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ANALYSIS OF SYSTEMIC LIQUIDITY RISK FOR THE BANKING SECTOR IN BOSNIA AND HERZEGOVINA (BH)

Abstract

The purpose of this paper is to relate the Danish concept of the "Balance Principle" to test the hypotheses of systemic liquidity risk in the banking sector. In the paper, the major econometric method is to gauge the general applicability of theories of liquidity and to test the applicable validity of Bosnia and Herzegovina (BH). A prime example for this study is taken from the first quarter of 2004 to the second quarter of 2014. Our intention here is to consider the identification of macroeconomic parameters that positively affect the growth of the banking sector. The parameter liquidity, i.e. liquid assets / total assets will be observed as a dependent variable, and nonperforming loans / total loans, average profitability on equity capital, non-interest expenses / total revenue, the average required reserve, total loans, the money supply in the wider sense, net capital / risk weighted assets and net performing assets / total assets will be used as independent variables. The purpose of the paper is to determine whether there is interdependence in the movement between the independent and dependent variables through a multiple linear regression.

Keywords: Systemic liquidity risk, Danish balance principle, ANOVA test, macroeconomic parameters

1. Introduction

The present financial economic research question emerged from the question: *What is systemic liquidity risk?* It is hard to give convincing answers to this question. Previous financial studies suggest a highlight between two waves of debit and credit in the balance sheet and liquidity is usually described with respect to this framework. *Liquidity* provides the rapid circulation between two waves of debit and credit in the balance sheet. In addition, *systemic liquidity risk* has convincingly argued by on-balance sheet factors and off-balance sheet factors in the economy with financial related parties and non-financial related parties. This paper calls attention to the central problem of systemic liquidity risk as to the balance principle. Indeed, the systemic risk issue argues persuasive evidence of solutions beyond on-balance sheet factors. Still, the paper makes an attempt to answer the on-balance sheet factors.

The Danish balance principle mortgage model is intended to maintain the mortgage market stability in Denmark over the last two centuries (IMF, 2011). The balance principle in this case ensures interest rate matching, duration/liquidity matching and currency matching by maintaining the purchase of bonds and cash flows with bond investors and securing loans and instalment fees of real properties

with borrowers. Under the strict balance principle, each new mortgage loan is in principle funded by the issuance of new mortgage bonds of equal size and identical cash flow and maturity characteristics. For example, the 30-year, fixed rate, callable annuity loan funded by a pass-through callable mortgage bond gives a plausible explanation for the balance principle application. Proceeds from the sale of the bonds are passed to the borrower to purchase the real property and the interest and principal payments are passed to the investors holding the mortgage bonds.

Cleary, in the paper, the balance principle touches upon the theme of correlation of the profitability index and debt ratio analysis by the ANOVA test on Bosnia and Herzegovina (BH). The balance principle framework means that assets are supported by profits and liabilities are operated by loans accounts for liquidity of on-balance sheet factors. In addition, the fundamental idea underlying the liquidity of on-balance sheet factors is exploring the systemic liquidity risk because the debt with collaterals gives reliable explanations for off-balance sheet factors. Even if we limit our analysis to a simple economy setting with on-balance sheet factors, the method of an operational goal and financial stability would have at least three important effects that should be taken into account: (1) The effect on timing and sequential causality of crisis; (2) The effect on counterproductivity of banks and their borrowers; and (3) The effect on institutional deficiencies.

The following first session will review professional tools indicating the timing and sequential causality of crisis management. Representative methods are the Internal Capital Adequacy Assessment Process (ICAAP) and the Supervisory Review and Evaluation Process (SREP). The preventive method to the crisis situation can provide the sequential process to fend off a financial crisis.

Assets of banks are loans. Evidently, if the bank can borrow much more money, the profit of a bank goes up. Hence, the sharp power game between the regulatory bodies and banks has existed. The liquidity coverage ratio (LCR) and the net stable funding ratio (NSFR) are fortified liquidity concepts in the third Basel accord (BASEL III). Asset price appreciation is required to be more than the cost of borrowing in these concepts.

In the last session, the macroprudential stress test aimed to simulate the regulative situation. Regulatory actions to ensure the financial stability and risk taking try to do the work beyond the institutional constraints. One strong centralized body cannot exist in finance. The core of finance is voluntary investment and thus, it cannot be controlled by one strong body. We will test the significance of observed financial variables in the model, where the null hypothesis is the reason why the independent variables do not significantly affect the dependent. In this context, it is stated that the observed independent variables have the greatest impact on the growth or decline of the liquidity for the banking sector in Bosnia and Herzegovina.

2. Literature Review

Overall liquidity risk management is intended to aim at market stability rather than efficient operation. However, traditionally, liquidity functions have supported the stable capital structure of banks. The premise which underpins a good deal of my subsequent argument is dependency of deposits within the scope of liquidity motion. To facilitate understanding of motion of deposits and loans, it seems necessary to examine the balance sheet principle for the going concern of the banking entities.

Specially, in a risky situation, the bank cannot meet the debt obligation of loans under constrained conditions. In this case, it may be better for the bank to seek marketable assets to build a better investment portfolio with stable debt condition to arbitrage the profitable investment. It is highly probable that the required amount of liquid and marketable investments depends on the stability of its deposit structure related with the credit portfolio growth. On the other hand, if the majority of the portfolio consists of a large volume of long-term loans and stable deposits, it evidently offers a greater liquidity position for commercial banks (Greuning, Bratanovic, 2006). Testing of liquidity risk can be implemented through Monte Carlo simulation, which allows the distribution of liquidity, as well as the probability of insolvency for each scenario under consideration.

Liquidity risk is divided into two types: funding liquidity risk (cash flow risk), and market liquidity (asset/product risk). Accepted at face value and taken in literal expression itself, funding liquidity risk is the problem of funding (liability of traders), and market liquidity is the problem of the market (of

assets). A close look at the Brunnermeier-Pedesen model (2008) reveals that market liquidity declines as fundamental volatility increases, which is consistent with the empirical findings of Benston and Hagerman (1974) and Amihud (2002). Diamond and Dybvig (1983), argue that financial crisis occurs if there is a lack of short-term liquidity. Burnside et al. (2001) view government guarantees as actual causes of financial crises. These authors claim that the lack of private hedging of exchange rate risk by firms and banks led to financial crises in Asia. According to Goodhart et al. (2006), bank liquidity is approximated based on the model of microeconomic basis, where the test endogenous reactions of banks and liquidity is projected on the basis of the credit supply.

According to Adrian et al. (2008), banks will actively respond to any development of the prices of financial assets in the financial market, in order to stabilize its financial leverage and harmonize the financial regulations in force. According to Brunnermeir et al. (2009), behaviour liquidity of banks in a financial crisis and tension, i.e. in the case of increasing the impact of the crisis relationship between funding liquidity and market liquidity, is stronger in terms of the formation of the spiral of liquidity, or spreading financial contagion.

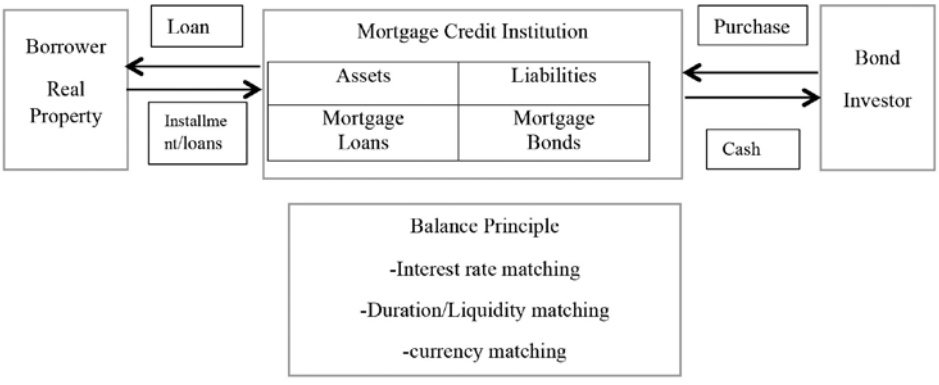
3. Methodology and the multiple regression model

Given a goal of stability, there is one further argument of cashflows. The cashflow is saturated with expectations of inflows and outflows as given maturity. The temporary cash shortage is prominent in the liquidity problem. It appears likely to us that the liquidity management is the need for net financing. There is somewhat the likelihood of qualified liquidity management of commercial banks; however, there is the prediction problem of expected liquidity associated with contingent liabilities. For example, legal clauses of credit and guarantees stimulate huge cash outflows that do not depend on financial conditions of some banks. That's why significant cash outflows caused by insolvency and bankruptcy situations suddenly occur in an economic depression and financial crisis.

Something that holds the various elements of a complicated structure together is an economically and financially integrated solution. For example, Denmark has a sophisticated housing finance system with a unique arrangement of asset-liability matching that has helped maintain mortgage market stability over the last two centuries. The system relies on mortgage financing via covered bonds. It underwent a regulatory overhaul in 2007 following the adoption by the European Union of the Capital Requirements Directive a year earlier.

The mortgage loan casts itself in the role of small margin and long-term investment. Mortgage banks take the credit risk and market risk including prepayment risk is passed on to the bond investors.

Figure 1 The Danish Balance Principle Mortgage Model



Source: IMF (2011), Global Financial Report: Durable Financial Stability, p. 118

In Denmark, under the strict balance principle, each new mortgage loan is in principle funded by the issuance of new mortgage banks of equal size and identical cash flow and maturity characteristics.

The analysis of systemic liquidity risk between Economics and Finance has been identified as the most complex aspect of regulation. The dual role of assets and liabilities with the balance principle kept by the going concern with the accounting perspective takes on a much easier role.

Asset Liquidity is defined as a quick validated certain asset liquidation with minimum losses. The dimensions of Asset Liquidity are *time* and *Liquidation value.* In pricing models, market illiquidity is measured by an illiquidity premium. The pricing model introduces an additional variable for the market illiquidity, which can be interpreted as the premium required by investors as compensation for any transaction costs or uncertainty. The present value of market illiquidity can be expressed by the following equation (Schmaltz, 2009: 16 - 17):

$$L_t^a = \sum_{j=t+1}^{T} \frac{CF_s^a}{(1 + r_f(t,j) + c^a(t,j) + \delta^a(t,j))^s} \tag{1}$$

Where:

CF_s^a – Future Cash Flow, asset a;

L_t^a – Liquidation Value, asset a;

$r_f(t,j)$ – Risk free interest rate;

$c^a(t,j)$ – Credit Risk Premium, asset a;

$\delta^a(t,j)$ – Illiquidity premium, assets a,

$\delta^a(t,j) \geq 0$

The liquidation value of assets a at time t is denoted L_t^a. It presents the sum of all future cash flows discounted at the risk-free rate $r_f(t_1,t_2)$ plus the premium for credit risk inherent in assets a $c^a(t_1,t_2)$ and the premium for potential future illiquidity $\delta^a(t_1,t_2)$. Also, market liqudity is measured by delta, where delta is an illiquidity premium. The present value PV_t^a can be expressed as the market value of perfect liquid assets:

$$PV_t^a = L_t^a \ (\ \delta^a = 0) \tag{2}$$

In liquidity management, assets liquidity is measured by haircuts - HC, as follows:

$$PV_t = HC \ \cdot PV_t + (1 - HC) \cdot PV_t \tag{3}$$

where:

PV - Present value;

HC - Haircut.

The present value can be decomposed into a fraction that can and a fraction that cannot be recovered in liquidation. Haircuts can take values from 0 to 1. As well as delta the haircuts are illiquidity measures as they take values for less liquid and zero for perfectly liquid assets. Asset liquidity depends on the institutional setup, for example marketable assets have a higher liquidity than non-marketable assets. On the other hand, financial assets are marketable if they are produced on a primary market and not by an intermediary.

For instance, an investor who buys a stock on 50% margin will lose 40% of his money if the stock declines 20% (Bodie et al., 2008). Thus, both liquidity ratios and solvency ratios provides considerable insight into the status of entities. To measure liquidity risk, essential to the notion of liquidity ratios is the comparison with the solvency ratios as shown in Table 1.

The regression model is an equation with a finite number of parameters and variables. Depending on whether a model comprised only one or more variables, there is a simple and multiple linear regression models respectively. In addition to a dependent variable and one or more independent variables, each regression models contains a random variable. A simple linear regression model expresses a relationship between the two parameters as follows:

$$Y_i = \alpha + \beta X_i + \varepsilon_i \qquad i = 1, 2, \dots \dots n, \tag{4}$$

where:

Y - dependent variable,

α and β - unknown parameters that need estimate, and

ε_i - stochastic variable (error distances)

Unlike the simple regression model, the multiple linear regression model is different in that it comprises two or more independent variables.

$$Y_i = \alpha + \beta_1 X_{i,1} + \beta_2 X_{i,2} + \cdots + \beta_i X_{i,j} + \cdots + \beta_k X_{i,k} + \varepsilon_i \tag{5}$$

$$i = 1, 2, \dots . n.$$

Table 1 Financial Analysis: Solvency vs. Liquidity Ratios

Liquidity Ratios	Current ratio	**= Current assets / Current liabilities** The current ratio measures a company's ability to pay off its current liabilities (payable within one year) with its current assets such as cash, accounts receivable and inventories. The higher the ratio, the better the company's liquidity position
	Quick ratio	**= (Current assets – Inventories) / Current liability** **= (Cash and equivalents + Marketable securities + Accounts receivable) / Current liabilities** The quick ratio measures a company's ability to meet its short-term obligations with its most liquid assets, and therefore it excludes inventories from its current assets. It is also known as the acid-test ratio.
	Days Sales Outstanding (DSO)	**= (Accounts receivable / Total credit sales) × Number of days in sales** DSO refers to the average number of days it takes a company to collect payment after it makes a sale. A higher DSO means that a company is taking unduly long to collect payment and is tying up capital in receivables. DSOs are calculated quarterly or annually.
Liquidity Index	LI	$LI_q = \Sigma^N i=1 [W_i (P/P^*)]$ Where: W_i stands for the percentage of each section of assets in the bank's portfolio, P stands for the price of assets in case of a sudden sales and P* stands for real market price of assets. The bigger the difference in price, logically the lower the liquidity of the concerned financial institution (bank). Liquidity index (LI) measures the size of a bank q 's possible loss caused by a final sale of assets, compared to the normal market price of those assets.
Liquidity at Risk	LaR	**= Probability of reaching a certain Liquidity level (pL) – Cash flow at Risk (CaR)** • Withdrawal of deposits by X % • Inability to refinance all funds • Inability to refinance X % of money/commercial papers • One-day drop by X% in the main index of shares • Substantial change of interest rates • Restrictions related to convertibility of currency on the emerging markets • Crisis on the emerging markets • Loss in respect of loans • Business risk • Ad hoc analysis of special events This method is used to determine the value of cash flows related to various balance sheet and off-balance sheet positions of a bank.
Solvency Ratios	Debt to equity	**= Total debt / Total equity** This ratio indicates the degree of financial leverage being used by the business and includes both short-term and long-term debt. A rising debt-to-equity ratio implies higher interest expenses, and beyond a certain point it may affect a company's credit rating, making it more expensive to raise more debt.
	Debt to assets	**= Total debt / Total assets** Another leverage measure, this ratio measures the percentage of a company's assets that have been financed with debt (short-term and long-term). A higher ratio indicates a greater degree of leverage, and consequently, financial risk.
	Interest coverage ratio	**= Operating income (or Earnings before interest and taxes (EBIT) / Interest expense)** This ratio measures the company's ability to meet the interest expense on its debt with its operating income, which is equivalent to its earnings before interest and taxes (EBIT). The higher the ratio, the better the company's ability to cover its interest expense.

Source: Financial Analysis: Solvency vs. Liquidity Ratios (2014) retrieved from http://www.investopedia.com/articles/investing/100313/financial-analysis-solvency-vs-liquidity-ratios.asp

Specifically, this model consists of one dependent variable Y, and K independent variables, which are referred to as: $X_{i,j}$= 1,2,..., K. This study used a multiple linear regression model, which assesses the nature and strength of a bond between a dependent variable and K independent variables marked with $X_{i,j}$= 1,2,..., K.

4. The macroprudential stress test beyond the institutional environment – Bosnia and Herzegovina (BH)

As some banks have differently defined risk-weighted assets according to their internal models and differences in local rules of the European Union (EU) member states, there is a risk that the current amount of capital will not be sufficient in terms of meeting the regulatory requirements. Otherwise, there is a trend of deterioration in the credit quality of the portfolio where there is an increase in the share of non-performing loans (NPLs) to total loans. The following is the capital adequacy ratio for banks in the euro zone from 2006 to 2013 as follows.

Table 2 The Regulatory Capital of 13 Eastern European Countries for 2006 - 2013 (in %)

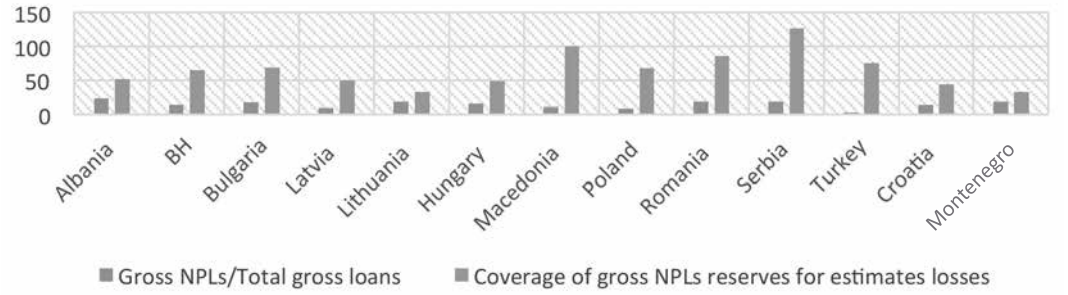
Country	2006	2007	2008	2009	2010	2011	2012	2013	Index (2013/ 2006)	Average
Romania	18.1	13.8	13.8	14.7	15.0	13.4	14.6	13.9	76.79%	**17.1**
Montenegro	21.3	17.1	15.0	15.8	15.9	16.5	16.5	14.7	69.014%	**17.1**
Poland	13.2	12.0	11.2	13.3	13.9	13.1	14.8	15.2	115.15%	**17.1**
Turkey	21.9	18.9	18.0	20.6	19.0	16.5	17.9	15.7	71.69%	**17.1**
Bulgaria	14.5	13.8	14.9	17.0	17.5	17.5	16.5	16.6	114.48%	**17.1**
Macedonia	18.3	17.0	16.2	16.4	16.1	16.8	17.1	16.8	91.80%	**17.1**
Hungary	11.0	10.4	12.3	13.9	13.9	14.2	15.9	16.9	153.64%	**17.1**
Bosnia and Herzegovina	17.7	17.1	16.3	16.1	16.2	17.2	17.0	17.0	96.04%	**17.1**
Lithuania	10.2	11.1	11.8	14.6	14.6	17.4	15.2	17.4	170.59%	**17.1**
Albania	18.1	17.1	17.2	16.2	15.4	15.6	15.6	17.9	98.89%	**17.1**
Latvia	10.8	10.9	12.9	14.2	15.6	14.0	16.7	18.1	167.59%	**17.1**
Croatia	14.0	16.3	15.1	16.4	18.8	19.2	20.5	20.9	149.28%	**17.1**
Serbia	24.7	27.9	21.9	21.4	19.9	19.1	19.9	20.9	84.61%	**17.1**

Source: Annual Financial Stability Report of National Bank of Serbia (2014), Available at:: http://www.nbs.rs/internet/cirilica/90/fs.html

Figure 2 illustrates the tendency of Net Profits and Losses (NPLs) coverage reserves for estimated losses and the share of problematic loans of countries in the region and individual countries of the European Union (EU).

As shown, on the basis of Net profits and losses (NPLs), the Republic of Serbia is above the regional average (6.80 times) excepted for Turkey, which apparently seems to be the best coverage (27.85 times) because it fulfils minimum of the gross Net Pofits and Losses (NPLs) to total gross loans, as well as Macedonia (9.52 times) and Poland (7.67 times). In order to maintain financial stability and pursue interests of depositors and other creditors of the National bank of Serbia (NBS), the IFRS (International Financial Reporting Standards) requires the establishment of regulatory provisions that at the end of 2013 accounted for about 50.9% of Net Profits and Losses (NPLs) where the loan loss covered on-balance and off-balance sheet losses amounting to about of 117.9% of the loans. The share of domestic banks in total assets of Bosnia and Herzegovina (BH) is very negligible. Table 4 illustrates the structure of assets of financial intermediaries in Bosnia and Herzegovina (BH) for the period of 2011 – 2013.

Figure 2 The tendency of Net Profits and Losses (NPLs) of Eastern European Countries on December 31, 2012 (in %)



Source: Annual Financial Stability Report of National Bank of Serbia (2014), Available at: http://www.nbs.rs/internet/cirilica/90/fs.html

The most important and most developed financial market in Bosnia and Herzegovina (BH) is certainly the banking market. Table 3 makes clear that commercial banks have a predominant share of the total assets of the business, which amounted to 86.1 % in 2011 and reached 87.4% in 2013. The second large portion in the amount of total assets certainly insurance companies and reinsurance companies, with a relatively small portion of 4.4% in 2011 and 4.5% in 2013 (The Central Bank of Bosnia and Herzegovina - CBBH, 2014).

Table 3 The Value of Assets of Financial Intermediaries in Bosnia Herzegovina (BH) for 2011 - 2013 (in mil. EUR)

Financial intermediaries	2011		2012		2013	
	Value	Participation (%)	Value	Participation (%)	Value	Participation (%)
Banks	10 734	86.1	10 832	86.3	11 262	87.4
Leasing companies	392	3.1	366	2.9	305	2.4
Microcredit organizations	379	3.1	345	2.8	341	2.6
Mutual funds	414	3.3	407	3.2	390	3.0
Insurance and reinsurance	550	4.4	600	4.8	586	4.5
Total	**12 469**	**100**	**12 550**	**100**	**12 884**	**100**

Source: Financial Stability Report, Central Bank, 2013, p. 37, Available at: http://www.cbbh.ba/files/financial_stability_report/fsr_2013_bs.pdf

Contraction of the non-banking sector resulted from low purchase power of the population, weak economic activity, political circumstances and the previously accumulated risks, particularly in the segment of leasing companies and the microcredit sector. Underdevelopment of the capital market, slow transformation of closed investment funds and high fees of companies that manage investment funds reduced the value of domestic investment funds. Due to prominent legal uncertainty and segmentation, the domestic capital market is not sufficiently attractive to foreign investors (The Central Bank of Bosnia and Herzegovina - CBBH, 2014).

The dominant presence of foreign banking groups in Bosnia and Herzegovina (BH) causes the indirect transfer problems from the eurozone banking system to the banking sector of Bosnia and Herzegovina (BH). The liquidity position at the end of 2012 continued to be fragile. Risks of investing in the real sector in comparison to the amount of money of

banking groups have created a kind of cash drag, or liquidity, which in the short term cannot qualify to cover the costs. As a result of the given situation, banks partly compensated for large decreases of foreign liabilities by the increase of deposits of domestic sectors of 2.6%. Investors in government bonds and treasury bills were mainly domestic banks. Banks in Bosnia and Herzegovina (BH) have surplus funds invested in securities due to the lack of quality projects and other better opportunities for potential investments. The main objective of investing in domestic banks was primarily the preservation of the net interest margin, i.e. achieving high yields on securities (Alihodžić, Plakalović, 2014: 348).

Given the data of the council for Ministers Directorate for Economic Planning, Economic Trends, Bosnia and Herzegovina (2013), the banking sector in Bosnia and Herzegovina (BH) after three years has generated a negative financial result. The growth in non-interest expenses or provisions for general credit risk and potential credit risk was influenced by a negative result at the end of 2013. If the value of the indicator ROA is less than 0.5%, the bank's profitability is considered to be bad. If it is between 0.5% and 1%, then we can say it is about average profitability, and if the value of the ROA indicator ranges between 1% and 2%, we are certainly talking about very profitable financial institutions.

In the table below, it is quite clear that the indicator of the profitability of the banking sector of BH recorded a negative value of 0.20% in the last quarter of 2013. In the second quarter of 2014 a slight increase was recorded in the value of 0.5%.

Table 4 Performance Indicators of the Banking Sector in Bosnia and Herzegovina (BH) for the Quarter 4 of 2013 - Quarter 2 of 2014 (in %)

Weak lending activity reflects the weak demand on the one hand, and the rigidity of the banks on the other. In a time of weak domestic demand, the demand for credit is stagnant or declining. Also, due to the unstable economic growth and development, it is difficult to determine the risk assessment of bank lending, which leads to weak loan supply.

As can be noted from the table in terms of liquidity indicators, there was a slight decline at the Central bank in Bosnia and Herzegovina (BH) (2013). Unlike other indicators where positive developments are deemed desirable, the overly high level of the liquidity indicator, especially under the current macroeconomic conditions, often indicates unwillingness of banks to finance domestic the economy and households. Banks in BH efficiently managed their liquidity, which is shown by the data that liquid assets accounted for 26.4% of the banking sector assets at the end of 2013, and that 46.2% of short-term liabilities of BH banks were covered by liquid assets.

The banking sector in Bosnia and Herzegovina is stable with regard to liquidity except for a few banks that displayed significant weaknesses in their business operations. At the system level, the BH banking sector is still adequately capitalised. Also, in Table 5 it's quite clear that the average capital adequacy of the banking sector of BH from quarter 4 in 2013 to quarter 2, in 2014 was recorded (17.26%), which led to the conclusion that the banking sector is well capitalized and able to maintain a high rate of capitalization above the statutory minimum of 12%. Also, it can be noted in the third quarter of 2013, in the increasing rates of non-performing loans there is a slight decline in the rate of capital adequacy. Higher rates of non-performing loans are related to reduced domestic demand and high unemployment.

Parameters of the Banking sector	Period		
	Q4/2013	Q2/2014	Index (Q2 2014/Q4 2013)
Return on average assets	-0.20	0.5	250.0%
Liquid assets/Total assets	26.4	24.7	93.56%
Liquid assets/Current financial liabilities	46.2	43.4	93.94%

Source: http://cbbh.ba/sfsi.php?id=618&lang=bs&table=&show_all/Statistics/Selected FSIs for banking sector (Adjusted by Author)

Table 5 Movement of the capital adequacy ratio and non-performing loans of the banking sector of BH for the period: Q4 2013 – Q2 2014 (in %)

Years/ Quarter	Q4 2012	Q1 2013	Q2 2013	Q3 2013	Q4 2013	Q1 2014	Q2 2014
Capital adequacy	17.0	17.2	17.2	17.0	17.8	17.3	17.3
Non-performing loans/total loans	13.5	13.8	14.3	14.9	15.1	14.9	15.5

Source: http://cbbh.ba/sfsi.php?id=618&lang=bs&table=&show_all/ Statistics/ Selected FSIs for banking sector

On the other hand, the high rate of credit risk can cause losses of banks due to significantly incapacitated enterprise borrowers to properly fulfil their obligations.

The banking sector in Bosnia and Herzegovina (BH) in 2013 is construed as stable. Generally, the banking sector in Bosnia and Herzegovina (BH) is adequately capitalized. The main risk of the banking sector in Bosnia and Herzegovina (BH) is the tendency of further growth in non-performing loans. Thus, the increased level of systemic risk in the banking sector in Bosnia and Herzegovina (BH) is the result of the high level of non-performing loans and the lack of an appropriate solution for this problem.

The global economic crisis has highlighted the fact that the rapid credit growth in the countries of Southeastern Europe had an impact on the increase in non-performing loans to total loan portfolio and increased credit losses. Based on macroeconomic assumptions, the Central Bank of Bosnia Herzegovina (BH) has implemented top-down stress tests as shown in Table 6.

In the table below, from the data of the Central Bank of Bosnia and Herzegovina - CBBH, it is quite clear that the highest value of economic activity as measured by the gross domestic product was recorded in 2007 (6.0%). On the other hand the lowest value was recorded in 2009 (-2.7%). Crisis effects did not become effective in full capacity until the end of 2008, as the activities continued to take place by inertia of previously arranged agreements. Towards the end of the year, only export indicated that the crisis was being accelerated and expanded to BH, while other economic indicators were still the lowest at the level from 2007. At the end of the year, the banking sector suffered a strong shock due to withdrawal of a portion of the deposits and the deteriorated conditions for foreign borrowing, which then had an impact on the reduction of availability of credit, as well as

Table 6 Analysis of Movement of Macroeconomic Variables for the period: 2007 – 2013 (in %)

Indicators	2007	2008	2009	2010	2011	2012	2013
Real GDP (growth rate)	6.0	5.6	-2.7	0.8	1.0	-1.2	1.6
Average Annual Growth Rate of CPI	1.5	7.4	-0.4	2.1	3.7	2.0	-0.1
Broad Money - M2 (as a percentage of GDP)	54.2	49.8	52.3	54.8	55.9	57.9	61.6
The growth rate of loans in the financial sector	28.83	22.43	-3.17	3.51	5.28	4.12	2.94
The growth rate of deposit in the financial sector	37.93	-1.75	1.83	3.62	3.70	2.57	6.93
The growth rate of foreign direct investment	200.61	-48.55	-73.68	70.39	16.50	-23.54	-21.81
Growth of commercial bank assets	32.80	7.83	-0.61	0.75	3.90	1.95	5.02

Source: http://www.cbbh.ba/files/bilteni/2013/Bilten_4_2013.pdf /Statistics/Main Economic Indicators and GDP

a slowdown of personal consumption and investment. In general, the domestic economy still relied on domestic consumption and investments. After several years of economic expansion and relatively high growth rates, in 2009 the domestic economy experienced a marked contraction caused by the global recession. The domestic economy entered this crisis with a serious fiscal deficit and a very sensitive external position of the country, as well as an unfinished transition process. The three main channels of transmission of the crisis for all emerging market countries were a sudden drop in capital inflows, a reduction of the external demand for their exports, and a decrease in metal prices. Investments fell off considerably due to much lower capital inflows, so, for instance, a 39 per cent reduction in imports of capital products was recorded, while the domestic production of capital products was lower by 18 per cent.

Positive economic trends and gradual recovery from 2011 and beginning of 2012 suddenly stopped during 2012. In the first half of the year, there was still a momentum in the activities, followed by stagnation and slow-down, which was mainly caused by the recession trends in the euro area and our region. Recession in the euro area has lasted for six successive quarters, and in our economy, the situation particularly became complicated when the circumstances in the German economy became worse. The main effects of economic stagnation in the euro-area, on the local economy were reflected in the decrease of external demand for our exports and insufficient capital inflows. All this brought about recession trends and it is estimated that the real decline of the GDP in 2012 was -0.5%, and that negative risks were realized to a high extent, which were not so visible at the beginning of 2012.

When measured by the value of the nominal GDP and growth of the real GDP of International Monetary Fund (IMF), there was a slight recovery in economic activity in the country in 2013. Despite the nominal annual growth, economic activity in the country in the periods after 2008 is quite weak, and could adversely affect the trend of long-term potential growth of the country. Experts from the International Monetary Fund predict that the continuous growth of foreign direct investment (FDI) in Bosnia and Herzegovina (BH) for the period 2014 – 2018 will amount from 320 million to 360 million.

The high value of the consumer price index was recorded in 2008 (7.4%), while on the other hand the lowest value was recorded in 2009 and 2013 respectively (-0.4% and -0.1%). The slowdown trend in inflation has been present since the early 2011, and continued in 2013, with the deflationary pressures emerging in the second half of the year. Annual inflation, measured by the consumer price index (CPI) in 2013 was - 0.1%. At the end of 2013, inflation rate of – 1.2% was recorded. Deflation in 2013 is a result of a continuing trend in the decrease of food and oil prices on the global markets. Long-term inflationary trend in data of the Central Bank of Bosnia and Herzegovina (CBBH) measured by core inflation, is almost zero.

The amount of money in circulation in terms of the currency board arrangement is conditioned by the amount of funds in the reserve account with the Central Bank of Bosnia and Herzegovina - CBBH and it comprises of cash in bank vaults and cash out of banks, that is, the amount of money circulating in the economy. While cash in vaults of banks in recent years has generally had a uniform trend with a pronounced seasonal character, its constant growth has been recorded in 2013. Growth in savings in the banks contributed to the evident results in macroeconomic stabilization due to the introduction of the currency board in 1997, contributing to a significant stabilization of prices.

The growth rate of loan amounting to 2.94% at the end of 2013 was largely caused by refinancing, which involved extension of clients' repayment periods by banks and provision of additional loans for continuation of clients' business operations. More prominent orientation of the BH banking sector to the government sector is possible in the period ahead, due to budget needs linked with the financing of the existing budget deficits. The reliance of the BH banking system on foreign sources was one of the most significant risks that the domestic financial system was exposed to, despite all positive effects of funding from abroad. The increase in resident deposits buffered the effects of deleverage of banks owned by foreign banking groups and contributed to maintaining financial stability of the CBBH.

Foreign direct investment in the absence of the dynamics of domestic investment remains the only real source of stronger economic growth in Bosnia and Herzegovina. In the table below it is quite clear that foreign direct investment in the reporting period had a very volatile movement, which, in our opinion, can be much more volatile in the future.

Table 7 Testing the rise in Non-Performing Loans to Total Loans through the Stress Test Scenarios for the period: 2014 – 2015

Indicators	Baseline scenario		Extreme scenario	
	2014	2015	2014	2015
Shock A – Slowdown in economic activity				
Increasing the ratio of NPLs to total loans	1.0%	0.0%	5.0%	4.0%
Shock B – Increase in interest rates				
Increasing the ratio of NPLs to total loans	0.0%	0.0%	0.0%	0.5%
The capital adequacy ratio	18.0%	18.3%	16.1%	15.0%
The number of banks that need recapitalization	5	6	7	10

Source: Financial Stability Report, The Central Bank of BH, 2013, p. 42, Available at: http://www.cbbh.ba/files/financial_stability_report/fsr_2013_bs.pdf

This empirical study refers to the analysis of the total liquidity of the banking sector in Bosnia and Herzegovina (BH) for the period from Q1 2004 to Q2 2014. The data used for this study are the official data (statistical analysis) of the Central Bank of Bosnia and Herzegovina. This study used a multiple linear regression model which assesses the nature and strength of the bond between a dependent variable, and K independent variables that are marked with X_ (i, j) = 1, 2, ..., K. Therefore, in this study, parameter liquidity - liquid assets / total assets (LA / TA) of the banking sector in BH is used as a dependent variable and the following ones as independent variables: NPLs / total loans (NPLs / TL) average profitability on equity capital (APEC), non-interest expenses / total revenue (NIE / TR), the average required reserve (ARR), total loans (TL), the money supply in the wider sense (M2), net capital / risk weighted assets (NC / RWA) and NPAs / Total assets (NPA / TA). The regression model in this study is presented as follows:

$$LA/TA = \alpha + \beta_1 \times (NPLs/TL) + \beta_2 \times (APEC) + \beta_3 \times (NIE/TR) + \beta_4 \times (ARR) + \beta_5 \times (TL) + \beta_6 \times (M2) + \beta_7 \times (NC/RWA) + \beta_8 \times (NPAs/TA) + \varepsilon_i \quad (6)$$

The representativeness of the model will be calculated based on the coefficient of correlation (r), coefficient of determination (R^2) and adjusted coefficient of determination ($\overline{R}^2$). There is also an analysis of variance (ANOVA), which will test the significance of observed financial variables in the model, where the null hypothesis is the reason why the independent variables do not significantly affect the dependent:

$H_0 ... \beta_1 = 0,$

$H_0 ... \beta_1 \neq 0$

Table 8 illustrates the descriptive statistics of explanatory.

It is clearly evident that the highest volatility is measured by the standard deviation observed in the total loans of 3.801% and the money supply in the broader sense of 3.084%. Credit growth in Bosnia and Herzegovina at the end of 2013 was approximately 3.4% and it is mainly related to the refinancing of the existing bank clients. The growth of non-performing loans, increased risk aversion and tighter requirements for the granting of weak domestic demand influenced the design of lending activity to businesses. In Bosnia and Herzegovina (BH) in 2013, of total loans to enterprises, 60% were related to short-term loans. Thus, this data suggests a problem of liquidity of companies, and as a consequence of increasing the number of blocked accounts of companies in Bosnia and Herzegovina (BH) and the increasing amount of uncollectible receivables from companies that are bridging these borrowings (The Central Bank of Bosnia and Herzegovina, 2013).

Table 8 Descriptive statistics of the observed banking performance from the Quarter 1 2004 to Quarter 2 2014

Management Domain	Dependent and independent variables of the model	Index	Mean	Std. Deviation	N
Liquidity	Liquid assets/total assets	LA/TA	30.97	4.73	42
Debt Quality	NPLs/total loans	NPLs/TL	7.97	4.26	42
Profitability	Average profitability on equity capital	APEC	3.19	3.07	42
Profitability	Non-interest expenses/ total revenue	NIE/TR	89.27	7.98	42
Reserve	Average required reserve	ARR	1.535E3	654.66	42
Liquidity	Total loans	TL	1.232E4	3,801.82	42
Money Supply	M2	M2	1.185E4	3,083.73	42
Capital	Net capital/risk weighted assets	NC/RWA	16.95	1.088	42
Asset Quality	NPAs/total assets	NPAs/TA	5.67	3.48	42

Source: Calculation by the authors (SPSS 16.0)

4.1 The research results

Results obtained by regression analysis indicate that the coefficient of correlation is $r = 0.99$, indicating that there is a strong correlation between the dependent variable, i.e. liquidity - Liquid Assets / Total Assets (LA / TA), and independent variables: Net Profits and Losses (NPLs) / Total Loans (NPLs / TL) Average Profitability on Equity Capital (APEC), Non-Interest Expenses / Total Revenue (NIE / TR), the Average Required Reserve (ARR), Total Loans (TL), the Money Supply in the wider sense (M2), Net Capital / Risk Weighted Assets (NC / RWA) and Non-Performing Assets (NPAs) / Total assets (NPA/ TA). The coefficient of determination is R^2 = 97%,, and the adjusted coefficient of determination is $\overline{R}^2 = 0.97$. The data shows that this model describes 97% of the variations with independent variables which makes the model relatively representative. The significance test also indicates that there is a significant influence of certain independent variables on the dependent variable. The testing of the null hypothesis indicates that there is significant influence of certain independent variables at a significance level of $\alpha = 1\%$, and that the empirical F- ratio is 163.29.

As for this study, the value of the empirical F- ratio (163.29) is greater than the theoretical value of the F- ratio (3.09) for the 8-degree of freedom in the numerator and 34 in the denominator. Thus, we can conclude to reject the null hypothesis that the independent variables have a significant impact on the dependent variable. Darbin-Watson statistics show a high correlation with respect to the value of approximately over 1.

Table 9 Regression analysis between the following parameters: LA/TA, NPLs/TL, APEC, NIE/TR, ARR, TL, M2, NC/RWA, NPAs/TA in Bosnia and Herzegovina (BH) for the period: Q1 2004 – Q2 2014

Regression Statistics	
Multiple R	0.988
R Square	0.975
Adjusted R Square	0.969
Std. Error of the Estimate	0.828
Durbin - Watson	1.592

Source: Calculation by the authors (SPSS 16.0)

Table 10 Analysis of variance between the following parameters: LA/TA, NPLs/TL, APEC, NIE/TR, ARR, TL, M2, NC/RWA, NPAs/TA in Bosnia and Herzegovina (BH) for the period: Q1 2004 – Q2 2014

ANOVA	Df	SS	MS	F	Significance F
Regression	8	896.48	112.06	163.29	0.01
Residual	34	22.65	0.69	-	-
Total	**42**	**919.13**	-	-	-

Source: Calculation by the authors (SPSS 16.0)

Table 11 The matrix of correlation coefficients between the parameters: LA/TA, NPLs/TL, APEC, NIE/TR, ARR, TL, M2, NC/RWA, NPAs/TA in Bosnia and Herzegovina (BH) for the period: Q1 2004 – Q2 2014

	LA/TA	NPLs/TL	APEC	NIE/TR	ARP	TL	M2	NC/RWA	NPAs//TA
LA/TA	1.000	-0.824	0.362	-0.004	0.144	-0.838	0.820	0.320	-0.854
NPLs/TL	-0.824	1.000	-0.256	-0.072	-0.463	0.576	0.643	0.015	0.996
APEC	0.362	-0.256	1.000	-0.724	0.049	-0.309	-0.255	0.253	-0.234
NIE/TR	-0.004	-0.072	-0.724	1.000	0.058	0.065	0.006	-0.275	-0.108
ARP	0.144	-0.463	0.049	0.058	1.000	0.339	0.312	-0.647	-0.409
TL	-0.838	0.576	-0.309	0.065	0.339	1.000	0.984	-0.651	0.626
M2	0.820	0.643	-0.255	0.006	0.312	0.984	1.000	-0.599	0.690
NC/RWA	0.320	0.015	0.253	-0.275	-0.647	-0.651	-0.599	1.000	-0.170
NPAs/TA	-0.854	0.996	-0.234	-0.108	-0.409	0.626	0.690	-0.017	1.000

Source: Calculation by the authors (SPSS 16.0)

The coefficient of correlation can take values from -1 to +1. Thus, the resulting ratio shows the strength of two observed parameters. A zero value indicates that there is no correlation, and, the value of 1.0 indicates the correlation between complete and connected, while the value of -1.0 indicates the correlation between complete and negative. From the above table it is evident that most explanatory variables are slightly negatively correlated with each other, and on the other hand, a number of observed variables have a positive correlation. Since the object of analysis is about the impact of independent variables on the dependent variable, i.e. the ratio of liquid assets to total assets (liquidity of the banking system in Bosnia and Herzegovina) it can be seen that the strongest positive correlation was observed between the ratio of liquid assets / total assets and money supply in the wider sense of the word, i.e. parameter - M2 (0.820).

In fact, this correlation is completely logical and reasonable because of the increase of parameter M2 leading to an increase of liquidity in the banking system. Also, the indicators of liquid assets / total assets and the value of average profitability on equity capital were recorded as the positive correlation (0.362), and between the indicators of net capital / risk-weighted assets (0.320). The greatest value of the capital adequacy ratio for the analysed period was recorded in 2004 (20.1%), the lowest was reached in the last quarter of 2008 (15.0%) and the mean value of 16.95%, which suggests that the banking system in Bosnia and Herzegovina (BH) is well capitalized and is able to maintain a constant high rate of capitalization and well above the legal minimum of 12%, which reflects positively on the overall liquidity of the banking sector. Also, the average reserve requirement has had a positive causality of the observed variable ratio (0.144).

Theoretically, the amount of required reserves directly affects the value of bank resources. The height of required reserves directly influences the values of resources. With higher required reserves the banking resources are becoming more expensive, because the required reserves are the funds on which the yield is small (Kozaric, Kovacevic, 2007). Required reserves are the only monetary policy instrument operationally available to the CBBH to implement the economic policy goals.

Therefore, the strongest negative correlation was noted between the observed indicators of liquidity as the dependent variable and independent variables in the model, such as indicators of non-performing assets to total assets (-0.854), followed by total loans (-0.838) and non-performing loans to total loans (-0.824). The movement of non-performing assets, or bad loans, have an impact on liquidity. Thus, the high liquidity leads to low profitability and vice versa, lower liquidity leads to higher profitability (Kosmidou, 2008).

In the first quarter of 2014, most financings of the Central Bank of Bosnia and Herzegovina (CBBH) are related to short-term loans where the rate of growth on a quarterly level was 3% for short-term loans and 0.1% for long-term loans to private and public non-financial companies. Thus, the data indicates increased repayment of maturing obligations and forecasts new loans used to restructure existing loans.

From the above tables, we can explore the indicator of liquidity in the banking sector of Bosnia and Herzegovina (BH) i.e. the ratio of Liquid Assets and Total Assets (LA / TA) presents the strongest positive correlation to the Money Supply in the wider sense (M2) (1.97). As previously noted, the correlation coefficient was observed in the same trend in the movement, which is quite reasonable because the increase in the money supply in the financial system leads to an increase of liquidity.

A potential indicator of liquidity is assumed as the Net Capital / Risk-Weighted Assets (NC / RWA) (0.10). The increase in risk-weighted assets while increasing non-performing loans and provisions shows that the actual credit growth to some extent was offset with the negative effect of additional provisions for non-performing bank claims. The growth of capitalization in the banking sector and

Table 12 Regression analysis coefficients between the following parameters: LA/TA, NPLs/TL, APEC, NIE/TR, ARR, TL, M2, NC/RWA, NPAs/TA in Bosnia and Herzegovina (BH) for the period: Q1 2004 – Q2 2014

Model	Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	t	Sig	95% Confidence Interval for B Lower Bound	Upper Bound	Zero order	Correlations Partial	Part
(Constant)	23.29	5.96	-	3.91	0.001	11.17	35.41	-	-	-
NPLs/TL	2.51	0.73	-2.26	3.45	0.002	1.03	3.98	-0.82	0.51	0.09
APEC	0.07	0.07	0.04	0.92	0.36	-0.08	0.22	0.36	0.16	0.01
NIE/TR	-0.01	0.03	-0.01	-0.21	0.83	-0.07	0.05	-0.01	-0.04	-0.01
ARP	6.43	0.01	0.01	0.11	0.92	-0.01	0.01	0.14	0.02	0.01
TL	-0.01	0.01	-2.01	-8.68	0.01	-0.01	-0.01	-0.84	-0.83	-0.24
M2	0.01	0.01	1.97	7.18	0.01	0.01	0.01	0.01	-0.82	0.78
NC/RWA	0.44	0.24	0.10	1.80	0.08	-0.06	0.93	0.32	0.30	0.05
NPAs/TA	-4.34	0.93	-3.19	-4.67	0.01	-6.23	-2.45	-0.85	-0.63	-0.13

Source: Calculation by the authors (SPSS 16.0)

the growth of risk-weighted assets induces that the banking sector achieved a certain financial stability at the end of 2013.

On the other hand, the most pronounced negative correlation was recorded between the ratio of Net Assets to Total Assets (NA / TA) and the ratio of Liquid Assets and Total Assets (LA / TA) (-3,19). This relation is quite logical, because the increase in non-performing assets and loans leads to falling liquidity. Non-performing loans are the largest source of risk of the Bosnia and Herzegovina (BH) banking sector. At the end of 2013, non-performing loans accounted to 15.12% of all loans in the balance sheets of commercial banks in Bosnia and Herzegovina (BH). Despite this, the banking sector in Bosnia and Herzegovina (BH) has a lower level of participation of non-performing loans to total loans compared to some countries in the region, and non-performing loans are one of the biggest risks to the stability of the financial system.

The second considerable amount of negative correlation is Non-Performing Loans / Total Loans - NPLs / TL and Liquid Assets / Total Assets - LA / TA (-2.26). Also, negative linear trends were observed between the total loans - TL as an independent variable and liquid assets / total assets - LA /TA as the dependent variable in the model (-2.01). The risk of insolvency is the inability of banks to meet maturing obligations which may eventually lead to a loss of business (Alihodzic, 2014). The aim of this article is to synthesize the insights of liquidity ratios related solvency and highlight on systemic liquidity risk.

5. Conclusion

To facilitate understanding of the systemic liquidity risk framework, and thus as an alternative solution for the real sector, it seems necessary to examine the local data in the Bosnia and Herzegovina (BH) case from the Central Bank of Bosnia and Herzegovina (BH). This study does not attempt a fully-fledged account of global data, but simply points to the Danish balance principle to the liquidity and solvency problems, without data of Cyprus, Greece, Turkey, Ukraine, Austria, Armenia, Russia, The Czech Republic and Poland. Therefore, our purpose is to discuss the application possibility of the Danish balance principle and the macro-prudential analysis in Economics and Finance and not to support the claim of the representativeness of the data of Bosnia and Herzegovina (BH).

With the multiple linear regression model of Bosnia and Herzegovina (BH), the liquidity of the banking sector in Bosnia and Herzegovina (BH) in the period from the first quarter of 2004 to the second quarter of 2014, presents an impressive and familiar combination of liquidity analysis. The null hypothesis was rejected because it was not shown that the independent variables affect the dependent variable.

From the negative point of view, high liquidity causes counter-productivity in terms of unfavourable attitudes of foreign investors with negative mood towards investment in Bosnia and Herzegovina (BH). It stands to reason: (1) The improvement of solvency ratios cannot imply the improvement of liquidity ratios. While our effort in this paper is only a first step, we believe it offers an insight into the systemic liquidity risk. In particular, it is important to recognize key points: (2) The Danish balance principle is applicable to systemic liquidity risky situations involving economic and financial problems. (3) The macroprudential stress test works in the multiple linear regression of the Bosnia and Herzegovina (BH) model with total assets (LA/TA) and independent variables: NPLs / total loans (NPLs / TL) average profitability on equity capital (APEC), non-interest expenses / total revenue (NIE / TR), the average required reserve (ARR), total loans (TL), the money supply in the wider sense (M2), net capital / risk weighted assets (NC / RWA) and NPAs / Total assets (NPA/ TA).

The Danish balance principle provides a key with which to unlock many of the riddles of the systemic liquidity risk problem. This approach also provides an umbrella under which we see each other as working within the same paradigm, but in different ways. The text displays a coherent structural and macro-prudential solution to financial problems. The results of this paper lead to the conclusion that the systemic risk is still present and directly correlated with the negative or slow growth in the gross domestic product. Also, this study lays the foundation for future work on the banking business model by pointing to several promising applications.

References

1. Alihodžić, A. (2014), "Profitability Determinants of BH Banking Sector in Circumstances of Slower Economic Growth", in Lehner, O. M. (Ed.), Proceedings in Finance and Risk Series '14, ACRN Oxford Publishing House, Enns, Austria, pp. 697-709.
2. Alihodžić, A., Plakalović, N. (2014), "Testing And Application of Wilson's to Bank in BH in Conditions of Slow Economic Growth", Institutional Change as Determinant of Economic Development in Serbia, Faculty of Economics - University of Kragujevac, pp. 345 – 362.
3. Amihud, Y. (2002), "Illiquidity and Stock Returns: Cross-section and Time-series Effects", Journal of Financial Markets, Vol. 5, No. 1, pp. 31-56.
4. BCBS-Basel Committee on Banking Supervision (2006). International Convergence of Capital Measurement and Capital Standards. Bank for International Settlements, Basel.
5. Bodie, Z., Kane, A., Marcus, A. J. (2008). Investments. 8th edition. Berkshire: McGraw-Hill.
6. Bratanovic, S. B., Greuning, H. V. (2006). Analysis of bank risk management - Approaches to evaluating the organization of risk management and exposure to financial risk. Zagreb: MATE.
7. Brunnermeier, M., Pedersen, L. H. (2009), "Market Liquidity and Funding Liquidity", Review of Financial Studies, Vol. 22, No. 6, pp. 2201-2238.
8. Bulletin of the Central Bank of Bosnia and Herzegovina (CBBH) (2014), Available at: http://www.cbbh.ba/files/bilteni/2014/Bilten_1_2014.pdf (Accessed on: April 04, 2015)
9. Burnside, C., Eichenbaum, M., Rebelo, S. (2001), "Hedging and financial fragility in fixed exchange rate regimes", European Economic Review, Vol. 45, No. 7, pp. 1151–1193.
10. Diamond, P., Dybvig, P. (1983), "Bank runs, deposit insurance and liquidity", Journal of Political Economy, Vol. 91, No. 3, pp. 404-419.
11. Financial Analysis: Solvency vs. Liquidity Ratios (2014), Available at: http://www.investopedia.com/articles/investing/100313/financial-analysis-solvency-vs-liquidity-ratios.asp (Accessed on: December 20, 2014)
12. Goodhart, C. A. E., Sunirand, P., Tsomocos, D. P. (2006), "A Model to Analyze Financial Fragility", Economic Theory, Vol. 27, No. 1, pp. 107-142.
13. Hull, J. C. (2010). Risk Management and Financial Institutions. Boston: Pearson.
14. IMF (2011). Global Financial Report: Durable Financial Stability, p. 118.
15. IMF (2014). Bosnia and Herzegovina, Fifth Review Under the Stand – By Arrangement and Request for Waivers of Applicability and Extension and Augmentation of the Arrangement, February 11, Country Report, No. 14/39.
16. Kosmidou, K. (2008), "The determinants of bank's profit in Greece during the period of EU financial integration", Managerial Finance, Vol. 34, No. 3, pp. 146-159.
17. Kozarić, K., Kovacevic, D. (2007), "The price of money in Bosnia and Herzegovina", Available at: http://www.cbbh.ba/files/specijalne_teme_istrazivanja/STI02_07_bs.pdf (Accessed on: December 20, 2014)
18. National Bank of Serbia (2014), Annual Financial Stability, Available at: http://www.nbs.rs/internet/cirilica/90/fs.html (Accessed on: January 20, 2015)
19. Ruozi, R., Ferrari, P. (2013). Liquidity Risk Management in Banks. New York, Dordrecht, London: Springer Heidelberg.
20. Schmaltz, Ch. (2009). A Quantitative Liquidity Model for Banks. Wiesbaden: Gabler GWV, Fachverlage GmbH.

21. The Central Bank of Bosnia and Herzegovina (2008), Annual Report, Sarajevo, Available at: http://www.cbbh.ba/files/godisnji_izvjestaji/2008/cbbh_annual_report_2008_en.pdf) (Accessed on: December 20, 2014)
22. The Central Bank of Bosnia and Herzegovina (2009), Annual Report, Sarajevo, Available at: http://www.cbbh.ba/files/godisnji_izvjestaji/2009/GI_2009_en.pdf (Accessed on: December 20, 2014)
23. The Central Bank of Bosnia and Herzegovina (2012), Annual Report, Sarajevo, Available at: http://www.cbbh.ba/files/godisnji_izvjestaji/2012/GI_2012_en.pdf (Accessed on: December 20, 2014)
24. The Central Bank of Bosnia and Herzegovina (2013), Annual Report, Sarajevo, Available at: http://www.cbbh.ba/files/godisnji_izvjestaji/2013/GI_2013_bs.pdf (Accessed on: December 20, 2014)
25. The Central Bank of Bosnia and Herzegovina (2013), Financial Stability Report, Available at: http://www.cbbh.ba/files/financial_stability_report/fsr_2013_bs.pdf (Accessed on: December 20, 2014)

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Analiza sistematskoga rizika likvidnosti za bankarski sektor u Bosni i Hercegovini

Sažetak

Osnovni cilj ovoga rada jest testiranje hipoteze na sistematski rizik likvidnosti za bankarski sektor na osnovi danskoga koncepta – „Principa ravnoteže". U ovome se istraživanju glavna ekonomska metoda temelji na ocjeni opće primjenjivosti teorije likvidnosti te valjanosti za Bosnu i Hercegovinu. Najbolji je primjer za ovo istraživanje uzet za razdoblje od prvoga tromjesečja 2004. do drugoga tromjesečja 2014. godine. Namjera je ovoga istraživanja razmatranje identifikacija makroekonomskih čimbenika koji pozitivno utječu na rast bankarskoga sektora. Likvidna varijabla - likvidna sredstva / ukupna aktiva razmatrat će se kao zavisna, a nekvalitetni krediti / ukupni krediti, prosječna profitabilnost na dionički kapital, nekamatni troškovi / ukupni prihodi, prosječna obavezna rezerva, ukupni krediti, novčana masa u širem smislu, neto kapital / rizikom ponderirana aktiva i nekvalitetna aktiva / ukupna aktiva koristit će se kao nezavisne varijable. Dakle, osnovna svrha ovoga istraživanja jest da se utvrdi postoji li međuzavisnost i uvjetovanost u kretanju između nezavisnih i zavisnih varijabli putem viševarijantne regresijske analize.

Ključne riječi: sistematski rizik likvidnosti, danski princip ravnoteže, ANOVA test, makroekonomski pokazatelji