

MODELING OF THE INFLUENCE OF TRANSPARENCY OF THE DERIVATIVES MARKET ON FINANCIAL DEPTH

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Abstract

The market of derivative tools becomes an integral part of the financial market, the functions which are carrying out in it peculiar only to it: hedging, distribution of risks, ensuring liquidity of basic assets, information support of future movement of the prices, decrease in asymmetry of information in the financial markets. However, the insufficiency or lack of transparent information can lead to emergence of the crisis phenomena, shocks in the financial market and growth of system risk. Emergence of need for strengthening of information function of the market of derivatives changes of requirements to transparency of information had been caused by financial crisis of 2008-2009. In this article the attempt of an assessment of influence was made by means of autoregressive models the change of requirements to standard transparency, such as qualitative characteristic of the derivatives market, on quantitative indices of the financial market, in particular financial depth. The results of research demonstrate that reforming of the legislation concerning strengthening of transparency in the derivatives market positively influences the growth of financial depth. The research of this question will promote the best understanding of importance of reforming of regulation of the derivatives market, in particular strengthening of requirements to transparency. Recommendations of the further researches concern the needs of input of reforms of financial regulation in the derivatives market in Ukraine, and, thus, to provide the corresponding conditions for his development.

Keywords: Derivatives Market, Transparency, Financial Depth, Regulation Reforming, Macroeconomic Indicators

1. INTRODUCTION

Nowadays the financial markets are considered defective if in their structure the absent derivatives markets. It is more than that, some researchers even confirm that derivatives should be included in the definition of broad money to make the monetary policies of the central banks more effective (Savona et al., 1998) [1].

According to Singh (2004) the forward market eliminates asymmetry of information, provides objective data on pricing processes, does them more predicted, promotes reduction of cost of the capital and transaction expenses, this most increasing uniformity of global economic space [2]. However, insufficiency or lack of transparent information can lead to emergence of the crisis phenomena, shocks in the financial market and growth of system risk.

The following fragment can serve as additional argument of need of observance of requirements of transparency the Council of Securities Regulators of Americas's Principles of Market Transparency «Transparency is increasingly important for today's securities markets. The fairness and efficiency of securities markets are directly related to their transparency. By providing protections for investors, transparency encourages greater participation in the securities markets, and thereby enhances the liquidity of those markets. This increase in liquidity,

in turn, increases market efficiency. Conversely, by reducing the effects of market fragmentation and increasing the pricing efficiency of securities markets, transparency also promotes fairness of the markets (Kostyuk, 2005). For these reasons, regulators have a responsibility to assess the adequacy of the transparency of the markets operating within their respective jurisdictions» [3].

Understanding of reforming needs of regulation has started for derivatives market in the world since 2009. At this particular time the decision on strengthening regulatory transparency through improvement of the world system of financial regulation, and especially improvement of information regulation of the over the counter market of derivative tools has been made. Introduction in July, 2010 in the USA of new rules of disclosure of information in the derivatives market became the first steps in realization of actions concerning reforming of the derivatives market - Dodd - Frank Wall Street Reform and Consumer Protection Act [4].

2. BRIEF LITERATURE REVIEW

Trade transparency and its influence on process of pricing and liquidity began to be investigated from 90th years of the XX century. So, for example, Madhavan (1996) [5] compared on the basis of game

theory the markets with different before trade transparency for check of ability of transparency to influence liquidity and changeability of the prices that has allowed him to draw a conclusion that transparency increase not always promotes reduction of volatility and to growth of liquidity of the market; Pagano and Roell (1996) [6] compared trading systems differ in their degree of transparency. The authors find that greater transparency engerates lower trading costs for uninformed traders on average, although not necessarily for every size of trade. Bloomfield and O'Hara (1999) [7] investigated applying laboratory experiments to determine the effects of trade and quote disclosure on market efficiency, bid-ask spreads, and trader welfare; Baruch (2005) [8] constructs theoretical models to infer how the disclosed content of limit-order book affects market performance, and he finds that increased transparency can improve liquidity and informational efficiency of stocks markets; Feng Dong Liyan Han [9] have considered consequences of change of requirements to standard transparency in China in stock markets, and claim that after introduction of new requirements to transparency information efficiency of the majority of actions has improved though the quantitative structure of actions has worsened; liquidity of the market has considerably grown.

We will notice that researches also prove an opposite opinion - transparency increase negatively influences on the liquidity and increases volatility and transaction expenses [10]. Yinghua He, Ulf Nielsson, Hong Guo, Jiong Yang [11] investigated influence of growth of trade transparency on liquidity of the market. They have proved that growth of trade transparency on the Shanghai Stock Exchange has affected market activity, behavior of participants, but not liquidity level. However growth of operating expenses through wider bid-ask spread and volatility has at the same time taken place that the big transparency, the better contradicts the statement".

However these works investigate influence of trade transparency within a market microstructure on securities market, and questions of influence of standard transparency on the derivatives market, the financial market and economy remain low-investigated.

The purpose of the present study is determination of the influence level of change of requirements of regulatory transparency, as qualitative characteristic of the derivatives market, on quantitative indices of the financial market, in particular financial depth.

3. EMPIRICAL METHODOLOGY AND DATA

During research we have made a hypothesis that changes in regulation of regulatory transparency of the derivatives market can affect the main macroeconomic, financial performance and share indexes.

Because of limitation of data we will carry out empirical finishing a hypothesis on the example of

one country - the United States of America and his macroeconomic indicators.

We will investigate influence of change of requirements to transparency of the derivatives market on financial depth with the help of the econometric models which belong to the class of dynamic models, in particular: autoregressive models, autoregressive models of partial adaptation, autoregressive model of the distributed log with indicator variables.

For research we have selected several main macroeconomic indicators of the USA (GDP of the USA, GDP deflator, a consumer price index, the total state revenues (% to GDP), cash surplus / deficit, the personal income, Federal Reserve System rate, unemployment rate, PMI index, Gross capital formation, portfolio investments, a banking capital to assets, market capitalization of the listing companies in the current prices, is real an interest rate, financial depth) and stock indexes (CBOE Volatility Index (VIX), an *index option* of the USA and the EU, an index futures of the USA and the EU during 2000-2013.

Information base of research is facts of World Bank on the main macroeconomic indicators of the USA for the period from 2000-2013, Bank for International Settlements - by the volumes of agreements from derivatives market.

At the same time for research of influence of transparency on financial depth we have carried out division of data into certain periods according to changes of the current legislation of the USA to disclosure of information on derivatives market, in particular for the USA from 2000 to 2010 - before adoption of Dodd - Frank Wall Street Reform and Consumer Protection Act and from 2010 to 2013.

During research the charts were analyzed of dispersion of time ranks of the macro indicators from 2000 to 2013. Defined point is a 2010 year which displays the growing tendency of these indicators through change of the legislation. Among the considered macro indicators there is only financial depth (DFS) and unemployment rate (BEZ) had an accurate tendency to increase (reduction) after 2010. To the explaining variables which also had the growing (falling) trends for this period, - the personal income (PDOX) and GDP of the USA (VVP), and also cash surplus / deficit (CPD) (CurProfDif). As for *index option* of the USA and the EU, and index futures of the USA and the EU we can't claim that growth of these stock indexes is influenced only by transparency.

For our research the financial depth is the most acceptable indicator for the purpose of a transparency. At the same time, it is possible to consider the derivatives market from the point of view of influence on real economy and the financial market through performance of specific functions.

Besides, the indicator of financial depth characterizes economy saturation by monetary and financial instruments, and also the level of development of financial architecture which in general gives an assessment of opportunities to accumulate and distribute monetary resources for ensuring requirements of economic growth. Usually this indicator is measured by coefficient "money +

quasimoney / a gross domestic product". Therefore, the more the saturated economy monetary resources, has the bigger value in an economic turnover a share component [12].

4. EMPIRICAL RESULTS

For definition of influence of transparency on financial depth we will define interrelation between

macroeconomic indicators of the USA for 2000-2013. For this purpose we will use the correlation analysis [13]. In our research the correlation analysis will allow to choose the correct specification of models. Results of the correlation analysis between the main macroeconomic indicators of economy of the USA for 2000 - 2013 are presented in table 1.

Table 1. A matrix R_0 of pair coefficients of correlations between the main macroeconomic indicators of economy of the USA for 2000-2013

	<i>Bez</i>	<i>VVP</i>	<i>PDOx</i>	<i>CPP</i>	<i>VIK</i>	<i>DFS</i>	<i>vik min1</i>	<i>dfs min1</i>
<i>Bez</i>		0,5845	0,6118	-0,9647	-0,9598	0,8129	-0,8824	0,9121
		0,0460	0,0345	0,0000	0,0000	0,0013	0,0001	0,0000
<i>VVP</i>	0,5845		0,9956	-0,6991	-0,6606	0,8600	-0,6902	0,8222
	0,0460		0,0000	0,0114	0,0194	0,0003	0,0130	0,0010
<i>Pdox</i>	0,6118	0,9956		-0,7077	-0,6967	0,8797	-0,7222	0,8410
	0,0345	0,0000		0,0100	0,0118	0,0002	0,0080	0,0006
<i>CPP</i>	-0,9647	-0,6991	-0,7077		0,9158	-0,8597	0,8570	-0,9315
	0,0000	0,0114	0,0100		0,0000	0,0003	0,0004	0,0000
<i>VIK</i>	-0,9598	-0,6606	-0,6967	0,9158		-0,8998	0,8478	-0,9331
	0,0000	0,0194	0,0118	0,0000		0,0001	0,0005	0,0000
<i>DFS</i>	0,8129	0,8600	0,8797	-0,8597	-0,8998		-0,7274	0,9139
	0,0013	0,0003	0,0002	0,0003	0,0001		0,0073	0,0000
<i>vik min1</i>	-0,8824	-0,6902	-0,7222	0,8570	0,8478	-0,7274		-0,9057
	0,0001	0,0130	0,0080	0,0004	0,0005	0,0073		0,0001
<i>dfs min1</i>	0,9121	0,8222	0,8410	-0,9315	-0,9331	0,9139	-0,9057	
	0,0000	0,0010	0,0006	0,0000	0,0000	0,0000	0,0001	

Note: * - here and further: in a numerator - pair coefficient of correlation, in a denominator - his significance value. Significant coefficients of correlation are highlighted in bold type

Source: Compiled by the authors

The analysis of pair coefficients of correlations (Tab. 1) has allowed drawing conclusions concerning density of interrelations of indicators with an indicator of financial depth. Thus, on an absolute value variables have the closest interrelation with the financial depth: (1) VIK_t - Gross Capital Formation with the return sign; (2) DFS_{t-1} - Financial depth for the period (t - 1); (3) $PDOX_t$ - Personal income; (4) BEZ_t - Unemployment rate; (5) VVP_t -

Gross domestic product; (6) CPP - Cash surplus / deficit with the return sign. At the same time the analysis of a matrix of partial coefficients of correlation (Tab. 2) allows to claim that financial depth has close correlation connection only with variables VIK and with a level of personal income ($\alpha=0,109$) - $PDOX_t$.

Table 2. A matrix of partial coefficients of correlations between the main macroeconomic indicators of economy of the USA for 2000-2013

	<i>Bez</i>	<i>VVP</i>	<i>PDOx</i>	<i>CPP</i>	<i>VIK</i>	<i>DFS</i>	<i>vik min1</i>	<i>dfs min1</i>
<i>Bez</i>		-0,4744	0,4189	-0,7749	-0,5247	-0,3486	0,0014	0,0937
		0,4195	0,4827	0,1238	0,3640	0,5653	0,9983	0,8809
<i>VVP</i>	-0,4744		0,9595	-0,5913	-0,4094	-0,6029	0,3319	0,5044
	0,4195		0,0097	0,2936	0,4937	0,2818	0,5853	0,3862
<i>Pdox</i>	0,4189	0,9595		0,4171	0,6042	0,7935	-0,1364	-0,5855
	0,4827	0,0097		0,4848	0,2805	0,1091	0,8269	0,2996
<i>CPP</i>	-0,7749	-0,5913	0,4171		-0,0488	-0,0247	0,5729	-0,1067
	0,1238	0,2936	0,4848		0,9379	0,9686	0,3127	0,8643
<i>VIK</i>	-0,5247	-0,4094	0,6042	-0,0488		-0,9218	-0,5151	0,4455
	0,3640	0,4937	0,2805	0,9379		0,0259	0,3745	0,4522
<i>DFS</i>	-0,3486	-0,6029	0,7935	-0,0247	-0,9218		-0,3462	0,6371
	0,5653	0,2818	0,1091	0,9686	0,0259		0,5682	0,2476
<i>vik min1</i>	0,0014	0,3319	-0,1364	0,5729	-0,5151	-0,3462		0,1041
	0,9983	0,5853	0,8269	0,3127	0,3745	0,5682		0,8677
<i>dfs min1</i>	0,0937	0,5044	-0,5855	-0,1067	0,4455	0,6371	0,1041	

Source: Compiled by the authors

The carried-out correlation analysis has allowed making a choice of exogenous variables which will be used further for modeling of financial depth and definition of influence of transparency on him.

Exactly the variable of financial depth (DFS) has unambiguously reacted to adoption of law on transparency is known as Dodd-Frank Act.

Considering the fact that it is difficult to define influence of transparency in pure form as the indicator of financial depth is influenced also by other factors, we will construct models which will allow calculating a maximum level of her influence taking into account influence of other macroeconomic variables. Thus, for the pre-crisis period from 2000 to 2009, the financial depth of the USA was described by an exponential function (1):

$$DFS_t = \exp(4,2217 + 0,00250494 * t^2) \quad (1)$$

However this model doesn't allow establishing the level of sensitivity of financial depth to transparency change.

For further research and an assessment of level of influence of transparency on an indicator of the financial depth from 2000 for 2013 of the USA we will use autoregressive model of the distributed log of the financial depth (the ADL (1,1) model - model 1 from a fictitious variable). In which we take a natural logarithm of the financial depth for an endogenous variable. The natural logarithm of the personal income is the quality of exogenous variables a natural in the present and last periods (years) and the depth financial market in the last periods. For tracking of reaction of financial depth to transparency it is applicable an indicator variable for which we take the period from 2000 to 2010 for zero, and the period 2011, 2012, 2013 - unit. Formalization and interpretation of a car of regression model of the distributed log of the financial depth from a fictitious variable it is provided in the Appendix 1. Transparency, behind this model, increases financial depth on average by 0,046%.

For definition of the valid influence of transparency, within a certain model, we will count on the financial depth standardized or coefficients of a beta which matter $\beta_{PDOX_t}^s = -0,93$,

$$\beta_{PDOX_{t-1}}^s = 1,418, \quad \beta_{DFS_{t-1}}^s = 0,397 \quad \text{and} \quad \beta_{TRAN_t}^s = 0,177.$$

Address operation of standardization under a condition if the explaining variables have different units of measure (at us it is dollars and %).

Data of coefficients of a beta demonstrate that the size of a gain of the personal income of the USA (0,488), further - DFS_{t-1} (0,397), and already then - transparency has the greatest influence on increase in the financial depth. The part of influence of the last puts about 0,177. That is, the long-term effect of increase in financial depth of adoption of law of Dodd - Frank Act puts on average 0,177%.

However in the VIF (*Variance inflation factors*) parameter size, this model in such specification can't be applied through existence of multicollinearity in it. For it elimination it is applicable ridge regression which is formalized in the Appendix 1.

This model is free from multicollinearity and autocorrelations. Use of ridge parameter was reduced by efficiency of model from $R^2=0,984$ approximately to 0,956. That is the variation of dependence of the financial depth is explained by variations $PDOX_t/icp$, DFS_{t-1} and transparencies, in this model approximately for 96%. That is loss of efficiency of model is insignificant.

Interpretation of the specified autoregressive model of the distributed log of financial depth is provided in the Appendix 1. Transparency behind this model without standardization increases the financial depth on average by 0,032% annually. For definition of the valid influence of transparency within ridge model we will calculate beta coefficients which matter on the size of financial depth

$$\beta_{PDOX_t}^s = -0,579, \quad \beta_{PDOX_{t-1}}^s = 1,035, \quad \beta_{DFS_{t-1}}^s = 0,450 \quad \text{and} \quad \beta_{TRAN_t}^s = 0,124.$$

It demonstrates that the size of a gain of the personal income - 0,456, has the greatest influence on increase in financial depth of the USA further - DFS_{t-1} (0,450), and already then - transparency. The part of influence of the last puts about 0,124%. Therefore, the long-term effect of increase in the financial depth of adoption of Dodd - Frank Act in the USA puts on average 0,124% that it is slightly less, than in model with a multicollinearity (0,177%), and allows to draw a conclusion on minor changes in model concerning influence of transparency and its level.

In model 1 - autoregressive model of the distributed log of the financial depth (ADL (1,1) Model) we have faced a problem multicollinearity which has been untied by means of application of ridge regression. Signs of a multicollinearity have revealed first of all variables $PDOX_t/icp$ and $PDOX_{t-1}/icp$. Therefore we will eliminate one of these variables from calculations (model 2).

Formalization and interpretation of autoregressive model 2 it is provided in Appendix 1. Transparency behind this model increases the financial depth on average by 0,052%. The standardized coefficients $\beta_{PDOX_{t-1}}^s = 0,403$,

$$\beta_{DFS_{t-1}}^s = 0,807 \quad \text{and} \quad \beta_{TRAN_t}^s = 0,257,$$

demonstrate that the greatest influence on the financial depth of the USE is $DFS_{t-1} = 0,807$ and $\beta_{PDOX_{t-1}}^s = 0,403$, and already then - transparency - 0,257%. That is, the long-term effect of increase in financial depth of adoption of Dodd - Frank Act for this model puts on average 0,257%.

Above we noted that stock indexes of derivatives market also influence the size of an indicator of financial depth that is connected directly with the fact that derivatives market are tools of the fictitious capital of 2 and 3 levels and take part in monetization or a saturation of the financial market and real economy financial resources. For this purpose we will consider dependence of an indicator of financial depth depending on VIX index by means of autoregressive model of the distributed log of financial depth (the ADL (1,1) Model - 3) which would allow to estimate the level of dependence of a saturation of economy of the USA financial instruments through a stock component of the financial market and transparency. At the same time as exogenous variables we will apply indicator logarithm volatility in the present and last periods (years).

For tracking of reaction of economy to change of requirements to disclosure of information in the market of DFI it is applicable an indicator variable. Besides, for peak values of the size VIX during financial crisis of 2008-2009, we will use an indicator variable - F. Model 3 it is formalized and explained in the Appendix 1. Transparency behind

this model increases financial depth on average by 0,046%. The standardized coefficients $\beta_{\ln VIX}^s = 0,737$, $\beta_{\ln VIX, t-1}^s = -1,183$, and $\beta_{TRAN, t}^s = 0,553$ demonstrate that influence of indicators volatility the market on reduction of financial depth of the USA has size - 0,446 with the return sign, that is the bigger VIX-index, the smaller financial depth which will well be coordinated with the economic theory. Therefore, the long-term effect on growth of financial depth in this model from adoption of Dodd - Frank Act puts on average 0,553%.

We will carry out estimation of influence of the personal income and transparency on a financial component of economy of the USA by means of Model 4 - Model of partial adaptation of financial depth of the USA. Respectively model 4 it is formalized and characterized in the Appendix 1. Transparency behind this model increases the financial depth on average by 0,025%. Coefficients of the Beta allow to establish that size DFS_{t-1} (0,618)

and $\beta_{PDOX, t}^s = 0,257$ has the greatest influence on increase in the financial depth of the USA, and already then - transparency on average 0,123%.

Model 5 - the ADL Model (1,1) dependences of financial depth of the USA on GDP - will allow to estimate influence of GDP of the USA and transparency on the financial depth (Appendix 1), in particular transparency behind this model increases the financial depth on average by 0,045%. For this Model beta-coefficients will be such: $\beta_{\ln VVP, t}^s = -0,688$,

$\beta_{\ln VVP, t-1}^s = 1,142$, $\beta_{\ln DFS, t-1}^s = 0,371$ and $\beta_{TRAN, t}^s = 0,200$ what demonstrates the greatest influence on financial depth of the USA of a gain of the standardized GDP of the USA (0,454%). Growth of financial depth of economy in the last period for 1% at constancy of other factors will lead to increase in financial depth of economy of the USA in the present period for 0,371%. Transparency behind this model increases financial depth on average by 0,200%.

For overcoming of multicollinearity we will use ridge regression which formalization is provided in the tab. A.1. At the same time the standardized coefficients: $\beta_{\ln VVP, t}^s = -0,681$, $\beta_{\ln VVP, t-1}^s = 0,996$,

$\beta_{\ln DFS, t-1}^s = 0,573$ and $\beta_{TRAN, t}^s = 0,140$. confirm the greatest influence on financial depth of the USA of the standardized GDP of the USA (0,454%) and financial depth in the last period - 0,573%. Transparency behind Model 5 increases financial depth on average by 0,140%, that is the long-term effect of increase in financial depth of change of the legislation puts on average 0,140% that it is less than in model with multicollinearity (0,200%).

5. CONCLUSION

Thus, emergence of need for improvement of information function of the derivatives market through strengthening of transparency has been caused by financial crisis of 2008-2009. Transparency as the phenomenon it was always interesting to researchers. However the majority of researches have been concentrated on a role of transparency of financial intermediaries, such as banks. The global processes connected with liberalization of financial sector and development of technologies and communications have led to

growth of a role of stock market (capital market) as the main source of financing. Strengthening of value of stock market beginning from 1990th years was followed by the phenomenal growth of the world derivatives market. The derivatives market tools becomes an integral part of the financial market, the functions which are carrying out in it specific and peculiar only to it: hedging and distribution of risks, ensuring liquidity and informing on future direction of the prices in the spot market, decrease in moral dangers of asymmetric information in the financial markets [14]. Post-crisis global reforming of the derivatives market in the direction of improvement of its standard transparency has to provide growth of its efficiency and protection for investors.

This research is the first attempt to empirically investigate influence of change of requirements to standard transparency as qualitative characteristic of the derivatives market, on quantitative indices of the financial market.

On sensitivity to change of requirements to regulatory transparency only one indicator which has reacted to introduction Dodd - Frank Act - the financial depth has allowed to reveal research of macroeconomic indicators.

Research of influence of change of standard requirements to transparency with the help of econometric models: autoregression models, autoregression models of partial adaptation, autoregression models of the distributed log have allowed to establish connection with fictitious (indicator) variables and to estimate the level of influence of transparency after change of the legislation concerning disclosure of information in the derivatives market on the financial depth of the USA.

The largest level of influence is recorded by Model 2 - 0,052%, the Standardized assessment of influence of the qualitative characteristic - transparencies behind this model puts 0,257%, and the greatest among standardized is Model 3 - 0,553%.

Average elasticity of influence of an indicator of transparency on the financial depth of the USA behind all models has put on average 0,225%. That is in case of improvement of transparency of information transparency positively influences financial depth of the USA and increases her level on average by 0, 04%. By results of research we can claim that reforming of the legislation on disclosure of information in the derivatives market of the USA has positively influenced growth of financial depth though this influence is insignificant. The expansion of the period of can be revealed more significant effect in the further researches.

These conclusions cause need of implementation of the actions connected with reforming of regulation of the derivatives market of Ukraine, providing implementation of the world standards on ensuring transparency of the derivatives market and strategy of his development which are one of the directions.

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Appendix 1

Table A.1. Dynamic models of dependence of an indicator of financial depth of the USA on a number of macroeconomic factors and transparency

<i>N^o</i> <i>Model</i>	<i>Model</i>	<i>Exogenous variables</i>	<i>Formalization of model</i>	<i>Determination coefficient R²</i>	<i>Fisher's ratio test F</i>	<i>Assessment of influence of parameter of transparency of %</i>	<i>The standardized influence assessment to parameter %</i>
1	Autoregressive model of the distributed log from the fictitious variable financial depth	Personal income in the present and last periods (years) and financial depth in the last periods	$\ln(DFS_t) = -3,762 - 1,465 * \ln(PDOX_t / icp) + 2,215 * \ln(PDOX_{t-1} / icp) + 0,388 * \ln(DFS_{t-1}) + 0,046 * TRAN_t.$ <p>where - DFS_t - financial depth in % for t period; DFS_{t-1}; financial depth in % for the period (t - 1); $PDOX_t / icp$ - personal income of the population of the USA in one billion a dollars is real for t period; $PDOX_{t-1} / icp$ - real personal income of the population of the USA in one billion dollars for the period (t - 1).</p>	0,984	122,5	0,046	0,177
Interpretation of model							
growth of size of the personal income of the population of the USA for the present period of t for 1%, at constancy of other factors, reduces financial depth for the present period on average by 1,465%. At the same time, influence of last period of the same factor leads to increase in financial depth in the present period for 2,215%. With a growth of financial depth in the last period for 1%, at constancy of other factors, will lead to increase in financial depth of the USA in the present period for 0,388%.							
1*	Autoregressive model of the distributed log from the fictitious variable financial depth of the USA (ridge model)	Personal income in the present and last periods (years) and financial depth in the last periods	$\ln(DFS_t) = -3,644 - 0,891 * \ln(PDOX_t / icp) + 1,595 * \ln(PDOX_{t-1} / icp) + 0,451 * \ln(DFS_{t-1}) + 0,032 * TRAN_t.$	0,956	43,5	0,032	0,124
Interpretation of model							
growth of size of a gain of the real personal income of the population of the USA by 1%, at constancy of other factors, increases financial depth on average by 0,704%. Growth of an indicator of financial depth in the last period for 1%, at constancy of other factors, will lead to increase in financial depth of the USA in the present period for 0,451%.							
2	Autoregressive model financial depth of the USA	Personal income in the last period (years) and financial depth in the last periods	$\ln(DFS_t) = -4,479 + 0,629 * \ln(PDOX_{t-1} / icp) + 0,792 * \ln(DFS_{t-1}) + 0,052 * TRAN_t.$	0,953	61,5	0,052	0,257
Interpretation of model							
growth of size of the real personal income of the population of the USA in the last period for 1%, at constancy of other factors, increases financial depth for the present period on average by 0,629%. With a growth of an indicator of financial depth in the last period for 1%, at constancy of other factors, - will lead to increase in financial depth of the USA in the present period for 0,792%.							
3	Autoregressive model of the distributed log of financial depth	The indicator of volatility VIX in the present and last periods (years)	$\ln(DFS_t) = 0,211 + 0,0825 * \ln(VIX_t) - 0,139 * \ln(VIX_{t-1}) + 0,046 * TRAN_t + 0,103F.$	0,97	45,4	0,046	0,553
Interpretation of model							
growth of size of VIX the USA in the present and last period of time for 1%, at constancy of other factors, reduces financial depth for the present period negatively on average by -0,0565%. With a growth financial depth the Volatility Index annually decreased on average by 0,0048 points.							

Table A.1. Dynamic models of dependence of an indicator of financial depth of the USA on a number of macroeconomic factors and transparency (continued)

<i>N₀</i> <i>Model</i>	<i>Model</i>	<i>Exogenous variables</i>	<i>Formalization of model</i>	<i>Determination coefficient R²</i>	<i>Fisher's ratio test F</i>	<i>Assessment of influence of parameter of transparency of %</i>	<i>The standardized influence assessment to parameter %</i>
4	Autoregressive model of partial adaptation of financial depth of the USA	Indicator of the personal income of the population of the USA in the present and last periods (years)	$\ln(DFS_t) = -1,77 + 0,605 * \ln(DFS_{t-1}) + 0,405 * \ln(PDOX_t / icp) + 0,025 * TRAN + 0,05 * F$	0,962	49,9	0,025	0,123
<i>Interpretation of model</i>							
growth of size of the personal income of the population of the USA in the present period for 1%, at constancy of other factors, increases financial depth for the present period on average on 0,405, and increase in value of an indicator of financial depth in the last period by 1%, at constancy of other factors, will lead to his growth in the present period for 0,605%							
5	Autoregressive model of the distributed log from fictitious variable dependence of financial depth of the USA on GDP	GDP of the USA in the present and last periods (years)	$\ln(DFS_t) = -3,264 - 1,09 * \ln(VVP_t / icp) + 1,7868 * \ln(VVP_{t-1} / icp) + 0,363 * \ln(DFS_{t-1}) + 0,045 * TRAN_t.$ <p>where DFS_t - financial depth in % for t period; DFS_{t-1} - financial depth of the USA in % for the period (t-1); VVP_t / icp - the actual size GDP of the USA is one billion dollars for the period t; VVP_{t-1} / icp - the actual size GDP of the USA is one billion dollars for the period (t-1).</p>	0,99	197,2	0,045	0,200
<i>Interpretation of model</i>							
growth of size of real GDP of the USA for the present period for 1% at constancy of other factors reduces financial depth for the present period on average by 1,09%. At the same time, influence of the same factor in the last period leads to increase in financial depth in the present period for 1,79%. Growth of financial depth in the last period for 1% at constancy of other factors will lead to increase in financial depth of the USA in the present period for 0,363%.							
5'	Autoregression model of the distributed log from fictitious variable dependence of financial depth of the USA on GDP (ridge model)	GDP of the USA in the present and last periods (years)	$\ln(DFS_t) = -0,228 - 1,079 * \ln(VVP_t / icp) + 1,6 * \ln(VVP_{t-1} / icp) + 0,561 * \ln(DFS_{t-1}) + 0,031 * TRAN_t.$	0,97	64,7	0,031	0,140
<i>Interpretation of model</i>							
growth of size of real GDP of the USA for the present period for 1% at constancy of other factors reduces financial depth for the present period on average by 1,079%. At the same time, influence of the same factor in the last period leads to increase in financial depth in the present period for 1,6%. Growth of financial depth in the last period for 1% at constancy of other factors will lead to increase in financial depth of the USA in the present period for 0,561%.							
Σ				0,969	83,5	0,040	1,574
Average value of an assessment (criterion)				0,969	83,5	0,040	0,225

Source: Compiled by the authors