	230.19	351.66	816.21	235.18
GDP									
Germany	2025500	2063700	2112400	2129200	2207200	2241000	2302700	2423000	2489400
Ukraine	338185	424193	448917	443768	522154	690859	858705	1041834	1232309

* - made on the basis[3]

[3] The official site of Deutsche Bundesbank [Economic resource]. – Regime of access : http://www.bundesbank.de
The official site of Federal Statistical Office of Germany [Economic resource]. – Regime of access : http://www.destatis.de.
The official site of Federal Financial Supervisory Authority of Germany [Economic resource]. – Regime of access : http://www.bafin.de/
Бюлетень Національного банку України № 12/2006 (165) [Електронний ресурс]. – Режим доступу : http://www.bank.gov.ua/Publication/econom/Buleten/2006/bull_12-06.pdf
Бюлетень Національного банку України № 12/2008 (189) [Електронний ресурс]. – Режим доступу : http://www.bank.gov.ua/Publication/econom/Buleten/2008/bull_12-8.pdf
Інформація про стан і розвиток страхового ринку України за 2002 рік [Електронний ресурс]. – Режим доступу : http://www.dfp.gov.ua/files/Fin_markets_2002.pdf
Основні показники системи кредитних спілок (формат Microsoft Excel) [Електронний ресурс]. – Режим доступу : http://www.dfp.gov.ua/ 733.html

Table 2. Statistical indicators that characterize the dynamics of the banking system's parameters, the market of non-banking services, stock market functioning and the GDP for Ukraine and Germany in 2001-2008

Indicator	*Germany*			*Ukraine*			*General tendency of the indicator's dynamics*
	Average absolute growth, million EUR	*Average growth coefficient, units*	*Average growth rate, per cent*	*Average absolute growth, million EUR*	*Average growth coefficient, units*	*Average growth rate , per cent*	
Volume of loans issued to firms by commercial banks	30150.0	1.01	1.35	70.06	1.49	48.81	common
Total assets of Central Bank	44455.9	1.13	13.22	47.14	1.27	27.38	common
Total assets of commercial banks	234061.3	1.04	3.91	141.83	1.51	51.10	common
Total assets of non-banking commercial institutions	66375.6	1.03	2.88	8.07	1.50	49.92	common
Assets of financial systems	344892.7	1.04	3.99	197.03	1.41	41.07	common
Stock market capitalization	**-55884.9**	**0.83**	**-17.49**	**27.04**	**1.43**	**43.41**	**different**
GDP	57987.5	1.03	2.99	111765.5	1.20	20.29	common

Основні показники системи ломбардів (формат Microsoft Excel) [Електронний ресурс]. – Режим доступу : http://www.dfp.gov.ua/731.html

Основні показники системи недержавного пенсійного забезпечення (формат Microsoft Excel) [Електронний ресурс]. – Режим доступу : http://www.dfp.gov.ua/ 732.html

Річний звіт Державної комісії з регулювання ринків фінансових послуг за 2003 рік (формат PDF) [Електронний ресурс]. – Режим доступу : http://www.dfp.gov.ua/fileadmin/downloads/Zvit_DFP_2003.pdf

Річний звіт Державної комісії з регулювання ринків фінансових послуг за 2005 рік (формат PDF) [Електронний ресурс]. – Режим доступу : http://www.dfp.gov.ua/files/RK-5907.pdf

Річний звіт Державної комісії з регулювання ринків фінансових послуг за 2006 рік (формат PDF) [Електронний ресурс]. – Режим доступу : http://www.dfp.gov.ua/files/RK-7572.pdf

Річний звіт Державної комісії з регулювання ринків фінансових послуг за 2007 рік (формат PDF) [Електронний ресурс]. – Режим доступу : http://www.dfp.gov.ua/fileadmin/downloads/ZVIT_NA_SAIT_2007pdf.pdf

Річний звіт Державної комісії з регулювання ринків фінансових послуг за 2008 рік (формат PDF) [Електронний ресурс]. – Режим доступу : http://www.dfp.gov.ua/fileadmin/downloads/richnyi_zvit_2008_1.pdf

Річний звіт Національного банку України за 2006 р. (формат PDF) [Електронний ресурс]. – Режим доступу : http://www.bank.gov.ua/Publication/an_rep/A_report_2006.pdf

Річний звіт Національного банку України за 2008 р. (формат PDF) [Електронний ресурс]. – Режим доступу : http://www.bank.gov.ua/Publication/an_rep/A_report_2008.pdf

Річні звіти ПФТС: 2000-2008 рр. (формат PDF) [Електронний ресурс]. – Режим доступу : http://www.dfp.gov.ua/731.html http://www.pfts.com/uk/yearly-reports

Фінансовий стан та розвиток кредитних спілок у 2004 році [Електронний ресурс]. – Режим доступу : http://www.dfp.gov.ua/files/KC_2004.pdf

Analyzing the data of Table 2 one can assert that ***Ukraine and Germany have identical tendencies concerning the dynamics of all indicators, with an exception of stock market capitalization.*** During 2001-2008 the volume of loans issued by commercial banks to firms in Germany kept increasing by 30150.0 million EUR annually. In Ukraine, the increase of this parameter averaged 48.81 per cent.

A similar tendency is also true to the indicators of the financial system's assets and assets of central banks, commercial banks and non-banking institutions. It applies to both absolute and relative indicators that characterize the financial systems of both countries. The average absolute increase of the total assets of the German Central Bank accounts for 44455.9 million EUR, while in Ukraine this indicator totaled 47.14 million EUR.

The average growth coefficient of the total assets of German commercial banks during 2001-2008 amounted to 1.04 units, and to 1.51 units in Ukraine. The average growth rate of the total assets of non-banking commercial institutions amounted 2.88 per cent in Germany and 49.92 per cent in Ukraine. As a result of the growth in the total assets of banking and non-banking institutions the increase of the financial system's assets is observed both in Germany and Ukraine.

The growth trends also impact the GDP. In Germany this indicator during the analyzed period grew on average by 3 per cent, in Ukraine the average GDP growth rate GDP amounted 20.3 per cent.

The only indicator that demonstrated recessionary tendency from 2001 till 2008 is a stock market capitalization in Germany. During the analyzed period this parameter on average fell 17.49 per cent. In Ukraine the stock market capitalization over the same period increased by 43.41 per cent on average.

Considering the qualitative characteristic of statistical regularities that reflect the correlation between the indicators which define the financial system, the stock market and the GDP of Ukraine and Germany, ***it is necessary to provide their quantitative evaluation. It will make it possible not only to find the interdependence***, but also to formalize them on the basis of analytical correlation.

The determination of existence, density and trend of any correlation is carried out through ***correlation analysis***. The determination of the variation degree of the resultant variable under the influence of factoral variables is based on ***regressive analysis.***

Assuming that the development parameters of the financial system's, stock market and economy of Germany and Ukraine are incomparable at the moment, there is the necessity to determine the time intervals (lags) that occur between the trends of every parameter[4].

Now we will determine the correlation coefficients between the growth parameters of the financial system, stock market and the GDP for Ukraine and Germany.

[4] Soyoung K. Do monetary policy shocks matter in G-7 countries? Using common identifying assumptions about monetary policy across countries / K. Soyoung // Journal of international economics . – 1999. – №2. – 387–412 p.

$$r_{x_{1j}x_{2j}} = \frac{n \times \sum_{i=1}^{n} x_{1j}x_{2j} - \sum_{i=1}^{n} x_{1j} \sum_{i=1}^{n} x_{2j}}{\sqrt{\left(n\sum_{i=1}^{n} x_{1j}^2 - (\sum_{i=1}^{n} x_{1j})^2 \right)\left(n\sum_{i=1}^{n} x_{2j}^2 - (\sum_{i=1}^{n} x_{2j})^2 \right)}} \quad (1)$$

where $r_{x_{1j}x_{2j}}$ is the correlation coefficient for the interdependency of x_{1j} and x_{2j} parameters of the relevant country (1 – Germany, 2 – Ukraine);

x_{11} and x_{21} are the volumes of loans issued by commercial banks to the firms in Germany and Ukraine;

x_{12} and x_{22} are the total assets of Central Banks in Germany and Ukraine;

x_{13} and x_{23} are the total assets of commercial banks in Germany and Ukraine;

x_{14} and x_{24} are the total assets of non-banking commercial institutions in Germany and Ukraine;

x_{15} and x_{25} are the assets of financial system of Germany and Ukraine;

x_{16} and x_{26} are the stock market capitalization of Germany and Ukraine;

x_{17} and x_{27} are the GDP of Germany and Ukraine.

The results of the calculation of correlation coefficients are shown in Table 3.

Table 3. Calculation of correlation coefficients between the indicators of development rates of the banking system, stock market and the GDP of Ukraine and Germany

Indicators	*Years of comparison*						
	2008/ 2008	*2008/ 2007*	*2008/ 2006*	*2008/ 2005*	*2008/ 2004*	*2008/ 2003*	*2008/ 2002*
Volume of loans issued by commercial banks to firms	**0.94746**	0.84601	0.69423	0.38223	0.24997	0.64753	0.86810
Total assets of Central Bank	0.98667	**0.98800**	0.95129	0.94754	0.84137	0.63514	-0.69609
Total assets of commercial banks	0.97744	**0.97857**	0.96184	0.93091	0.88292	0.82350	0.93626
Total assets of non-banking commercial institutions	0.97546	0.98522	0.98039	**0.99121**	0.95418	0.98286	0.92896
Assets of financial systems	0.97452	**0.97798**	0.96885	0.95793	0.93028	0.87153	0.90973
Stock market capitalization	-0.26677	-0.40976	-0.16453	**-0.76224**	-0.30718	-0.40496	-0.36209
GDP	0.98323	0.97769	0.97873	0.98913	0.98408	0.98103	**0.99830**

Note: the correlation coefficients in the table characterize the biggest correlation between the indicators

The correlation coefficients presented in table 3 are the quantitative parameters for determining the dynamics trends in Ukraine and comparing them with the same parameters in Germany. Correlation coefficients are defined as forecast indicators in specified time intervals.

We will take a look at the correlation coefficients for the parameters as the function of closeness between the growth indicators of Germany and Ukraine according to time lags and find the extreme points of this function.

The maximum point of the function of the analyzed interval (from 2000 till 2008) is the identifier of different trends in both countries. Taking into account all points of the local maximums of the functions we determine the maximum correlation coefficient:

$$\max_j \max \left\{ r_{x_{1j}x_{2j}} \right\} \max_j \max \left\{ r_{x_{1j}x_{2j}} \right\} \quad (2)$$

We will analyze the correlation coefficients for certain developmental parameters of Germany and Ukraine (Fig. 2 and Fig. 3).

Fig.2. Correlation coefficients with time lags from 2008/2008 till 2008/2002 for the following indicators: volume of loans issued by commercial banks to firms, total assets of Central Banks and stock market capitalization of Germany and Ukraine

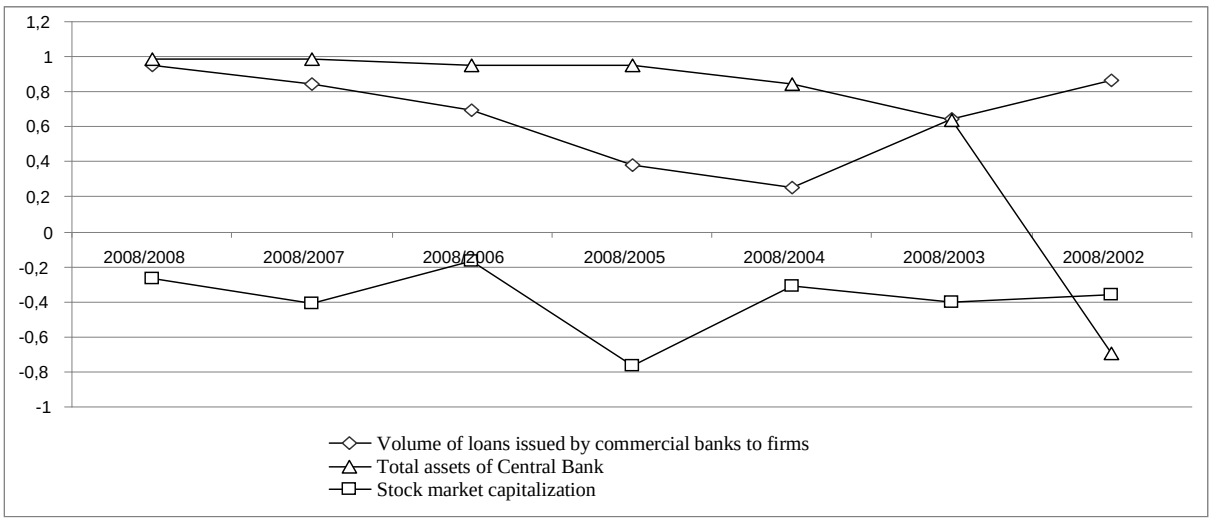
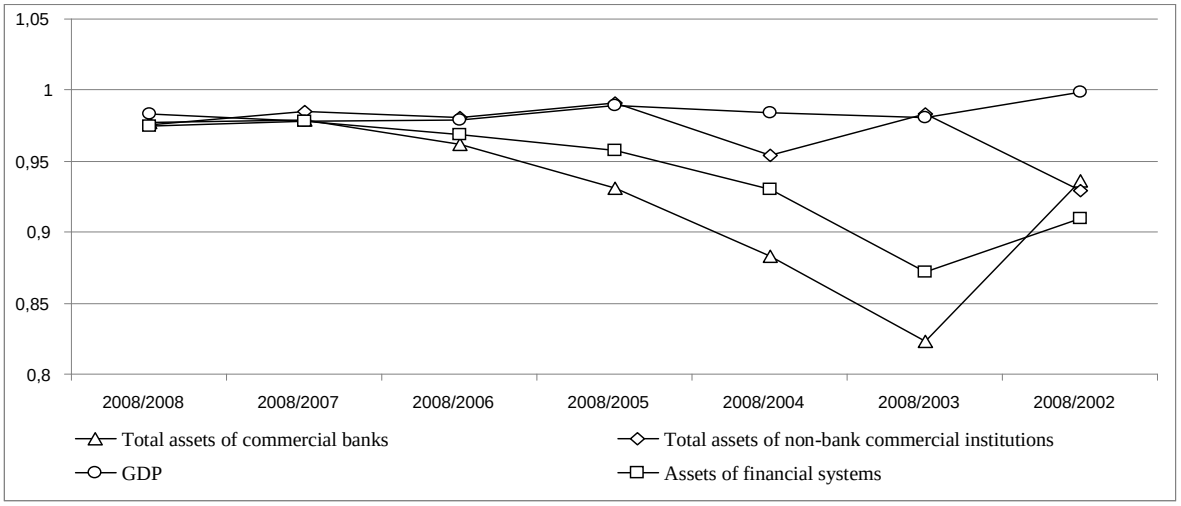


Fig.3. Correlation coefficients with time lags from 2008/2008 till 2008/2002 for the following indicators: total assets of commercial banks, total assets of non-banking commercial institutions, assets of financial system and the GDP of Germany and Ukraine.



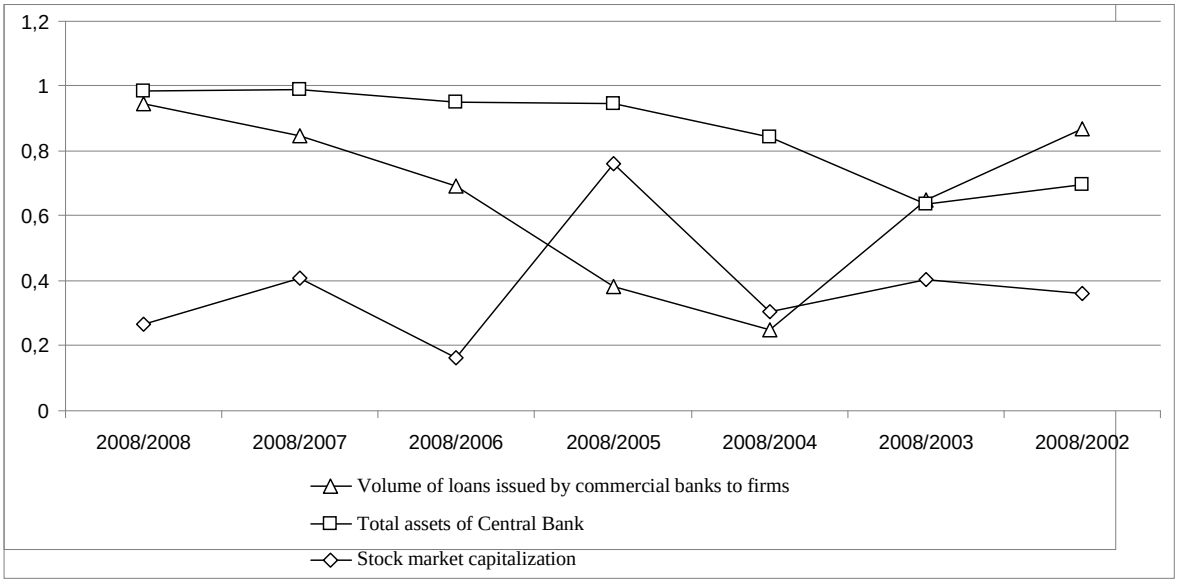
The analysis of the data presented in Fig. 2 and Fig. 3 makes it possible to draw the conclusions:

- among all the studied parameters and their correlated interconnections, only the correlation coefficient between the indicators of stock markets' capitalization of Germany and Ukraine has a negative mutual correlation. In other words, with the decrease of stock market capitalization in Germany there is the growth of stock market capitalization in Ukraine;
- for other parameters, the correlations of which we analyzed (volume of loans issued by commercial banks to firms, total assets of commercial banks, total assets of non-banking commercial institutions, assets of financial system and the GDP) we observe definite correlated connections. In other words, with the increase of the levels of these parameters in Germany there is the reduction of their levels in Ukraine;
- the only parameter that changes its interconnection during the analyzed interval is the total assets of a central bank. During the period 2000-2007 simultaneously with the increase in the Deutsche Bundesbank's assets
- there was both an increase and decrease in the assets of the National Bank of Ukraine.

As it is generally known the correlation analysis makes it possible to define not only the direction of interconnection between different indicators, but also their density. Proceeding from this assumption and on the basis of Fig. 2 and Fig. 3 ***we will determine the***

density of interconnection of analyzed parameters (from Fig. 4 one should take into account the absolute value of correlation coefficients between stock market capitalization in Germany and Ukraine in order to carry out the analysis).

Fig.4. Correlation coefficients with time lags from 2008/2008 till 2008/2002 for the following indicators: volume of loans issued by commercial banks to firms, total assets of Central Bank and stock market capitalization in Germany and Ukraine



The analysis of the data presented in Fig. 3 and Fig. 4 makes it possible to draw the following conclusions:

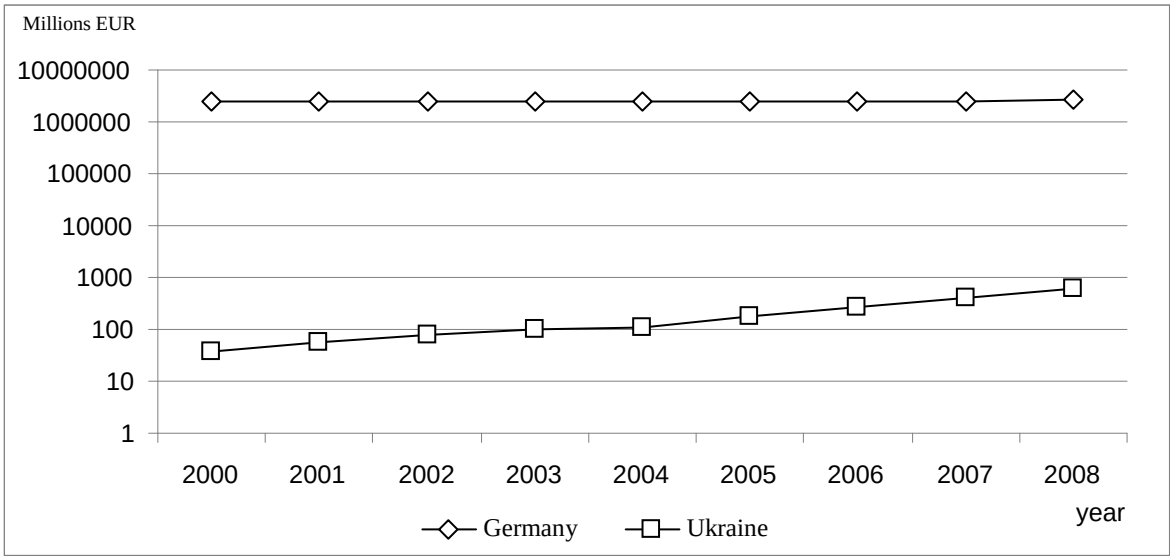
- there is a strong connection between all analyzed parameters of the economic development in Germany and Ukraine, because their correlation coefficients exceed 0.7 units, which is marginally permissible for such a connection;
- the closest interconnection between the changes of loan volumes issued by commercial banks to firms in Ukraine and Germany occurs in 2008/2008 (lag 0);
- the closest interconnection between the changes in the total assets of the Deutsche Bundesbank and the National Bank of Ukraine, changes in the total assets of commercial banks in Germany and Ukraine, and changes in total assets of the financial systems of these countries is observed in 2008/2007 (lag 1);
- the closest interconnection between the changes of the total assets of non-banking commercial institutions in Germany and Ukraine, and changes of stock market capitalization occurs in 2008/2005 (lag 3);
- the closest interconnection between the changes in the gross domestic product of Germany and Ukraine occurred in 2008/ 2002 (lag 6);
- among the studied parameters the most closely connected are the GDP in Germany and Ukraine with a lag in 6 periods (years) because correlation coefficients are the highest and amount to 0.99830 that proves a high degree of connection;
- the lowest dependency (-0.76224) has the indicator of stock market capitalization, that is the increase of the level of this parameter in Germany is accompanied by simultaneous reduction of the parameter in Ukraine.

The conducted correlation and regression analysis can be used for the modeling of interconnections between the main characteristics of the banking systems, stock markets and GDPs in Germany and Ukraine. It would give us an opportunity to define the prognostic values for every individual indicator (loan volumes issued by commercial banks to firms, total assets of a Central Bank, total assets of commercial banks, total assets of non-banking commercial institutions, total assets of the financial system, stock market capitalization, GDP) and establish an interconnection between indicators.

Now we will build a linear regression that describes the correlation between the volumes of loans given by commercial banks to firms in Germany and Ukraine. Such modeling have the following stages.

During the first stage we will study the type, peculiarities and oscillatory trends of interconnection between the volumes of loans issued by commercial banks to firms in Germany and Ukraine. We will carry out such research through the analysis of the graphic presentation of the dynamics of changes in the volumes of loans during 2000-2008 (Fig. 5).

Fig. 5. Dynamics of the volumes of loans given by commercial banks to firms in Germany and Ukraine during 2000-2008, millions UAH (on the basis of[5])



[5] The official site of Federal Statistical Office of Germany [Economic resource]. – Regime of access : http://www.destatis.de
Бюлетень Національного банку України № 12/2006 (165) [Електронний ресурс]. – Режим доступу : http://www.bank.gov.ua/Publication/econom/Buleten/2006/bull_12-06.pdf
Бюлетень Національного банку України № 12/2008 (189) [Електронний ресурс]. – Режим доступу : http://www.bank.gov.ua/Publication/econom/Buleten/2008/bull_12-8.pdf

Analyzing the time series for both Germany and Ukraine and making their comparison we can make a conclusion that some trends are common for the two countries. It means the absence of a time lag which is needed to be passed by one country in order to achieve the trend of the other (regarding the volumes of loans given by commercial banks to firms).

During the second stage we will further investigate the earlier determined interconnection. For this purpose during the research of the dynamics of changes of commercial banks lending to businesses we will move the time series of these data for Ukraine by one year relative to the time series of these data for Germany. The results of this analysis are shown in Table 4.

Table 4. Estimation of interdependency between the changes in the volume of loans issued to firms by commercial banks in Germany and Ukraine during 2000-2008

Lag	*Country*	*Output data for analysis (by years)*									*Correlation coefficients*	
		2000	*2001*	*2002*	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*	*Germany*	*Ukraine*
1 lag	Germany	2445700	2497100	2505800	2497400	2479700	2504600	2536100	2556000	2686900	1	
	Ukraine	36.97429	55.99759	76.97859	97.68442	111.63646	171.98235	263.03555	392.34016	597.46886	0.94746	1
2 lag	Germany	2445700	2497100	2505800	2497400	2479700	2504600	2536100	2556000	2686900	1	
	Ukraine	55.99759	76.97859	97.68442	111.63646	171.98235	263.03555	392.34016	597.46886		0.846011	1
3 lag	Germany	2445700	2497100	2505800	2497400	2479700	2504600	2536100	2556000	2686900	1	
	Ukraine	76.97859	97.68442	111.63646	171.98235	263.03555	392.34016	597.46886			0.69423	1
4 lag	Germany	2445700	2497100	2505800	2497400	2479700	2504600	2536100	2556000	2686900	1	
	Ukraine	97.68442	111.63646	171.98235	263.03555	392.34016	597.46886				0.38223	1
5 lag	Germany	2445700	2497100	2505800	2497400	2479700	2504600	2536100	2556000	2686900	1	
	Ukraine	111.63646	171.98235	263.03555	392.34016	597.46886					0.24997	1
6 lag	Germany	2445700	2497100	2505800	2497400	2479700	2504600	2536100	2556000	2686900	1	
	Ukraine	171.98235	263.03555	392.34016	597.46886						0.64753	1
7 lag	Germany	2445700	2497100	2505800	2497400	2479700	2504600	2536100	2556000	2686900	1	
	Ukraine	263.03555	392.34016	597.46886							0.86810	1

During the third stage we will study the depth of interconnection between the volumes of loans issued by commercial banks to firms in Germany and Ukraine with different time lags. For this purpose we will calculate the correlation coefficients (Table 5) and analyze the trends in the changes of loan volumes in Ukraine in accordance with the tendencies of such changes in Germany.

Table 5. Correlation coefficients between the changes in the volumes of loans issued to firms by commercial banks in Ukraine and Germany during 2000-2008

Germany/Ukraine	*Years of comparison*						
	2008/ 2008	*2008/ 2007*	*2008/ 2006*	*2008/ 2005*	*2008/ 2004*	*2008/ 2003*	*2008/ 2002*
Volume of loans issued to firms by commercial banks	**0.95489**	0.84047	0.70909	0.36714	0.18056	0.60756	**0.85953**

Note: the correlation coefficients in the table characterize the biggest correlation between the indicators.

The analysis of data given in Table 5 let us make a conclusion that the closest interconnection between the volumes of loans issued by commercial banks to firms in Germany and Ukraine occurs in two cases: (1) in case of a zero time lag, that is the time series of 2000-2008 correlating without the shift of data in time, (2) with the time lag 6 (volumes of loans issued by commercial banks to firms in Germany from 2000 till 2002 correspond to the volumes of loans issued by commercial banks to firms in Ukraine from 2000 till 2008).

During the fourth stage we will perform the analysis of the closeness of interdependencies between the volumes of loans issued by commercial banks to firms in Germany and Ukraine. We will analyze every correlation coefficient for the corresponding time lag and compare them with the correlation coefficients for the previous time lag. Furthermore, we will identify the increase of interrelations and determine the biggest coefficient, which is the identifier of the biggest coincidence in the changing trends in both countries. The results of the analysis makes it possible to make a conclusion that a zero time lag corresponds to the goal of our research concerning the estimation of interrelation between the volumes of loans issued by commercial banks to firms in Germany and Ukraine.

During the fifth stage we will define the analytic dependence between the volumes of loans issued by commercial banks to firms in Germany and Ukraine by making a linear regression:

$$C^U(t) = -6299{,}96 + 0{,}0026 \times C^G(t) \quad (3)$$

where $C^U(t)$ is the volumes of loans issued by commercial banks to firms in Ukraine in *t* period; $C^G(t)$ is the volumes of loans issued by commercial banks to firms in Germany in *t* period.

On the basis of the constructed model of the linear regression for volumes of loans issued by commercial banks to firms in Germany and Ukraine we can draw a conclusion that during the studied period with the growth of the volume of loans issued by commercial banks to firms in Germany by 1 million euro, the volume of such loans in Ukraine increases at a slower pace – by 2.6 thousand euro.

For the purpose of testing the level of statistical significance of the obtained equation of the linear regression we will conduct a regression analysis, the results of which are represented on Fig. 6.

Fig. 6. Results of the regression analysis about the correlation of loans issued to firms by commercial banks in Germany and Ukraine

	A	B	C	D	E	F	G	H	I
109	*Regression statistics*								
110	Multiple R	0,94746							
111	R-square	0,89768							
112	Adjusted R-square	0,88306							
113	Standard Error	64,02804							
114	Observations	9							
115									
116	ANOVA								
117		*df*	*SS*	*MS*	*F*	*Significance F*			
118	Regression	1	251760,6458	251760,6458	61,41117	0,0001			
119	Resudial	7	286897,1314	4099,5902					
120	Total	8	280457,7772						
121									
122		*Coefficients*	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95%*	*Upper 95%*
123	Intercept	-6299,95751	829,77615	-7,59236	0,00013	-8262,06632	-4337,8487	-8262,06632	-4337,8487
124	Germany	0,00258	0,00033	7,83653	0,0001	0,0018	0,00335	0,0018	0,00335

As it's seen from Fig. 6 the actual values of Student's t criteria exceed the critical values. This shows the adequacy and statistical significance of the equation of the linear regression. We will perform a similar research for other characteristics of the functioning of financial system and stock markets in Germany and Ukraine.

We will determine the analytic dependence between the total assets of central banks of Ukraine and Germany.

Fig. 7. Dynamics of total assets of central bank in Germany and Ukraine during 2000-2008, millions UAH

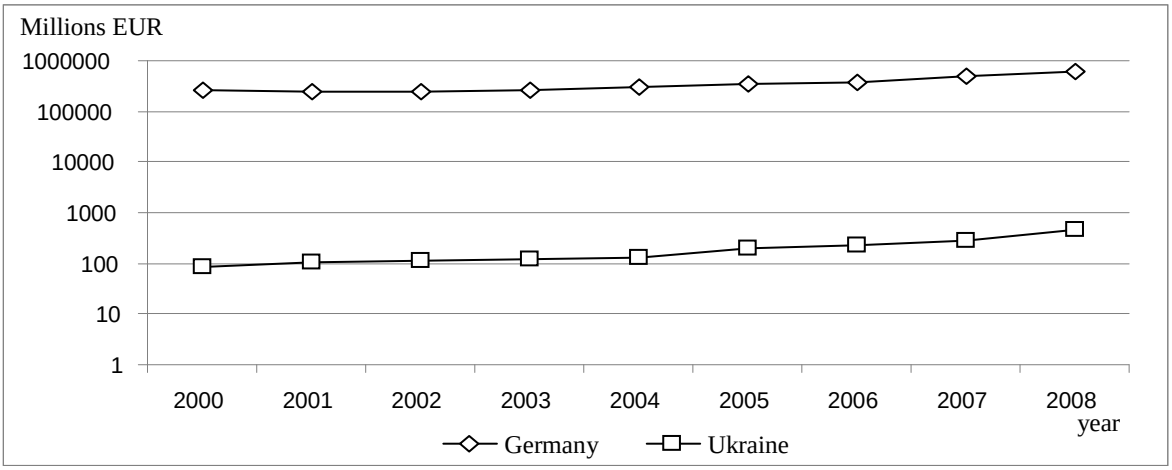


Fig. 8. Results of the regression analysis of total assets correlation of central banks in Germany and Ukraine

	A	B	C	D	E	F	G	H	I
53	*Regression statistics*								
54	Multiple R	0.988							
55	R-square	0.97615							
56	Adjusted R-square	0.97218							
57	Standard Error	20.32223							
58	Observations	8							
59									
60	ANOVA								
61		*df*	*SS*	*MS*	*F*	*Significance F*			
62	Regression	1	101420,2481	101420,2481	245,5737	0			
63	Resudial	6	2477,95924	412,99321					
64	Total	7	103898,2073						
65									
66		*Coefficients*	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95%*	*Upper 95%*
67	Intercept	-241,72914	29,28214	-8,25517	0,00017	-313,37995	-170,07833	-313,37995	-170,07833
68	Germany	0,00142	0,00009	15,67079	0	0,0012	0,00165	0,0012	0,00165

Table 6. Correlation coefficients of total assets indicators of central banks of Ukraine and Germany during 2000-2008

Germany/Ukraine	***Ears of comparison***						
	2008/ 2008	***2008/ 2007***	***2008/ 2006***	***2008/ 2005***	***2008/ 2004***	***2008/ 2003***	***2008/ 2002***
Correlation coefficients of total assets indicators of central banks of Germany and Ukraine	0.98667	**0.98800**	0.95129	0.94754	0.84137	0.63514	-0.69609

Table 7. Estimation of interdependency between changes of total assets of central banks in Germany and Ukraine during 2000-2008 (calculated on the basis of the data[6])

Lag	***Country***	***Output data for analysis (by years)***									***Correlation coefficients***	
		2000	***2001***	***2002***	***2003***	***2004***	***2005***	***2006***	***2007***	***2008***	***Germany***	***Ukraine***
1 lag	Germany	256916	239997	240083	267439	293272	343919	373535	483674	612563	1	
	Ukraine	84,91917	101,77622	113,85460	119,45920	132,56574	193,05779	219,90721	282,29087	462,02387	0,98667	1
2 lag	Germany	256916	239997	240083	267439	293272	343919	373535	483674	612563	1	
	Ukraine	101,77622	113,85460	119,45920	132,56574	193,05779	219,90721	282,29087	462,02387		0,98800 31	1
3 lag	Germany	256916	239997	240083	267439	293272	343919	373535	483674	612563	1	
	Ukraine	113,85460	119,45920	132,56574	193,05779	219,90721	282,29087	462,02387			0,95129	1
4 lag	Germany	256916	239997	240083	267439	293272	343919	373535	483674	612563	1	
	Ukraine	119,45920	132,56574	193,05779	219,90721	282,29087	462,02387				0,94754	1
5 lag	Germany	256916	239997	240083	267439	293272	343919	373535	483674	612563	1	
	Ukraine	132,56574	193,05779	219,90721	282,29087	462,02387					0,84137	1
6 lag	Germany	256916	239997	240083	267439	293272	343919	373535	483674	612563	1	
	Ukraine	193,05779	219,90721	282,29087	462,02387						0,63514	1
7 lag	Germany	256916	239997	240083	267439	293272	343919	373535	483674	612563	1	
	Ukraine	219,90721	282,29087	462,02387							-0,69609	1

[6] Річний звіт Національного банку України за 2006 р. (формат PDF) [Електронний ресурс]. – Режим доступу : http://www.bank.gov.ua/Publication/an_rep/A_report_2006.pdf

Річний звіт Національного банку України за 2008 р. (формат PDF) [Електронний ресурс]. – Режим доступу : http://www.bank.gov.ua/Publication/an_rep/A_report_2008.pdf

The official site of Deutsche Bundesbank [Economic resource]. – Regime of access : http://www.bundesbank.de

On the basis on the interim calculations, presented on Fig. 7 and Fig. 8, in Table 5 and Table 6, we will identify the analytic dependence between the total assets of central banks in Ukraine and Germany by building a linear regression:

$$A_{cb}^{U}(t+1) = -241{,}73 + 0{,}00142 \times A_{cb}^{G}(t) \quad (4)$$

where $A_{cb}^{U}(t+1)$ is the total assets of the National Bank of Ukraine in (t+1) period; $A_{cb}^{G}(t)$ is total assets of the Deutsche Bundesbank in t period.

The Fishers F-test is considered to be the evidence of statistical significance of the determined relationship and its relevance to the real conditions (Fig. 8). Analyzing the data presented above, we can come to the conclusion that the total assets of the National Bank of Ukraine in each of the analyzed periods correspond to the total assets of the Deutsche Bundesbank in the previous period. In other words, according to this criterion Germany is one year ahead of Ukraine. The increase in the total assets of the Deutsche Bundesbank by 1 miln. Euro corresponds to the increase in the total assets of the National Bank of Ukraine by 1.42 thousand euro.

We will define the analytical dependence between the total assets of commercial banks in Ukraine and Germany.

Fig. 9. Changes in the total assets of commercial banks of Germany and Ukraine during 2000-2008, millions UAH (made on the basis of the data[7])

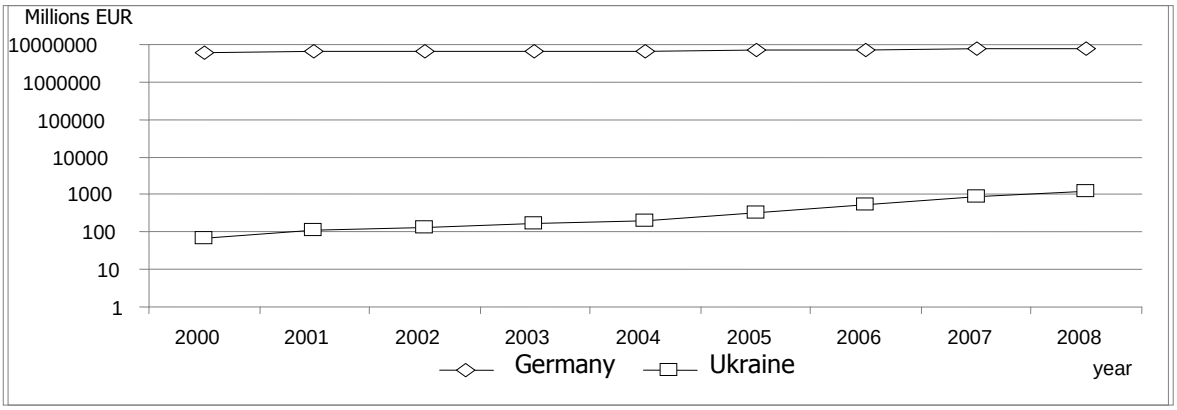


Fig. 10. Results of the regression analysis about the correlation of commercial banks' total assets in Germany and Ukraine

	A	B	C	D	E	F	G	H	I
47		*Regression statistics*							
48	Multiple R	0,97857							
49	R-square	0,95759							
50	Adjusted R-square	0,95053							
51	Standard Error	88,83964							
52	Observations	8,00000							
53									
54	ANOVA								
55		*df*	*SS*	*MS*	*F*	*Significance F*			
56	Regression	1	1069339,56280	1069339,56280	135,48839	0,00002			
57	Resudial	6	47354,88663	7892,48111					
58	Total	7	1116694,44943						
59									
60		*Coefficients*	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95%*	*Upper 95%*
61	Intercept	-4847,39662	455.6654902163	-10,63806	0,00004	-5962,36991	-3732,42334	-5962,36991	-3732,42334
62	Germany	0.00078719758	0,00007	11,63995	0,00002	0,00062	0,00095	0,00062	0,00095

[7] The official site of Deutsche Bundesbank [Economic resource]. – Regime of access : http://www.bundesbank.de

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Table 7. Correlation coefficients of indicators of commercial banks total assets in Germany and Ukraine during 2000-2008

Germany/Ukraine	*Years of comparison*						
	2008/ 2008	*2008/ 2007*	*2008/ 2006*	*2008/ 2005*	*2008/ 2004*	*2008/ 2003*	*2008/ 2002*
Correlation coefficients of indicators of commercial banks total assets in Germany and Ukraine	0.97744	**0.97857**	0.96184	0.93091	0.88292	0.82350	0.93626

On the basis of the calculations presented above, we will identify the analytical dependence between the total assets of commercial banks in Ukraine and Germany by constructing a linear regression:

$$A_b^{\,U}(t+1) = -4847{,}4 + 0{,}00079 \times A_b^{\,G}(t) \quad (5)$$

where $A_b^{\,U}(t+1)$ is the total assets of commercial banks in Ukraine in (t+1) period; $A_b^{\,G}(t)$ is the total assets of commercial banks in Germany in t period.

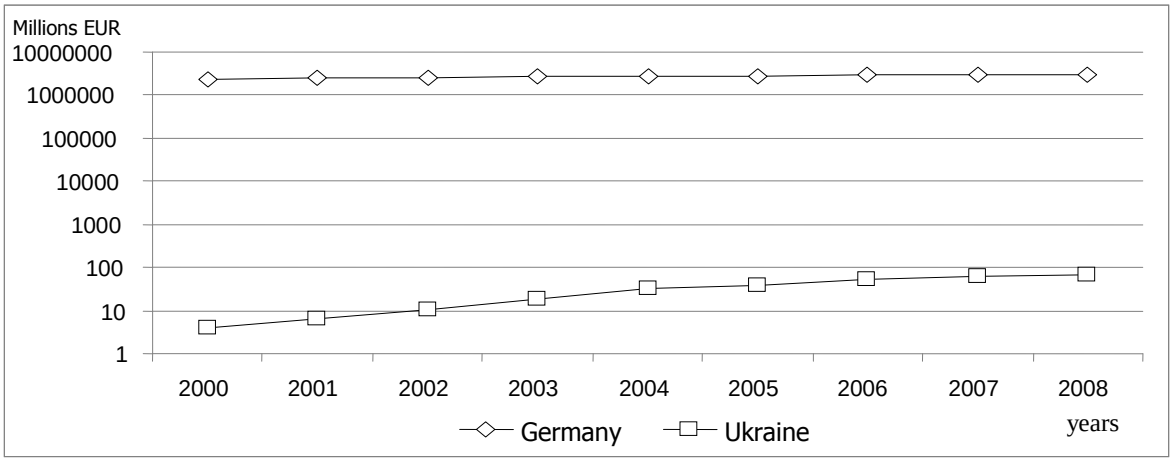
Analyzing the data presented above we conclude that the total assets of commercial banks of Ukraine in each of the analyzed periods correspond to the total assets of commercial banks of Germany in the previous period. So, according to this criterion Germany goes one year ahead of Ukraine. Comparing the analysis results concerning the total assets of central and commercial banks of these countries, we come to the conclusion that the dynamics of changes of commercial banks' total assets in Ukraine is much slower then in Germany, because the growth of commercial banks' total assets in Germany by 1 million euro is accompanied by the increase of this indicator in Ukraine by 0.79 thousand euro. The Fisher's F-test and interval of parameters for the constructed regression equation prove the statistical significance of the determined dependence (5) and its relevance to the real conditions (Fig. 10). It confirms the assumption about the existing correlation between the volume of commercial banks' total assets in Ukraine and Germany (taking into account other factors, in particular, stock market characteristics).

Table 8. Estimation of interdependency between the changes in commercial banks' total assets in Germany and Ukraine during 2000-2008

Lag	*Country*	*Output data for analysis (by years)*									*Correlation coefficients*	
		2000	*2001*	*2002*	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*	*Germany*	*Ukraine*
1	Germany	6083900	6386110	6452299	6470882	6663797	6903169	7187714	7625737	7956390	1	
lag	Ukraine	66.82008	107.45781	134.73589	166.38072	203.26792	334.71259	536.82289	866.44227	1201.46147	0.97744	1
2	Germany	6083900	6386110	6452299	6470882	6663797	6903169	7187714	7625737	7956390	1	
lag	Ukraine	107.4578	134.7359	166.3807	203.2679	334.7126	536.8229	866.4423	1201.4615		0.97857	1
3	Germany	6083900	6386110	6452299	6470882	6663797	6903169	7187714	7625737	7956390	1	
lag	Ukraine	134.7359	166.3807	203.2679	334.7126	536.8229	866.4423	1201.4615			0.96184	1
4	Germany	6083900	6386110	6452299	6470882	6663797	6903169	7187714	7625737	7956390	1	
lag	Ukraine	166.3807	203.2679	334.7126	536.8229	866.4423	1201.4615				0.93091	1
5	Germany	6083900	6386110	6452299	6470882	6663797	6903169	7187714	7625737	7956390	1	
lag	Ukraine	203.2679	334.7126	536.8229	866.4423	1201.4615					0.88292	1
6	Germany	6083900	6386110	6452299	6470882	6663797	6903169	7187714	7625737	7956390	1	
lag	Ukraine	334.7126	536.8229	866.4423	1201.4615						0.82350	1
7	Germany	6083900	6386110	6452299	6470882	6663797	6903169	7187714	7625737	7956390	1	
lag	Ukraine	536.8229	866.4423	1201.4615							0.93626	1

We will define the analytical dependence between the total assets of non-banking commercial institutions in Ukraine and Germany.

Fig. 11. The dynamics of changes in the total assets of non-banking commercial institutions in Germany and Ukraine during 2000-2008, millions UAH (made on the basis of the data[8])



[8] Інформація про стан і розвиток страхового ринку України за 2002 рік [Електронний ресурс]. – Режим доступу : http://www.dfp.gov.ua/files/Fin_markets_2002.pdf

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Основні показники системи ломбардів (формат Microsoft Excel) [Електронний ресурс]. – Режим доступу : http://www.dfp.gov.ua/731.html

Основні показники системи недержавного пенсійного забезпечення (формат Microsoft Excel) [Електронний ресурс]. – Режим доступу : http://www.dfp.gov.ua/ 732.html

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Річний звіт Державної комісії з регулювання ринків фінансових послуг за 2005 рік (формат PDF) [Електронний ресурс]. – Режим доступу : http://www.dfp.gov.ua/files/RK-5907.pdf

Річний звіт Державної комісії з регулювання ринків фінансових послуг за 2006 рік (формат PDF) [Електронний ресурс]. – Режим доступу : http://www.dfp.gov.ua/files/RK-7572.pdf

Річний звіт Державної комісії з регулювання ринків фінансових послуг за 2007 рік (формат PDF) [Електронний ресурс]. – Режим доступу : http://www.dfp.gov.ua/fileadmin/downloads/ZVIT_NA_SAIT_2007pdf.pdf

Річний звіт Державної комісії з регулювання ринків фінансових послуг за 2008 рік (формат PDF) [Електронний ресурс]. – Режим доступу : http://www.dfp.gov.ua/fileadmin/downloads/richnyi_zvit_2008_1.pdf

Фінансовий стан та розвиток кредитних спілок у 2004 році [Електронний ресурс]. – Режим доступу : http://www.dfp.gov.ua/files/KC_2004.pdf

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The official site of Federal Financial Supervisory Authority of Germany [Economic resource]. – Regime of access : http://www.bafin.de/

Fig. 12. Results of the regression analysis on the correlation of the total assets of non-banking commercial institutions in Germany and Ukraine

	A	B	C	D	E	F	G	H	I
47	*Regression statistics*								
48	Multiple R	0,99121							
49	R-square	0,98250							
50	Adjusted R-square	0,97812							
51	Standard Error	2,71597							
52	Observations	6,00000							
53									
54	ANOVA								
55		*df*	*SS*	*MS*	*F*	*Significance F*			
56	Regression	1	1656,46935	1656,46935	224,56124	0,00012			
57	Resudial	4	29,50588	7,37647					
58	Total	5	1685,97523						
59									
60		*Coefficients*	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95%*	*Upper 95%*
61	Intercept	-318,97183	24,32632	-13,11221	0,00020	-386,51251	-251,43115	-386,51251	-251,43115
62	Germany	0,00014	0,00001	14,98537	0,00012	0,00011	0,00017	0,00011	0,00017

Table 9. Correlation coefficients of indicators of total assets of non-banking commercial institutions of Germany and Ukraine during 2000-2008

Germany/Ukraine	***Years of comparison***						
	2008/ 2008	***2008/ 2007***	***2008/ 2006***	***2008/ 2005***	***2008/ 2004***	***2008/ 2003***	***2008/ 2002***
Correlation coefficients of indicators of total assets of non-banking commercial institutions in Germany and Ukraine	0.97546	0.98522	0.98039	**0.99121**	0.95418	0.98286	0.92896

Table 10. Estimation of interdependency between the changes in the total assets of non-banking commercial institutions of Germany and Ukraine during 2000-2008

Lag	***Country***	***Output data for analysis (by years)***									***Correlation coefficients***	
		2000	***2001***	***2002***	***2003***	***2004***	***2005***	***2006***	***2007***	***2008***	***Germany***	***Ukraine***
1	Germany	2412565	2542032	2568394	2641858	2686451	2790995	2858361	2898840	2943570	1	
lag	Ukraine	4.02752	6.24771	10.59502	18.60448	33.15213	39.42941	51.54366	59.84023	68.55863	0.97546	1
2	Germany	2412565	2542032	2568394	2641858	2686451	2790995	2858361	2898840	2943570	1	
lag	Ukraine	6.24771	10.59502	18.60448	33.15213	39.42941	51.54366	59.84023	68.55863		0.98522	1
3	Germany	2412565	2542032	2568394	2641858	2686451	2790995	2858361	2898840	2943570	1	
lag	Ukraine	10.59502	18.60448	33.15213	39.42941	51.54366	59.84023	68.55863			0.98039	1
4	Germany	2412565	2542032	2568394	2641858	2686451	2790995	2858361	2898840	2943570	1	
lag	Ukraine	18.60448	33.15213	39.42941	51.54366	59.84023	68.55863				0.99121	1
5	Germany	2412565	2542032	2568394	2641858	2686451	2790995	2858361	2898840	2943570	1	
lag	Ukraine	33.15213	39.42941	51.54366	59.84023	68.55863					0.95418	1
6	Germany	2412565	2542032	2568394	2641858	2686451	2790995	2858361	2898840	2943570	1	
lag	Ukraine	39.42941	51.54366	59.84023	68.55863						0.98286	1
7	Germany	2412565	2542032	2568394	2641858	2686451	2790995	2858361	2898840	2943570	1	
lag	Ukraine	51.54366	59.84023	68.55863							0.92896	1

On the basis of the calculations presented above we will identify the analytical dependence between the total assets of non-banking commercial institutions in Ukraine and Germany by constructing a linear regression:

$$A_{nb}^{U}(t+3) = -318{,}97 + 0{,}00014 \times A_{nb}^{G}(t) \quad (6)$$

where $A_{nb}^{U}(t+3)$ is the total assets of non-banking commercial institution in Ukraine in (t+3) period; $A_{nb}^{G}(t)$ is the total assets of non-banking commercial institutions of Germany in t period.

Analyzing the data we come to the conclusion that the total assets of non-banking commercial institutions of Ukraine in each of the analyzed periods correspond to the total assets of non-banking commercial institutions of Germany 3 years later. With the growth in the total assets of non-banking commercial institutions in Germany by 1 mln. euro the total assets of non-banking commercial institutions in Ukraine increase by 0.14 thousand Euro. The general quality of the developed model makes it possible to transfer the received results of the stratified sample to the general sample, as proved by the coefficient of determination. In this case it is an indicator of the influence of the changes in the total assets of non-banking commercial institutions in Germany on the level of this indicator in Ukraine. So, 98 per cent of the total assets of non-banking commercial institutions of Ukraine are explained by

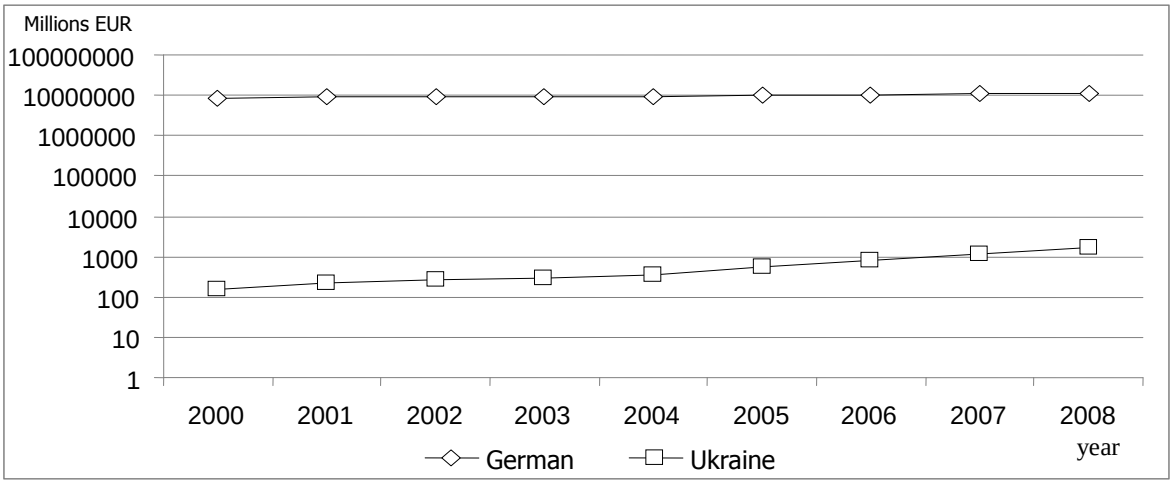
the factor variance of the total assets of non-banking commercial institutions in Germany, and only 2 per cent - by unexpected and insignificant factors (see Fig. 13).

We will define the analytical dependence between the total assets of financial systems in Ukraine and Germany.

Fig.14. The results of the regression analysis on the correlation of the total assets of financial institutions in Germany and Ukraine

	A	B	C	D	E	F	G	H	I
47	*Regression statistics*								
48	Multiple R	0,97798							
49	R-square	0,95645							
50	Adjusted R-square	0,94919							
51	Standard Error	121,86705							
52	Observations	8,00000							
53									
54	ANOVA								
55		*df*	*SS*	*MS*	*F*	*Significance F*			
56	Regression	1	1956815,66132	1956815,66132	131,75811	0,00003			
57	Resudial	6	89109,46282	14851,57714					
58	Total	7	2045925,12414						
59									
60		*Coefficients*	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95%*	*Upper 95%*
61	Intercept	-6265,56296	606,88317	-10,32417	0,00005	-7750,55257	-4780,57334	-7750,55257	-4780,57334
62	Germany	0,00072	0,00006	11,47859	0,00003	0,00056	0,00087	0,00056	0,00087

Fig.13. The dynamics of changes in the total assets of the financial systems in Germany and Ukraine during 2000-2008, millions UAH (made on the basis of the data[9])



[9] The official site of Federal Statistical Office of Germany [Economic resource]. – Regime of access :http://www.destatis.de. The official site of Federal Financial Supervisory Authority of Germany [Economic resource]. – Regime of access : http://www.bafin.de/

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Бюлетень Національного банку України № 12/2008 (189) [Електронний ресурс]. – Режим доступу : http://www.bank.gov.ua/Publication/econom/Buleten/2008/bull_12-8.pdf

Table 11. Correlation coefficients for the indicators of the total assets of financial institutions in Germany and Ukraine during 2000-2008

Germany/Ukraine	*Years of comparison*						
	2008/ 2008	*2008/ 2007*	*2008/ 2006*	*2008/ 2005*	*2008/ 2004*	*2008/ 2003*	*2008/ 2002*
Correlation coefficients for the indicators of the total assets of financial institutions in Germany and Ukraine	0.97452	0.97798	0.96885	**0.95793**	0.93028	0.87153	0.90973

On the basis of the calculations presented above, we will identify an analytical dependence between the total assets of financial systems in Ukraine and Germany by constructing a linear regression:

$$A_{fs}^{\ U}(t+1) = -6265{,}56 + 0{,}00072 \times A_{fs}^{\ G}(t) \quad (7)$$

where $A_{fs}^{\ U}(t+1)$ is the total assets of the financial system in Ukraine in (t+1) period; $A_{fs}^{\ G}(t)$ is the total assets of the financial system in Germany in t period.

The general quality and adequacy of the model 7 is confirmed by the Fishers F-test, and the statistical significance of the linear regression equation is confirmed by Student's t-test (Fig. 14).

Analyzing the data we come to the conclusion that the total assets of the financial system in Ukraine in each of the analyzed periods correspond to the volume of the total assets of the German financial system in the previous period. Therefore, according to this criterion, Germany goes one year ahead of Ukraine. If the assets of the German financial system increase by 1 million euro, the increase of the assets in Ukraine will be by 0.72 thousand euro.

We will define the analytical dependence the volumes of stock market capitalization in Ukraine and Germany.

Table 12. Estimation of interdependency between the changes in the total assets of the financial institutions in Germany and Ukraine during 2000-2008

Lag	Country	Data for analysis (by years)									Correlation coefficients	
		2000	2001	2002	2003	2004	2005	2006	2007	2008	Germany	Ukraine
1 lag	Germany	8753381	9168139	9260776	9380179	9643520	10038083	10419610	11008251	11512523	1	
	Ukraine	155.7668	215.4817	259.1855	304.4444	368.9858	567.1998	808.2738	1208.5734	1732.0440	0.97452	1
2 lag	Germany	8753381	9168139	9260776	9380179	9643520	10038083	10419610	11008251	11512523	1	
	Ukraine	215.4817	259.1855	304.4444	368.9858	567.1998	808.2738	1208.5734	1732.0440		0.97798	1
3 lag	Germany	8753381	9168139	9260776	9380179	9643520	10038083	10419610	11008251	11512523	1	
	Ukraine	259.1855	304.4444	368.9858	567.1998	808.2738	1208.5734	1732.0440			0.96885	1
4 lag	Germany	8753381	9168139	9260776	9380179	9643520	10038083	10419610	11008251	11512523	1	
	Ukraine	304.4444	368.9858	567.1998	808.2738	1208.5734	1732.0440				0.95793	1
5 lag	Germany	8753381	9168139	9260776	9380179	9643520	10038083	10419610	11008251	11512523	1	
	Ukraine	368.9858	567.1998	808.2738	1208.5734	1732.0440					0.93028	1
6 lag	Germany	8753381	9168139	9260776	9380179	9643520	10038083	10419610	11008251	11512523	1	
	Ukraine	567.1998	808.2738	1208.5734	1732.0440						0.87153	1
7 lag	Germany	8753381	9168139	9260776	9380179	9643520	10038083	10419610	11008251	11512523	1	
	Ukraine	808.2738	1208.5734	1732.0440							0.90973	1

Table 14. Estimation of interdependency between the changes in volumes of stock market capitalization in Germany and Ukraine during 2000-2008

Lag	Country	Data for analysis (by years)									Correlation coefficients for relevant country	
		2000	2001	2002	2003	2004	2005	2006	2007	2008	Germany	Ukraine
1 lag	Germany	604409	413978	422058	418601	329756	460301	370735	376534	157330	1	
	Ukraine	18.84905	16.74838	46.28139	42.52042	107.54078	230.19457	351.66424	816.21301	235.18422	-0.26677	1
2 lag	Germany	604409	413978	422058	418601	329756	460301	370735	376534	157330	1	
	Ukraine	16.74838	46.28139	42.52042	107.54078	230.19457	351.66424	816.21301	235.18422		-0.40976	1
3 lag	Germany	604409	413978	422058	418601	329756	460301	370735	376534	157330	1	
	Ukraine	46.28139	42.52042	107.54078	230.19457	351.66424	816.21301	235.18422			-0.16453	1
4 lag	Germany	604409	413978	422058	418601	329756	460301	370735	376534	157330	1	
	Ukraine	42.52042	107.54078	230.19457	351.66424	816.21301	235.18422				-0.76224	1
5 lag	Germany	604409	413978	422058	418601	329756	460301	370735	376534	157330	1	
	Ukraine	107.54078	230.19457	351.66424	816.21301	235.18422					-0.30718	1
6 lag	Germany	604409	413978	422058	418601	329756	460301	370735	376534	157330	1	
	Ukraine	230.19457	351.66424	816.21301	235.18422						-0.40496	1
7 lag	Germany	604409	413978	422058	418601	329756	460301	370735	376534	157330	1	
	Ukraine	351.66424	816.21301	235.18422							-0.36209	1

Fig.15. Changes of volumes of stock market capitalization in Germany and Ukraine during 2000-2008, millions UAH (made on the basis of data[10])

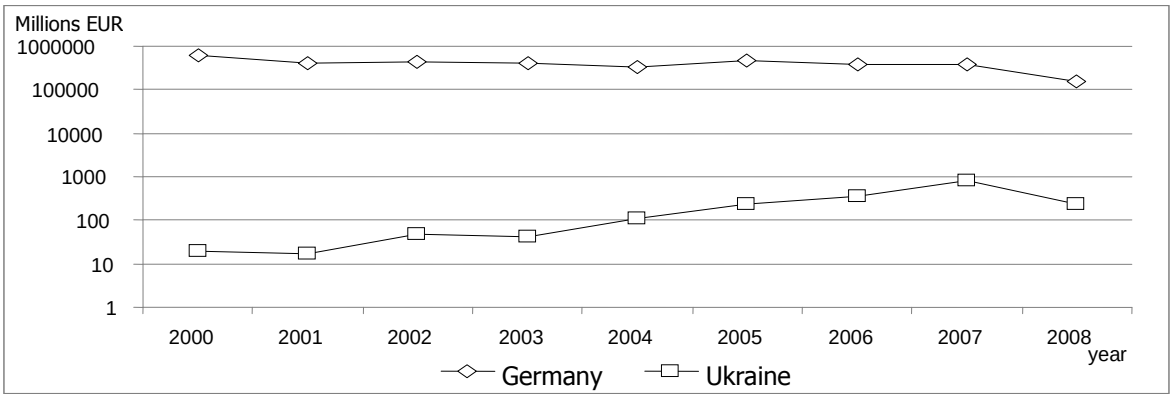

Fig.16. Results of the regression analysis on the correlation of the volume of stock market capitalization in Germany and Ukraine

	A	B	C	D	E	F	G	H	I
47	*Regression statistics*								
48	Multiple R	0,76224							
49	R-square	0,58101							
50	Adjusted R-square	0,47626							
51	Standard Error	199,90606							
52	Observations	6,00000							
53									
54	ANOVA								
55		*df*	*SS*	*MS*	*F*	*Significance F*			
56	Regression	1	221659,11913	221659,11913	5,54669	0,07808			
57	Resudial	4	159849,73418	39962,43354					
58	Total	5	381508,85331						
59									
60		*Coefficients*	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95%*	*Upper 95%*
61	Intercept	1323,31834	443,26244	2,98541	0,04052	92,62450	2554,01218	92,62450	2554,01218
62	Germany	-0,00232	0,00099	-2,35514	0,07808	-0,00506	0,00042	-0,00506	0,00042

Table 13. Correlation coefficients for the indicators of market capitalization in Germany and Ukraine during 2000-2008

Germany/Ukraine	***Years of comparison***						
	2008/ 2008	***2008/ 2007***	***2008/ 2006***	***2008/ 2005***	***2008/ 2004***	***2008/ 2003***	***2008/ 2002***
Correlation coefficients for the indicators of market capitalization in Germany and Ukraine	-0.26677	-0.40976	-0.16453	**-0.76224**	-0.30718	-0.40496	-0.36209

[10]Річні звіти ПФТС: 2000-2008 рр. (формат PDF) [Електронний ресурс]. – Режим доступу : http://www.pfts.com/uk/yearly-reports

The official site of Federal Financial Supervisory Authority of Germany [Economic resource]. – Regime of access : http://www.bafin.de/

On the basis of these calculations we will identify the analytical dependence between the volumes of stock market capitalization in Ukraine and Germany by constructing a linear regression:

$$C_{sm}^{U}(t+3) = 1323{,}32 - 0{,}00232 \times C_{sm}^{G}(t) \quad (8)$$

where $C_{sm}^{U}(t+3)$ is the stock market capitalization of Ukraine in (t+3) period; $C_{sm}^{G}(t)$ is the stock market capitalization of Germany in t period.

Analyzing the data presented above and the equation (8) we come to the conclusion about the existing inverse tendency, that is, the decrease of the stock market capitalization in Germany by 1 million euro is accompanied by an increase in the stock market capitalization in Ukraine by 2.32 thousand euro. Even if the level of stock market capitalization in Germany is equal to zero (what is nearly impossible in the real economic conditions), then the stock market capitalization in Ukraine will amount to 1323.32 million euro in 3 years, which is a significant potential for the national financial system.

It's necessary to point out that during the estimation of the level of stock market capitalization in Ukraine (equation 8), in which only the free member of equation regression is statistically significant, which underlines the necessity of taking into account not only the level of stock market capitalization in Germany, but other factors too. Considering the value of the Student criterion (see Fig. 16), we can assert that ignoring the influence of other factors leads to the reduction of statistical significance of the obtained regression equation.

The obtained correlation dependencies give us an opportunity to make a prognosis of the volumes of Ukraine's GDP based on the data about the changes of some financial market parameters in Germany.

During the determination of the correlation between the changes of Ukraine's GDP volumes and individual parameters of development of the financial system and stock market in Germany the whole range of problem ocurs, in particular:

- lack of financial information for the modeling of an adequate equation of linear regression with the time lag that describes the interconnection between the examined indicators (lag – 6 years);
- adherence to the requirements concerning the correlation of the number of factor indications for the model and the number of statistical observations that are necessary to construct the model (the number of observations should exceed factor indications by one).

To overcome these drawbacks we should screen the irrelevant factors.

For the modeling of the real economic situation it is necessary to consider not all the possible factors that have an impact on the final result, but only the most significant parameters according to the determined goal of the study. Therefore, we should determine the optimal quantity of relevant and significant parameters during the formalization of relation between the changes in the volumes of Ukraine's GDP and some parameters of financial development in Germany. During the analysis the correlation coefficients very important, and in each case its content can be different: it can be either a correlation between the result indication and one of the factor indications, or correlation between individual factor indications. The results of such analysis are presented in Table 15 that makes it possible not only to determine the influence of each factor on the result indication but formalize the interrelations between the factors.

The analysis of the data presented in Table 15 shows that several factors have significant influence on the formation of Ukraine's GDP: total assets of the central bank, total assets of commercial banks and total assets of non-banking commercial institutions as their correlation coefficients exceed 96 per cent. That is the evidence of a close direct relationship between the Ukraine' GDP and these factors. If we exclude the indicators defined as irrelevant (volume of credit issued by commercial banks to companies, stock market capitalization and financial system's assets) the result indicator variation (GDP of Ukraine) is by 99.7 per cent determined by the variation of those relevant factors that remained in the model and only by 0.3 per cent by the variation of unaccounted factors.

Table 15. Results of correlation coefficients calculation concerning the determination of relevant factors in the context of formalization of relations between the changes in the volumes of GDP in Ukraine and Germany

	Volume of loans issued by commercial banks to firms	*Total assets of Central Bank*	*Total assets of commercial banks*	*Total assets of non-bank commercial institutions*	*Stock market capitalization*	*Assets of financial systems*	*GDP*
Volume of loans issued by commercial banks to firms	1	X	X	X	X	X	X
Total assets of Central Bank	0.96178	1	X	X	X	X	X
Total assets of commercial banks	0.95397	0.99060	1	X	X	X	X
Total assets of non-bank commercial institutions	0.84861	0.95936	0.94042	1	X	X	X
Stock market capitalization	-0.10322	-0.36274	-0.36211	-0.59894	1	X	X
Assets of financial systems	0.93807	0.99132	0.99793	0.95811	-0.41292	1	X
GDP	0.89495*	0.97510**	0.98537**	0.96820**	-0.49600*	0.99305*	1

Note: * – correlation coefficients proposed to be excluded from the model;
** – correlation coefficients proposed to be included in the model.

In other words:

$$GDP^U(t) = A_{cb}{}^U + A_b{}^U + A_{nb}{}^U \quad (9)$$

For each parameter of the financial development of Ukraine the analytical correlations of dependencies of the similar parameters of Germany's financial development were determined: for the total assets of the National Bank of Ukraine ($A_{cb}{}^U$) – the equation 4, for the total assets of commercial banks of Ukraine ($A_b{}^U$) – the equation 5, for the total assets of non-banking commercial institutions ($A_{nb}{}^U$) – the equation 6.

The equation 9 can be presented in the following form:

$$GDP^U(t) = -7848317 - 3{,}15364 \times A_{cb}{}^G(t-1) + 0{,}89611 \times A_b{}^G(t-1) + 1{,}35405 \times A_{nb}{}^G(t-3) \quad (10)$$

where $GDP^U(t)$ is the GDP of Ukraine in *t* period.

The results of the calculations of the model 3.10 are represented on Fig. 17 (Fisher's F-test, Student's t-test, coefficient of determination), that confirms its adequacy.

Fig. 17. Results of regression analysis of the correlation between Ukraine's GDP and the volumes of total assets of the Central Bank, commercial bank and non-banking commercial institutions of Germany

	A	B	C	D	E	F	G	H	I
78	*Regression statistics*								
79	Multiple R	0,99796							
80	R-square	0,99592							
81	Adjusted R-square	0,98979							
82	Standard Error	30805,26023							
83	Observations	6,00000							
84									
85	ANOVA								
86		*df*	*SS*	*MS*	*F*	*Significance F*			
87	Regression	3	462916402657,16300	154305467552,38800	162,60412	0,00612			
88	Resudial	2	1897928115,96036	948964057,98018					
89	Total	5	464814330773,12300						
90									
91		*Coefficients*	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95%*	*Upper 95%*
92	Intercept	-7848316,53070	1603879,58450	-4,89333	0,03932	-14749253,40279	-947379,65861	-14749253,40279	-947379,65861
93	Germany	-3,15364	1,42221	-2,21743	0,15688	-9,27290	2,96562	-9,27290	2,96562
94	Variable X 2	0,89611	0,22758	3,93761	0,05886	-0,08308	1,87529	-0,08308	1,87529
95	Variable X 3	1,35405	0,38770	3,49255	0,07310	-0,31407	3,02218	-0,31407	3,02218

We will determine the duration of lags, which are similar for Ukraine and Germany regarding the common tendencies relating to the influence of central banks' assets, commercial banks' assets and assets of non-bank institutions on the GDP formation.

The biggest delay period (3 years lag) between the examined indicators of these countries is observed with the assets of non-banking institutions. Particularly, the increase by 1 million euro of the assets of Germany's non-banking institutions is accompanied by the increase of the assets of Ukraine's non-banking institution by 1.35405 million euro in 3 years.

To achieve the level of Germany according to the size of assets of the central bank and assets of commercial banks, the domestic banking system needs an identical time period – 1 year. The impact of these indexes on the GDP of Ukraine has the following peculiarities: with an increase in the assets of the Deutsche Bundesbank the GDP of Ukraine decreases by 3.15364 million euro, while at the same time the increase in the assets of commercial banks in Germany is accompanied by the slow growth of Ukraine's GDP – by 0.89611 million euro.

We can come to the conclusion that during the forecasting of the volumes of Ukraine's GDP on the basis of the offered model we are forced to use the indicators, the changing of which will lead to the appearance of the appropriate tendencies with different time lags. A separate problem during the model's practical application in the context of an adequate forecasting on its basis is the conformity of these indicators which characterize the changes in certain parameters during different time periods. One should remember that each of the examined indicators (for example, the level of inflation, credit and deposit interest rates, investment climate in the country, government policy, etc) in certain periods can demonstrate a tendency which is not typical for other periods, and sometimes can even be opposite. ***For this reason it is necessary to correct the model in relation to the alignment of its time parameters*** (in other words, the parameters of the model should have identical time lags of changing). We will carry out such adjustment by moving the time series to the appropriate lags (Fig. 18) that will ensure the comparability of the analyzed indicators.

Using the information of Fig. 18 we can build ***two models: with 1 year lag and with 3 years lag***. The use of these models will allow us to get a complex integral estimation on the basis of the data of both a short-term (1 year lag) and medium-term (3 years lag) forecast. In addition, these models will enable us to determine which factors cause the fluctuations.

Fig. 18. Adjustment results of the model for the determination of correlation between the changes of the main parameters of the financial system and stock market in Germany and the GDP volume of Ukraine

Year/ period	*Germany*						*Ukraine*
	Volume of loans issued by commercial banks to firms, millions EUR	*Total assets of Central Bank, millions EUR*	*Total assets of commercial banks, millions EUR*	*Assets of financial systems, millions EUR*	*Total assets of non-bank commercial institutions, millions EUR*	*Stock market capitalization, millions EUR*	*GDP, millions EUR*
	t	*t+1*	*t+1*	*t+1*	*t+3*	*t+3*	*t*
2000	2445700						338185
2001	2497100	256916	6083900	8753381			424194
2002	2505800	239997	6386110	9168139			448918
2003	**2497400**	**240083**	**6452299**	**9260776**	**2412565**	**604409**	**443769**
2004	**2479700**	**267439**	**6470882**	**9380179**	**2542032**	**413978**	**522155**
2005	**2504600**	**293272**	**6663797**	**9643520**	**2568394**	**422058**	**690859**
2006	**2536100**	**343919**	**6903169**	**10038083**	**2641858**	**418601**	**858705**
2007	**2556000**	**373535**	**7187714**	**10419610**	**2686451**	**329756**	**1041835**
2008	**2686900**	**483674**	**7625737**	**11008251**	**2790995**	**460301**	**1232309**
		612563	7956390	11512523	2858361	370735	
					2898840	376534	
					2943570	157330	

We have the following model which determines the correlation between the changes in the volume of GDP in Ukraine and individual parameters of financial development of Germany with one year lag:

$$GDP^{U}(t) = -5124073 - 1{,}53889 \times A_{cb}{}^{G}(t-1) - 0{,}80744 \times A_{b}{}^{G}(t-1) + 1{,}20443 \times A_{fs}{}^{G}(t-1) \quad (11)$$

Fig. 19 presents test results for the calculations of the model (11) (Fisher's F-test, Student's t-test, coefficient of determination) which allows us to prove its adequacy. As we see from Fig. 19, the fluctuation of Ukraine's GDP by 99.7 per cent is explained by the fluctuation of assets of the Deutsche Bundesbank, assets of commercial banks and assets of the financial system of Germany with time lag in 1 year, and by 0.3 per cent – by other (unaccounted) factors. The direct influence on the GDP of Ukraine is made only by the factor of total assets of the financial system. Regarding other factors, their increase by 1 million euro is accompanied by the decrease of Ukraine's GDP by 1.5 and 0.8 million euro accordingly.

Fig. 19. Results of regression analysis of the interconnection between Ukraine's GDP and Germany's total assets of the central bank, commercial banks and financial system

	A	B	C	D	E	F	G	H	I
1	*Regression statistics*								
2	Multiple R	0,99856							
3	R-square	0,99712							
4	Adjusted R-square	0,99279							
5	Standard Error	25889,80246							
6	Observations	6							
7									
8	ANOVA								
9		*df*	*SS*	*MS*	*F*	*Significance F*			
10	Regression	3	463473767030,10	154491255676,699	230,48700	0,00432			
11	Resudial	2	1340563743,026	670281871,51277					
12	Total	5	464814330773,123						
13									
14		*Coefficients*	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95%*	*Upper 95%*
15	Intercept	-5124073,08983	998827,50166	-5,13009	0,03596	-9421680,96618	-826465,21349	-9421680,96618	-826465,21349
16	Total assets of Central Bank	-1,53888	1,00994	-1,52373	0,26704	-5,88431	2,80655	-5,88431	2,80655
17	Total assets commercial banks	-0,80744	0,37930	-2914,00000	0,17960	-2,51958	-0,90470	-2,51958	-0,90470
18	Assets of financial system	1,20443	0,28309	4,25453	0,05105	-0,01362	2,42247	-0,01362	2,42247

We have the following model which determines the correlation between the changing of GDP volume of Ukraine and individual parameters of financial development of Germany with three year lag is following:

$$GDP^{U}(t) = -5780285 + 2{,}44880 \times A_{nb}{}^{G}(t-3) + 0{,}44031 \times C_{sm}^{G}(t-3) \quad (12)$$

Fig. 20 presents the results for the calculation of the model (12) (Fisher's F-test, Student's t-test, coefficient of determination) which allows us to prove its adequacy.

Fig. 20. Results of regression analysis of interconnection between Ukraine's GDP and total assets of non-banking commercial institutions and stock market capitalization of Germany

	A	B	C	D	E	F	G	H	I
1	*Regression statistics*								
2	Multiple R	0,97385							
3	R-square	0,94838							
4	Adjusted R-square	0,91397							
5	Standard Error	89430,97649							
6	Observations	6							
7									
8	ANOVA								
9		*df*	*SS*	*MS*	*F*	*Significance F*			
10	Regression	2	440820632105,19000	220410316052,59500	27,55853	0,01173			
11	Resudial	3	23993698667,93270	7997899555,97756					
12	Total	5	464814330773,12300						
13									
14		*Coefficients*	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95%*	*Upper 95%*
15	Intercept	-5780284,75548	1162063,21877	-4,97416	0,01561	-9478488,55211	-2082080,95886	-9478488,55211	-2082080,95886
16	Total assets of non-bank commercial institutions	2,44880	0,38328	6,38902	0,00776	1,22903	3,66858	1,22903	3,66858
17	Stock market capitalization	0,44031	0,55127	0,79871	0,48284	-1,31409	2,19471	-1,31409	2,19471

As we see from Fig 20, the fluctuation of the GDP of Ukraine, which was forecasted for 3 years, is by 94.8 per cent determined by the influence of the total assets of non-bank commercial institutions and stock market capitalization of Germany. The increase of each of these parameters is accompanied by the growth of the result indication – the GDP of Ukraine, so that there is a direct influence. The coefficients of regression equation act as quantitative characteristics of this influence, which show that an increase of both the total assets of non-banking commercial institutions and stock market capitalization of Germany by 1 million euro is accompanied by an increase of the result indication by 2.44 and 0.44 million euro accordingly.

Making the conclusion, we should point out that our research of correlations between the individual parameters of the financial system, stock market and GDP of Germany and Ukraine with the appropriate lags makes it possible to:

– draw conclusion about the existence of a considerable correlation between such indicators of financial development as: volume of loans issued by commercial banks to firms, total assets of commercial banks, total assets of non-banking commercial institutions, assets of the financial system and the GDP;

- define, formalize and quantitatively measure the lagging of Ukraine behind Germany in the basic parameters of financial market and banking system development that makes it possible to determine the investment potential of the banking system, to plan strategic and tactical actions, to prioritize the steps needed to support the development of the stock and credit segments of the financial market;
- identify further tendencies and prognostic values of every individual parameter (volume of loans issued by commercial banks to firms, total assets of central banks, total assets of commercial banks, total assets of non-banking commercial institutions, total assets of the financial system and level of stock market capitalization);
- conduct short- and medium-term prognostication of changes in the GDP volume of Ukraine on the basis of development parameters of the financial market and banking system of Germany.

Conclusion

In order to confirm the hypothesis about the bank-centered type of the financial market in Ukraine we conducted a comparative analysis of individual indicators of the financial development of Ukraine and Germany, because the financial market of the latter is considered to be the classic example of the bank-centered model.

Assuming that the parameters of the development of the banking system, stock market and economy in general of Germany and Ukraine are incommensurable at the present time, the authors introduced the time intervals (lags) which arise between the extremes of the fluctuating tendencies for each indicator. On the basis of the multifactor regression analysis we have confirmed the hypothesis about the presence of the one-type interrelation between individual segments of the financial market and macroeconomic indicators of economic development, and also general trends concerning the influence of the banking system on the reproductive processes in the economic systems of Ukraine and Germany.

Despite the 100000 times discrepancies between the parameters of financial development in Ukraine and Germany, according to the dynamics of changes in the total assets of central banks, commercial banks and assets of the financial systems Germany goes one year ahead of Ukraine, while according to the dynamics of changes in the assets of non-banking financial institutions and stock market capitalization – it goes three years earlier. According to the tendencies of changes in the volumes of loans issued by commercial banks to firms, they have concurred in both countries.