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ANALYSIS OF INTERNAL AND EXTERNAL IMBALANCES IN THE FINANCIAL SECTOR OF UKRAINE'S ECONOMY

The article analyses the internal and external imbalances in the financial sector of Ukrainian economy on the basis of the revealed significant deviations in the credit aggregate actual values from their expected values. The research conducted has revealed the nature of endogenous financial risks formation.
Keywords: financial sector; endogenous imbalances; external imbalances; deposits; credits; income of population.

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АНАЛІЗ ВНУТРІШНЬОСИСТЕМНИХ І ЗОВНІШНІХ ДИСБАЛАНСІВ У ФІНАНСОВОМУ СЕКТОРІ ЕКОНОМІКИ УКРАЇНИ

У статті проаналізовано внутрішньосистемні та зовнішні дисбаланси фінансового сектора економіки України на основі виявлених істотних відхилень фактичних значень кредитних агрегатів від їхніх очікуваних значень. Проведене дослідження дозволило розкрити природу формування внутрішньосистемних фінансових ризиків.
Ключові слова: фінансовий сектор; внутрішньосистемні дисбаланси; зовнішні дисбаланси; депозити; кредити; доходи населення.
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АНАЛИЗ ВНУТРИСИСТЕМНЫХ И ВНЕШНИХ ДИСБАЛАНСОВ В ФИНАНСОВОМ СЕКТОРЕ ЭКОНОМИКИ УКРАИНЫ

В статье проанализированы внутрисистемные и внешние дисбалансы финансового сектора экономики Украины на основе выявленных существенных отклонений фактических значений кредитных агрегатов от их ожидаемых значений. Проведенное исследование позволило раскрыть природу формирования внутрисистемных финансовых рисков.
Ключевые слова: финансовый сектор, внутрисистемные дисбалансы, внешние дисбалансы, депозиты, кредиты, доходы населения.

Introduction. Sustainable functioning of the financial sector, its shock resistance is determined not only by fluctuations in the economy. To some degree it depends on imbalances in the process of the financial sector development itself. In addition, the imbalances in the financial sector mean the emergence of disproportions in the structure of financial institutions balances that appear in the conditions of credit expansion and assets price rise. Imbalance rise reflects excessive increase in leverage, net worth of business entities on the background of speculative operations expansion and decrease in the share of productive investments in real assets. In this regard, nowadays a serious problem for central banks and other regulatory authorities of the financial service market is a search for adequate mechanisms of imbalance regulations in the financial sector of economy. It is assumed that well-timed neutralization of such imbalances will allow to guarantee the efficiency of the financial sector main function realization related to the accumulation and transformation of free cash into productive investment.

Latest research and publications analysis. Among foreign scientists who made a significant contribution into the development of a theoretical basis of the financial imbalance concept and working out of practical recommendations are Borio et al. (2001), Borio and White (2004), Borio and Low (2004), Shinazi (2005), Borio and Dremann (2009) and others. More specifically, Shinazi (2005) noted that transition of the financial sector from a stable state (dynamical equilibrium) to the unstable one takes place due to endogenous accumulation of financial imbalances and exogenous shock influence. Provided that, in the process of financial imbalance accumulation exposition of the financial sector to embodiment of system risks increases.

Borio and White (2004) interpreted "financial imbalances" as "overextension" of economic agents' balances ("excessive" increase of leverage) during credit booms as a result of interaction of assets and external financing prices alteration (increase), which can lead to economic growth stability decrease and aggravate the following recession.

Among the domestic scientists financial imbalance interpretation is close to foreign scientists' approach. Kozyuk (2007) determined "financial imbalances" as a significant deviation of financial aggregate behavior (various financial instruments market capitalization) from their historic path. Snizhko (2008) characterizes "financial imbalances" as processes of overproduction or underproduction of financial instruments and services in particular market segments, overvaluation of balance estimating of financial system participants, volatility growth cases in particular financial markets (price "bubbles").

In a collective monograph "Ukrainian financial market stability and mechanisms of its provision" edited by Baranovskiy (2010), banking sector imbalances of the pre-crisis period (2007—2008) were formalized. The imbalances came out in:
- a gap between bank's liabilities and loans;
- prevailing of short-term liabilities in resource base structure and long-term loans in assets structure;
- currency imbalances, in particular, ratio of loans to deposits by foreign currency;
- a significant gap between credit expansion and real GDP change;
- a mismatch of credit expansion and nominal income of population level;
- high speed of annual crediting growth of the private sector of economy.

Unresolved issues. The problem of imbalance regulation in the financial sector of the national economy must be solved with the corresponding formalization of all stages and components. Foreign and national scientists formed the theoretical base of the financial imbalance concept cyclically coming out in modern market economy. However, imbalance evaluation and regulation problem in the process of financial sector development still has not achieved a systemic and comprehensive solution.

The research objective is working out a methodical background for carrying out an analysis of endogenous and external imbalances of the financial sector of the Ukrainian economy.

Key research findings. Taking into account the academic experience of domestic scientists (The National Bank of Ukraine, 1996–2011) in the issues of the banking sector imbalance formalization prevalent in assets and trade among other institutions of the financial sector, we would offer to conduct structural classification of financial sector imbalances (Figure 1).
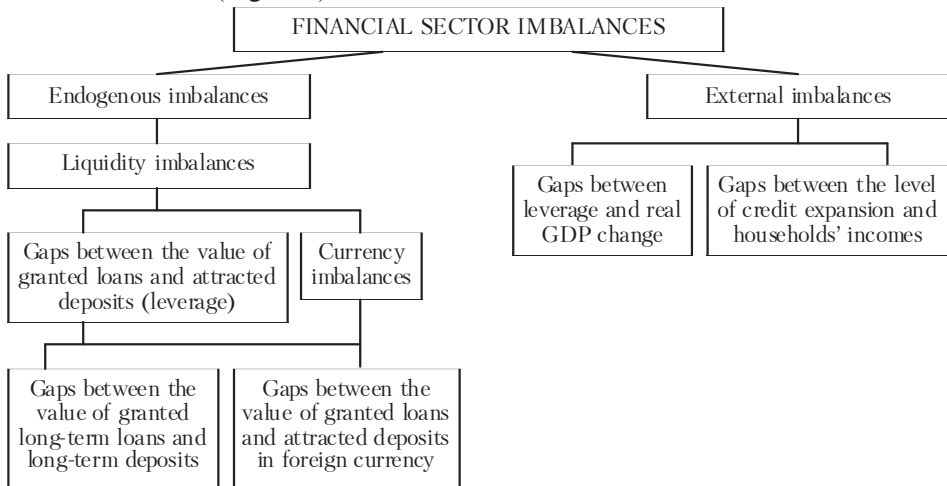

Figure 1. **Imbalances of the financial sector of economy,**
developed by the authors, based on Baranovskiy (2010)

Endogenous and external imbalances of the financial sector of Ukrainian economy emerged in the conditions of the financial economic crisis of 2007–2008. A lot of scientific works have been published, revealing the crisis factors and triggers (Bukovinsky, 2010; Vakhnenko, 2008; Baranovskiy, 2010; Sheludko, 2009; Shinazi, 2005). Among the crisis key factors are the following:

- market price booms on assets not backed by influence of fundamental economic factors;
- worldwide liquidity surplus and credit booms;
- accumulation of excessive debts in the household sector and achievement of high level of financial leverages;
- wide spreading of complex and "exotic" financial instruments and system risk accumulation;
- inability of financial regulatory authorities to control too risky activity of financial institutions and inability to foresee crisis scenario of course of events (Bogdan, 2010).

Second-class mortgage market meltdown in the USA was the trigger of the crisis which led to the following chain reaction in the worldwide financial economic system (Baranovskiy, 2010). Domestic banking sector suffered most of all from the crisis, it could not completely compensate for the negative consequences connected with crisis development in the national economy. Moreover, Baranovskiy notes that the crisis itself had an indirect influence on the macroeconomic situation in Ukraine. First of all, the crisis had a negative influence on the commodity market environment that determines the national export. Energy sources of the economic sector became more expensive, that could not but affect the banking sector.

At the same time such negative impact of the crisis on the national economy was reinforced by significant endogenous imbalances accumulated in the financial sector of Ukrainian economy. Given this, Vakhnenko (2008) points to a series of indices that in 2007−2008 signalized serious future consequences of the worldwide financial economic crisis in Ukraine:

- overestimations of the national currency exchange rate and lack of international reserves of the country in comparison to the volume of external obligations;

- attraction of significant volumes of foreign capital and formation of excessive foreign load;

- quick growth of bank credits and financing at the expense of consumer and nonproductive investment expenditures of economic entities;

- distending "bubble" prices on real assets and bonds of domestic emitters.

In accordance with the classification offered (Figure 1) let's analyze balance sheet ratio behavior, non-linear character of its changes can signify the formation of imbalances in the national economy financial sector. Ratios calculation scheme is shown in Table 1.

Table 1. **Credit aggregate calculation scheme,** *developed by the authors*

Aggregate	Ratio	Interpretation
Credits to deposits ratio (K_1)	$K_1 = \dfrac{L}{D}$	L – loans, granted by deposit-taking corporations into economy; D – deposit held with deposit-taking corporations by deposit corporations
Long-term loans to long-term deposits ratio (K_2)	$K_2 = \dfrac{L^{lt}}{D^{lt}}$	L^{lt} – long-term loans, granted by deposit-taking corporations into economy; D^{lt} – long-term deposits, held with deposit-taking corporations
Credits in foreign currency to deposits in foreign currency ratio (K_3)	$K_3 = \dfrac{L^{fc}}{D^{fc}}$	L^{fc} – loans in foreign currency, granted by deposit-taking corporations into economy; D^{fc} – deposits in foreign currency, held with deposit-taking corporations
Ratio of credits to nominal income of populations (K_4)	$K_4 = \dfrac{L}{I^p}$	I^p – value of nominal income of population

Analysis of the credit ratio extended into the national economy and GDP values has been realized in the work Lunyakov (2012).

So let's suppose that imbalances emerge when actual values of the indices significantly (nonlinearly) differ from the expected values. For detecting possible signifi-

cant deviations it is advised to use a Hodrick-Prescott statistic filter. The advantages of this filter usage compared to the analysis of deviation from average values of the temporary raw is in allowing to define cyclical component and its frequent use in the theory of business cycles (Gourinchas et al., 2001) and financial cycles (Hodrick, 1997). Hodrick-Prescott filter conceptual framework comes down to decomposition of time series to trend and cyclical components:

$$y_t = \tau_t + c_t, \tag{1}$$

where y_t — the value of time series, $t = 1,2,...,T$; τt — time series trend; c_t — time series cyclical component. To smooth time series the task of loses function minimization (sum of deviation squares) of temporary raw growth rate is solved:

$$\min\left(\sum_{t=1}^{T}(y_t - \tau_t)^2 + \lambda \sum_{t=2}^{T-1}[(\tau_{t+1} - \tau_t) - (\tau_t - \tau_{t-1})]^2 \right), \tag{2}$$

where $\sum_{t=1}^{T}(y_t - \tau_t)^2$ — penalty function of the cyclical component of time series; $\lambda \sum_{t=2}^{T-1}[(\tau_{t+1} - \tau_t) - (\tau_t - \tau_{t-1})]^2$ — penalty function of the trend component of time series; λ — value of smoothness of trend ($\lambda = 14400$ for monthly values, $\lambda = 1600$ for quarterly values, $\lambda = 100$ for annual values of time series).

To conduct the analysis let's use the method of Hodrick-Prescott filter application, offered by Gourinchas et al. (Gourinchas, 2001) in 2001 for identifying the credit "bubbles". The peculiarity of this method is in usage of the extended trend for modeling expected values of the above-mentioned indexes.

Let's suppose that imbalances of the analyzed balance indices will occur if their actual values (K_1, K_2, K_3, K_4) exceed their expected values, simulated with the use of Hodrick-Prescott filter by more than 5%, the threshold of five percent has been applied to cut insignificant deviations. In general, the rule defining imbalances of the analyzed indexes is:

$$\frac{K_j(t_l) - K_j^{"EHP"}(t_l)}{K_j^{"EHP"}(t_l)} > \gamma, \tag{3}$$

where $K_j(t_l)$ — actual value of analyzed index j ($j = 1,2,...,4$) at moment t_l ($l = 1,2,...,T$); $K_j^{"EHP"}(t_l)$ — expected value of analyzed index j at moment t_l, calculated using "extended trend" of Hodrick-Prescott filter; γ — threshold of significant deviations of actual values from expected ones in the analyzed indexes, $\gamma = 0.05$ or 5%.

To calculate the analysed indices let's take statistics of financial (to detect endogenous imbalances) and real (to detect external imbalances) sectors of economy as basic values. This statistics is posted on the official site of the National Bank of Ukraine, that is:

- statistic data "Deposit held with deposit-taking corporations by deposit corporations (excluding National Bank of Ukraine)": "Deposits by resident sectors (excluding National Bank of Ukraine)";

- statistic data "Loans, granted by deposit-taking corporations into economy (excluding National Bank of Ukraine)": "Loans granted by deposit-taking corporations (excluding National Bank of Ukraine)";

- statistic data "Income and expenses of population".

Figure 2 graphically shows the changes of actual and expected values of K_1 ratio. During the period from 1996 to 2005 the economy of Ukraine faced insignificant credit deviations from the value of deposits attracted into the national banking system.
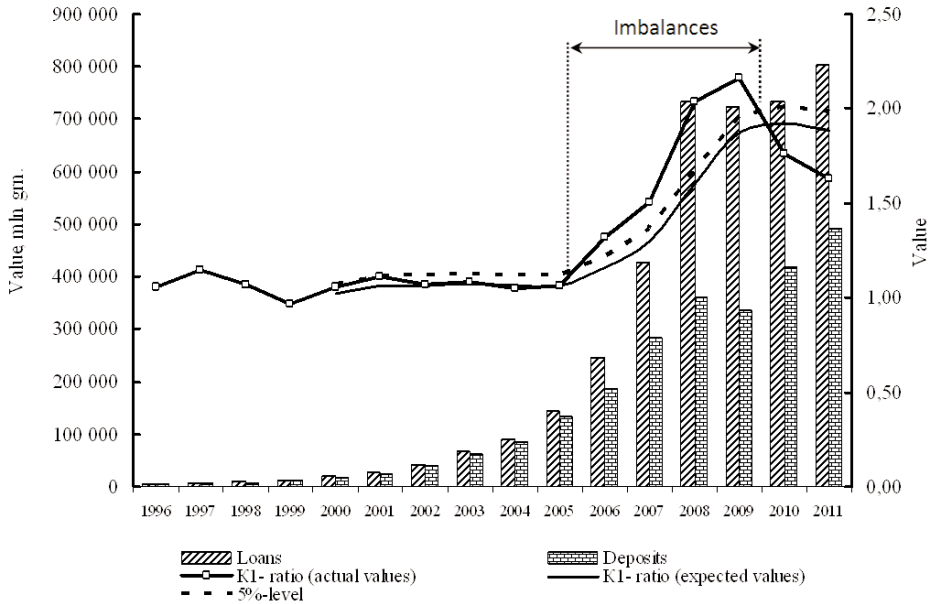

Figure 2. **Actual and expected values of credit to deposit ratio (K_1),** *based on the statistics of financial sector (The National Bank of Ukraine, 1996–2011)*

Imbalances (sharp and significant deviations) between the values of extended credits and attracted deposits were detected from 2006 to 2009, it signifies aggressive credit policy based on optimistic expectations in the issues of stable increments of deposit base and borrower's solvency. Figure 3 shows the dynamics of long-term loans to long-term deposit ratio.

Analyzing the trends of the long-term loans extended by the banking sector into the national economy in relation to the attracted deposits during the period of more than one year, it's possible to find the tendency of prevailing the short-term deposits over the long-term loans. In particular, long-term loans to long-term deposits ratio in 2007 was about 2:1, in 2008 − 3:1.

Such gaps made the basis of vulnerability to shocks increase and materialization of endogenous liquidity risks. Figure 4 graphically shows the dynamics of credits to deposits ratio in foreign currency.

Significant gaps between the value of loans in foreign currency extended by deposit-taking corporations and the value of deposits in foreign currency were detected during the period of 2006−2008. So in 2007 this ratio was 2:1. At that time the loans, granted to households in foreign currency significantly increased. It was true of households that had no stable income in foreign currency and their solvency depended on currency exchange rate stability. In 2007 compared to 2006 the increments of loans in foreign currency, granted to households, were 98%.
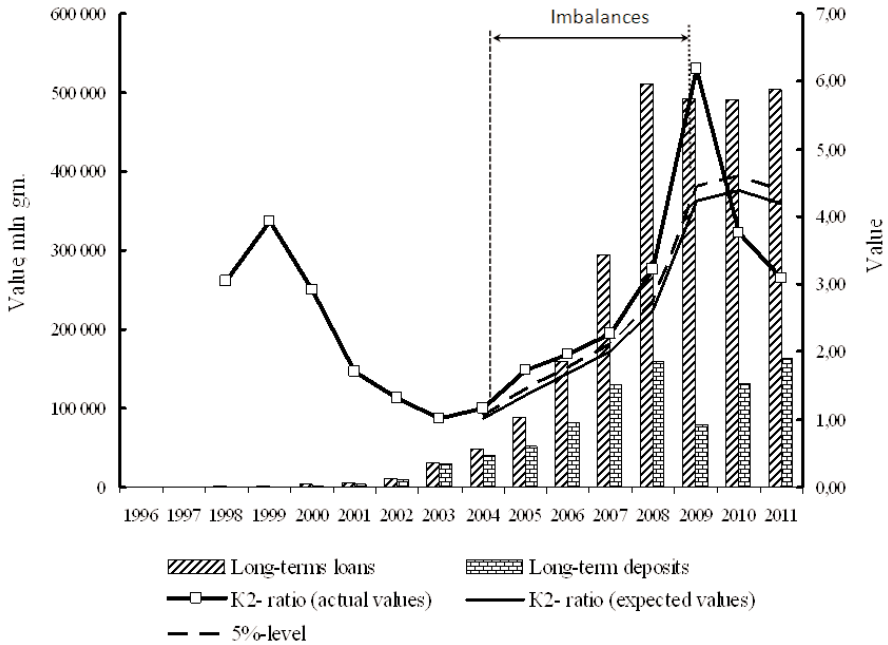
Figure 3. **Actual and expected values of long-term loans to long-term deposit ratio (K_2),** *based on the statistics of financial sector (The National Bank of Ukraine, 1996–2011)*
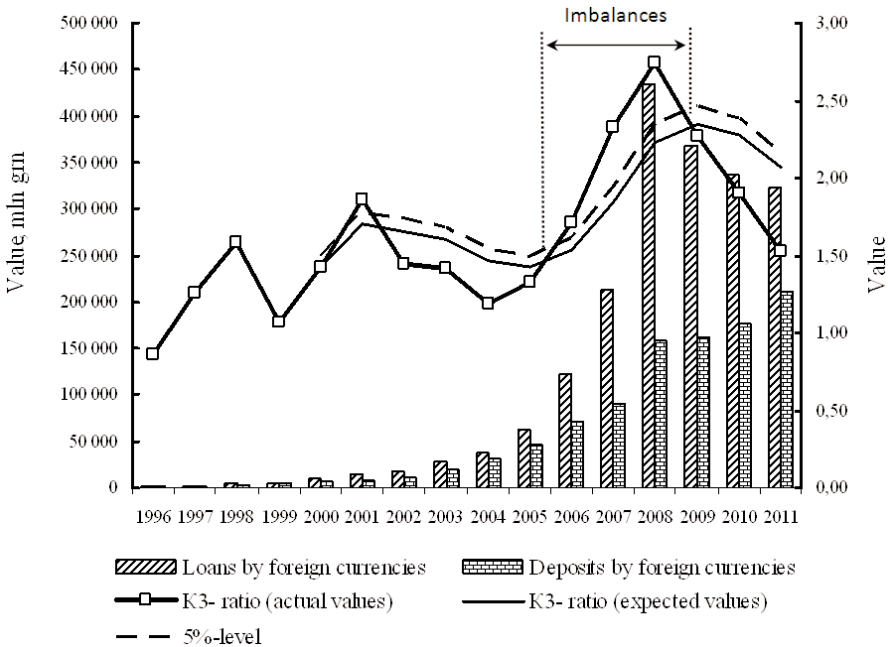

Figure 4. **Credits to deposits ratio in foreign currency (K_3),** *based on the statistics of financial sector (The National Bank of Ukraine, 1996–2011)*

Quick foreign currency credit gain with evident delay of the corresponding deposit base formation led to currency risk shifting on to the end-use borrowers and formed endogenous credit risks for deposit-taking corporations. As foreign specialists say, the representatives of the International Monetary Fund, expansion of crediting in foreign currency often precedes financial crises (Evans, 2000).

As Baranovskiy (2010) notes, an important factor that had a significant impact on the formation of the above-analyzed imbalances were external borrowings of Ukrainian banks, and also growth of non-resident bank deposit base functioning in Ukraine. More specifically, during the period of 2006—2008 these deposits increased in times which ensured their share in aggregate attracted funds to the level of 10%. It should be noted that the actions of the National bank of Ukraine during this period were directed at controlling the growing inflation expectations. Moreover, the inflation itself was backed by extension of consumer crediting of households that did not correspond to the macroeconomic level of the country development, with economy productivity growth weakening (Figure 5).
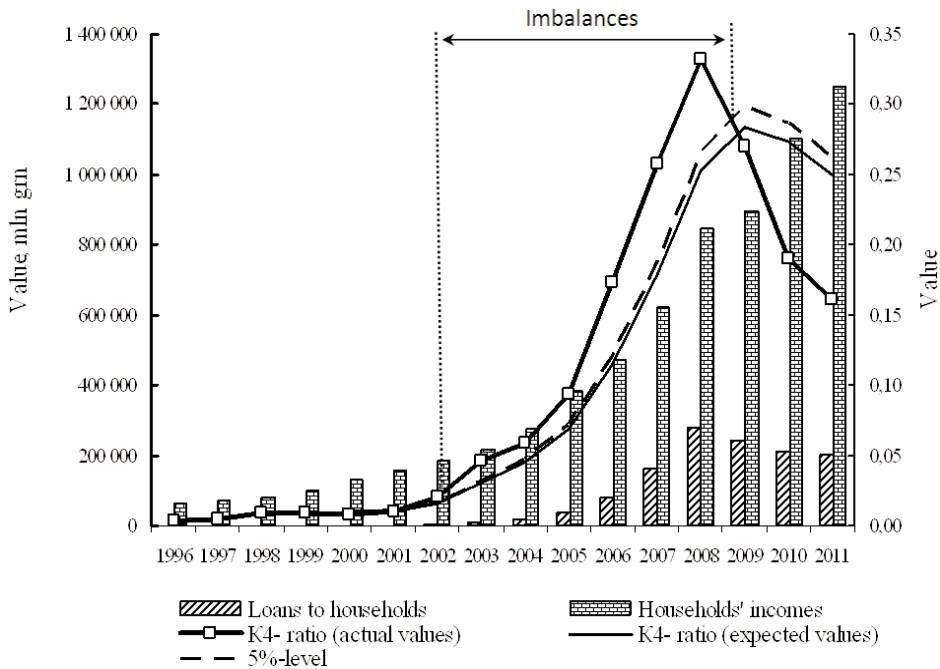

Figure 5. **The ratio of loans to nominal income of population (K_4),** *based on the statistics of financial sector (The National Bank of Ukraine, 1996–2011)*

The loans, granted by deposit-taking corporations, into the economy of Ukraine, did not correspond to the growth rate of income of the population. As it can be seen from Figure 4, starting from 2002, significant disproportion between loans and macroeconomic aggregates has emerged. In 2007 credit share in nominal incomes increased by 48% (from 17% till 26%) compared to the similar period of 2006.

Conclusions. The conducted research of imbalance evaluation in the financial sector of the national economy allowed distinguishing the period of forming of evi-

dent endogenous and external imbalances on the scientific basis. Defining the speculative component in the process of economic growth, related to the change period of fundamental conditions, is the reason for conducting a well-timed restriction monetary policy by the central bank of the country.

The following scientific investigations in this field refer to the improvement of monetary and administrative instruments of imbalance regulation in the financial sector of Ukrainian economy.

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