Measures of Financial Stability in Macedonia

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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**

Risk	Indicator	Weight
Insolvency	Capital adequacy ratio	**0.25**
Credit risk	Nonperforming loans / Total loans	**0.25**
	Annual growth rate of non-performing loans	
Profitability	Return on equity	**0.20**
	Non-interest expenses / Gross income	
Liquidity risk	Liquid assets / Total assets	**0.25**
	Liquid assets / Short-term liabilities	
Currency risk	Net open position in foreign exchange / Own funds	**0.05**

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

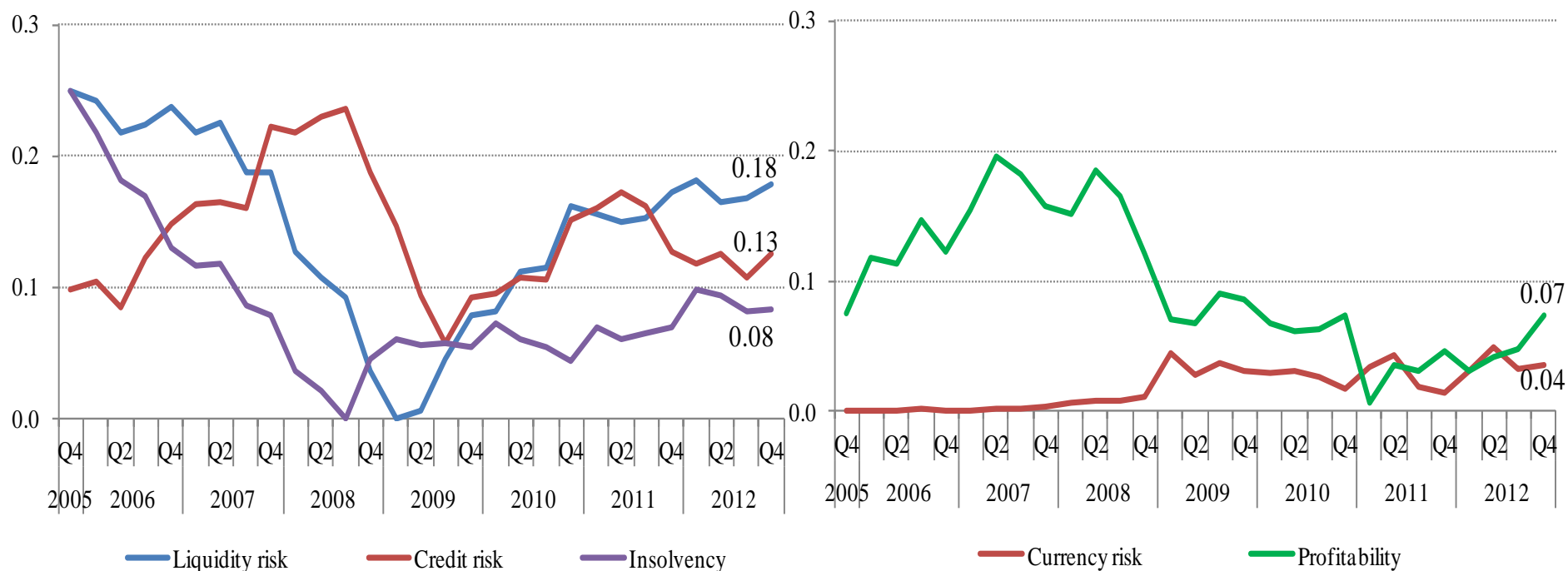# Construction of the banking stability index

◆ Empirical normalization:

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

◆ I_{it} is the value of indicator i in period t; Min (I_i) and 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

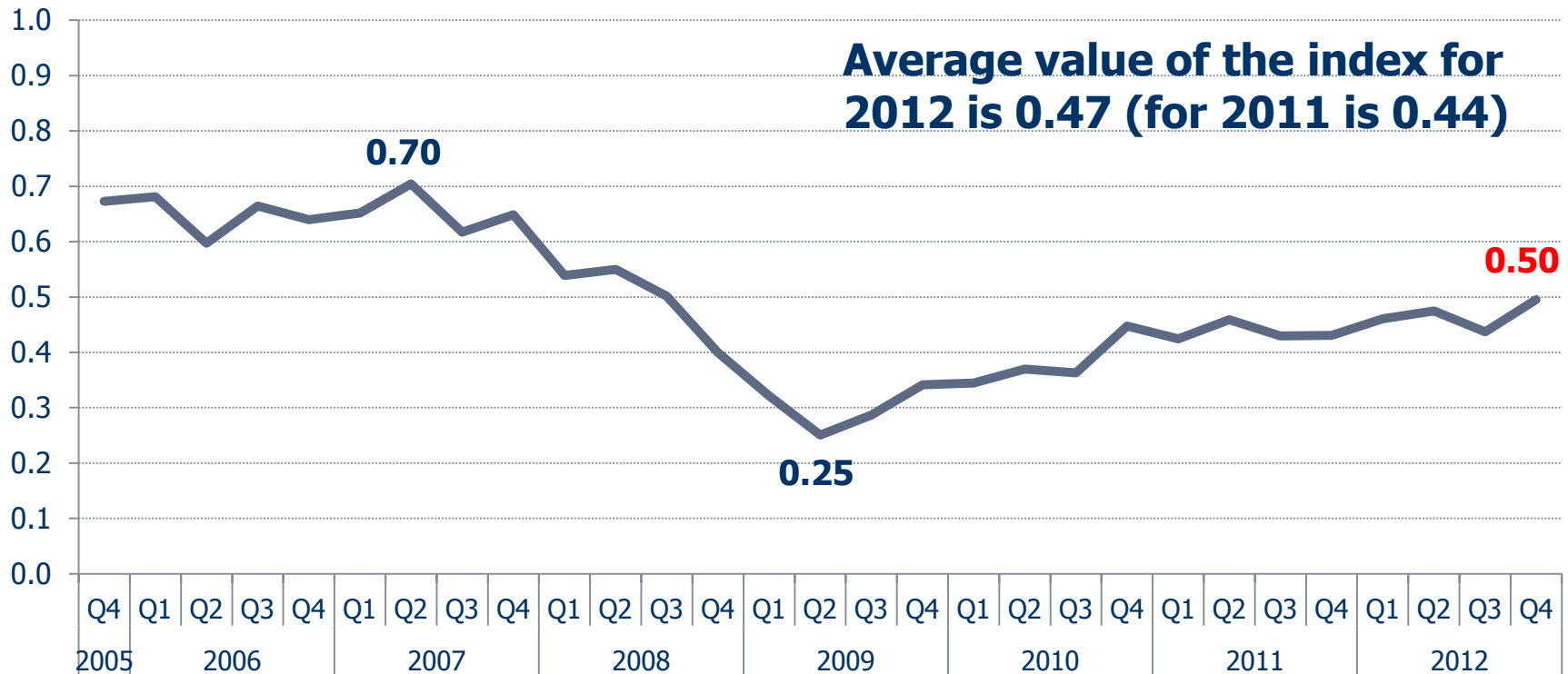◆ Movements to the value of 1 (Max) mean lower risk, while the movements towards 0 (Min) mean larger risk

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

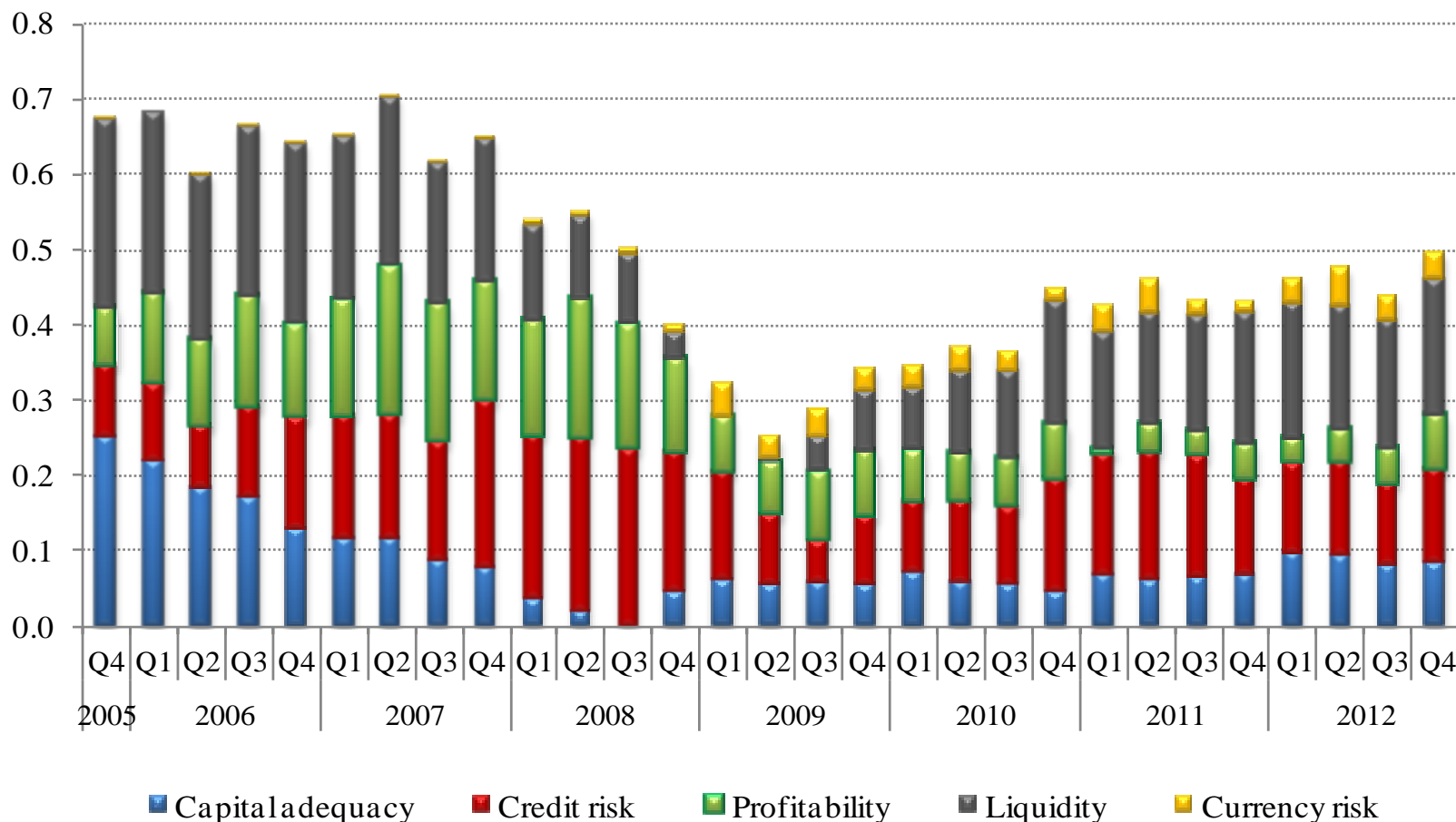◆ The calculation of the banking stability index is a weighted sum of normalized indicators for individual risks

Obtained results for
the banking stability index

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

0.70

0.25

0.50

1.0																													

Q4 | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4

2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012

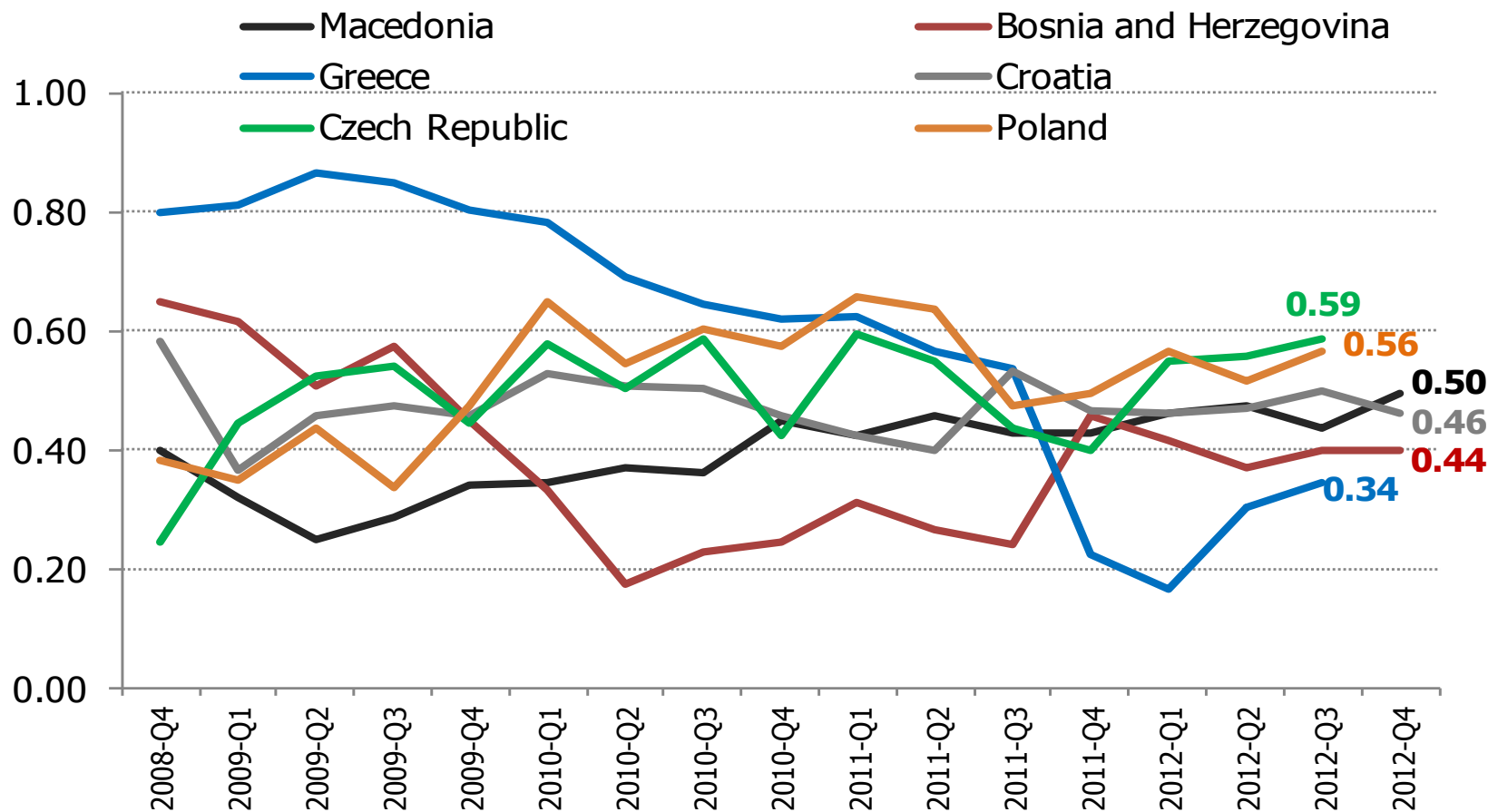♦ **The increase in the index means improved banking stability, while the decrease denotes stability worsening**

Contributions of the components of the banking stability index

Legend: Capital adequacy, Credit risk, Profitability, Liquidity, Currency risk

Banking stability index with individual regional countries

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

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

▪ **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;

FCI (left-hand scale) CB_Bills (right-hand scale)
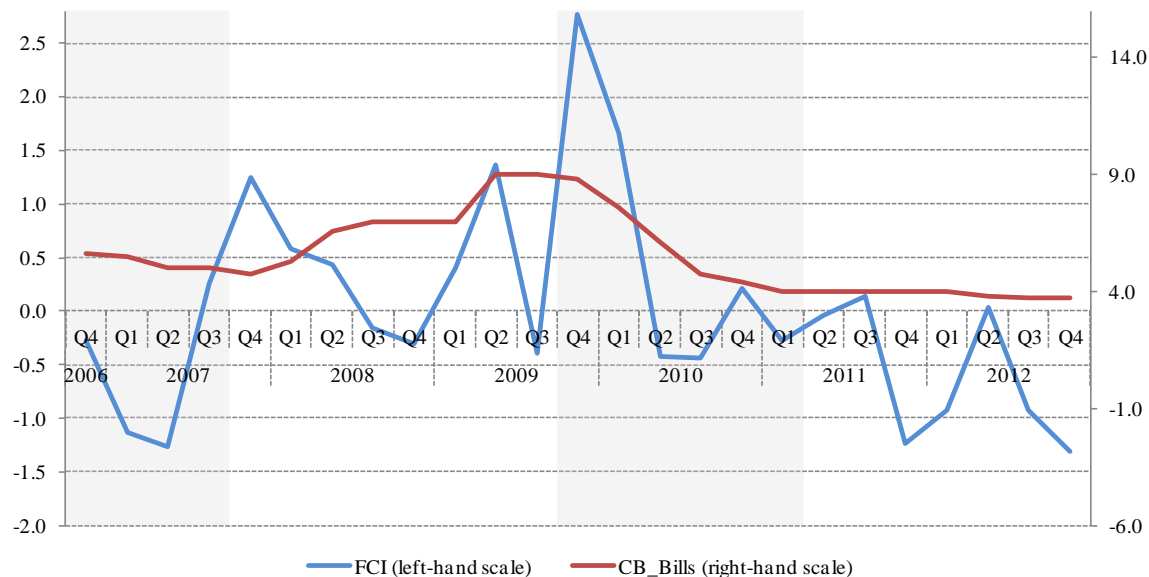
Shaded areas coincide with NBRM policy easing cycle

- **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

FCI (left-hand scale)   CB_Bills (right-hand scale)
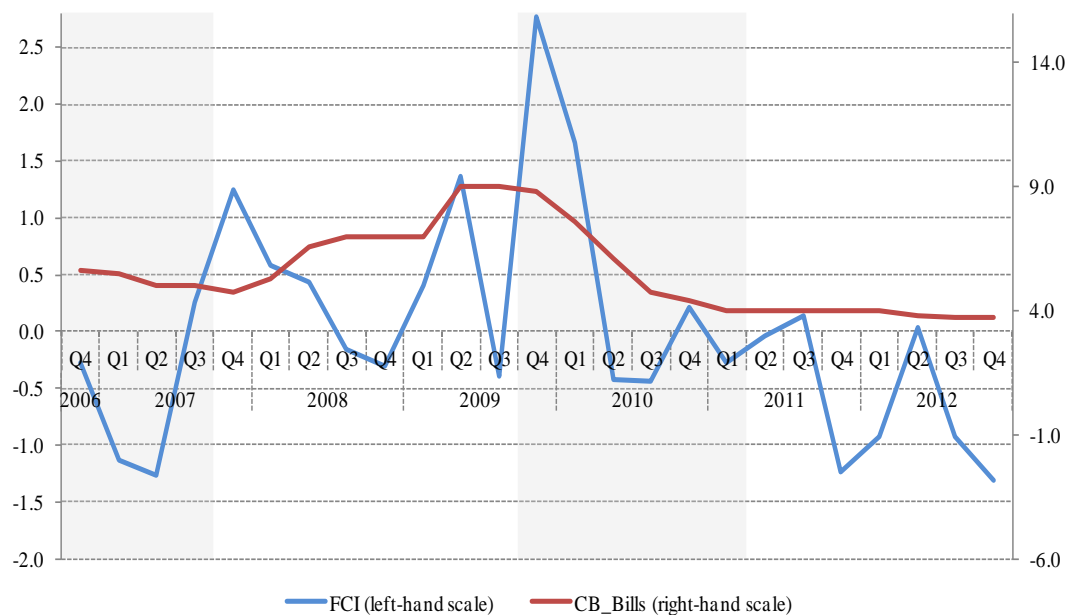
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▪**beginning of 2011 – present** - favorable financial conditions

▪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
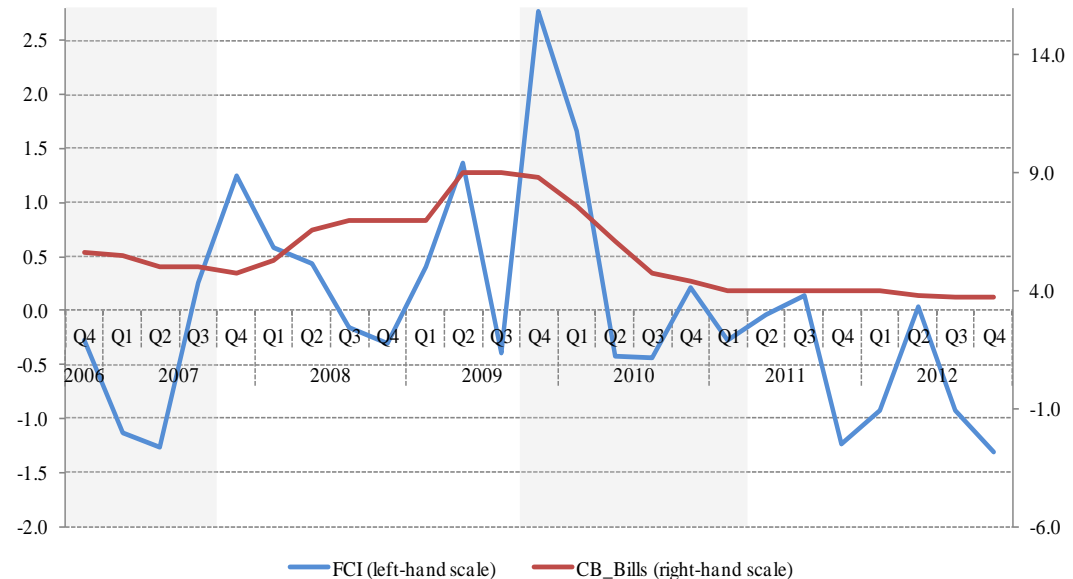
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Forecasting economic conditions using the FCI

- 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