

# Banking Stability Index: A Cross-Country Study

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## **Abstract**

*Successful development of economy is based on the effective and stable performance of credit institutions, mainly banks. This paper discusses some of the existing efforts to construct an aggregate financial stability index and brings attempts to construct an aggregate Banking Stability Index (BSI), taking into account indicators of financial strength of banks (performance and capital adequacy) and major risks (credit and liquidity risk) affecting banks in the banking system. An aggregate BSI is then used for evaluation of stability in the European Union (EU) countries, focusing on ten countries that joined EU in 2004. Results showed that in 2014 countries with the most stable banking sectors were Luxembourg and Estonia. On the opposite end of the scale were banking sectors in Spain, Portugal, and Greece. The outcome of the study showed decline of the average banking stability in EU countries during the period of 2005-2008, and its improvement since 2009. The improvement in last years was positively affected mainly by development of the capital adequacy. Results also showed that the countries that joined EU in 2004 were positively affected by accession to EU what is evidenced by the value of BSI, which increased between the years 2004 and 2014.*

*Keywords: Financial Soundness Indicators, aggregate index, banking sector, EU countries*  
*JEL codes: C20, G21*

## **1. Introduction**

Over the past decade, financial systems in all European countries have undergone several changes that have significantly affected stability of their banks. One of the consequences of the global financial crisis, which has affected stability of banks in all countries of the world was the growth of credit risk in terms of growth of non-performing loans and growth of their share on total gross loans. For example, the average share of non-performing loans to total gross loans in European countries has risen from 3.95% in 2004 to a failure rate of 10.27% in 2013. The theme of credit risks has attracted more attention in recent years. Several studies examined bank failures and found out that assets quality was an indicator of insolvency (Demirgüç-Kunt, 1989; Barr and Siems, 1994), since banks still had a high level of non-performing loans before bankruptcy. Those authors found out that when the volume of non-performing loans increased, the banks' ability to increase their performance declined.

Besides credit risk, one important aspect in the measurement of bank stability is the performance. As well as the performance of European financial system was affected by the global financial crisis. This is evidenced by decreasing level of performance measured by Return on Assets (ROA) and Return on Equity (ROE). For example, the average ROA in EU countries has declined from 1.22% in 2004 to the lowest value -0.13% in 2011; and average ROE has declined from 16.88% in 2004 to the lowest value -3.96% in 2011. Performance of banks and other financial institutions is a frequently discussed topic in publications, as their performance can affect efficiency and stability of the banking industry and thus the efficiency of the whole monetary system. Banking sector is still the primary form of financial intermediation in the EU countries, being the major channel for mobilization of domestic savings and their transformation into a major source of external capital for firms. Banking sector is still also the key player in payment systems; therefore development of banking sectors' performance is crucial for the growth of economies in the EU countries.

As explained above, credit risk and performance are important aspects for measuring the stability of banking system. Other indicators that affect the stability of the banking systems are also

indicators of liquidity, capital adequacy, indicators of currency risk, interest risk, and so on. Therefore the aim of this study is to assess the evolution of the main indicators affecting the stability, try to construct an aggregate Banking Stability Index and analyze the level of stability in European Union countries between the years 2004 and 2014. Particular attention is paid to countries that joined EU together with Slovakia in 2004<sup>1</sup>.

This paper discusses some of the existing efforts to construct an aggregate financial stability index. We also bring the attempts to construct an aggregate Banking Stability Index taking into account indicators of the financial strength of banks (performance and capital adequacy) and the major risks (credit risk and liquidity risk). Constructing a single indicator to indicate the level of stability of the banking system is a very difficult task. Construction of aggregate index allows following development of stability in financial system during the selected period, but also compares stability in financial system of selected countries. The Banking Stability Index as a tool for qualitative measurements would allow policy makers and financial system participants supervise level of financial stability better than in the present. The BSI can represent an important feature in monetary policy rules, namely it covers the financial risks which threaten the efficiency of monetary policy decisions.

## 2. Literature Review

The successful development of economy is based on the effective and stable performance of credit institutions, mainly banks. The evaluation of stability and soundness of banks is a complex task which involves a significant number of multidimensional criteria. Choice of evaluation techniques applicable to the relevant banking market is very important.

Financial stability is difficult to define and even more difficult to measure. Strictly speaking, a financial system can be characterized as stable if there absent the excessive volatility, stress or crises. This narrow definition is relatively simple to formulate, but fails to capture the positive contribution of a well-functioning financial system to overall economic performance. Indeed, broader definitions of financial stability encompass the smooth functioning of a complex nexus of relationships among financial markets, infrastructures and institutions operating with the given legal, fiscal and accounting framework. Such definitions are more abstract but are more inclusive of the macro-economic dimension of financial stability and interactions between the financial and real sectors. From this perspective financial stability can be defined as “a condition in which financial system – comprising financial intermediaries, markets and market infrastructure – is capable of withstanding shocks and the unraveling of financial imbalances, thereby mitigating the likelihood of disruptions in the financial intermediation process which are severe enough to significantly impair the allocation of savings to profitable investment opportunities. (Gadanecz and Kaushik, 2008)

In recent years researchers, including those of central banks, have been trying to identify conditions that would ensure financial stability. For this purpose there were used various statistical indicators that characterized and described vulnerability of financial system. Many central banks in their financial stability reports try to evaluate financial stability related risk while only focusing on a few main indicators. The approaches to the development of these measures has changed over the time as the focus of concern moved from micro-prudential to macro-prudential dimension of financial stability.

The growing interest of central banks in monitoring and analyzing risks and threats to the stability of the financial system has resulted into the publication of Financial Stability Reports (FSR). According Oosterloo et al. (2007) there are three main incentives for publication of FRS: increasing the transparency of authorities responsible for financial stability, contributing to financial stability, and strengthening co-operation between the various authorities involved in maintaining financial stability.

One of the available information comparing the stability of the banking sectors is a regular report (The Global Competitiveness Report) prepared by the World Economic Forum. This report offers a unique dataset on a broad array of competitiveness for 144 world economies. The Report presents the ranking of the Global Competitiveness Index based on 12 pillars (World Economic Forum, 2015). Within the index there is also evaluated the parameter „Soundness of banks”. This parameter is assessed on the basis of an opinion poll, where respondents evaluate the stability of the banking sector in their

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<sup>1</sup> Czech Republic, Cyprus, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovak Republic and Slovenia.

country (1 = extremely low – banks may require recapitalization, 7 = extremely high – banks are generally healthy with sound balance sheets).

Table 1: Literature review – Financial stability indicators

Author (Year)	Country	Categories (Indicators)	Weight
Gersl and Hermanek (2007, 2008)	Czech Republic	Capital adequacy (CAR)	0.05
		Asset quality (NPL/TL)	0.25
		Profitability (ROA, ROE)	0.25
		Liquidity (LA/TA, LA/TD)	0.25
		Interest rate risk (Net position/TA)	0.10
		Foreign exchange risk (FX1, FX2)	0.10
Central Bank of the Republic of Turkey (2008)	Turkey	Asset quality (NPL/TL, NPL/E, FA/TA)	1/6
		Liquidity (LA/TA)	1/6
		Exchange rate risk (FX1, FX2)	1/6
		Profitability (ROA, ROE)	1/6
		Capital adequacy (CAR, FC/TA)	1/6
		Interest rate risk (Net position/E)	1/6
Albulescu (2010)	Romania	Financial development index	0.20
		Financial vulnerability index	0.40
		Financial soundness index	0.25
		World economic climate index	0.15
Bank of Albania (2010)	Albania	Asset quality (NPL/TL, NPL/E, FA/TA)	1/6
		Liquidity (LA/TA, STA/STL)	1/6
		Exchange rate risk (FX1, FX2)	1/6
		Profitability (ROA, ROE)	1/6
		Capital adequacy (CAR, FC/TA)	1/6
		Interest rate risk (Net position/E)	1/6
Maudos (2012)	Spain	Profitability (ROA), Solvency (CAR), Efficiency (CI), Asset quality (NPL/TL)	No defined
Ginevičius and Podviezko (2013)	Lithuania	Capital adequacy (CAR)	0.223
		Asset quality (NII, TL/TA, DELINQ, LD)	0.208
		Management (NIE/GI)	0.166
		Earnings (PPP/RWA, NI/RWA)	0.225
		Liquidity (TD/TL, LIQ)	0.178
Laznia (2013)	Slovakia	Profitability (ROA)	0.30
		Liquidity (TD/TL)	0.30
		Capital adequacy (CAR)	0.10
		Asset quality (NPL/TL)	0.30
Petrovska and Mihajlovska (2013)	Macedonia	Insolvency (CAR)	0.25
		Credit risk (NPL/TL, GNPL)	0.25
		Profitability (ROE, NIE/GI)	0.20
		Liquidity (LA/TA, LA/TD)	0.25
		Currency risk (Net FX/OF)	0.05

\* CAR-Capital adequacy ratio, CI-Cost to income ratio, DELINQ-Delinquent loans/Total assets, FA/TA-Fixed assets/TAs, FC/TA-Free capital/TA, FX1-Absolute value of open total position in foreign exchange/Tier 1 capital, FX2-Absolute value of open balance sheet position in foreign exchange/Tier 1 capital, GNPL-Annual growth rate of non-performing loans, LA/TA-Liquid assets/TA, LA/TD-Liquid assets/Total deposits, LD-Loan value decrease/TA, LIQ-Regulatory liquid ratio, NI/RWA-Net income/Risk weighted assets, NII-Net interest income/Risk weighted assets, Net FX/OF-Net open position in foreign exchange/Own funds, Net position/E-Cumulative net balance sheet position to 1 month/Equity, Net position/TA-Cumulative net balance sheet position to 3 month/TA, NIE/GI-Non-interest expenses/Gross income, NPL/E-Non-performing loans/Shareholders' Equity, NPL/TL-Non-performing loans/Total loans, PPP/RWA-Pre-provision profit/Risk weighted assets, ROA-Return on assets, ROE-Return on equity, STA/STL- Assets with a maturity up to 3 months/Liabilities with a maturity up to 3 months, TA- Total assets , TD/TL-total deposits to total loans, TL/TA-Total loans/TA

Source: prepared by author

Construction of aggregate financial stability index is presented in works of many authors. Albulescu (2013) constructed a reduced-form model for the Euro Area, addressing the need to include the financial stability objective into the ECB monetary policy decisions. According Albulescu (2013) in accordance with the ECB status, the monetary policy decisions are based on a large set of economic and financial variables (the “second” pillar). Thus the ECB is interested not only in the monetary indicators but also in the economic and financial indicators. The advantages of aggregated index are related to the overall vision on the instability level in the Euro Area.

On the national level Albulescu (2010) developed an aggregate stability index for the Romanian financial system. This index took into consideration indicators related to financial system development, vulnerability, soundness and also indicators which characterize the international economic climate.

Some authors focus on constructing an aggregate indicator for the banking sector, which is the most important part of financial system. In the literature, a variety of methodologies for constructing Financial Stability Index or Banking Stability index have been developed. Table 1 summarizes the works of authors investigating financial stability through selected indicators. As can be seen from the Table 1, in the evaluation of financial stability, attention is focused on four main areas: capital adequacy, asset quality, profitability, and liquidity.

Many of mentioned authors used selected quantitative indicators of the set of basic Financial Soundness Indicators compiled by the International Monetary Fund. For a long time, central banks had no standard framework to analyze financial stability. In an effort to improve the quality and ensure comparability of stability level in different countries, the International Monetary Fund (IMF) has developed a set of Financial Soundness Indicators (FSIs) in order to calculate level of stability on an internationally harmonized basis. These indicators (40 indicators) are divided into two sets: core set and encouraged set. Encouraged set includes additional statistics (28 indicators) on deposit takers as well as statistics related to households and corporate sectors, real estate markets and non-bank financial institutions. Core set includes statistics on the health and performance of deposit takers and consists of main indicators related to the banking sector (12 indicators, see Table 2).

Table 2: IMF’s Core Financial Soundness Indicators

Category	Indicators
Capital adequacy	1. Regulatory capital to risk-weighted assets, Ratio (%) 2. Regulatory Tier 1 capital to risk-weighted assets, Ratio (%)
Asset quality	3. Non-performing loans to total gross loans, Ratio (%) 4. Non-performing loans net of provisions to Capital, Ratio (%) 5. Sectoral distribution of loans to total loans, Ratio (%)
Earnings and profitability	6. Return on assets, Ratio (%) 7. Return on equity, Ratio (%) 8. Interest margin to gross income, Ratio (%) 9. Non-interest expenses to gross income, Ratio (%)
Liquidity	10. Liquid assets to total assets, Ratio (%) 11. Liquid assets to short-term liabilities, Ratio (%)
Exposure to foreign exchange risk	12. Net open position in foreign exchange to capital, Ratio (%)

Source: International Monetary Fund (2015)

The core indicators relate to five basic areas relevant from the point of view of banking business and are compatible with so-called CAMELS methodology for the assessment of the soundness of individual financial institutions (C – Capital adequacy, A – Asset quality, M – Management soundness, E – Earnings, L – Liquidity, S – Sensitivity to market risk). The capital adequacy indicators measure the banking sector’s ability to absorb sudden losses and are thus closest to the “resilience to shock” concept, whereas the asset quality indicators are directly associated with potential risks to banks’ solvency. The profitability indicators measure the ability to absorb losses without any impact on capital, while the liquidity indicators measure banks’ resilience to cash flow shocks. Foreign currency exposure is an indicator measuring a bank’s risk exposure with regard to movements in asset prices on financial markets. The management quality indicators were ultimately not included in the FSIs owing to difficulties connected with quantifying indicators that are qualitative in nature. (Gersl and Hermanek, 2008)

It is easy to see that the whole set of FSIs is dominated by deposit takers' health. Many of indicators are also focused on banking sector stability. This is due to the fact, that financial systems in most countries are rather banking-oriented than market-oriented. (Maliszewski, 2009)

The main goal of the FSIs is international comparability, which should be guaranteed by the fact that all countries that assess stability of the banking sector using FSIs, using the same methodology. International comparability is, however, still limited by some differences in accounting standards and in data collection formats at national level.

### 3. Banking stability index

#### 3.1 Methodology

Constructing a single indicator to indicate the level of stability of the banking system is a very difficult task. In this section we try to construct an aggregate stability index which is subsequently used for evaluation of stability in the European Union (EU) countries, detailed focusing on ten countries that joined EU in 2004. The Banking Stability Index (BSI) for EU countries uses selected quantitative indicators from the database of International Monetary Fund (International Monetary Fund, 2015). The calculation of BSI is realized for the period from 2004 to 2014, on a yearly basis. The Banking Stability Index is constructed as a weighted sum of selected indicators and includes only the data of commercial banks. We try to construct an aggregate index, taking into account indicators of the financial strength of banks (performance and capital adequacy) and the major risks (credit risk and liquidity risk) affecting banks in the banking system. On the basis of the literature studied four sub-indices capturing the risks and fragilities of the banking sector were selected. They were used to form the Banking Stability Index with certain weights. Table 3 presents four main categories and their weights, selected indicators and their expected impact on the Banking Stability Index.

Table 3: Banking Stability Index (BSI)

Category	Weight	Adjustments	Indicators	Impact
Capital adequacy	0.25	Mean of normalized values	CAR	+
			T1 CAR	+
Asset quality	0.25	Mean of adjusted and normalized values	NPL/TL	-
			(NPL-P)/C	-
Earnings and profitability	0.25	Mean of adjusted and normalized values	ROA	+
			ROE	+
			IM/GI	+
			NIE/GI	-
Liquidity	0.25	Mean of normalized values	LA/TA	+
			LA/STL	+

Source: prepared by author

Bank's capital adequacy shows its capacity to deal with potential risks and determine the robustness of bank to shocks to its balance sheet. Aggregate risk-based capital ratios (CAR – Regulatory capital to risk-weighted assets; T1 CAR – Regulatory Tier 1 capital to risk-weighted assets) are the most common indicators of capital adequacy, based on the methodology agreed by the Basel Committee. Capital adequacy measures banks' buffer size to address expected or unexpected losses. Excessively low levels of this ratio point to potential failures and may indicate forthcoming banking crisis.

Asset quality is assessed through indicator related to credit risk of the banks. Lack of diversification in loan portfolio and loan concentration in a specific economic sector signals an important vulnerability of the financial system. The rate of non-performing loans to total loans (NPL/TL) is the key indicator to measure the level of credit risk. It identifies problems with the loan portfolio quality, whereas captures the value of loans for which the bank expects that it will have difficulty to collect. Asset quality can be also assessed through the level of provisions. Provisions can be general (for possible losses not yet identified) or specific (for identified losses e.g. loan-loss reserves). The share of non-performing loans net of provisions to capital ((NPL-P)/C) measure the share of bad loans for which reserves have not been created. It is an important indicator of the capacity of bank capital.

Return on Equity (ROE) and Return on Assets (ROA) are profitability indicators intended to measure deposit takers' efficiency in using their capital and total assets. In addition, noninterest expenses to gross income ratio (NIE/GI) measures the size of administrative expenses within gross income, and this way it measures the efficiency of deposit takers' use of resources. Differences in capital structure among banks must be considered in analyzing of bank performance. Banks with higher equity will generally report higher operating assets ratio (such as ROA), but lower operating equity ratios. Also, operating income ratios may be affected by the value of equity. The interest margin ratios (e.g. IM/GI – Interest margin to gross income) and net income ratios will be higher, while the non-interest income and non-interest expenses ratios will be lower for banks with higher equity. The reason for this is that banks with higher equity need to borrow less to support a given level of assets and thus have lower interest expenses, what results in higher net income.

The level of liquidity influences the ability of a banking system to withstand shocks. Common measures of liquidity include liquid assets to total assets (LA/TA). This indicator reflects the maturity structure of asset portfolio and can highlight excessive maturity mismatches and a need for more careful liquidity management. (Sundararajan et al., 2002) The second liquidity ratio (LA/STL – Liquid assets to short-term liabilities) measures banking sectors' readily available short-term resources that can be used to meet short-term liabilities.

Before the final aggregation, the data passed through a process of adjustment, normalization and process of the weights' allocation.

First, indicators were adjusted in order to lead to an increase of stability (i.e. the Banking Stability Index). This adjustment ensured that increase (higher value) of all individual indicators means an improvement in banking stability and decrease means deterioration. Therefore in case of indicators with expected negative impact on stability (NPL/TL; (NPL-P)/C; NIE/GI) the reciprocal value were taken.

Second, indicators were normalized to have the same variance. In literature, there are two main methods for normalization: statistical and empirical normalization.

Statistical normalization converts indicators to a common scale with an average of zero and standard deviation of one. The zero average avoids introducing aggregation distortions stemming from differences in indicators' means. The scaling factor is the standard deviation of the indicator. Thus, an indicator with extreme value will intrinsically have a greater effect on the composite indicator. This might be desirable if the intention is to reward exceptional behavior, i.e. if an extremely good result on a few indicators is considered to be better than a lot of average scores. By this approach, the range between minimum and the maximum should be varied among the normalized indicators. The formula of statistical normalization is (Cheang and Choy, 2009):

$$I_{it}^n = \frac{I_{it} - \mu_i}{\sigma_i} \quad (1)$$

Where:  $I_{it}^n$  is normalized value of indicator  $i$  in period  $t$ ;  $I_{it}$  is value of indicator  $i$  in period  $t$ ;  $\mu_i$  and  $\sigma_i$  are the mean and standard deviation of the indicator  $i$  in the analyzed period.

Through the process so-called empirical normalization all indicators are placed in the same scale in the interval from zero to one [0;1]. The formula that represents this method is as follows (Petrovska and Mihajlovska, 2013):

$$I_{it}^n = \frac{I_{it} - \text{Min}(I_i)}{\text{Max}(I_i) - \text{Min}(I_i)} \quad (2)$$

Where:  $I_{it}^n$  is normalized value of indicator  $i$  in period  $t$ ;  $I_{it}$  is value of indicator  $i$  in period  $t$ ;  $\text{Min}(I_i)$  and  $\text{Max}(I_i)$  are the minimum and maximum of the indicator  $i$  in the analyzed period.

Through the empirical normalization each indicator is compared to its limit values (minimum and maximum) in the analyzed period, and its normalized value represents the deviation from the limit values. According to the empirical normalization, the approximation of the index value to 1 (max), means lower risk, while movement towards 0 (min) means higher risk exposure. Therefore we have decided to use empirical normalization in case of our study.

In the third step, the means for four main categories for each banking sector (27) in each year (11) were calculated. The means values were calculated as the simple arithmetic average of adjusted and normalized values of indicators in selected category.

In next step, the average values of the four main components (categories) were weighted in order to emphasize the significance on the stability of the banking system. In the literature (e.g. Illing and Liu, 2003; Maliszewski, 2009) there are multiple ways of assigning weights to sub-indices, including the following: expert judgment, standardization (variance-equal weights), the size of the market segment, coefficients of the first factor from factor analysis, estimation of a logit model and so on. The weights represent the significance of individual risks on banking stability. The starting point in our paper was the application of variance-equal weights method. This method generates an index that assigns identical weights to all sub-indices, which indicates equal importance to each variable. It is the most common weighting method used in literature.

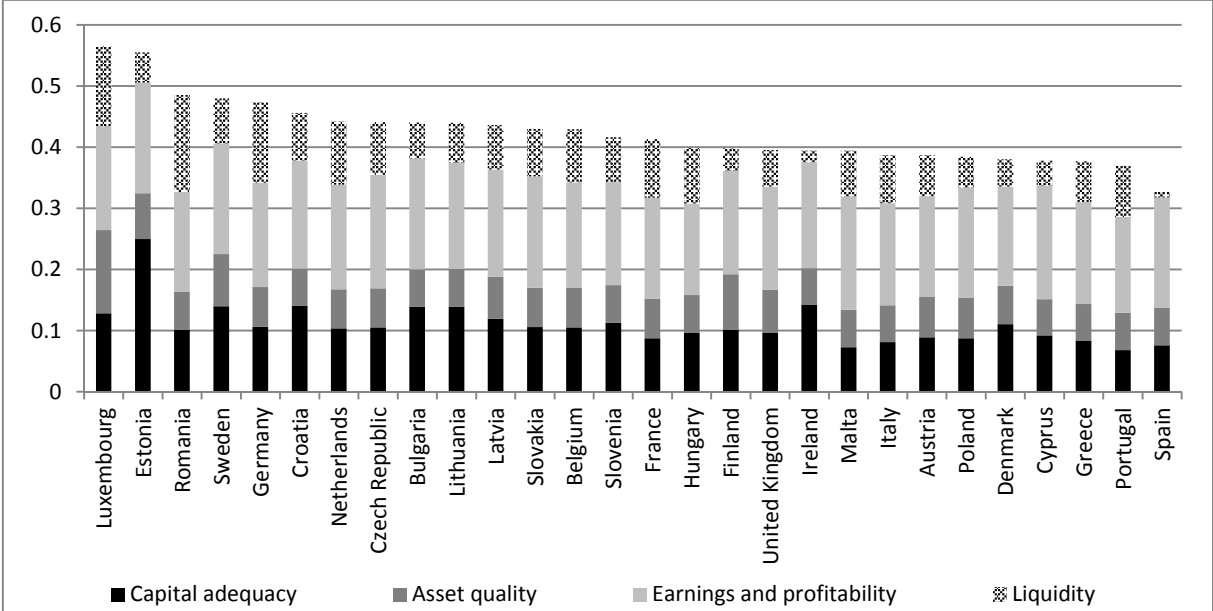
In the final step, the aggregate Banking Stability Index was calculated for each banking sector (27) in each year (11) as a sum of weighted values for four individual components.

**3.2 Results**

The aggregate Banking Stability Index is calculated as a sum of the weighted adjusted and normalized values for individual components. Figure 1 displays the contributions of individual components to the Banking Stability Index (BSI) in all European Union (EU) countries in 2014. According to BSI values in 2014, Luxembourg was the country with the most stable banking sector. Luxembourg had the most stable banking sector since 2009. First position gained through conservative approach (more deposits than loans and high quality of provided loans). The stability of the banking sector was also positively influenced by the relatively high liquidity ratios.

Luxembourg banking sector was followed by the banking sectors of Estonia and Romania. The strengths of the Estonian banking sector were high capital adequacy (the highest in the sample of all analyzed countries) and high quality of assets. In the case of Romanian banking sector the BSI was positively influenced mainly by the high value of liquid component (the highest value in the analyzed group of countries).

Figure 1: Banking Stability index and its components in 2014



Source: prepared by author

On the other end of scale, at least stable were Spanish, Portuguese and Greece banking sectors. The low stability of these banking sectors was influenced mainly by the lowest value of liquid component (in the case of Spain), by the low value of asset quality component (in case of Greece) and by the lowest value of capital adequacy component (in case of Portugal).

As can be seen in Figure 1, the individual components of the Banking Stability Index in analyzed countries showed different trajectories. Market pressure, requirement for higher levels of core capital and expectation of the effects of new Basel III accords led to the increase in quality and quantity of equity capital. Significant impact of capital adequacy in recent years positively affected the growth of stability index mainly in countries like Estonia, Ireland, Croatia, Bulgaria, Lithuania and Sweden. The lowest levels of capital adequacy were recorded in case of banking systems of Portugal, Spain and Malta.

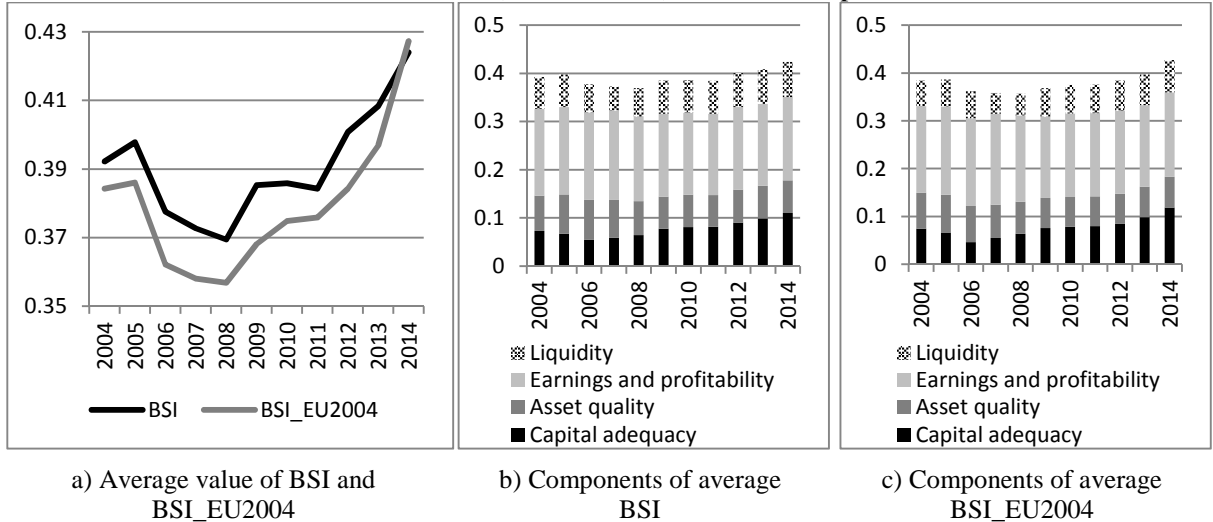
The share of non-performing loans to total loans (NPL ratio) has risen exponentially since the onset of the crisis. Whereas the loans to the clients create a substantial part of the bank’s assets, increasing value of NPL ratio led to a decline in asset quality. Asset quality was the major component that positively affected the stability in Luxembourg banking system. The asset quality also positively influenced the Banking Stability Index of Finland, Sweden and Estonia. The worst results in terms of asset quality were recorded in banking systems of Cyprus, Greece and Italy.

The lowest volatility can be seen in case of component earnings and profitability. This indicator was the major component which affected the stability of EU banking sector in average as evidenced by more than 40% share of that component in the overall index value. Earnings and profitability component positively influenced the BSI in banking sectors of Czech Republic, Cyprus, Malta and Slovakia. The lowest levels of this component were recorded in case of banking systems of Hungary and Portugal.

The final aspect of the stability is liquidity, which significantly affected the stability in the banking systems of Romania, Germany and Luxembourg. The reason for liquidity increase was primarily the growth in the volume of liquid assets, which could be the result of several movements. The lowest level of liquidity was recorded in case of banking system of Spain.

In next part of our paper we try to analyze the development of average stability in banking sectors of all European Union countries (BSI) and we try to compare them with the development of average stability in the banking sectors of ten countries, which joined the European Union in 2004 (BSI\_EU2004). The development of these average values and the components of both average indexes are displayed in Figure 2 (a, b, c).

Figure 2: Development of average Banking Stability index in all EU countries (BSI) and in accession countries in 2004 (BSI\_EU2004) and their components



Source: prepared by author

Figure 2a shows the development of average values of BSI and BSI\_EU2004 during the whole analyzed period. As can be seen, the tendency of development in accession countries is the same as in all EU countries, except of the last year of the analyzed period, when the average value of index (BSI\_EU2004) in the accession countries exceeded the average value of BSI in all EU countries. This significant increase of stability in the last year of analyzed period was positively influenced mainly by higher values of capital adequacy and liquidity components.

The analyzed period (2004-2014) can be divided into two stages. The first stage covers the period from the 2004 until 2008. During this period the average value of indexes decreased to their

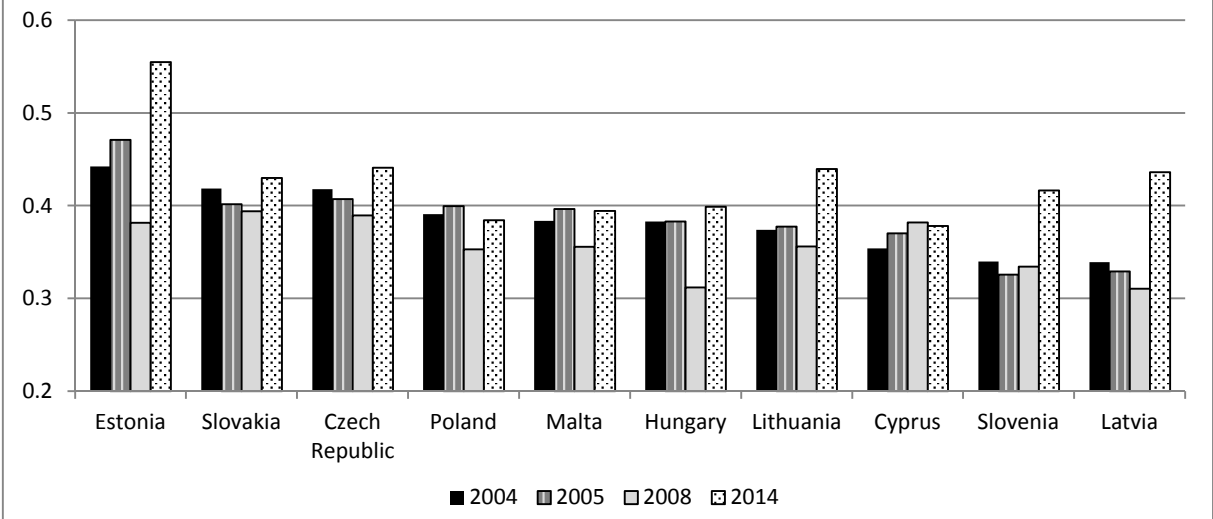


minimal values in 2008. The lowest values of indexes in this year mirrored the negative effects of the financial crisis which hit the banking sectors in all EU countries. The second stage covers the period from 2008 until 2014 when can be monitored a gradual increase in the average stability. Positive development in stability during this second stage was influenced mainly by the growing demand for rising capital adequacy (see Figure 2b and Figure 2c), which was related to the gradual implementation of Basel III. Another factor with the positive impact was growth of liquidity component. Trends of the other components (asset quality, earning and profitability) can be considered as stable.

In the last part of our paper, we try to evaluate how was affected stability of the banking sectors in countries that joined EU in 2004. Results showed that these countries were positively affected by accession to the EU what is evidenced by the value of BSI, showing increase between the years 2004, 2005 and 2014 (Figure 3). Only in case of Polish banking sector there can be seen a slight decrease (compared to 2004). Well, we can see that all banking sectors have been hit by the financial crisis, as evidenced by a significant decline in index values in 2008. The only exception is Cyprus, where stability in 2008 has increased, which may be affected by the accession of Cyprus to the Eurozone.

Estonian banking sector was one of the most stable in 2014. In comparison with 2004, the stability of the banking sector increased significantly. This was positively influenced by the development in asset quality component in 2005 and in capital adequacy component in last years. Current financial indicators suggest a sound banking sector in Estonia, and show relative strength in asset quality and earnings. Also profitability was among the highest in Europe, driven by high profitability and strong operational efficiency. In asset quality there can be seen a slight decrease during the crisis years, but in last years the NPL ratio was extremely low, one of the lowest in EU countries.

Figure 3: Banking Stability index in selected EU countries in 2004, 2005, 2008 and 2014



Source: prepared by author

A significant increase between 2004 and 2014 was also recorded in the banking sector of Lithuania, Slovenia and Latvia. In case of Slovenian and Latvian banking sectors, there can be seen slight decrease in 2005, which was affected by decline in the profitability component. In case of Lithuania, the stability slightly increased in 2005. It was positively influenced by increase in profitability, operational efficiency and by low level of nonperforming loans. The system’s capital adequacy had also increased, although it was still relatively low in comparison to the average for the EU member states. Improvement in stability between 2004 and 2014 in all three countries was affected by development in all components. The banking sectors enhanced their resilience against potential losses through the reduction of risks. Capital adequacy ratios of banking sectors were well above the regulatory requirement. The structure of capital was in last years qualified as top tier, as it consists of shareholders’ equity and retained earnings. Banks improved their capital adequacy ratio through the investment in less risky assets (housing loans or loans to economic sector with a low risk profile, high-rated debt securities, deposits on bank, and so on). These facts positively affected the value of the Tier 1 ratios and consequently the value of whole capital adequacy component. Although the maturities of liabilities got

shorter, this positively affected the liquidity component. Improvements in the asset quality were mainly driven by bad loan write-offs. The quality of loan portfolio was also supported by improvements in the financial wellbeing of the banks' biggest debtors, i.e. households and non-financial corporations. In case of Slovenian banking sector, development in last years was influenced by the process of recapitalization by the government.

Improvement in stability between 2004 and 2014 can be also seen in case of banking sectors of Slovakia, Czech Republic, Malta, Hungary and Cyprus. In case of the Slovak and the Czech banking sectors can be seen slight decrease in 2005. The decline in stability in the Slovak banking sector was affected by the decline in capital adequacy component, which was influenced by substantial increase in risk-weighted assets, by the banks' effort to manage capital claims more efficiently (by seeking to manage risk while holding a smaller volume of capital) and by introduction more sophisticated risk management methods in banks.

The slight decline in stability in the Czech banking sector in 2005 was affected by the decline in liquidity component. In last years the development in the Czech banking sector can be considered as positive. Banking sector increased its profitability and strengthened its capital adequacy and liquidity. It is related to the fact, that the banking sector was compliant with the new CRD IV/CRR (Capital Requirements Directive IV and the Capital Requirements Regulation) capital requirement regulations by a sufficient margin, as well as to decrease the risk weighting when calculating capital adequacy.

One of the available information comparing the stability of the banking sectors, mentioned in the literature review, is a regular report prepared by the World Economic Forum, which presents the ranking of the Global Competitiveness Index based on 12 pillars. Within the index there is also evaluated the parameter „Soundness of banks”. When we look at the results of this ranking in 2014 we can find that Finland was the country with the soundest banks. Finland banking sector was followed by the banking sectors of Malta, Luxembourg, Czech Republic and Slovakia. On the other end of scale, at least sound banks were in Slovenia, Cyprus, Greece, Ireland and Spain. When we look at ten countries that in 2004 joined European Union we can see, that the soundest banks were in Malta, Czech Republic and Slovakia, and the last sound banks were in Slovenia, Cyprus, Greece and Lithuania. Compared to our paper the results are different, which may be affected by fact, that in the evaluation of „Soundness of banks” the score is assigned according to the subjective assessment of the respondents in survey which can lead to different results than the assessment of soundness based on financial indicators.

When we compare our results with other studies which are based on the financial indicators we can find, that our results of BSI in 2005 are in line with study of Gersl and Hermanek (2008) who evaluated stability in selected countries based on Financial Soundness Indicators compiled by the International Monetary Fund. In their study they found out, that the most stable banking sector in 2005 (in evaluated group of countries) was banking sector in Czech Republic. It is in line with our study, where we can see that in 2005 the Czech Republic was the second stable banking sector within the framework of the accession countries. The results are the same at the opposite end of scale, where both works as the least stable marked the banking sector in Slovenia.

#### **4. Conclusion**

The objective of banking stability has gained on importance over the last year. Many central banks started to evaluate financial stability related risks while focusing only on a few main indicators. Given the different results of individual countries for various indicators, it is not easy to make an overall evaluation of the financial soundness in the banking sector. One of methods allowing us to compare the financial soundness of selected banking sector is determination of ranking of individual countries for particular indicators and then somehow aggregates this ranking for particular countries. The country with the lowest total is then assessed as the best. Another method is effort to construct an aggregate banking stability index reflecting the main indicators.

In the literature, a variety of methodologies for constructing the Financial Stability Index have been developed. In the evaluation of financial stability, the attention is focused on four main areas: capital adequacy, asset quality, profitability and liquidity. Many of mentioned authors used selected quantitative indicators of the set of basic financial soundness indicators set by the International Monetary Fund.

Based on the international experience, an aggregate Banking Stability Index was experimentally compiled for the European Union countries using data for the period from 2004 to 2014, on a yearly basis. The individual components of the BSI showed different trajectories. In the most recent period capital adequacy and liquidity have been increasing, this contributed to an improvement of the BSI. In parallel, the asset quality, earnings and profitability remained stable and had a relatively stable effect on the BSI.

According to BSI values in 2014, Luxembourg, Estonia and Romania were countries with the most stable banking sectors. The strengths of these banking sectors were relatively high liquidity ratios, high capital adequacy, and high quality of assets. On the other end of scale, at least stable were Spanish, Portuguese and Greece banking sectors. The low stability of these banking sectors was influenced mainly by the lowest value of liquid component (in the case of Spain), by the low value of asset quality component (in case of Greece), and by the lowest value of capital adequacy component (in case of Portugal).

In the next part of our paper we have analyzed development of the average stability in the banking sectors of all European Union countries (BSI) and we compared them with the development of average stability in the banking sectors of ten countries, which joined the European Union in 2004 (BSI\_EU2004). The tendency of development in accession countries was the same as in all EU countries, except of the last year of the analyzed period, when the average value of index in the accession countries exceeded the average value of BSI in all EU countries. The analyzed period (2004-2014) can be divided into two stages. The first stage covers the period from the 2004 until 2008. During this period the average value of indexes decreased to their minimal values in 2008. The lowest values of indexes in this year mirrored the negative effects of the financial crisis which hit the banking sectors in all EU countries. The second stage covers the period from 2008 until 2014 when can be monitored a gradual increase in the average stability. Positive development in stability during this second stage was influenced mainly by the growing demand for rising capital adequacy, which was related to the gradual implementation of Basel III. Another factor with the positive impact was growth of the liquidity component. Development of the other components (asset quality, earning and profitability) can be considered as stable.

In the last part of our paper, we evaluated how was affected the stability of the banking sectors in countries that joined EU in 2004. Results showed that these countries were positively affected by accession to EU what is evidenced by the value of BSI which increased between the years 2004, 2005 and 2014. A significant increase of BSI can be seen in case of banking sectors of Estonia, Lithuania, Slovenia and Latvia. The improvement in stability can be also seen in case of banking sectors of Slovakia, Czech Republic, Malta, Hungary and Cyprus. Only in case of Polish banking sector there can be seen a slightly decreased compared to 2004.

An aggregate banking stability indicator may serve as a first step towards better operationalizing of the stability concept and building a more appropriate framework for assessing financial stability. The experimentally compiled banking stability index for the European Union countries constitutes one of the alternative methods for constructing an aggregate banking stability indicator. The main advantage of BSI is a possibility to compare the development of soundness of the banking system as a whole at a time, or to compare the banking systems of selected countries and detect possible adverse trends. The discussion of its pros and cons, however, suggests that it cannot simply be used to assess financial stability without knowledge and use of other supporting instruments and indicators. The index also does not take into account a number of potential risks related to off-balance sheet investments or cross-border dimension of the banking business. Nonetheless, it may serve as the basis for further efforts to construct quantitative indicators that reflect the nature of the financial system better and its links with the real sector and other countries. (Gersl and Hermanek, 2008)

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