

Uzbekistan's Financial Cycle Index

Abstract

This methodological framework describes the methodology for calculating the Financial Cycle Index for Uzbekistan. The calculation involves several stages, including the selection of relevant indicators, their standardization, the aggregation of standardized indicators into a composite index using principal component analysis, and the selection of the most appropriate index specification. The objective of this article is to develop a tool for identifying the current phase of the financial cycle.

Keywords: principal component analysis, financial cycle, conformity index, standard deviation, standardization.

Uzbekistan's Financial Cycle Index

Drawing on international experience and the specific features of Uzbekistan's financial system, the financial cycle index is calculated using the following indicators:

1. Corporate and Household Loan-to-GDP Ratios
2. Annual growth rates of corporate and household loans
3. Spread between loan and treasury bond interest rates
4. CAB-to-GDP Ratio
5. Bank capital-to-assets ratio
6. ROA
7. Loan-to-deposit ratio

These indicators are standardized using the Z-score method, which assesses how much each value deviates from the mean relative to the standard deviation¹.

To enhance evaluation and analyze interdependencies, the standardized indicators are categorized into groups. Using PCA model, eight financial cycle indexes are constructed from these groups².

A concordance index is used to determine how well the financial cycle indexes capture changes in the selected indicators³. It measures the degree of consistency

¹ The standardization of indicators is performed using the following formula:

$$y_z = \frac{y_t - y_\mu}{\sigma_{y_t}}$$

where:

y_z is the standardized value of the indicator;

y_t is the value of the indicator for quarter t ;

y_μ is the arithmetic mean of the indicator;

σ_{y_t} is the standard deviation of the indicator.

² The methodology for principal component analysis is presented in the Financial Stability Report for 2022.

³ Harding, D., & Pagan, A. (2002). Dissecting the Cycle: A Methodological Investigation. Journal of Monetary Economics.

The concordance index is calculated using the following formula:

$$I_{jr} = n^{-1} \left\{ \sum S_{jt} S_{rt} + (1 - S_{jt})(1 - S_{rt}) \right\}$$

where:

I_{jr} is the concordance index;

n is the total number of observation periods.

S_{jt} is defined as:

$S_{jt} = \begin{cases} 0, & \text{if in period } t \text{ the value of indicator } j \text{ decreases compared to the previous period} \\ 1, & \text{if in period } t \text{ the value of indicator } j \text{ increases compared to the previous period;} \end{cases}$

S_{rt} is defined as:

between two indicators, ranging from 0% (opposite movements) to 100% (perfect alignment).

Table 1. Structural Indicators of Different Financial Cycle Indexes

Indicator	1	2	3	4	5	6	7	8
Corporate Loans-to-GDP Ratio								
Household Loans-to-GDP Ratio								
Annual Growth Rate of Corporate Loans								
Annual Growth Rate of Household Loans								
Spread Between Average Loan Interest Rates and Treasury Bond Yields in Uzbekistan								
CAB-to-GDP Ratio								
Bank Capital-to-Assets Ratio								
ROA								
Loans-to-Deposits Ratio								

Source: CBU staff calculations.

Note: Each financial cycle index includes indicators corresponding to the rectangles highlighted in the respective columns.

The concordance index for the component indicators of the financial cycle index is calculated by determining the average value of the concordance indexes calculated separately for each component indicator. By assessing the correlation index values between each financial cycle index and the country's GDP gap, the most effective financial cycle index is selected, as it more fully captures the variability in structural indicators and maintains strong synchronization with economic cycles.

$$S_{rt} = \begin{cases} 0, & \text{if in period } t \text{ the value of indicator } r \text{ decreases compared to the previous period} \\ 1, & \text{if in period } t \text{ the value of indicator } r \text{ increases compared to the previous period;} \end{cases}$$

Table 2. Structural Indicators of Financial Cycle Indexes and Results of the Concordance Index with the Output Gap, %

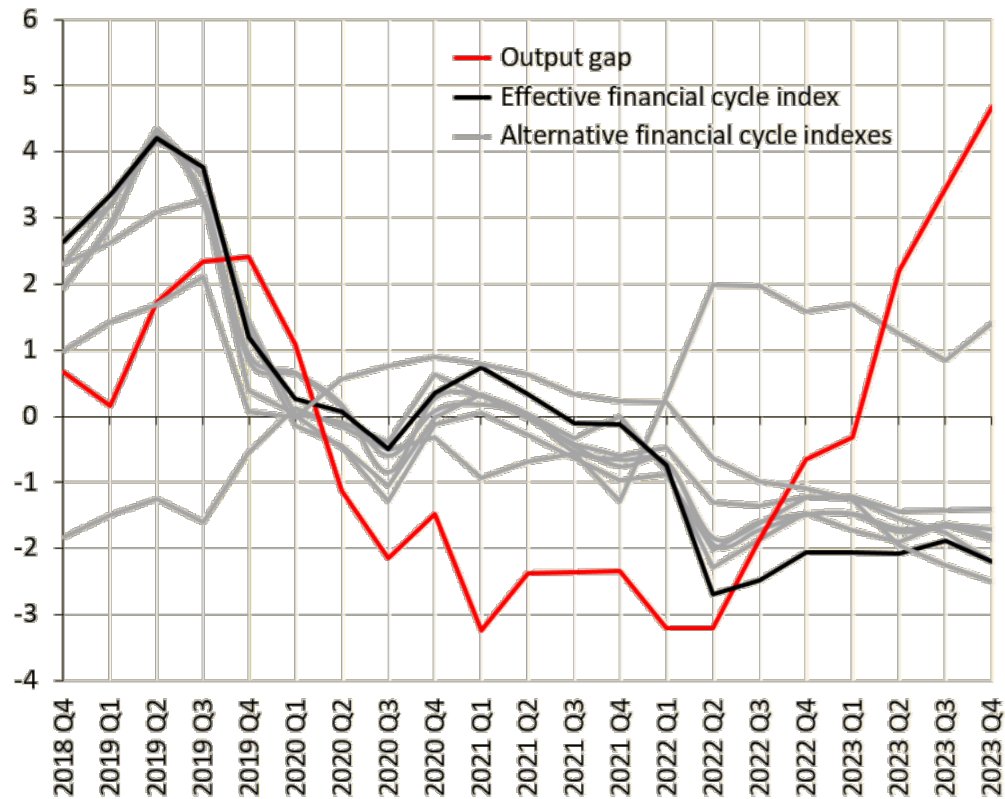
Financial cycle indexes	Structural indicators	Output gap
1	40	35
2	63	45
3	61	50
4	60	50
5	55	55
6	55	55
7	56	55
8	58	50

Source: CBU staff calculations.

Note: An index value close to 100 indicates a strong correlation between the evaluated indicator variables, while an index value close to 0 suggests significant differences between these variables.

Based on the concordance index results, the 7th financial cycle index demonstrated relatively high values of 55 and 56%, signifying a stronger correlation with the output gap and structural indicators. This index encompasses the growth rate of household and corporate loans and their ratio to GDP, the spread between loan and treasury interest rates, CAB-to-GDP ratio, the bank capital-to-assets ratio, ROA, and the loans-to-deposits ratio. Given its broader scope of indicators and higher concordance level, the 7th financial cycle index was deemed the most suitable for evaluating Uzbekistan's financial cycle.

Figure 1. GDP Gap and Financial Cycle Indexes



Source: CBU staff calculations

To verify whether the financial cycle index accurately represents periods of financial change in the country, it is essential to analyze its values during past financial crises. However, the absence of financial crises in Uzbekistan limits the ability to fully assess the index's effectiveness. Additionally, since financial cycle phases in other countries typically last between 8 and 30 years, the short time series of indicators in Uzbekistan's financial cycle index further reduces its ability to accurately reflect the country's financial cycle condition.

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