



August 2019, Frankfurt am Main.

METHODOLOGY FOR ASSIGNING BANKING SECTOR RISK SCORE – FULL VERSION

TABLE OF CONTENTS:

Contents

| | |
|---|---------------|
| I Summary..... | 2 |
| II Sources of information..... | 3 |
| III Methodology (BSR)..... | 3 |
| 1. Credit conditions..... | 3 |
| 2. Market Conditions..... | 4 |
| 3. Funding Conditions..... | 5 |
| 4. Institutional Framework..... | 5 |
| 5. Economic Factors..... | 6 |
| 6. Adjustment factors..... | 66 |
| IV BSR score calculation..... | 7 |
| V Final BSR Score application..... | 8 |

Deleted: 3. Funding Conditions . 54

Deleted: 6. Additional stress factors . 66¶

Deleted: 7

Deleted: 67

Deleted: IV BSR score calculation . 78

Deleted: V Final BSR Score application . 89

I Summary

This methodology aims to be a guidance for the calculation of the Banking Sector Risk (BSR) score intended for the credit rating of banks.

Our global score reflects the state of banking sector macro environment in each country rated and is scaled from 1 to 15, ranging from very high risk to very low risk levels of the banking sector respectively. The BSR scale and the respective risk levels are summarized in the table below:

| Score | Level of risk |
|-------|---------------|
| 15 | Very Low |
| 14 | |
| 13 | |
| 12 | Low |
| 11 | |
| 10 | |
| 9 | Adequate |
| 8 | |
| 7 | Moderate |
| 6 | |
| 5 | High |
| 4 | |
| 3 | |
| 2 | Very High |
| 1 | |
| 0 | |

The score takes into account the risk of the entire financial system, government risks and bank specific risks. It is based on a time span of 5 years, making the score stable and thus reliable through time. The score consists of five groups of quantitative factors, one stress factor for presence of a major crisis in the economy and six adjustment factors, which account for specific events or situations in the economy or the banking sector which are not captured by the other factors. The factors used are the following:

Quantitative Factors

- Credit Conditions;
- Market Conditions;
- Funding Conditions;
- Institutional Framework;
- Economic Conditions;

Adjustment Factors

Deleted: Stress Factor¶
<#>Presence of a major crisis in the economy;¶

- Bank regulatory capital to risk-weighted assets;
- Level of government involvement in the banking sector;
- Presence of an active capital market in the economy;
- Political risk assessment of the economy;
- State of the real estate market in the economy;
- Banking sector stability;
- Systemic risks.

- Presence of a major crisis

II Sources of information

The following sources of information are used for the assessment of the rating score:

- World Bank (Global Financial Development Database, World Development Indicators, Worldwide Governance Indicators);
- IMF (World Economic Outlook, International Financial Statistics);
- World Economic Forum (Annual Global Competitiveness Report);
- Statistics database of the country's Ministry of finance;
- Statistics database of the country's Central Bank;
- Statistics database of the country's Official statistical service;
- Statistics databases of the country's stock exchanges;
- Numbeo Cost of Living database
- Other public sources of information.

III Methodology (BSR)

1. Credit conditions

This group of factors is designed to assess the state of the credit environment in the economy, by considering the level of banking sector development and risk, as well as the leverage and debt capacity of the private sector.

1.1. Domestic credit provided by financial sector to GDP and its dynamics

Sources of information

1. Information about the volume of domestic credit by financial sector to GDP: World Bank or other public sources of information.

Reflects the amount of financial resources provided by domestic financial institutions, as a share of GDP (The financial sector includes monetary authorities and deposit money banks, as well as other financial corporations, such as finance and leasing companies, money lenders, insurance corporations, pension funds, and foreign exchange companies). The metric's effect on the BSR score is not easy to be observed, hence it requires a careful interpretation. A higher level of domestic credit provided by the financial sector to GDP indicates a developed banking sector in an economy. However, a very high value of this metrics may also indicate an unsustainable increase in leverage, and therefore a higher banking sector risk.

Formatted: List Paragraph, Justified, Space After: 6 pt, Bulleted + Level: 1 + Aligned at: 0,63 cm + Indent at: 1,27 cm

Formatted: Font: Cambria

Deleted: <#>¶

Deleted: Private credit by deposit money banks to GDP

Deleted: private credit

Deleted: deposit money banks

Deleted: to the private sector by domestic money

Deleted: banks

Deleted: Domestic money banks include commercial banks and other financial institutions that accept transferrable deposits, such as demand deposits

Deleted: private

Deleted: by deposit money banks to GDP

Growth of domestic credit provided by the financial sector to GDP metric reflects a developing banking sector. However the metric has to be assessed carefully as very high growth of this figure may indicate an over-heat in the credit market of an economy.

Deleted: private credit by deposit money banks to GDP

1.2. Gross domestic product based on purchasing-power-parity (PPP) per capita

Sources of information

1. Information about the gross domestic product based on purchasing-power-parity (PPP) per capita: World Bank or JME.

Deleted: other public sources of information

GDP (PPP) per capita is a proxy variable for the debt capacity of the private sector.

1.3. Bank non-performing loans to gross loans

Sources of information

1. Information about the bank non-performing loans to gross loans: World Bank or other public sources of information.

The variable assesses the risks involved in the repayment of loans. The larger the NPLs, the larger the loan loss provisions of banks, and the lower the profits. Hence a greater amount of NPL worsens the BSR score.

Formatted: Normal, Indent: Left: 0,63 cm

2. Market Conditions

The underlying group of factors is designed to assess the state of the banking market in an economy, by considering concentration, deepness and reach parameters.

Deleted: loan structure, as well as

2.1. Bank deposits to GDP

Sources of information

1. Information about the volume of bank deposits to GDP: World Bank or other public sources of information.

Reflects demand, time and saving deposits in deposit money banks as a share of GDP. The metric indicates deepness and reach of the banking sector through evaluating the scope of access to saving facilities.

2.2. Bank branches per 100 thousand adults

Sources of information

1. Information about the amount of bank branches per 100 thousand adults: World Bank or other public sources of information.

Reflects the amount of bank branches per 100 thousand adult population in the reporting country. The metric is a measure of outreach of the traditional banking sector, through the branch network of the banking sector.

2.3. Bank concentration dynamics

Sources of information

1. Information about the bank concentration: World Bank or other public sources of information.

Reflects concentration growth on the three largest banks and it helps us to assess whether the system is a monopoly, an oligopoly or if it is actually diversified. It also reflect how open is the market for the entry of new players.

2.4. Property price to income ratio

Sources of information

1. Information about property price to income ratio; Numbeo Cost of Living database or other public sources of information.

The variable assesses property purchase affordability. The higher the ratio, the higher risks in the real estate market, which lowers the BSR score.

3. Funding Conditions

This group of factors captures the funding conditions in the sector, by examining state of the central bank balance sheets, banks' liquidity and profitability characteristics.

3.1. Central bank assets to GDP (%)

Sources of information

1. Information about the central bank assets to GDP (%): World Bank or other public sources of information.

The factor reflects claims of a central bank on domestic real nonfinancial sector to GDP. The variable measures the size of the central banks' balance sheets, high values of which may indicate higher reserve requirements and presence of a recent or ongoing financial stress. Hence, a greater amount of central bank assets translates into lower BSR score.

3.2. Customer deposits to total loans (%)

Sources of information

1. Information about the Customer deposits to total loans (%); IMF or other public sources of information.

The ratio reflects ability of the banking system to attract alternative source of funding with a lower risk of a sudden withdrawal. Hence, a higher value of the indicator decreases the overall score.

3.3. Return on equity (ROE) volatility

Sources of information

1. Information about the Return on equity volatility; World Bank or other public sources of information.

The score captures profitability and stability of a country's banking system. A higher standard deviation of ROE, indicates a higher banking sector risk and hence negatively contribute to the banking sector aggregate.

4. Institutional Framework

Under this group of factors we analyze the regulatory environment in the country.

4.1. Regulation of securities exchanges

Sources of information

1. Information about the regulation of securities exchanges: WEF or other public sources of information.

Measures the degree to which regulation and supervision of security exchanges are effective (from 1 to 7(best)). A higher security exchanges' regulation score translates into a higher BSR score.

Deleted: Bank non-performing loans to gross loans

Deleted: the bank non-performing loans to gross loans

Deleted: World Bank

Deleted: the risks involved in the repayment of loans

Deleted: and worse

Deleted: larger the NPLs, the larger the loan loss provisions of banks, and the lower the profits. Hence a greater amount of NPL worsens the

Deleted: default

Deleted: , as well as FX reserves accumulated by the government.

Deleted: Liquid assets to deposits and short term funding

Deleted: liquid assets to deposits and short term funding (%)

Deleted: World Bank

Deleted: The metric's effect on the BSR score is not easy to be observed, hence it requires a careful interpretation

Deleted: This ratio

Deleted: the value of liquid assets (easily converted into cash) to short term funding plus total deposits. Liquid assets include cash and due from banks, trading securities and at fair value through income, loans and advances to banks, reverse repos and cash collaterals. Deposits and short term funding includes total customer deposits (current, savings and term) and short term borrowing (money market instruments, CDs and other deposits)

Deleted: . A higher value of the ratio indicates the ability of the banks in the system to fund themselves, hence, increasing the overall score.¶

Deleted: Bank Z-score

Deleted: Bank Z-score

Deleted: probability of default

Deleted: Bank Z

Deleted: -score

Deleted: lower probability of default of a country's

Deleted: positively

Deleted: 3.4. Total reserves minus gold (current US\$) to GDP (current US\$)¶

Sources of information¶

1. Information about the total reserves minus gold (current US\$): World Bank;¶
 2. Information about the GDP (current US\$): World Bank;¶
 3. Other public sources of information.¶
 Total reserves minus gold (current US\$) comprises special drawing rights, reserves of IMF members held by the IMF and holdings of FX under control of monetary authorities. This factor related to GDP (current US\$) is ...

4.2. Regulatory Quality

Sources of information

1. Information about the Regulatory Quality: World Bank or other public sources of information.

Reflects the perceptions of the ability of a government to formulate and implement sound policies and regulations that permit and promote private sector development. A better regulatory quality positively contributes to the BSR.

5. Economic Factors

Economic factors are designed to analyze the macroeconomic environment of the country by examining scale, policy, institutional framework and effectiveness factors.

5.1. GDP (current US\$)

Sources of information

1. Information about the GDP (current US\$): World Bank or other public sources of information.

Reflects the size of an economy, a greater level of which translates into a higher BSR score.

5.2. WEF Legal rights index

Sources of information

1. Information about the WEF Legal rights index: WEF or other public sources of information.

Reflects the degree of legal protection of borrowers' and lender's rights (from 1 to 10(best)). The score indicates how well collateral and bankruptcy laws protect borrowers' and lender's rights and thus facilitate lending. Hence, a greater WEF legal rights index translates into a higher BSR score.

5.4. Inflation, consumer price (annual %) volatility

Sources of information

1. Information about the inflation, consumer price (annual %) volatility: World Bank or other public sources of information.

Assesses the inflation volatility of the past five years and is designed to assess stability of prices in an economy. A higher volatility of inflation negatively contributes to the banking score.

6. Adjustment factors

A number of qualitative factors are introduced in order to allow BSR score to be manually adjusted for the effects that are not precisely captured by the quantitative analysis.

6.1. Bank regulatory capital to risk-weighted assets

Reflects banking sector's capital adequacy parameter. Due to its non-straight-forward effect on the BSR score, the factor requires a qualitative consideration. On one hand a higher banks' aggregate capital adequacy means a better protection of depositors and greater stability of the banking sector. On the other hand, a higher capital adequacy measure could imply that on average banks in a system are obliged to set out more capital, hence are experiencing or have recently experienced a financial shock affecting the banking sector.

6.2. Level of government involvement in the banking system

The factor includes analysis of the market share of the government owned banks, degree to which government is involved in central bank activities, as well as extent of the government funding support.

Deleted: 5.2. Wastefulness of government spending
Sources of information

1. Information about the wastefulness of government spending: WEF or other public sources of information.
Reflects how efficiently the government spends public revenue (from 1 to 7(best)). This factor is designed to capture the effectiveness of a country's institutions. A greater value of wastefulness of government spending score, the higher is the BSR score.

Deleted: 3

Deleted: <#>Additional stress factors

6.1. Presence of a major crisis

Sources of information

1. Information about the banking crisis: World Bank.
2. Analyst's own research and assessment.
The presence of a crisis in an economy considerably increases banking sector risks. Therefore, we have decided to include this additional qualitative assessment to account for this fact. It has to be considered if the country finds itself in a state of a banking crisis first. Once this is determined, the analyst may assess further if the country experiencing one of the following crisis scenarios after further research:
<#>Presence of a major financial/debt/currency crisis in the economy;
<#>Presence of a major banking crisis in the economy;
<#>Presence of a major political/social crisis in the country;
<#>Revolution and(or) civil war in the country.

6.3. Presence of an active capital market in the economy (e.g. to issue debt to the private sector)

Presence of a very well developed capital market, which allows to issue debt to the private sector may be a positive adjustment to the score. The same way, a poorly developed capital market may be a limitation to the banking sector, as well as to the economy's development.

6.4. Political risk assessment

Various political risks may limit the extent to which the banking and other sectors in the economy develop, especially in developing economies. Therefore, we find it important to allow the model to be adjusted once unsustainable political risks arise.

6.5. The state of the real estate market

The recent financial crisis has shown that the banking sector and real estate sector are very much tied together. This adjustment factor involves assessment of the commercial and housing real estate attributes, which could potentially have a negative effect on the banking sector.

6.6. Banking sector stability

High profitability is one of the major determinants of the banking sector stability. While conducting such analysis it is important to adjust for inflation to make the returns comparable.

6.7. Systemic risks

The analysis of systemic risks involves analysis of the government liquidity risk, as well as country's vulnerability to external shocks (e.g. a high degree of foreign currency lending).

6.8. Presence of a major crisis

The presence of a crisis in an economy, such as war, revolution, banking or financial crisis, considerably increases banking sector risks.

Deleted:

Formatted: Font: 12 pt

IV BSR score calculation

Each factor is weighted across the time span of five years with a respective optimal weight in accordance with the table below:

| T | T-1 | T-2 | T-3 | T-4 |
|-----|-----|-----|-----|-----|
| 40% | 20% | 20% | 10% | 10% |

We accumulate the effect of the Quantitative Factors to arrive at the preliminary BSR score. As a result, each group of Factors has a certain weight towards the preliminary BSR score, as per the table below;

| Factor | Weight |
|------------------------------|--------|
| Credit Conditions | 24% |
| Market Conditions | 26% |
| Funding Conditions | 10% |
| Institutional Framework | 22% |
| Economic Factors | 18% |
| PRELIMINARY BSR SCORE | |

Deleted: 5

Deleted: 15

Deleted: 15

Deleted: 3

The preliminary BSR is then adjusted through adjustment factors if needed.

Deleted: the stress and

Deleted: Stress and adjustment factors

V Final BSR Score application

The impact of the Banking Sector Risk score on the final rating depends on the initial assessment of the BSR. The distribution of the final rating score per level of BSR has been weighted and benchmarked following the best industry practices, deep macro analysis and calibration requirements.

| | | BSR | | | | |
|---------------------------|------------|-------------|-------------|-------------|------------|------------|
| | | 13-15 | 10-12 | 7-9 | 4-6 | 1-3 |
| PRELIMINARY CREDIT RATING | 1 | AAA / AA | AA / A+ | A+ / A- | BBB+ / BB+ | BB+ / B+ |
| | 1 - 0,95 | AAA / AA | AA / A+ | A / BBB+ | BBB / BB+ | BB / B |
| | 0,95 - 0,9 | AAA / AA | AA- / A+ | A / BBB+ | BBB / BB | BB / B |
| | 0,9 - 0,85 | AA+ / AA- | AA- / A | A / BBB+ | BBB- / BB | BB- / B |
| | 0,85 - 0,8 | AA+ / AA- | AA- / A | A- / BBB | BBB- / BB- | BB- / B |
| | 0,8 - 0,75 | AA / A+ | A+ / A- | A- / BBB- | BB+ / B+ | B+ / B- |
| | 0,75 - 0,7 | AA / A | A / BBB+ | BBB+ / BBB- | BB+ / B+ | B+ / B- |
| | 0,7 - 0,65 | AA- / A | A / BBB+ | BBB+ / BB+ | BB / B | B / B- |
| | 0,65 - 0,6 | A+ / A- | A- / BBB | BBB / BB+ | BB / B | B / B- |
| | 0,6 - 0,55 | A+ / A- | A- / BBB | BBB / BB | BB- / B | B / B- |
| | 0,55 - 0,5 | A / A- | BBB+ / BBB | BBB- / BB | BB- / B | B / B- |
| | 0,5 - 0,45 | A / BBB+ | BBB+ / BBB- | BBB- / BB | BB- / B | B- / CCC+ |
| | 0,45 - 0,4 | A / BBB+ | BBB+ / BBB- | BBB- / BB- | BB- / B- | B- / CCC+ |
| | 0,4 - 0,35 | A- / BBB | BBB / BB+ | BB+ / BB- | B+ / B- | B- / CCC+ |
| | 0,35 - 0,3 | BBB+ / BBB- | BBB- / BB | BB / B+ | B+ / CCC+ | B- / CCC+ |
| | 0,3 - 0,25 | BBB / BB | BB+ / BB- | BB- / B | B / CCC+ | CCC+ / CCC |
| | 0,25 - 0,2 | BB+ / BB- | BB / B | B+ / B- | B- / CCC | CCC+ / CCC |
| | 0,2 - 0,15 | BB- / B | B+ / B- | B / CCC+ | CCC+ / CCC | CCC / CCC |
| | 0,15 - 0,1 | B / CCC | B- / CCC | B- / CCC | CCC+ / CCC | CCC / CCC- |
| | 0,1 - 0,05 | CCC / CC | CCC / CC | CCC / CC | CCC / CC | CCC / CC |
| 0,05 - 0 | C / C | C / C | C / C | C / C | C / C | |