Measures of Financial Stability in Macedonia

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April 26, 2013
Measures of financial stability in Macedonia

- Construction of two composite measures which will provide timely warning of potential risks, composed of a set of economic and financial indicators
- First, *aggregate banking stability indicator* as an attempt to assess the risks to financial stability by focusing on a set of key financial soundness indicators of the banks
- Given the complex interactions of different elements of the financial system among themselves and with the real economy, developed a *financial conditions index*
Banking stability index

- Composed of a set of economic and financial indicators for the prevention (minimizing) of the financial crises

- To provide timely warning of potential risks

- International standard for the index – still not developed
Construction of the banking stability index

- Quantitative indicators (set of basic FSI) selected on the basis of their relevance to the stability of the banking system
- Does not include macroeconomic variables and qualitative indicators
- Period: December 31, 2005 - December 31, 2012, on a quarterly basis
- Includes only banks (banks – 88.6% of the entire financial system)
- Covers: insolvency risk, credit risk, profitability, liquidity risk and currency risk
Construction of the banking stability index

- Employed financial variables

<table>
<thead>
<tr>
<th>Risk</th>
<th>Indicator</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insolvency</td>
<td>Capital adequacy ratio</td>
<td>0.25</td>
</tr>
<tr>
<td>Credit risk</td>
<td>Nonperforming loans / Total loans</td>
<td>0.25</td>
</tr>
<tr>
<td></td>
<td>Annual growth rate of non-performing loans</td>
<td></td>
</tr>
<tr>
<td>Profitability</td>
<td>Return on equity</td>
<td>0.20</td>
</tr>
<tr>
<td></td>
<td>Non-interest expenses / Gross income</td>
<td></td>
</tr>
<tr>
<td>Liquidity risk</td>
<td>Liquid assets / Total assets</td>
<td>0.25</td>
</tr>
<tr>
<td></td>
<td>Liquid assets / Short-term liabilities</td>
<td></td>
</tr>
<tr>
<td>Currency risk</td>
<td>Net open position in foreign exchange / Own funds</td>
<td>0.05</td>
</tr>
</tbody>
</table>
Construction of the banking stability index

- Adjustment of the data:
  1. indicators which in opposite directions show improvement/deterioration in terms of the direction of other indicators, their reciprocal value is taken, while the annual growth rate of nonperforming loans is multiplied by (-1)

  2. indicators were normalized through a process of empirical normalization that placed all indicators in the interval from 0 to 1
Construction of the banking stability index

- Empirical normalization:

\[ I^{n}_{it} = \frac{I_{it} - \text{Min}(I_i)}{\text{Max}(I_i) - \text{Min}(I_i)} \]

- \( I_{it} \) is the value of indicator \( i \) in period \( t \); \( \text{Min}(I_i) \) and \( \text{Max}(I_i) \) are the minimum and maximum of the indicator in the analyzed period.

- Lack of this normalization is that it is based on minimum or maximum value of data within a specified period.

- The advantage is the effect it has in a series of data with minor changes from date to date, so any change has obvious effect on the value of the composite index.
Components of the banking stability index

- Movements to the value of 1 (Max) mean lower risk, while the movements towards 0 (Min) mean larger risk.
Construction of the banking stability index

- The normalized values of the individual indicators are weighted in order to emphasize the significance that the individual risks have on the stability of the banking system.

- The calculation of the banking stability index is a weighted sum of normalized indicators for individual risks.
The increase in the index means improved banking stability, while the decrease denotes stability worsening.

Average value of the index for 2012 is 0.47 (for 2011 is 0.44)

Obtained results for the banking stability index
Contributions of the components of the banking stability index
Banking stability index with individual regional countries

- Macedonia
- Bosnia and Herzegovina
- Greece
- Croatia
- Czech Republic
- Poland

Graph showing the banking stability index from 2008 to 2012.
Methodology behind the construction of the FCI

- Weighted average of a number of indicators of the financial system’s health
- PCA to estimate the weight given each indicator
- The weight each variable receives is consistent with its historical importance to fluctuations in the broader financial system
- Indexes of this sort have the advantage of capturing the interconnectedness of financial markets - a desirable feature allowing for an interpretation of the systemic importance of each indicator
Construction of the FCI

- Financial variables adjusted for current and past economic activity and inflation prior to construction of the index.
  - index separates the influence of economic conditions from financial conditions
- FCI is constructed by summing the first 5 PCs weighted by the share of total variability explained by them. The resulting index is then further divided by the share of total variance explained
- The actual importance of each variable in the FCI is equal to the weighted sum of the loadings on each variable across the 5 principal components
Employed financial variables

- Leverage ratio - degree of robustness of financial institutions to withstand shocks to their balance sheets
- Capital adequacy ratio - capacity of banks' capital to withstand losses from NPLs
- The asset price categories measure risk premiums in their various forms:
  - belief that house prices would continue to appreciate stimulates easy credits thus increasing the financial vulnerability
  - MBI-10 return measures the "risk - reward relationship" associated with the stock market thus covering the general equity market risk premium
Employed financial variables

- REER - adverse external shocks cause a larger *impact* real depreciation under flexible rates, but a larger *expected* real depreciation under fixed rates. *Ceteris paribus*, this causes domestic real interest rates to be higher under a peg, adversely affecting current investment and future output
  - only when the steady state ratio of debt to investment is large, then the economy is more likely to be financially vulnerable

- Degree of asset substitution in the economy
  - with dollarization/euroization, the domestic authorities lose the ability to respond to a sudden run on bank deposits by acting as a lender of last resort
Employed financial variables

- Banks’ profitability - influenced by the bank's management decisions and policy objectives; by changes in the macroeconomic environment; by factors related to market share changes

- Loans to deposit ratio as well as the banking system exposure to subsidiaries and shareholders are used to detect liquidity problems - a high ratio might indicate potential liquidity stress in the banking system
Employed financial variables

- Interest rates as well as the FX interest spread – increase in both coincides with tighter banking system conditions
  - High deposit interest rates are signaling increased risk, creating a secondary impulse for less risky banks to actually increase the riskiness of their portfolio
  - High bank lending rates closely associated with the high-risk premiums – “fear premiums” - driven by some country-specific macro/liquidity risks

- Higher spread between the lending and deposit rate reflects higher perceived credit risk - spread can also be used as a gauge of competitiveness within the sector - higher spread implies lower competitiveness
Risk measures with their generally positive weights and leverage measure with its negative weight imply that increasingly positive values of the index capture periods of above-average risk and below-average leverage.

- **First half of 2007** the FCI - into a negative territory - looser overall financial conditions driven largely by:
  - favorable movements in equity markets
  - restored capacity of the banks' capital to withstand losses from NPLs
  - the increased banks' profitability;

Adjusted FCI - measured in terms of number of standard deviations away from historical mean

Shaded areas coincide with NBRM policy easing cycle.
- **mid-2007 - mid-2008** - unfavorable financial conditions
  - sharp increase in interest rates on denar deposits
  - decrease in banks' leverage
- **second half of 2008** - favorable financial conditions
  - decline in short and long term interest rates on foreign currency loans
  - further improvement of the capacity of banks' capital to withstand losses from NPLs
- **2009 – 2010** - tight financial conditions
  - adverse movements in credit conditions (surge in banks' Denar deposit and lending rates)
  - increase in banking system exposure to subsidiaries and shareholders - increased liquidity risk

Adjusted FCI - measured in terms of number of standard deviations away from historical mean

Shaded areas coincide with NBRM policy easing cycle
- **beginning of 2011 – present** - favorable financial conditions
  - improved credit conditions (decrease in lending and deposit interest rates)
  - decrease in liquidity stress in the banking system (decline in total loans / customer deposits ratio)
  - increase in leverage
  - increase in capacity of banks' capital to withstand losses from NPLs
  - reduction in banking system exposure to subsidiaries and shareholders

Adjusted FCI - measured in terms of number of standard deviations away from historical mean

Shaded areas coincide with NBRM policy easing cycle
Forecasting economic conditions using the FCI

- We also evaluate the ability of our FCI to predict the future economic activity on a one quarter horizon relative to the AR model.
- As expected, the AR benchmark is generally hard to beat.
- The results suggest that the OLS regression containing only the first and the second lag of our FCI just marginally outperforms the alternative models examined.
Concluding remarks

- Both measures of financial stability can be used to gauge the build-up of imbalances in the system even in the absence of extreme events.
- The behavior of both aggregate indicators reflect the financial system conditions well post facto.
- They are intuitively attractive as they could enable policy makers to better monitor the degree of financial stability of the system and to anticipate the sources and causes of financial stress to the system.
Thank you for your attention