



MEASURING OF BANKING SYSTEM RESILIENCE BY USING THE TEXAS RATIO

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Abstract:

The issue of banking sector resilience is one of the most exploited after global financial crisis. Competent authorities and central banks worldwide conducted series of actions to strengthen their systems and made it more resilient on extraordinary events. For that purpose, there were conducted stress tests leading to results for improvement of central bank's supervisory activities and practices. Also, the analysis of banking sector resilience should be complemented with other measures, which are also treated as early warning indicators. Texas ratio is one of the early warning indicators that could indicate the banking system stability through the analysis of non-performing loans as portion of "toxic" assets in banks. High level of non-performing loans represents a huge threat for survival of banking systems, so their monitoring and efficient resolution is imperative. In paper, authors emphasize the significance of Texas ratio usage in the process of banking sector resilience evaluation.

Keywords:

resilience, banking sector, non-performing loans, Texas ratio, Republic of Serbia.

1. INTRODUCTION

The last global financial crisis revealed a lot of deficiencies in banking sectors worldwide and creates a special type of challenge ahead of regulators and market participants. They were faced with necessity to adequately react and strengthen the banking sector resistance on unexpected events in the future period (Mirković & Knežević, 2013a). Regulatory reforms through Basel standards were aimed to increase the level of financial system stability and constitute market discipline in the financial sector (Mirković & Knežević, 2013b).

Strengthening of risk management function and improvement of capacities for early warning system development in banks became crucial for the stability of banking sectors worldwide. Among the most difficult risks for identification are those that bear hidden moral hazard. Taking excessive risk without adequate consequences lead to moral hazard (Knežević & Mirković, 2015) and put into the risk the functioning of banking systems. Basel regulatory standards in banking are important not only from the perspective of future crisis prevention, already from the aspect of well-organized financial system creation.

Nevertheless, Djukić (2012) elaborated that "the strategy of maintaining allegedly healthy and successful banking and financial sector in general, in circumstances of obvious distortion in real economy, is a priori adjudged to catastrophe". The linkage between real economy and financial sector is almost perfectly reflected via category of non-performing loans (hereinafter: NPLs). The low level of NPLs is one of the main preconditions for stable banking sector, whilst an extraordinary high level of NPLs could seriously damage the financial stability.

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On the long run observing, NPLs at unacceptable high level represent the main challenge that countries should face with in timely manner by selecting an adequate resolution method. Different resolution methods were implemented across countries and resulted in visible positive effect reflected in significantly lower gross NPL ratio.

This paper has following structure. The first title is dedicated to the main results of NPLs trends and resolution of this issue in banking industry, emphasizing events in the Republic of Serbia and CESEE countries. The second and central part of the paper is focused on the introduction of the Texas ratio as a useful tool for measurement of banking systems resilience. The third title is dedicated to the research results obtained via Statistical Package for Social Sciences - SPSS 21.0 (Armonk, NY: IBM Corporation).

2. REVIEW OF NPLS TREND IN THE BANKING INDUSTRY

When it comes about NPLs and their presence worldwide among banking systems, there should be considered certain facts that follows. Beside already elaborated problem of unique definition absence and necessity for harmonized approach regarding NPLs (Barisitz, 2011; Mirković & Knežević, 2014a), most of the countries applied the NPLs definition given by IMF (IMF, 2005). National bank of Serbia applied the definition of NPLs that is very similar to above mentioned IMF's definition (National bank of Serbia, 2019) with the key criterion described in threshold of 90 days or more past due.

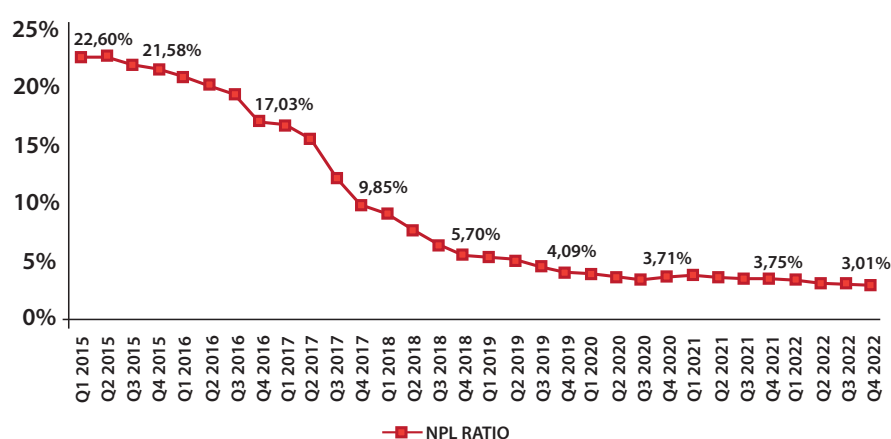
Furthermore, European Banking Authority (hereinafter: EBA) introduced non-performing and forbearance exposures in the document "Final draft Implementing Technical Standards on supervisory reporting on forbearance and non-performing exposures" (EBA, 2014) accompanied by the differentiation between transaction and debtor approach implementation and rules for determination of priorities between two of them (Mirković & Knežević, 2014b).

Outstanding high level of NPLs as well as inadequate risk management could cause loss of catastrophic dimension for banking industry. In many countries, NPLs have reached levels that negatively affect credit supply channels and lead to deterioration of the financial health indicators within the banking sector (Mirković, 2013c).

As NPLs could become a source of systemic risk and the state authorities of the Republic of Serbia (Government and National Bank of Serbia) have recognized the need to solve this issue as a task of high importance which requires the development of a comprehensive strategy with the involvement of all competent institutions (Pravno-informacioni sistem, Republike Srbije, 2015). Focus of the National bank of Serbia and its efforts to be fully aligned with Action plan and Strategy for NPL resolution was finally reflected in the adoption of "Decision on the accounting write-off of bank balance sheet assets" as end of September 2017 (National bank of Serbia, 2023). To resolve NPL issue on the long run, the Republic of Serbia expressed its orientation toward strategic, exhaustive approach based on market principles. Above mentioned approach has the main goal impersonated in creation of soundness bank's capacities for balance sheet "cleaning" and making possible a new credit cycle based on healthy background. This approach could be realized only if there exists a uniform attitude, i.e., consensus between all stakeholders that make active participation in removal of main drivers for NPLs growth in previous period (Mirković & Vujičić, 2018).

Results of systemic approach for NPL resolving in the Republic of Serbia are obvious: conducted measures resulted in downward trend of gross NPL ratio and reaching historical minimum at single digit percentage. Observing period of eight years (between Q1 2015 and Q4 2022), gross NPL ratio in Serbian banking sector was declined for more than 19.5 percentage points (from 22.6% to only 3.01%). Decreasing trend in gross NPL ratio in Serbian banking sector is presented on Figure 1 (National bank of Serbia, 2023). NPLs reductions were achieved via two channels, such as: direct write-offs and assignment of receivables (i.e., NPL sale).

Figure 1. Gross NPL ratio trend in Serbian banking industry between 2015 and 2022.





Various initiatives regarding NPL topic were introduced among the EU regulators. The main purpose of those incentives is alignment with best practices within Europe, making an important comparative advantage primarily for accession countries to EU. The effect of strategic approach in NPL resolution reflected in shrinking of NPLs at satisfactory rate in Serbia and CESEE countries are presented in Figure 1 and Figure 2, respectively. As of June 2022, average NPL ratio within group of CESEE countries reached 2.60%, which is the lowest level historically observed (Vienna Initiative, 2023). This indicates that the quality of bank assets has not deteriorated yet.

3. TEXAS RATIO: DEFINITION AND IMPLEMENTATION

Throughout history, when bank failures happen, it causes panic and an extraordinary amount of concern on the banking markets worldwide. To react preventively, analysts were occupied with defining metrics which are a kind of early warning system for potential bank collapses. The Texas ratio, as one of the most used metrics, was emerged in the 1980s to identify potential problem banks within the Texas economy.

Texas ratio could be defined as a measure of a bank's credit troubles. Namely, it's calculated by dividing the bank's total non-performing assets (variable: NPA) and real estate owned (variable: RE) by its tangible common equity (variable: TCE) and loan loss provisions (variable: LLP). When banks are faced with financial difficulties, the crucial issue becomes the assessment of bank's capital buffer which could cover potential losses derived from non-performing assets. The Texas ratio is calculated based on following formula:

$$TR = \frac{NPA + RE}{TCE + LLP} \quad (1)$$

where: TR = Texas Ratio

NPA = Non-Performing Assets

RE = Real Estate owned

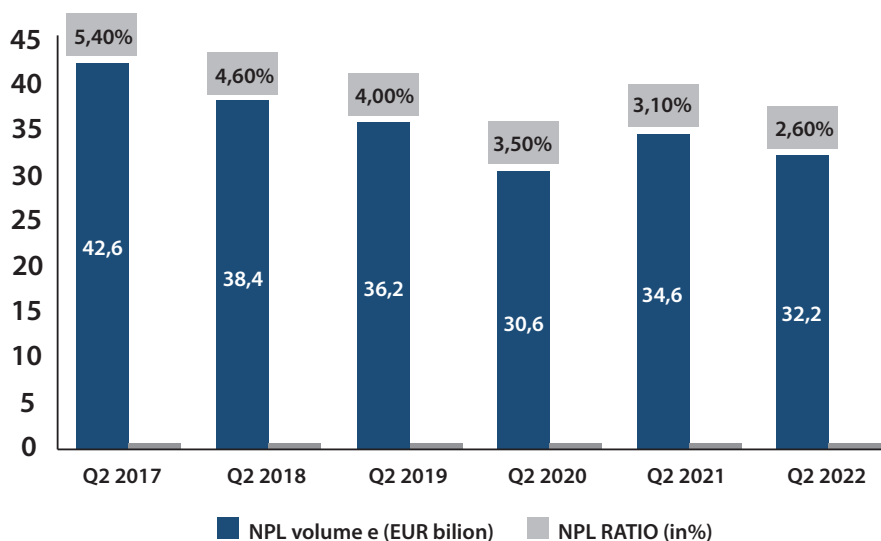
TCE = Tangible Common Equity

LLP = Loan Loss Provisions

The main purpose of the Texas ratio introduction was to encounter many customers which defaulted on their loan repayments. When bank possess more non-performing assets than it has resources to cover any potential future losses on those assets, then the Texas ratio will be higher than threshold set at 1 or 100% and consequently banks are prone to failure (Property Metrics, 2023). Through the usage of the Texas ratio analysts could determine whether a bank has enough equity and money for bad loans coverage. In other words, it gives an answer on the following question: does a bank possess sufficient capital reserve which is adequate for loan losses coverage during fulfillment their obligations toward deponents?

In the numerator of Texas ratio are two variables: non-performing assets and real estate owned. Non-performing assets are related to the category of loans which are not being paid back in a timely manner. Variable NPA is solely related to loans in default upon which regular monthly payments are delayed for 90 days or more. The second variable in the numerator is the real estate which the bank owned through foreclosure, i.e., assets that could potentially become expenses for the bank. In the denominator of the Texas ratio is the variable Tangible Common Equity, which represent a measure of a bank's physical capital, as well as the variable Loan Loss Provisions that could be observed as money reserved for anticipated future losses.

Figure 2. Gross NPL ratio in CESEE countries.



Source: Vienna Initiative, 2023.



Considering all variables included in the Texas Ratio, analysts could obtain an overview and visible driver for the assessment of stability and soundness within banking sector, even though it could vary widely between banks. Calculating the Texas ratio could lead to advantages for investors and customers. For customers, the knowing of the Texas ratio could be a great signal for the extent of the security of their funds. Latter is closely related to protection of deponents and their rights, with most important issue related to an appropriateness of equal insurance premiums. The purpose of establishing differentiation among insurance premiums is reflected into avoidance of excessive risk taking and taking corrective actions from the supervisory point of view.

The Law on Deposit Insurance in Serbia implies linear approach that is related to banks obligations to pay initial premium equals to 0.3% of the cash portion of minimum initial capital of the bank (Deposit Insurance Agency, 2023). Oppositely from described approach, Djukić (2013) exposed its proposal regarding differentiation of insurance premium imposing as a main criterion: observing an achieved capital adequacy ratio (CAR) of certain banks in relation with regulatory level of CAR. Introduction of this approach is leading to obvious differentiation between banks that have adequate risk management and those without it.

The aim of Djukić's proposal (Table 1) is to exactly precise assignment of the responsibility for bad management in certain banks (Mirković, 2015).

The Texas ratio functions effectively when it is complemented with other financial ratios. Also, it should bear in mind that a high Texas ratio does not necessarily mean that the bank will fail because many banks with high ratios could stay solvent, while banks that seem solid sometimes hit the buffers. The evolution of the Texas ratio and its downward trend in Serbian banking industry between Q1 2015 and Q4 2022 is presented on Figure 3.

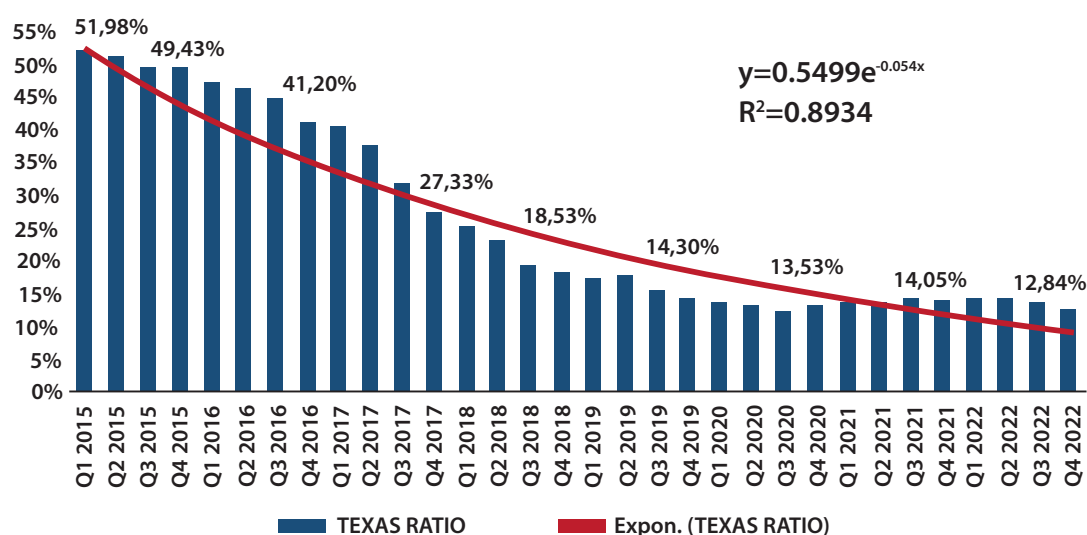
As per Figure 3, the Texas ratio in Serbian banking industry felt by almost 40 percentage points, whilst in the same period NPLs (which are one of the constitutive elements of the Texas ratio) declined for more than 19.5 percentage points. Additional shrinkage of NPLs is a realistic scenario as a result of the extension activities that encompass engagement of all competent authorities and market participants which are actively involved in the process of NPLs resolution as well as prohibiting the inflow of newly generated NPLs.

Table 1. Difference among insurance premiums - proposal

Achieved CAR vs. Average CAR	Haircut
If achieved CAR is higher than average CAR maximum to 15%	50%
If achieved CAR is higher than average CAR maximum to 30%	60%
If achieved CAR is higher than average CAR more than 30%	70%

Source: Djukić (2013)

Figure 3. Evolution of the Texas ratio in Serbian banking industry between 2015 and 2022.





4. RESEARCH RESULTS AND DISCUSSION

Data series regarding NPL ratio and the Texas ratio in a period between Q1 2015 and Q4 2022 were inputted in Statistical Package for Social Sciences - SPSS 21.0 due to further examination. Cronbach alpha coefficient was 0.893, determining high reliability and validity.

Before conducted analysis, there was calculated a contingency coefficient which reached 0.984 (far away from zero) meaning that those two variables are associated, but for precise dependence there should be complemented with other variables. In terms of correlation between NPL ratio and the Texas ratio it should be noted following:

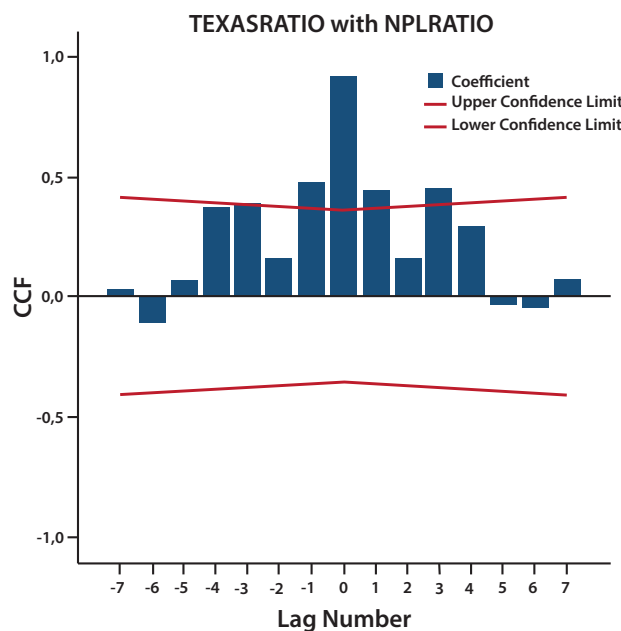
- Pearson correlation between observed variables equals 0.999 (indicated that values from 0.75 to 1 could be assessed from very good to excellent correlation);
- Kendall's tau_b coefficient is 0.859 meaning that coefficient is very close to 1, i.e., signaling almost perfect positive monotonous relation;
- Spearman's rho coefficient stands at 0.947 indicating a high positive relationship between variables.

The strongest correlation between variables occurs at lag 0, which is showed on Figure 4. The correlation itself equals 0.917 (Table 2). Above mentioned shows that series which are related NPL and Texas ratio are strongly

Table 2. Cross correlation between NPL and Texas ratio.

Lag	Cross Correlation	Std. Error
-7	.016	.204
-6	-.098	.200
-5	.067	.196
-4	.371	.192
-3	.386	.189
-2	.150	.186
-1	.474	.183
0	.917	.180
1	.443	.183
2	.155	.186
3	.444	.189
4	.289	.192
5	-.015	.196
6	-.037	.200
7	.067	.204

Figure 4. Cross correlation between NPL and Texas ratio.





simultaneously correlated. Furthermore, indicated strong positive correlation means that both series behave analogously to other exogenous factors. In Figure 4 are also presented data that pinpoint on negative cross correlations at lag -6 as well as lags $+5$ and $+6$, respectively. Finally, notwithstanding that those two series showed positive respond to contemporaneous factors, they are at the same time slightly negatively correlated with each other over time.

In terms of the degree of lack of symmetry (skewness) as well as the measuring the frequency of outliers occurring tested in relation with a normal distribution (kurtosis), via usage of SPSS 21.0 authors obtained following results, as it is presented in Table 3:

Considering that skewness for both, NPL and Texas ratio, stands between 0.5 and 1 we are considering that the distribution is moderately skewed, whilst kurtosis reference values for Texas ratio (-1.23) and NPL ratio (-1.18) pinpoint on platykurtic distribution (lighter tails that are shorter and contain fewer outliers).

5. CONCLUSION

Outstanding high level of NPLs was recognized as a large threat for survival of economies within EU and the Republic of Serbia. On the long run observing, NPLs at unacceptable high level represent the main challenge that countries should face with in timely manner by selecting

an adequate resolution method. Through resolution via private equity fund formations specialized in NPLs, or alternatively, there were created prerequisites for removing the obstacles that deteriorate economic growth.

In this paper are summarized conducted measures in EU and the Republic of Serbia regarding NPL resolution, which resulted in more than significant decline of gross NPL ratio. Also, authors presented the Texas ratio, which contains NPLs as one of the calculation elements, as very valuable tool which gave us an overview and visible driver for the assessment of stability and soundness within banking sector, even though it could vary widely between banks. The Texas ratio gave advantages for investors and customers, as it could be observed as a great signal for the level of the security of their funds.

Through implementation correlation and cross-correlation analysis, by using SPSS 21.0, authors concluded that there is a high positive correlation between analyzed variables: NPL ratio and the Texas ratio. Also, empirical evidence in the case of EU countries, on the one side and the Republic of Serbia on the other side, showed the declining trend in the NPL ratio variable during observed period. Similarly, the Texas ratio variable was analyzed in Serbian banking sector, and it showed decreasing trend, confirming positive correlation with variable NPL ratio. Although, it is not a common practice, this study gave very useful results for usage of the Texas ratio on the banking sector level and pointed that a described possibility could be beneficial for practitioners from the economics.

Table 3. Skewness and kurtosis for variables.

Type:	Texas Ratio	NPL Ratio
Skewness	0.70	0.75
Kurtosis	-1.23	-1.18

Source: Author's, SPSS 21.0.

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