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ASSESSMENT OF CONVERGENCE PROCESSES OF fINANCIAL DEPTH INDICATORS IN STATES WITH DIFFERENT LEVELS OF ECONOMIC DEVELOPMENT

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Abstract. The aim of the research is to assess convergence processes of market financial depth indicators in states with low, lower middle, upper middle, and high incomes in the period 1993-2015. The relevance of the research is determined by the fact that the deepening of financial markets encourages the increase in the level of economic stability and security, making it possible to serve the growing streams of trans-border capital. Deeper markets are able to provide alternative sources of finance during crises of international liquidity limiting sharp fluctuations of asset prices and currency exchange rates. Globalization of the world economy determines qualitative changes in the development of the world financial market. This is reflected in the dissolving boundaries between its various segments, as a result of which, problems of certain states and segments of the economy significantly influence other states and segments.

Keywords: depth of the financial market, convergence, sustainability and security aspects.

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JEL Classifications: E44, G10, G19, O16

1. Introduction

A financial market is a special sphere of economic relations – a system of market financial institutions and infrastructure mechanisms that create supply and demand on a specific product: financial assets and instruments, the sum of economic relations and institutions related to the movement of financial capital. Institutionally, a financial market includes banks and other numerous financial institutions (pension funds, insurance companies, investment funds, financial companies, securities companies, stock exchanges, and other infrastructure organizations). A financial market is one of the key components of a financial system of any state, the development level of which predetermines significantly the performance level of a national economy. Being an instrument that evens cyclic fluctuations in economy, a financial market is one of the warrants for the stable economic development of the state. It happens, when a financial market solves such basic tasks by providing banks, enterprises, for-profit and non-profit organizations, and personal savings with the most complete and fastest ways of movement of free cash for attracting funds to innovative economic development by means of creating innovative products and technologies, and technical upgrading of already existing enterprises (Bikas 2016; Stasytytė 2015; Novickytė, Pedroja 2014; Dubauskas 2012; Kordík, M.; Kurilovská, L. 2017; Ardalan et al. 2017).

The concept of "financial depth" in macroeconomics was first introduced at the end of the 1980s in publications by the World Bank in order to reflect the connection between the saturation of economy with financial resources, the complexity and multidivisional structure of a financial-monetary and credit system on the one hand, and the rates of economic development on the other. The level of financial depth in an economy establishes the advantage for a higher economic development (Global Financial Development Report 2013). It is much easier for states with deeper financial markets to enforce an accommodative monetary policy, as a developed financial market is able to absorb excessive liquidity without a significant inflation rate. According to N. Loayza and R. Ranciè (2004), deepening of financial markets in the long term stabilizes a financial system more, as the ability to serve flows of capital without sharp fluctuations of prices on assets and currency exchange improves.

It is possible to gain the understanding of the role of a financial market in an economy on the basis of the indicators of financial depth that are relative indicators demonstrating the proportion of a particular segment of this market in relation to GDP. Later, this understanding has acquired a more complex character providing means for a more comprehensive assessment of the level of financial intermediation in general as well as its certain segments (Christopoulosa et al., 2004). To a greater extent, the depth of financial markets has come to be based on monetary indicators of a wide monetary base and liquid liabilities of commercial banks and non-financial institutions (Montiei 2011). The great advantage of the financial depth indicator, taking into account its universal nature, is the ability to perform rather consistent international comparisons from the viewpoint of market segments as well as the analysis of financial positions of certain states or clusters of states in general and according to the main groups of financial products.

Three groups of main indicators that characterise the development level of a banking system, the development level of a securities market, and the develoment level of an insurance segment are often used when identifying the financial depth indicator of markets in particular states or a group of states as part of the world financial market. It should be emphasized that in order to achieve the aim of the research, it is necessary to investigate the dynamics of a wide range of indicators. Only after that, will it be possible to confirm or deny the hypothesis set with higher certainty. Considering the existing limitations in the presence of comparable number of data sets over the extended time period, the hypothesis of financial convergence has been tested on the basis of the following financial depth indicators that refer to the three abovementioned groups, such as a ratio of liquid liabilities to GDP[1] (%), private credit by deposit money banks and other financial institutions to GDP [2] (%), deposit money bank assets to GDP[3] (%), bank deposits to GDP[4] (%), stock market capitalization to GDP[5] (%), life insurance premium volume to GDP[6](%), non-life insurance premium volume to GDP[7](%). The development trends of these indicators in the period 1993-2015 have been identified. Groups of states with low, lower middle, upper middle, and high incomes are identified, applying the World Bank methodology.

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[1] LIQUID LIABILITIES to GDP (%): ratio of liquid liabilities to GDP, calculated using the following deflation method: {(0.5)*[Ft/P_et + Ft-1/P_et-1]}/[GDPt/P_at] where F is liquid liabilities, P_e is end-of period CPI, and P_a is average annual CPI.

[2] PRIVATE CREDIT BY DEPOSIT MONEY BANKS AND OTHER FINANCIAL INSTITUTIONS to GDP (%): Private credit by deposit money banks and other financial institutions to GDP, calculated using the following deflation method: {(0.5)*[Ft/P_et + Ft-1/P_et-1]}/[GDPt/P_at] where F is credit to the private sector, P_e is end-of period CPI, and P_a is average annual CPI.

[3] DEPOSIT MONEY BANK ASSETS to GDP (%): Claims on domestic real nonfinancial sector by deposit money banks as a share of GDP, calculated using the following deflation method: {(0.5)*[Ft/P_et + Ft-1/P_et-1]}/[GDPt/P_at] where F is deposit money bank claims, P_e is end-of period CPI, and P_a is average annual CPI.

[4] BANK DEPOSITS to GDP (%): Demand, time and savings deposits in deposit money banks as a share of GDP, calculated using the following deflation method: {(0.5)*[Ft/P_et + Ft-1/P_et-1]}/[GDPt/P_at] where F is demand and time and savings deposits, P_e is end-of period CPI, and P_a is average annual CPI.

[5] STOCK MARKET CAPITALIZATION to GDP (%): The stock market capitalization to GDP ratio is a ratio used to determine whether an overall market is undervalued or overvalued. The ratio can be used to focus on specific markets, such as the U.S. market, or it can be applied to the world market depending on what values are used in the calculation. Calculated as: Market Cap to GDP = (Stock Market Capitalization / Market GDP)*100/

[6] LIFE INSURANCE PREMIUM VOLUME to GDP (%)

[7] NON-LIFE INSURANCE PREMIUM VOLUME to GDP (%)

2. Design and the sample of the research

Financial convergence implies the process of convergence of states in terms of the level of financial depth that is characterized by the abovementioned indicators. The concept and quantitative methods for the assessment of convergence first were developed for research into the dynamics of economic growth. Two concepts of convergence, interrelated but determining different effects, prevail in the empiric study: β-convergence (Baumol, 1986; Barro and Sala-i-Martin, 1992) and σ-convergence (Sala-i-Martin, 1996a; Sala-i-Martin, 1996b; Islam, 2003).

According to β-convergence*, states with low absolute values of the indicator under study at the initial period of time have on average a higher growth rate of this indicator during the process of integration*. Growth-initial level regressions where the growth rate is a dependent variable, but the initial level of the indicator is an independent variable are used for the assessment of β-convergence. The simplest regression of this type is (1):

$$y_i = a + \beta \ln(x_{it-T}) + e, \quad (1)$$

where:

x_{it-T} – an indicator at the point of time preceding the current point of time *t* at *T* periods (as a rule, the initial period of integration or another point of time relevant for the development of integration grouping),

β – a coefficient to be evaluated,

y_i – average growth rates in *i*- state over *T* periods, calculated as $\ln(y_{it})/\ln(y_{it-T})$,

e – random deviation. The value of the β coefficient is an indicator of convergence.

If $\beta<0$, a high level of the indictor at the initial time period correlates with relatively lower growth rates.

Unlike β-convergence, σ-convergence presupposes *the decrease with time in a standard deviation of the indicator's value* which levels the discrepancy between states. Another indicator that is often used when there is a trend in time series is the relation of a standard deviation to average (variation coefficient). β-convergence (i.e. a quicker growth of indicators in the states with lower values of this indicator at the initial period) does not necessarily lead to the decrease in inequality on the indicator under study, namely to σ-convergence (Barro and Sala-i-Martin, 1991, 1992; Barro and Sala-i-Martin, 2010; Friedman, 1992; Quah, 1993; Quah, 1999; Magrini, 2004; Wodon and Yitzhaki, 2006). For example, there is no σ-convergence in a situation when a group of states with initially low absolute values of the indicator constantly changes places with the states with the initially higher absolute values of the indicator, although the overall level of gap between these states is permanent (Sala-i-Martin, 1996a; Sala-i-Martin X., 1996b; Barro and Sala-i-Martin, 1995).

The range of *R* variation and standard deviation are the most common indicators of the variation. Their calculation is as follows (2) (3):

$$R = X_{\max} - X_{\min}; \quad (2)$$

$$\sigma = \frac{\sum (x_i - \bar{x}) f_i}{\sum f_i}, \quad (3)$$

where:

$X_{\max}$ и $X_{\min}$ – largest and smallest value of the characteristic;

$\bar{x}$ – the average value of the characteristic;

x_i – variations of the characteristic;

f_i – frequency; $i = 1,2,....n$ – a number of variants.

We will use the relative indicators of the variation based on the abovementioned indicators: the coefficient of range (K_R) and the coefficient of variation (V_σ). Their calculation is as follows (4), (5):

$$K_R = \frac{X_{\max} - X_{\min}}{\bar{x}}; \quad (4)$$

$$(V_\sigma) = \frac{\sigma}{\bar{x}}, \quad (5)$$

where:

δ - a standard deviation,
$\bar{x}$ - an average value,
$X_{\max}$ and $X_{\min}$ – the largest and smallest value of the characteristic in the selection.

The increase of the coefficient of range and coefficient of variation directly signifies the enhancement of the characteristic in the population under study. Therefore, analysing dynamics of the abovementioned coefficients in relation to key parameters, it is possible to provide a qualitative characteristic of the process of growth of the existing differences in the sphere of indicators of market depth in the states under study.

3. Research results

This study found that in the modern time period developed states have significantly deeper financial markets than developing states. According to the values of "liquid liabilities to GDP (%)" indicator for 1993, the states with high income were 3.4 times ahead of the states with low income, 2 times ahead of the states with lower middle income, and 1.6 times ahead of the states with upper middle income. In 2015 the states with high income were 3 times ahead of the states with low income, 2 times ahead of the states with lower middle income, and 1.5 ahead of the states with upper middle income. In the period 1993-2015 the low income states increased by a factor of 1.7 the values of the "liquid liabilities to GDP (%)" indicator, whereas other states by only 1.5 times. Dynamic values of the indicator from 1993 to 2015 in all 4 groups of states are positive, i.e. there is deepening of financial market in the banking sphere (Figure 1).

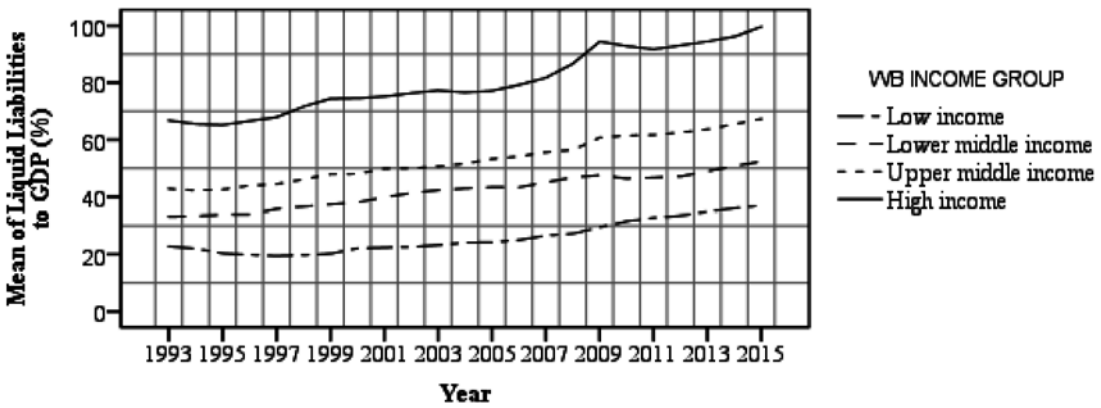

Fig. 1. Average values of the "liquid liabilities to GDP (%)" indicator in 4 groups of states (Annex 1) in the period 1993-2015.

Source: Developed by the authors. Raw data are from the electronic version of the IMF's International Financial Statistics: Financial Development and Structure Dataset http://www.worldbank.org/en/publication/gfdr/data/financial-structure-database

According to the values of the "private credit by deposit money banks to GDP (%)" indicator for 1993, the states with high income were 5.6 times ahead of the states with low income, 3.2 times ahead of the states with lower middle income, 1.8 times ahead of the states with upper middle income. In 2015 the states with high income were 5.2 times ahead of the states with low income, 2.6 times ahead of the states with lower middle income, and 1.7 times ahead of the states with upper middle income. In the period 1993-2015 the low income states increased by a factor of1.7 times the value of the "private credit by deposit money banks to GDP (%)" indicator, the lower middle income states by 2 times, the upper middle income states by 1.7 times, and high income states by 1.6 times. There is a trend of the increase in the absolute values of this indicator in dynamics

in all groups of states under study (Figure 2).

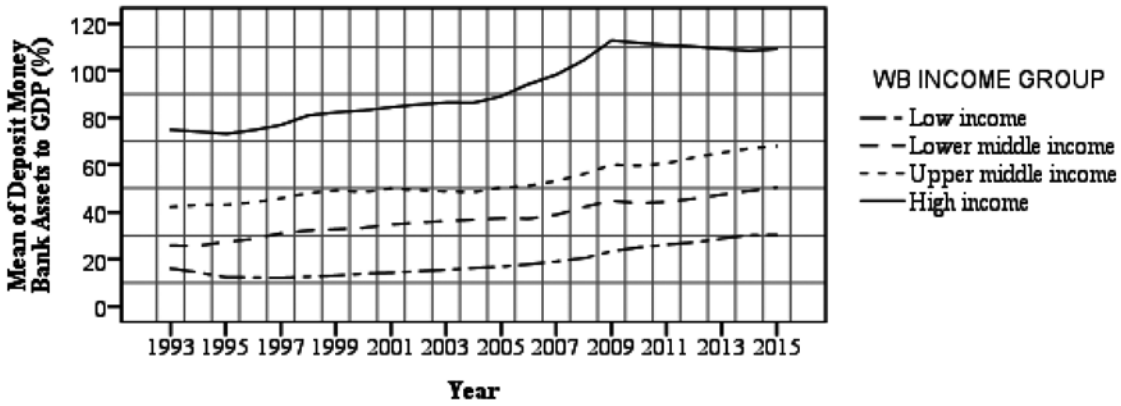

Fig. 2. Average values of the "private credit by deposit money banks to GDP (%)" indicator in 4 groups of states (Annex 1) in the period 1993-2015.

Source: Developed by the authors. Raw data are from the electronic version of the IMF's International Financial Statistics: Financial Development and Structure Dataset http://www.worldbank.org/en/publication/gfdr/data/financial-structure-database

According to the values of the "deposit money bank assets to GDP (%)" indicator for 1993, the states with high income were 6 times ahead of the states with low income, 3 times ahead of the states with lower middle income, 1.8 times ahead of the states with upper middle income. In 2015 the states with high income were 4.4 times ahead of the states with low income, 2.4 times ahead of the states with lower middle income, and 1.7 times ahead of the states with upper middle income. In the period 1993-2015 the low income states increased by a factor of 2 the value of the "deposit money bank assets to GDP (%)" indicator, the lower middle income states by 1.8 times, the upper middle income states by 1.6 times, and high income states by 1.5 times.

There is deepening of financial market in the banking sphere that is characterized by the "deposit money bank assets to GDP (%)" indicator (Figure 3).

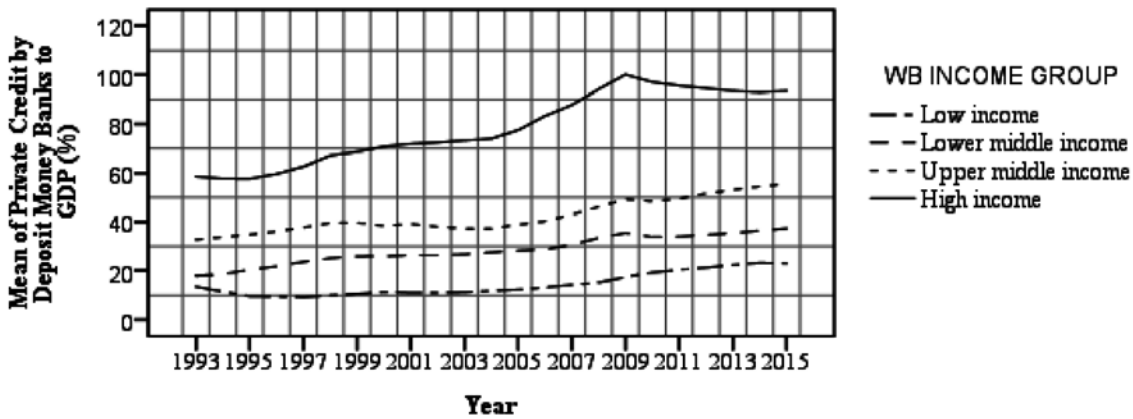

Fig. 3. Average values of the "deposit money bank assets to GDP (%)" indicator in 4 groups of states (Annex 1) in the period 1993-2015.

Source: Developed by the authors. Raw data are from the electronic version of the IMF's International Financial Statistics: Financial Development and Structure Dataset http://www.worldbank.org/en/publication/gfdr/data/financial-structure-database

According to the values of the "bank deposits to GDP (%)" indicator for 1993, the states with high income were 4.6 times ahead of the states with low income, 2.3 times ahead of the states with lower middle income, 1.7

times ahead of the states with upper middle income. In 2015 the states with high income were 3.6 times ahead of the states with low income, 2.2 times ahead of the states with lower middle income, and 1.6 times ahead of the states with upper middle income. In the period 1993-2015 the low income states increased by a factor of 2 the value of the "bank deposits to GDP (%)" indicator, the lower middle income states by 1.6 times, the upper middle income states by 1.6 times, and high income states by 1.5 times. There is a trend of the increase in the absolute values of the "bank deposits to GDP (%)" indicator in dynamics in all groups of states under study (Figure 4).

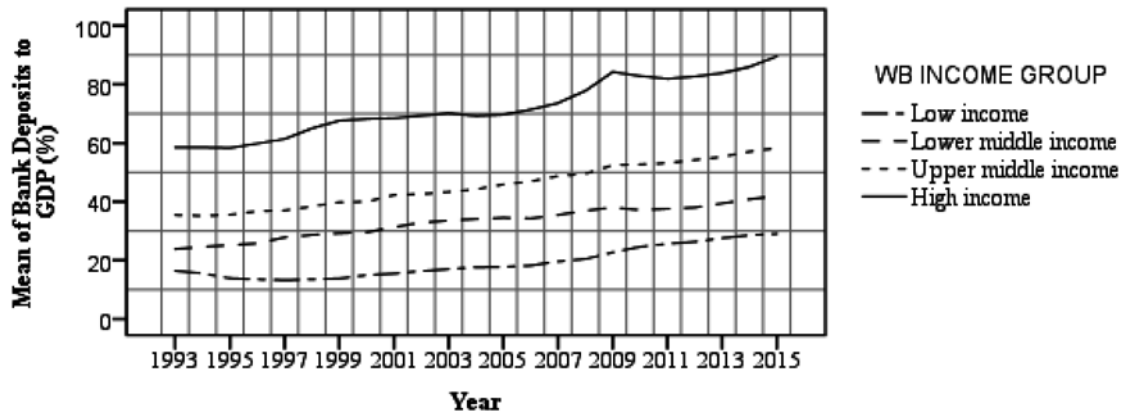

Fig. 4. Average values of the "bank deposits to GDP (%)" indicator in 4 groups of states (Annex 1) in the period 1993-2015.

Source: Developed by the authors. Raw data are from the electronic version of the IMF's International Financial Statistics: Financial Development and Structure Dataset http://www.worldbank.org/en/publication/gfdr/data/financial-structure-database

According to the value of the "stock market capitalization to GDP (%)" indicator for 1993, the states with high income were 13.2 times ahead of the states with low income, 2.8 times ahead of the states with lower middle income, 1.5 times ahead of the states with upper middle income. In 2015 the states with high income were 4.8 times ahead of the states with low income, 2.9 times ahead of the states with lower middle income, and 2.2 times ahead of the states with upper middle income. In the period 1993-2015 the low income states increased by a factor of 6.5 the value of the "stock market capitalization to GDP (%)" indicator, the lower middle income states by 2.3 times, the upper middle income states by 1.6 times, and high income states by 2.3 times. Average values of the "stock market capitalization to GDP (%)" indicator in all groups of states in dynamics tend to increase their values. In the 1990s in all states there was a quantum leap in stock trade, liberalization of financial markets and elimination of barriers for flows of capital; in the second half of the 1990s the Internet became widely used, which sharply decreased investor's costs, accelerated the flow of information, and provided the opportunity to perform operations with capital while staying at home, in fact, in real-time, which resulted in the globalization of world financial markets (Kazmierczyk 2012).

In 2003 there was a significant growth of developed markets and the majority of emerging markets almost everywhere. Specifically, in the USA an easy money policy played an important role. A similar trend could be observed in developed markets in 2005 as well, although there was an especially strong growth in a lot of emerging markets. In 2006-2007 stock markets demonstrated strong growth everywhere. However, already at the end of 2007 the developed markets indexes started to fall; the fall accelerated in 2008. The greatest fall in values of this indicator is obviously stipulated by the impact of the 2007 financial crisis; the crisis in the stock market resulted from the crisis in the debt market (Figure 5).

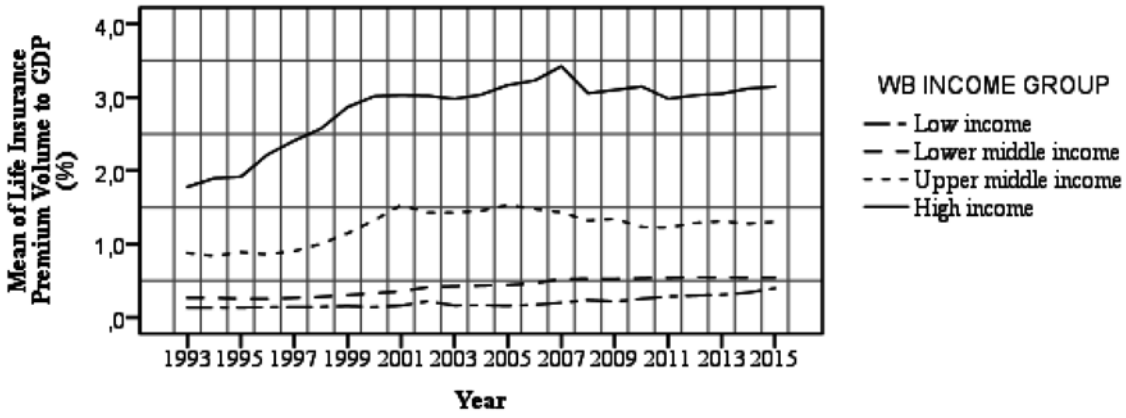

Fig. 5. Average values of the "stock market capitalization to GDP (%)" indicator in 4 groups of states (Annex 1) in the period 1993-2015.

Source: Developed by the authors. Raw data are from the electronic version of the IMF's International Financial Statistics: Financial Development and Structure Dataset http://www.worldbank.org/en/publication/gfdr/data/financial-structure-database

According to the values of the "life insurance premium volume to GDP (%)" indicator for 1993, the states with high income were 13.4 times ahead of the states with low income, 6.7 times ahead of the states with lower middle income, 2 times ahead of the states with upper middle income. In 2015 the states with high income were 7.9 times ahead of the states with low income, 5.8 times ahead of the states with lower middle income, and 2.4 times ahead of the states with upper middle income (Figure 6).

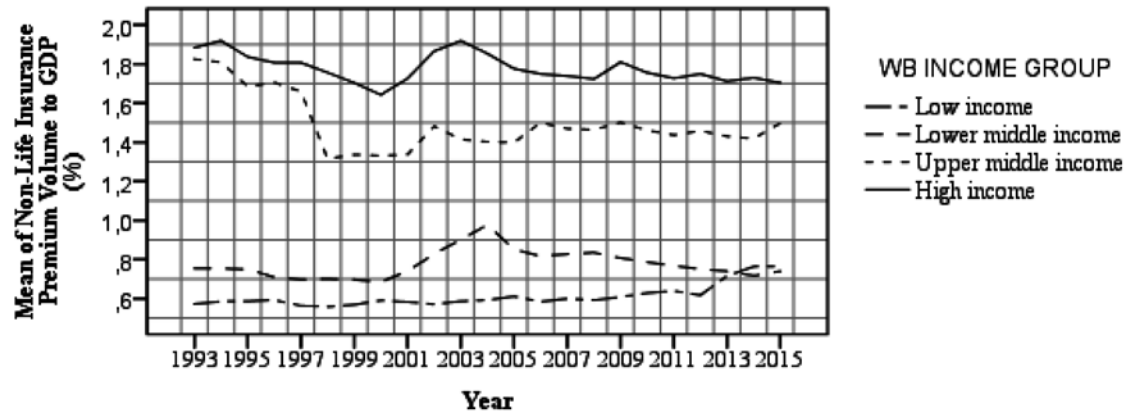

Fig. 6. Average values of the "life insurance premium volume to GDP (%)" indicator in 4 groups of states (Annex 1) in the period 1993-2015.

Source: Developed by the authors. Raw data are from the electronic version of the IMF's International Financial Statistics: Financial Development and Structure Dataset http://www.worldbank.org/en/publication/gfdr/data/financial-structure-database

According to the values of the "non-life insurance premium volume to GDP (%)" indicator for 1993, the states with high income were 3.3 times ahead of the states with low income, 2.5 times ahead of the states with lower middle income, were equal with the states with upper middle income. In 2015 the states with high income were 2.2 times ahead of the states with low income, 2.3 times ahead of the states with lower middle income, and 1.1 times ahead of the states with upper middle income.

The 2007 financial crisis and stock market crash had a negative impact on the growth of insurance premiums: life insurance premiums in the states with high income were influenced the most as a result of negative outcomes of operations on insurance with a single premium and products tied up to stock markets. According to

the indicators under study, non-life insurance premiums also underwent a slight fall. In some cases the demand for insurance decreased; the premium rates decreased too. Non-life insurance in 2008 featured a slight reduction in premiums as a result of the decrease in demand for insurance and relief in premium rates. In the states with high income and the states with upper middle income there was a reduction in non-life insurance premiums, although in the states with low income and the states with lower middle income there was a positive trend observed (Figure 7).

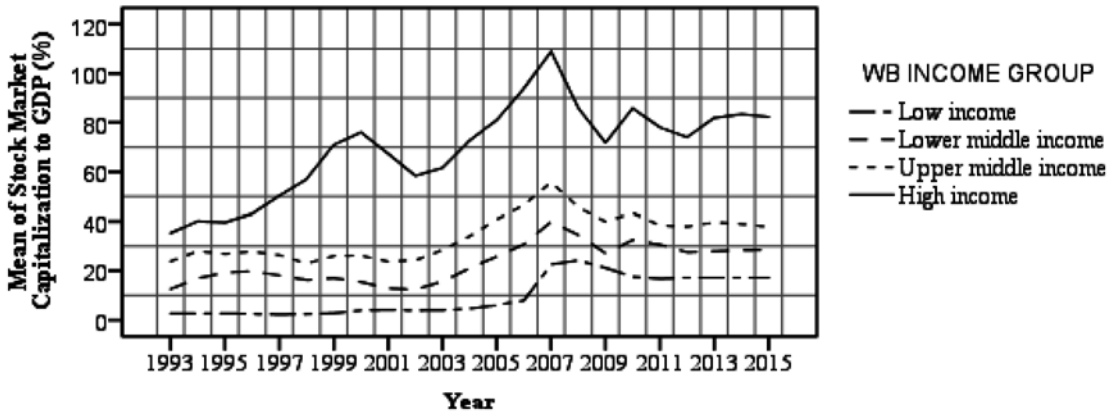

Fig. 7. Average values of the "non-life insurance premium volume to GDP (%)" indicator in 4 groups of states (Annex 1) in the period 1993-2015.

Source: Developed by the authors. Raw data are from the electronic version of the IMF's International Financial Statistics: Financial Development and Structure Dataset http://www.worldbank.org/en/publication/gfdr/data/financial-structure-database

Consequently, the financial depth indicators have higher values in high income states, and lowest values in low income states. The biggest differencs between the groups of states under study are identified in the level of the securities market development as well as the level of the insurance sector development. The smallest differences between the groups of states under study are determined in the level of banking system development. However, by 2015 the differences in the financial value indicators declined (see Fig. above).

In order to achieve the aim of the research, the authors carried out the assessment of β-convergence and σ-convergence inside the four groups of states. Since *β*-convergence is an essential prerequisite for the existence of *σ*-convergence, the authors developed growth regressions of the indicators under study in the period 1993-2015 which characterize the market depth at their initial level of the year 1993, and where the growth rates are dependent variables and the initial levels of indicators are independent variables.

According to the "liquid liabilities to GDP (%)" indicator, β-convergence of $\beta=-0,37<0$ is determined in all 4 groups (see Fig.8). So, the states with a low value of the "liquid liabilities to GDP (%)" indicator increase the value of this indicator at a quick rate, but the states with a higher value of the indicator increase it at a lower rate. In the states with low and lower middle income β-convergence is expressed more explicitly ($\beta=-0.597<0$, R Square = 0.266 and $\beta=-0.641<0$, R Square = 0.390 respectively) than in the states with upper middle income ($\beta=-0.404<0$, R Square = 0.351) and the states with high income ($\beta=-0.268<0$, R Square = 0.146) (Figure 8).

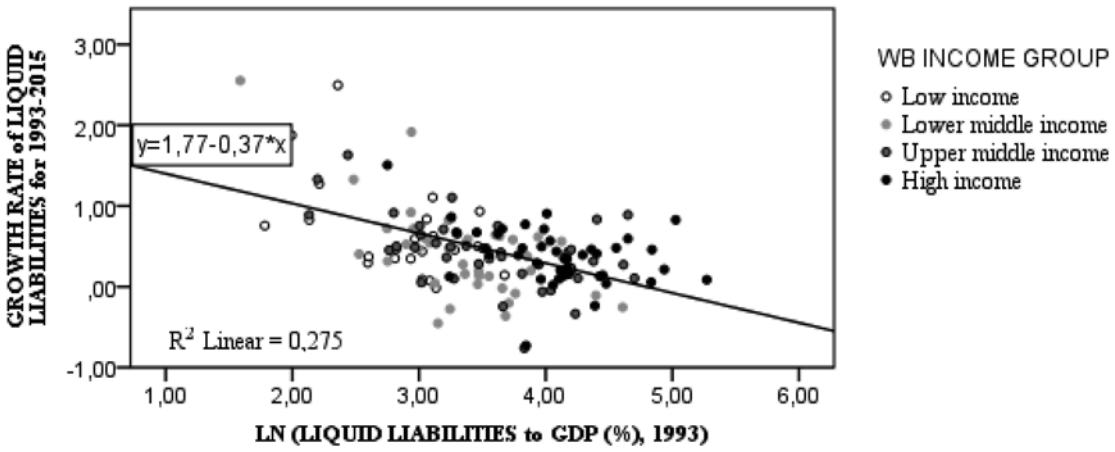

Fig. 8. Growth rate regression of the "liquid liabilities to GDP (%)" indicator in the period 1993–2015 at its initial 1993 level. (growth-initial level regressions). WB INCOM GROUP: Annex 1

Source: Developed by the authors. Raw data are from the electronic version of the IMF's International Financial Statistics: Financial Development and Structure Dataset http://www.worldbank.org/en/publication/gfdr/data/financial-structure-database

According to the "deposit money bank assets to GDP (%)" indicator, β-convergence of β=-0.5<0 is determined in all 4 groups (see Fig.9). In the states with low income and the states with lower middle income β-convergence is expressed more explicitly (β=-0.72<0, R Square = 0.582 and β=-0.71<0, R Square = 0.486 respectively) than in the states with upper middle income (β=-0.619<0, R Square = 0.366) and the states with high income (β=-0.493<0, R Square = 0.324) (Figure 9).

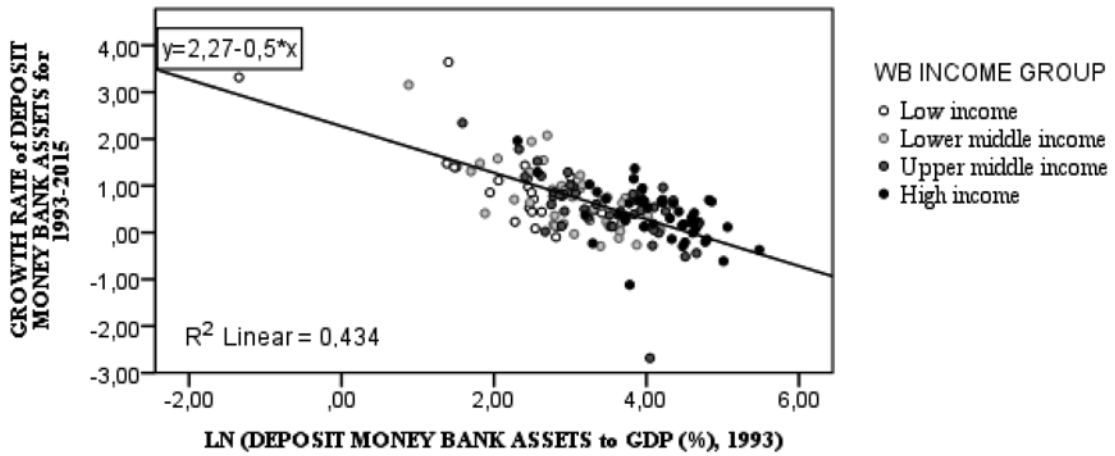

Fig. 9. Growth-initial level regression of the "deposit money bank assets to GDP (%)" indicator in the period 1993-2015 at its initial 1993 level. (growth-initial level regressions). WB INCOM GROUP: Annex 1

Source: Developed by the authors. Raw data are from the electronic version of the IMF's International Financial Statistics: Financial Development and Structure Dataset http://www.worldbank.org/en/publication/gfdr/data/financial-structure-database

According to the "private credit by deposit money banks to GDP (%)" indicator, β-convergence of β=-0.51<0 is determined in all 4 groups (see Fig.10). In the states with low income and the states with lower middle income β-convergence is expressed more explicitly (β=-0.77<0, R Square = 0.6 and β=-0.804<0, R Square = 0.553 respectively) than in the states with upper middle income (β=-0.678<0, R Square = 0.386) and the states with high income (β=-0.432<0, R Square = 0.285) (Figure 10).

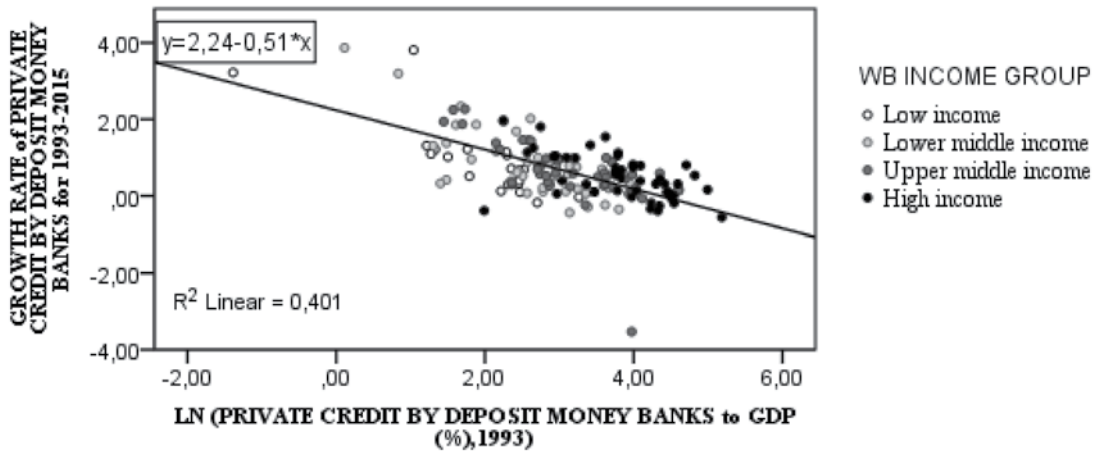

Fig. 10. Growth-initial level regression of the "private credit by deposit money banks to GDP (%)" indicator in the period 1993-2015 at its initial 1993 level. (growth-initial level regressions). WB INCOM GROUP: Annex 1

Source: Developed by the authors. Raw data are from the electronic version of the IMF's International Financial Statistics: Financial Development and Structure Dataset http://www.worldbank.org/en/publication/gfdr/data/financial-structure-database

According to the "bank deposits to GDP (%)" indicator, β-convergence of β=-0.45<0 is determined in all 4 groups (see Fig.11). In the states with low income, β-convergence (β=-0.548<0, R Square = 0.344) is also determined; in the states with lower middle income β-convergence is expressed more explicitly (β=-0.64<0, R Square = 0.574); in the states with upper middle income β-convergence is also determined (β=-0.512<0, R Square = 0.495) and in the states with high income, too (β=-0.408<0, R Square = 0.327) (Figure 11).

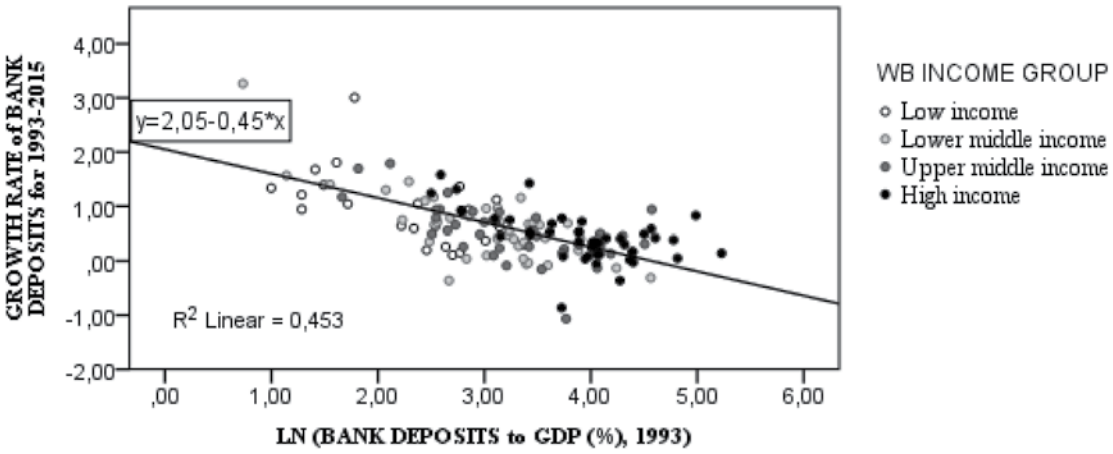

Fig. 11. Growth-initial level regression of the "bank deposits to GDP (%)" indicator in the period 1993-2015 at its initial 1993 level. (growth-initial level regressions). WB INCOM GROUP: Annex 1

Source: Developed by the authors. Raw data are from the electronic version of the IMF's International Financial Statistics: Financial Development and Structure Dataset http://www.worldbank.org/en/publication/gfdr/data/financial-structure-database

According to the "stock market capitalization to GDP (%)" indicator, β-convergence of β=-0.45<0 is determined in all 4 groups (see Fig.12). In the states with low income, β-convergence (β=-0.548<0, R Square = 0.344) is also determined; in the states with lower middle income β-convergence is expressed more explicitly (β=-0.64<0, R Square = 0.574); in the states with upper middle income β-convergence is also determined (β=-0.512<0, R Square = 0.495) and in the states with high income, too (β=-0.408<0, R Square = 0.327) (Figure 12).

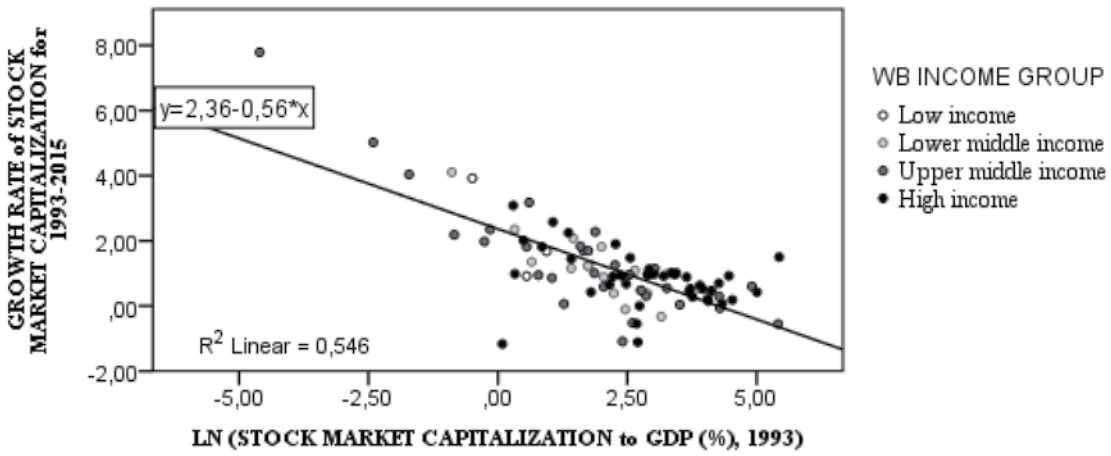

Fig. 12. Growth-initial level regression of the "stock market capitalization to GDP (%)" indicator in the period 1993 - 2015 at its initial 1993 level. (growth-initial level regressions). WB INCOM GROUP: Annex 1

Source: Developed by the authors. Raw data are from the electronic version of the IMF's International Financial Statistics: Financial Development and Structure Dataset http://www.worldbank.org/en/publication/gfdr/data/financial-structure-database

According to the "life insurance premium volume to GDP (%)" indicator, β-convergence of β=-0.36<0 is determined in all 4 groups (see Fig.13). In the states with low income, β-convergence (β=-0.79<0, R Square = 0.539) is also determined; in the states with lower middle income β-convergence is expressed more explicitly (β=-0.276<0, R Square = 0.104); in the states with upper middle income β-convergence is also determined (β=-0.547<0, R Square = 0.532) and in the states with high income, too (β=-0.293<0, R Square = 0.286) (Figure 13).

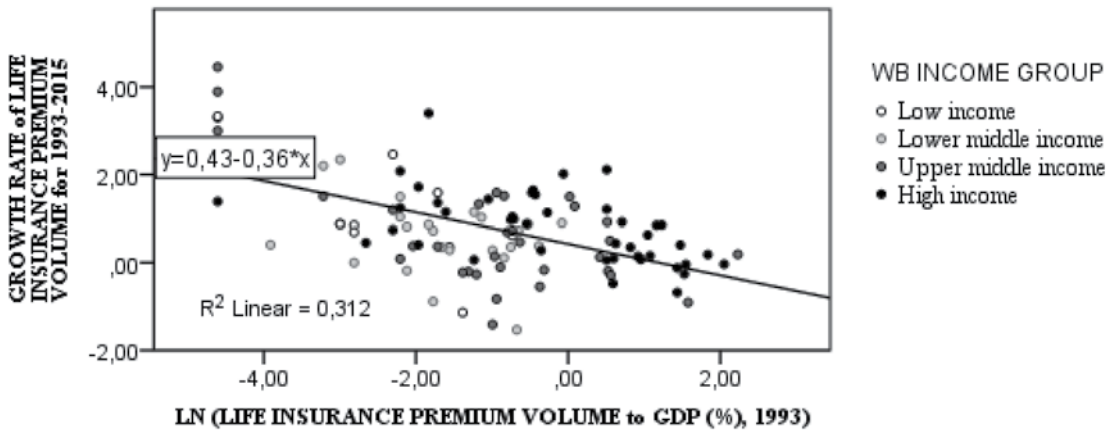

Fig. 13. Growth-initial level regression of the "life insurance premium volume to GDP (%)" indicator in the period 1993-2015 at its initial 1993 level. (growth-initial level regressions). WB INCOM GROUP: Annex 1

Source: Developed by the authors. Raw data are from the electronic version of the IMF's International Financial Statistics: Financial Development and Structure Dataset http://www.worldbank.org/en/publication/gfdr/data/financial-structure-database

According to the "non-life insurance premium volume to GDP (%)» indicator, β-convergence of: β=-0,42<0 is determined in all 4 groups (see Fig.14). In the states with low income, β-convergence (β=-0.755<0, R Square = 0.452) is also determined; in the states with lower middle income β-convergence is not determined, as R Square = 0.002; in the states with upper middle income β-convergence is also determined (β=-0.693<0, R Square = 0.747) and in the states with high income, too (β=-0.48<0, R Square = 0.443) (Figure 14).

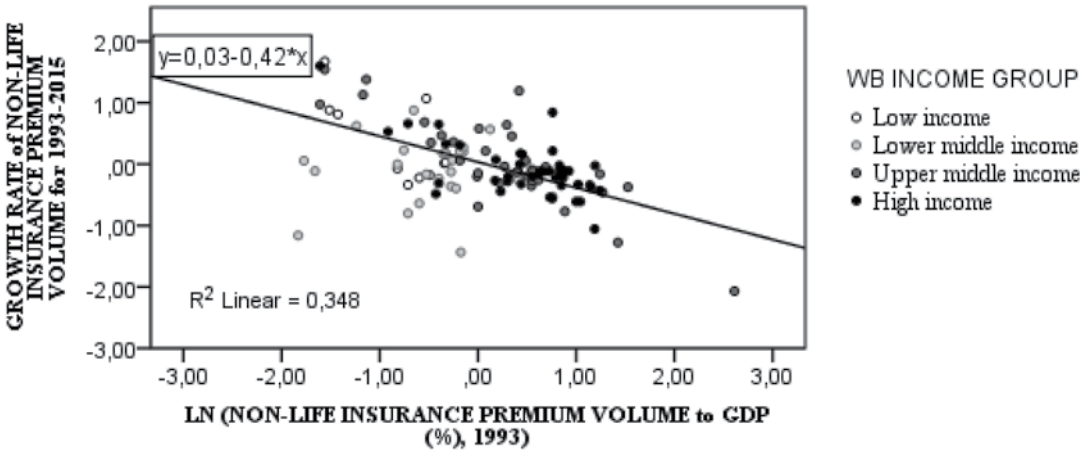

Fig. 14. Growth-initial level regression of the "non-life insurance premium volume to GDP (%)" indicator in the period 1993-2015 at its initial 1993 level. (growth-initial level regressions). WB INCOM GROUP: Annex 1

Source: Developed by the authors. Raw data are from the electronic version of the IMF's International Financial Statistics: Financial Development and Structure Dataset http://www.worldbank.org/en/publication/gfdr/data/financial-structure-database

The values of coefficients of variation of the financial depth indicators in 1993 and 2015 are determined. The first one measures dispersion and shows dynamics of inequality: if there is dispersion, and the coefficient of variation or other statistical indicators fall, we may say there is convergence, otherwise, indicators disperse in time (Table 1).

Table 1. Values of coefficients of variation of financial depth indicators in 1993 and 2015. (Low income states: Annex 1)

Financial depth indicators	Vσ 1993	Vσ 2015	$K_{R\ 1993}$	$K_{R\ 2015}$
liquid liabilities to GDP (%)	0.45	0.48	1.68	2.09
1993 g. = 100%	100	106	100	124
deposit money bank assets to GDP (%)	0.60	0.59	2.47	2.55
1993 g. = 100%	100	98	100	103
private credit by deposit money banks to GDP (%)	0.68	0.66	2.91	3.11
1993 g. = 100%	100	97	100	107
bank deposits to GDP (%)	0.64	0.57	2.16	2.40
1993 g. = 100%	100	89	100	111
stock market capitalization to GDP (%)	0.83	0.64	1.93	1.53
1993 g. = 100%	100	77	100	79
life insurance premium volume to GDP (%)	1.06	0.98	3.54	2.74
1993 g. = 100%	100	92	100	77
non-life insurance premium volume to GDP (%)	0.63	0.58	2.27	1.79
1993 g. = 100%	100	92	100	79

Source: Developed by the authors. Raw data are from the electronic version of the IMF's International Financial Statistics: Financial Development and Structure Dataset http://www.worldbank.org/en/publication/gfdr/data/financial-structure-database

The authors determined σ-convergence of the following indicators in the group of low income states in the period 1993 - 2015: stock market capitalization to GDP (%) – the coefficient of variation decreased by 23%, the scatter coefficient by 21%; life insurance premium volume to GDP (%) – the coefficient of variation decreased

by 8%, the scatter coefficient by 23%; non-life insurance premium volume to GDP (%) – the coefficient of variation decreased by 8%, the scatter coefficient by 21%. Therefore, in low-income states there is convergence of indicators, which characterizes the level of securities market development and the level of insurance sector development. It is too early to discuss the convergence of indicators which characterize the level of banking system development (Table 2).

Table 2. Values of coefficients of variation of financial depth indicators in 1993 and 2015 % (Low middle income states: Annex 1)

Financial depth indicators	Vσ 1993	Vσ 2015	$K_{R\ 1993}$	$K_{R\ 2015}$
liquid liabilities to GDP (%)	0.56	0.51	2.9	2.33
1993 g. = 100%	100	91	100	80
deposit money bank assets to GDP (%)	0.57	0.51	2.59	2.44
1993 g. = 100%	100	89	100	94
private credit by deposit money banks to GDP (%)	0.68	0.57	2.85	2.78
1993 g. = 100%	100	83	100	98
bank deposits to GDP (%)	0.69	0.47	3.73	1.94
1993 g. = 100%	100	68	100	52
stock market capitalization to GDP (%)	1.00	0.75	3.90	2.70
1993 g. = 100%	100	75	100	69
life insurance premium volume to GDP (%)	0.90	0.95	3.46	4.19
1993 g. = 100%	100	106	100	121
non-life insurance premium volume to GDP (%)	0.61	0.66	2.63	2.62
1993 g. = 100%	100	108	100	99.7

Source: Developed by the authors. Raw data are from the electronic version of the IMF's International Financial Statistics: Financial Development and Structure Dataset http://www.worldbank.org/en/publication/gfdr/data/financial-structure-database

There is σ-convergence of the indicators which characterize the level of banking system development and the level of insurance sector development in the group of states with low middle income: liquid liabilities to GDP (%) – the coefficient of variation decreased by 9%, the scatter coefficient by 20%; deposit money bank assets to GDP (%) – the coefficient of variation decreased by 11%, the scatter coefficient by 6%; private credit by deposit money banks to GDP (%) – the coefficient of variation decreased by 7%, the scatter coefficient by 2%; bank deposits to GDP (%) – the coefficient of variation decreased by 32%, the scatter coefficient by 48%; stock market capitalization to GDP (%) – the coefficient of variation decreased by 25%, the scatter coefficient by 31% (Table 3).

Table 3. Values of coefficients of variation of financial depth indicators in 1993 and 2015 % (Upper middle income states: Annex 1)

Financial depth indicators	Vσ 1993	Vσ 2015	$K_{R\ 1993}$	$K_{R\ 2015}$
liquid liabilities to GDP (%)	0.64	0.70	2.44	3.63
1993 g. = 100%	100	109	100	149
deposit money bank assets to GDP (%)	0.69	0.57	2.55	2.55
1993 g. = 100%	100	83	100	100
private credit by deposit money banks to GDP (%)	0.77	0.56	3.08	2.49
1993 g. = 100%	100	73	100	81
bank deposits to GDP (%)	0.69	0.71	2.69	4.13
1993 g. = 100%	100	103	100	154

stock market capitalization to GDP (%)	1.99	1.29	9.41	6.39
1993 g. = 100%	100	65	100	68
life insurance premium volume to GDP (%)	1.94	1.59	10.58	8.57
1993 g. = 100%	100	82	100	81
non-life insurance premium volume to GDP (%)	1.25	0.58	7.42	3.03
1993 g. = 100%	100	46	100	41

Source: Developed by the authors. Raw data are from the electronic version of the IMF's International Financial Statistics: Financial Development and Structure Dataset http://www.worldbank.org/en/publication/gfdr/data/financial-structure-database

There is σ-convergence of the indicators which characterize the level of banking system development, the level of insurance sector development, and the level of securities market development in the group of states with upper middle income: deposit money bank assets to GDP (%) – the coefficient of variation decreased by 17%; private credit by deposit money banks to GDP (%) – the coefficient of variation decreased by 27%, the scatter coefficient by 19%; stock market capitalization to GDP (%) – the coefficient of variation decreased by 35%, the scatter coefficient by 32%; life insurance premium volume to GDP (%) – the coefficient of variation decreased by 18%, the scatter coefficient by 19%; non-life insurance premium volume to GDP (%) – the coefficient of variation decreased by 54%, the scatter coefficient by 59% (Table 4).

Table 4. Values of coefficients of variation of financial depth indicators in 1993 and 2015 % (High income states: Annex 1)

Financial depth indicators	Vσ 1993	Vσ 2015	$K_{R\ 1993}$	$K_{R\ 2015}$
liquid liabilities to GDP (%)	0.54	0.55	2.68	2.97
1993 g. = 100%	100	102	100	111
deposit money bank assets to GDP (%)	0.59	0.44	3.11	1.98
1993 g. = 100%	100	75	100	64
private credit by deposit money banks to GDP (%)	0.65	0.51	2.98	2.44
1993 g. = 100%	100	78	100	82
bank deposits to GDP (%)	0.62	0.60	2.97	3.26
1993 g. = 100%	100	97	100	110
stock market capitalization to GDP (%)	1.24	1.92	6.46	12.50
1993 g. = 100%	100	155	100	193
life insurance premium volume to GDP (%)	1.04	0.90	4.36	4.34
1993 g. = 100%	100	87	100	99.5
non-life insurance premium volume to GDP (%)	0.45	0.51	1.73	2.69
1993 g. = 100%	100	113	100	155

Source: Developed by the authors. Raw data are from the electronic version of the IMF's International Financial Statistics: Financial Development and Structure Dataset http://www.worldbank.org/en/publication/gfdr/data/financial-structure-database

The authors determined σ-convergence of the following indicators in the group of high income states in the period 1993-2015: deposit money bank assets to GDP (%) – the coefficient of variation decreased by 25%, the scatter coefficient by 36%; private credit by deposit money banks to GDP (%) – the coefficient of variation decreased by 22%, the scatter coefficient by 18%; life insurance premium volume to GDP (%) – the coefficient of variation decreased by 13%, the scatter coefficient by 0.5%. Therefore, in high-income states there is convergence of certain indicators which characterize the level of banking system development and certain indicators which characterize the level of insurance sector development. There is divergence of "stock market capitalization to GDP (%)" indicators and "non-life insurance premium volume to GDP (%)" indicators (Table 5).

Table 5. Summary table of the occurance of β-convergence and σ-convergence in the groups of states (WB INCOM GROUP: Annex 1)

Groups of states / Financial depth indicators	Low income	Low middle income	Upper middle income	High income
liquid liabilities to GDP (%)	β (+) ; σ(-)	β (+) ; σ(+)	β (+) ; σ(-)	β (+) ; σ(-)
deposit money bank assets to GDP (%)	β (+) ; σ(-)	β (+) ; σ(+)	β (+) ; σ(+)	β (+) ; σ(+)
private credit by deposit money banks to GDP (%)	β (+) ; σ(-)	β (+) ; σ(+)	β (+) ; σ(+)	β (+) ; σ(+)
bank deposits to GDP (%)	β (+) ; σ(-)	β (+) ; σ(+)	β (+) ; σ(-)	β (+) ; σ(-)
stock market capitalization to GDP (%)	β (+) ; σ(+)	β (+) ; σ(+)	β (+) ; σ(+)	β (+) ; σ(-)
life insurance premium volume to GDP (%)	β (+) ; σ(+)	β (+) ; σ(-)	β (+) ; σ(+)	β (+) ; σ(+)
non-life insurance premium volume to GDP (%)	β (+) ; σ(+)	β (-) ; σ(-)	β (+) ; σ(+)	β (+) ; σ(-)

Source: Developed by the authors. Raw data are from the electronic version of the IMF's International Financial Statistics: Financial Development and Structure Dataset http://www.worldbank.org/en/publication/gfdr/data/financial-structure-database

Note: (+) – convergence occurs; (-) – convergence does not occur

Analyzing Table 5, it is determined that there are a few situations that are evident:
1) β – convergence and σ- convergence (β (+) ; σ(+));
2) β – convergence and no σ- convergence (β (+) ; σ(-));
3) no β – convergence and no σ- convergence (β (-); σ (-)).

The *first* situation explains that a quicker growth of indicators occurs in the states with lower values of these indicators at the initial period of time, which with time leads to the decrease in the coefficient of variation and scatter coefficient of indicators in a specific group of states.

The *second* situation is possible when the group of states with initially low absolute values of the indicator constantly changes places with the states with initially higher absolute values of the indicator, but the general level of gap between these states is permanent.

The *third* situation is possible if the condition of quicker growth of indicators in the states with lower values of these indicators at the initial period of time is not met, which cannot with time lead to the decrease in the coefficient of variation and scatter coefficient in a particular group of states.

Therefore, β –convergence is based on the Solow model and answers the question whether poor regions will be able to catch up with rich regions. The interrelation of these concepts is that β – convergence follows from σ- convergence, but there is no opposite consequence.

In the states with low middle and upper middle income, β – convergence and σ- convergence occur according to most indicators under study; in both the states with low and high income β – convergence and σ- convergence occur only according to part of the indicators.

Conclusions and discussion

It is determined that the financial depth in high income states is bigger than in low income states. The biggest differences between the groups of states under study are determined in the level of the securities market and the insurance sector; differences in the level of banking system development are much lower. It is likely that the increase in the efficiency and velocity of provision of financial services, which was due to fast development of information and communication technologies and use of the Internet as the market environment for provision of services (enterprises working 24 hours a day, transfer of operations into cyberspace, remote provision of services, etc.) was the

precondition for this increase. The increase in the mobility of international capital also encouraged the integration and enhancement of efficiency of financial markets' operations (Laneand Reichlin, 2016). Some researchers who consider convergence a system for levelling differences (Baele et all, 2004) identify financial integration as a market for a certain financial tool, when economic agents with identical relevant characteristics operate in identical administrative environments according to equal rules. Other researchers (Hristov and Rozenov, 2009), (Adam et all, 2002) measure the evolution of integration of capital markets according to financial indicators which are based on prices (price dispersion for assets at markets different European markets) and news indicators (the influence of particular information on price development for various financial assets). The given research show that despite the fact that financial integration differs according to certain financial products at different periods of time, it has achieved a significant level between European debt securities markets and money markets. Italian researchers offered to consider convergence from the viewpoint of general changes of financial institutions on the basis of quantitative methods focusing on the consequences of convergence processes. A group of European researchers (Murinde et all, 2004) identified convergence in the stock market on the basis of analysis of markets in seven European states in the period 1972-1996, but only in the stock segment. And other researchers (Giacinto and Esposito, 2004) using for analysis the data from 1995 until 2003 came to the conclusion that there is convergence of the indicators of financial development in 13 European states, although not for banking products. Therefore, the findings on analysis of the convergence process obtained by numerous researchers are determined by the period, methodology and the research object.

The decrease in the abovementioned differences happened during the period under study: convergence processes are more explicit in the states with low middle and upper middle income. Summarizing the carried out analysis of the hypothesis on financial convergence, it should be emphasized that it found a limited confirmation: all indicators in low income states were characterized by quicker growth in those states which in 1993 had minimal values of these indicators; but in only three of them did cross-country dispersion in the values of these indicators in the period 1993-2015 reduce (stock market capitalization to GDP (%), life insurance premium volume to GDP (%), non-life insurance premium volume to GDP (%)). The states with low middle income and upper middle income have most indicators characterized by β – convergence which resulted in the reduction of dispersion of these indicators among the states that belong to this group (except for "life insurance premium volume to GDP (%)" and "non-life insurance premium volume to GDP (%)" indicators that characterize insurance markets in the states with low middle income and "liquid liabilities to GDP (%)" and "bank deposits to GDP (%)" indicators that characterize the level of banking system development in the states with upper middle income). In the states with high income, convergence is confirmed according to 3 indicators: "deposit money bank assets to GDP (%)", "private credit by deposit money banks to GDP (%)", and "life insurance premium volume to GDP (%)".

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ANNEX 1

	WB INCOME GROUP			
	Low income	Lower middle income	Upper middle income	High income
	COUNTRY	COUNTRY	COUNTRY	COUNTRY
1	Benin	Armenia	Argentina	Australia
2	Burkina Faso	Bangladesh	Azerbaijan	Austria
3	Burundi	Bhutan	Belarus	Bahamas, The
4	Central African Republic	Bolivia	Belize	Belgium
5	Chad	Cabo Verde	Botswana	Chile
6	Comoros	Cambodia	Brazil	Croatia
7	Congo, Dem. Rep.	Cameroon	Bulgaria	Cyprus
8	Gambia, The	Congo, Rep.	China	Czech Republic
9	Guinea	Côte d'Ivoire	Colombia	Denmark
10	Guinea-Bissau	Djibouti	Costa Rica	Estonia
11	Haiti	Egypt, Arab Rep.	Dominica	Finland
12	Madagascar	El Salvador	Dominican Republic	France
13	Malawi	Ghana	Ecuador	Germany
14	Mali	Guatemala	Equatorial Guinea	Greece
15	Mozambique	Honduras	Fiji	Hong Kong SAR, China
16	Nepal	India	Gabon	Hungary
17	Niger	Indonesia	Georgia	Iceland
18	Rwanda	Kenya	Grenada	Ireland
19	Senegal	Kyrgyz Republic	Guyana	Israel
20	Sierra Leone	Lesotho	Iran, Islamic Rep.	Italy
21	South Sudan	Micronesia, Fed. Sts.	Jamaica	Japan
22	Tanzania	Moldova	Jordan	Korea, Rep.
23	Togo	Mongolia	Kazakhstan	Kuwait
24	Uganda	Morocco	Lebanon	Latvia
25		Myanmar	Macedonia, FYR	Lithuania
26		Nicaragua	Malaysia	Macao SAR, China
27		Nigeria	Maldives	Malta
28		Pakistan	Mauritius	Netherlands
29		Papua New Guinea	Mexico	Norway
30		Philippines	Namibia	Oman
31		Samoa	Panama	Poland
32		Solomon Islands	Paraguay	Portugal
33		Sri Lanka	Peru	Saudi Arabia
34		Sudan	Romania	Seychelles
35		Swaziland	Russian Federation	Singapore
36		Tajikistan	Serbia	Slovak Republic
37		Tonga	South Africa	Slovenia
38		Tunisia	St. Lucia	Spain
39		Ukraine	St. Vincent	St. Kitts and Nevis
40		Vanuatu	Suriname	Sweden
41		Vietnam	Thailand	Switzerland
42		West Bank and Gaza	Turkey	Trinidad and Tobago
43		Yemen, Rep.	Venezuela, RB	United Arab Emirates
44		Zambia		United Kingdom
45				United States
46				Uruguay

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