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MODELING THE DYNAMICS STABILITY OF UKRAINIAN BANKING SYSTEM

Liberalization of economic relations and dissemination of globalization tendencies triggered the rapid development of consumer and financial markets. But, from the other side, it also caused a lot of damages for financial market and its components, especially for banking system, because banks play the most important role on financial market and are major financial intermediaries in our country. So, on the base of previous statements, we can summaries that fluctuation in banking sector could cause to the instability of economic situation in the whole country. That's why it's very important to research and develop some type of model to identify the factors of banking system stable development and find out the mechanism of its regulation. All these facts prove the urgency of this scientific research topic.

Stability of banking system is proposed to consider as the ability of the system to maintain stable basic characteristics in time in condition of insignificant market fluctuation and to perceive and resist the influence of external factors adequately and to maintain the condition of a long-term dynamic equilibrium.

Modeling the dynamics stability of the banking system is proposed to realize on the basis of verification time series stationarity by adaptation of the Forster-Stewart method to the peculiarities of the research subject. Therefore, the stationary time series is a process, which is characterized by constant mathematical expectation and variance (without trends), autocorrelation function depends on two subsequent periods of time, and not from a particular time period. It is proposed to analyze the stages of the proposed approach practical implementation more detailed with consideration of the mentioned definition.

1 stage. Creation the research information base by collecting statistical data in the context of the dynamics of relevant indicators of quantitative estimation the stability of Ukrainian banking system; complex research of their basic regularities. Such indicators are: the rate of growth of net profit/loss; the capital adequacy of banks; interest margin; ROA (return on assets); ROE (return on equity) (figure 1).

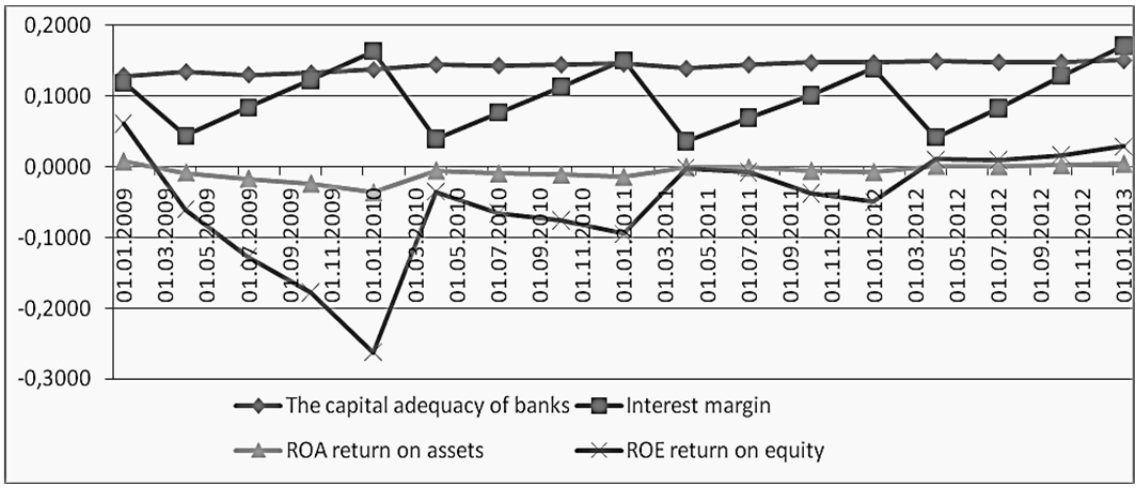

Figure 1 – Diagram of the dynamics of relevant indicators of quantitative estimation the stability of Ukrainian banking system

The comprehensive analysis of the time series, presented in figure 1, allowed to determine the main tendencies in change of the national banking system' indicators stability. Therefore, clear linear trend of development is observed in the context of capital adequacy and the return on assets of banking institutions, while the seasonal variations are characteristic such indexes as interest margin and return on capital. The above-indicated variations of the mentioned indicators cause the oscillation trends in the dynamics of banking system stability indicator.

Formalization and quantification of the revealed laws is proposed to realize with the use of mathematical methods by decomposition of the considered time series filtering trend $\left(F(t)\right)$, seasonal (cyclic) $\left(S\right)$ and random components:

- return on capital is described by the trend-seasonal multiplicative model:

$$ROE_t = F(t)\cdot S = \left(0,01t - 0,16\right)(-0,25)^{d_1}0,6^{d_2}1,31^{d_3}2,07^{d_4} \quad (1)$$

where ROE_t – the return on equity at time *t*; d_1 $\left(d_2, d_3, d_4\right)$ – the indicator of the first (second, third, fourth and so on) quarter, which takes the values: "1", if time moment of calculations are corresponded to the first (second, third, fourth an so on) quarter, "0" – otherwise:

- interest margin is characterized by a trend-seasonal additive model:

$$PM_t = \left(-0,01t + 0,10\right) + 0,41d_1 + 0,81d_2 + 1,18d_3 + 1,51d_4 \quad (2)$$

where PM_t – interest margin at time *t*.

2 stage. Definition of two numerical sequences *k* and *l* on the basis of the comparison of each input time series value (consistently one of a whole array selected indicators) with the previous according to this principle: in the context of the numerical sequence *k* – a single value, if the time series level (except the first one) is greater than all the previous ones, and a non-zero value otherwise, within the sequence *l* – a single value, if the time series level (except the first one) is less than all the previous ones, and a non-zero value otherwise.

3 stage. Calculation of the monotonicity characteristics (variables c and d), fading or slacking off each time series of relevant indicators of quantitative estimation of the Ukrainian banking system stability:

$$c = \sum_{t=2}^{n}(k_t + l_t),\ d = \sum_{t=2}^{n}(k_t - l_t) \qquad (3)$$

where $k_t(l_t)$ – the value of the numerical sequence *k* (respectively, *l*) at time *t*.

4 stage. The comparison of t-relations actual values with a critical one and formation conclusions on the confirmation (if the calculated value exceeds a critical) or reject the hypothesis about trends in average and in the dispersion the corresponding time series. Formulas take the form of:

$$t_c = \frac{|c-\mu|}{\sigma_1},\ \sigma_1 = \sqrt{2\ln n - 3{,}43},\ t_d = \frac{|d-0|}{\sigma_2},\ \sigma_2 = \sqrt{2\ln n - 0{,}85} \qquad (4)$$

where μ – assessment of the mathematical expectations time series;
σ_1 – assessment of the mean-square deviations the value *c*;
σ_2 – assessment of the mean-square deviations the value *d*.

5 stage. Determination of the dynamics banking system stability indicator (*R*) as a time series, which elements are calculated as the amount of *t*-relations in the moment of time *t*.

The practical implementation of the above-mentioned approach allows to identify time intervals, during which Ukrainian banking system is characterized by insufficient level of stability. So, the stability indicator takes a value “1” (the fact of an unstable condition) in the second half of 2010, the second quarter of 2011 and during almost the whole year in 2012.

Stability of the banking system is determined by a lot of indicators and influences on the formation of the main banking sector indicators. In the research it is relevant to determine the direction and nature of the link between the effective sign and the size of equity capital, liabilities and assets for the banking system as a whole. Therefore, quantification the impact

factors in the stability indicator is proposed on the basis of an econometric approach, which considers the construction of the equations multiple non-linear regression in such form:

$$R = -91\,783,33 - 44\,754,38 \ln OC - 338\,405,64 \ln E + 385\,645,31 \ln A + \\ + 1\,260,82 \ln^2 OC + 8\,606,86 \ln^2 E - 9\,744,91 \ln^2 A \quad (5)$$

where R – the indicator of the banking system stability;
OC – equity capital;
E – liabilities;
A – assets.

Analysis of the equation parameters (5) allows to make the following conclusions. With the increase of the banks equity capital to the amount 177,48 billion (18 % of GDP) the level of banking system stability will gradually reduce. Increase of the equity capital above the specified value will cause the revive of Ukrainian banking system stability. A similar tendency is characterized the liabilities (critical value of 196,59 billion – 19,94 % of GDP), in contrast to assets, the which influence on the effective sign is opposite. Therefore, as the relationship between the stability indicator and assets are presented in the form of polynomial second order branches down, the increase in the assets to the level of 197,87 billion (20,07 % of GDP) is accompanied by increase of productive character. The excess of this factor he specified value gradually leads to the loss of the banking system the stable state.

The accuracy and adequacy of revealed regularities are confirmed: criterion Fisher, the actual value of which 3,52 exceeds a critical permissible level of 3,41; the coefficient of determination at the level of 70,10 %; statistically significant parameters of the regression equation (*t*-criterion).

Thus, modeling the dynamics stability of the Ukrainian banking system is allowed to define the stability indicator, explore its dynamics as time series, identify its' main factors, realize decomposition of a system-forming components of the effective indicator.

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MACROPRUDENTIAL REGULATION: THE SHIFT IN THE GLOBAL ECONOMIC

In the aftermath of the recent global financial crisis the concept of government regulatory role has drastically changed. Failure to develop a policy that would create a net positive effect for the economy as a whole

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