

Methodology underlying the determination of the countercyclical capital buffer rate for domestic exposures

1. REGULATORY FRAMEWORK FOR SETTING THE COUNTERCYCLICAL CAPITAL BUFFER RATE

The application of the countercyclical capital buffer (hereinafter: CCyB) has been mandatory for all Member States of the European Union (EU), including Hungary, since 1 January 2016. In the EU, the definition of the countercyclical capital buffer follows the principle of guided discretion. Pursuant to Article 135 (1)(b) of the CRD¹, the European Systemic Risk Board (hereinafter: ESRB) is authorised to issue guidance to designated national authorities with regard to the calculation of the benchmark countercyclical capital buffer rate prescribed in Article 136 (2) of the directive. Article 135 (1)(c) of CRD IV also authorises the ESRB to provide guidance on the selection of variables that indicate the build-up of systemic risks associated with periods of excessive credit growth in the financial system.

The public authority designated to determine the Hungarian countercyclical capital buffer rate is the Magyar Nemzeti Bank (hereinafter: MNB). Pursuant to Article 33 (1) of Act CXXXIX of 2013 on the Magyar Nemzeti Bank (hereinafter: MNB Act), the Governor of the MNB shall regulate the conditions for the establishment of the countercyclical capital buffer in a decree. Pursuant to Article 33 (2) of the MNB Act, within the strategic framework specified by the Monetary Council, the Financial Stability Board (FSB) shall determine the *benchmark countercyclical capital buffer rate* every quarter to serve as the basis for determining the *countercyclical capital buffer rate applicable* to exposures in Hungary, taking into consideration the status of the lending cycle, the risks of the excessive outflow of credit, the specificities of the national economy, the percentage rate of the stock of credit to the gross domestic product and its deviation from the long-term trend, and the ESRB's guidance for the determination of the countercyclical capital buffer rate.

The *benchmark countercyclical capital buffer rate* is an important, but not exclusive element of the determination of the *applicable capital buffer rate*. Both the legislative framework and the ESRB guidance enable policymakers to take into account, when considering a decision about the rate to be applied, any other factors deemed important by them in relation to the stability of the financial intermediary system.

Taking into consideration the *benchmark countercyclical capital buffer rate*, the guidance of the ESRB and any other factors related to the stability of the financial intermediary system, the MNB shall regulate by decree – and publish on its website – the *countercyclical capital buffer rate applicable* to exposures to counterparties residing in Hungary. The MNB reviews the intensity of

¹DIRECTIVE 2013/36/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 26 June 2013 on access to the activity of credit institutions and the prudential supervision of credit institutions and investment firms, amending Directive 2002/87/EC and repealing Directives 2006/48/EC and 2006/49/EC.

cyclical systemic risks and the countercyclical capital buffer rate every quarter, adjusts them as necessary, and publishes the results of the review on its website.

2. DETERMINATION OF THE APPLICABLE COUNTERCYCLICAL CAPITAL BUFFER RATE

The MNB determines the *applicable countercyclical capital buffer rate* in consideration of

- the *benchmark countercyclical capital buffer rate* that depends on the cyclical systemic risks stemming from the status of the lending cycle and the overheatedness of lending,
- the *positive neutral countercyclical capital buffer rate* expected in a neutral risk environment,
- and any other factors.

2.1. Determination of the *benchmark capital buffer rate (buffer guide)*

The *benchmark capital buffer rate* is specified by the MNB taking into consideration the status of the lending cycle, the risks arising from the overheatedness of lending, the specificities of the national economy, the evolution of the monitored credit-to-GDP gaps and the ESRB's guidance. The starting point for the determination of the *benchmark capital buffer rate* is a rule-based proposed rate based on the so-called additional credit-to-GDP gap, developed by the MNB in consideration of the ESRB's guidance, complemented by an assessment of the signals of the monitored supplementary indicators. The MNB determines the *benchmark capital buffer rate* on a quarterly basis based on the monitored credit-to-GDP gaps and the supplementary indicators.

The starting point for setting the *benchmark capital buffer rate* is the rule-based proposed rate that depends on the so-called additional credit-to-GDP gap. The additional credit-to-GDP gap is a credit-to-GDP gap that is established in consideration of national specificities, and is based on outstanding borrowing that is narrower than the standard credit-to-GDP gap recommended by the ESRB. Higher thresholds than those recommended by the ESRB are applied for the rule-based signal that depends on the credit-to-GDP gap. Details of the calculation of the additional rate and the related thresholds are presented in the *Annex*.

Considering, in addition to the additional credit-to-GDP gap, the supplementary indicators corresponding to the national specificities provides an even more accurate and detailed view of the development of the cyclical systemic financial risks and the underlying processes. Indeed, the credit-to-GDP gap indicators are not perfect early warning measures of financial crises. This is reflected by the fact that prior to the previous financial crises of certain EU Member States credit-to-GDP gaps remained low, i.e., they failed to signal the build-up of the systemic financial risks in time. Moreover, it is not guaranteed that the credit-to-GDP gap values will increase to an extent that they would signal an adequate warning before a financial crisis that has, at least partially, different attributes than those of the previous ones.

The ESRB's methodological background study² assessed a wide range of the indicators based on consolidated data from the EU Member States. The study was intended to determine the degree to which the values of the indicators were capable of forecasting past financial crises. The MNB selected the supplementary indicators to be considered for the purpose of defining the countercyclical capital buffer rate applicable to Hungarian exposures using this methodology, also involving other indicators based on its own data collection and testing the sensitivity of the results. The list of the selected Hungarian supplementary indicators covers all of the categories recommended by the ESRB. The MNB allocated these indicators to two groups, one of which contains the indicators measuring the overheating of the financial system, while the other group includes those that measure the vulnerability of the financial system to external shocks. In addition, the MNB monitors an internally developed multivariate credit-to-GDP gap indicator as a supplementary indicator.

2.2. Application of the *positive neutral rate of countercyclical capital buffer*

The *positive neutral rate of countercyclical capital buffer* (hereinafter: PNR CCyB) is a framework with a positive applicable capital buffer rate even in a neutral risk environment.

From 1 July 2025, the MNB will impose a *positive neutral countercyclical capital buffer rate of 1 per cent* to strengthen banks' resilience to shocks and ensure an adequate level of capital to be released by regulatory means in a neutral risk environment that is not characterised by excessive credit growth.

2.3. Determination of the *applicable countercyclical capital buffer rate*

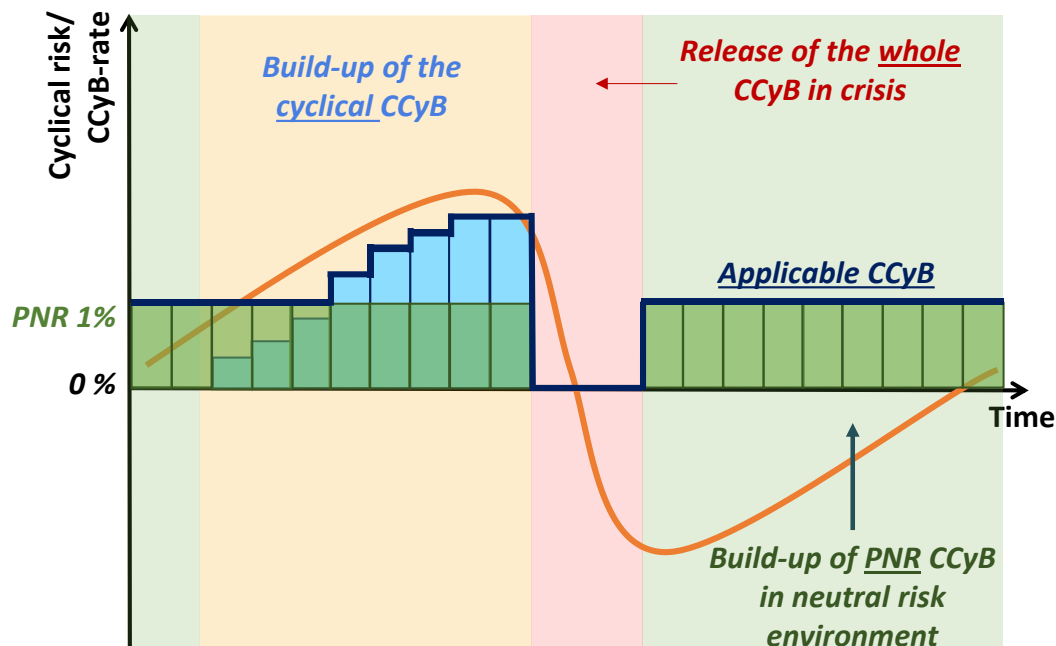
The MNB will determine the *capital buffer rate to be applied* to the domestic exposures of institutions based on the *benchmark capital buffer rate*, the *positive neutral capital buffer rate* and any other factors as follows:

$$\max(r_{\text{Cyclical benchmark}}; r_{\text{PNR}}) + \text{other factors} \rightarrow r_{\text{applicable}}$$

1. The *benchmark cyclical capital buffer rate*, which is dependent on overheated lending, is determined on a quarterly basis as described in Section 2.1.
2. The *positive neutral capital buffer rate*, which is independent of overheating risks, is 1 per cent.
3. The applicable *capital buffer rate* prescribed by the MNB to banks (pursuant to Article 33 (4) of the MNB Act) is determined in consideration of the higher of the *positive neutral rate* and the *benchmark capital buffer rate*, as well as any other factor relevant to the stability of the financial intermediary system.

² Detken, C., Weeken, O., Alessi, L., Bonfim, D., Boucinha, M., Castro, C., ... & Welz, P. (2014). Operationalising the countercyclical capital buffer: indicator selection, threshold identification and calibration options. ESRB: Occasional Paper Series, (2014/5).

Chart 1: Operation of the countercyclical capital buffer framework with the application of the positive neutral approach



Accordingly, at different stages of the credit cycle the value of the applicable capital buffer may be as follows:

- In a **neutral, “normal” risk environment**: the higher of the *positive neutral capital buffer rate* and the *cyclical benchmark capital buffer rate* applies; therefore, in the absence of material overheating risks, the *positive neutral capital buffer rate* of 1 per cent applies in this phase.
- **In a period of overheating**: when credit risks point to excessive credit growth and, consequently, the *benchmark capital buffer rate* exceeds 1 per cent, the *applicable capital buffer rate* will be higher than 1 per cent.
- **In times of crisis**: in order to maintain the capacity of bank lending, the treatment of the *positive neutral capital buffer rate* and the *cyclical benchmark capital buffer rate* will be the same; thus, the capital buffer requirement will be released in full if necessary. In the case of a gradual release, the *applicable capital buffer rate* is reduced in line with the normalisation of the elevated risks, with the proviso that the *1 per cent positive neutral capital buffer rate* of a neutral risk environment applies.

3. RELEASE OF THE COUNTERCYCLICAL CAPITAL BUFFER

In the event of a crisis, the MNB will release the countercyclical capital buffer, which may mitigate the downturn occurring as a result of a sudden drop in lending activity. If no crisis occurs, but the systemic risks that justified the level of the *applicable countercyclical capital buffer rate* decrease, the macroprudential authority may prescribe a lower countercyclical capital buffer rate depending on the degree of the decrease in the risks.

The release of the capital buffer may be necessary in two situations:

- 1. Prompt release:** When a financial crisis occurs, in a single step, the macroprudential authority reduces the *applicable* level of the *countercyclical capital buffer rate* to zero.
- 2. Gradual release:** If no crisis occurs, but a steady decrease is observed in the systemic risks, the macroprudential authority will gradually reduce the *applicable rate of the capital buffer* in proportion to the decline in the risks.

3.1. Prompt release:

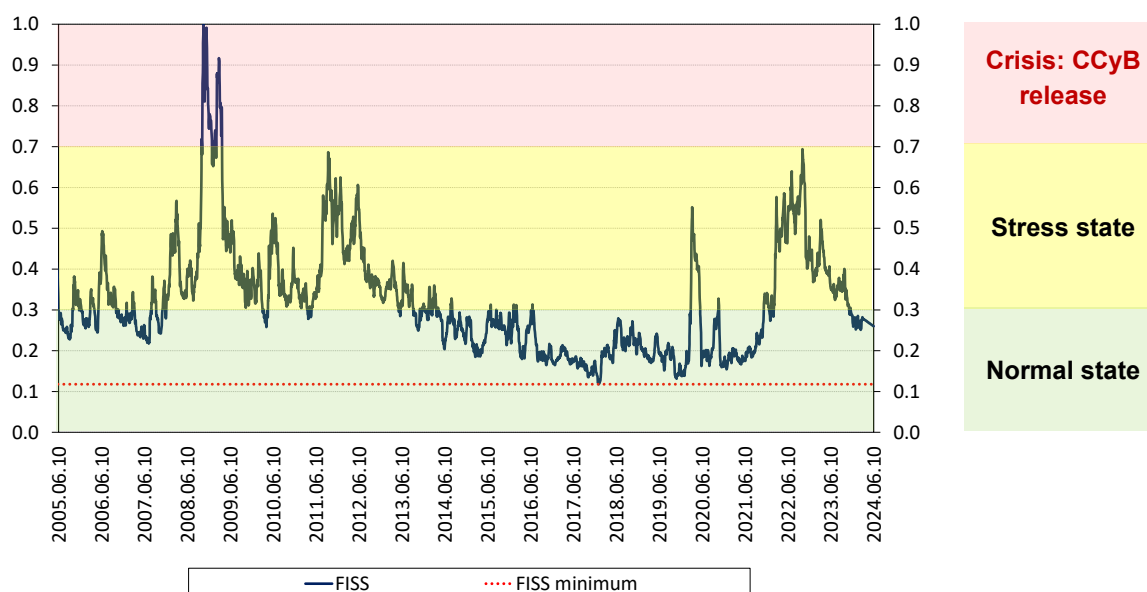
Upon prompt release, the regulatory authority reduces the level of the *applicable countercyclical capital buffer rate* to zero. The purpose is to cover the losses of banks and to maintain lending activity during a crisis. Accordingly, the MNB makes the timing of the decision conditional upon the time at which the stress of the financial system crosses the line that signals a crisis situation. The discretionary powers of the authority play an important role in the decision, since for the decision on the release the authority needs to consider the complex economic situation reflected by the higher stress level of the financial system.

The MNB uses the Factor Based Index of Systemic Stress (FISS)³ for measuring the level of stress. This is a rapid-reaction stress indicator that captures the fundamentals of the financial system efficiently, which was designed to reflect the current stress level of the financial system considering the individual submarkets of the financial system as a whole, bearing in mind co-movements.

The MNB decides on the prompt release of the countercyclical capital buffer in consideration of the current values of the FISS. When the value exceeds a specific threshold calibrated on the basis of the historic values of the index, it indicates a financial crisis. The chart below illustrates the calibration result and the historic FISS values. Upon the FISS signal the MNB prepares a detailed analysis covering the fundamentals of the economic environment, and the Financial Stability Council makes its decision in view of that analysis.

³ For a detailed description of the FISS methodology, see Tibor Szendrei, Katalin Varga (2017): A Factor Based Index of Systemic Stress in the Financial System, MNB Working Papers 9.

Chart 2: Historic FISS values and the potential threshold for a prompt release proposal



3.2. Gradual release

A gradual release can be applied when the systemic risks underlying the accumulation of the countercyclical capital buffer decrease. With this method, the regulatory authority gradually reduces the level of the *applicable capital buffer rate* if its level is above the *positive neutral capital buffer rate*.

When the cyclical systemic risks are on a steadily declining path and the countercyclical capital buffer rate justified by the factors determining the build-up falls below the currently applied capital buffer rate, it may be justified to reduce the *applicable countercyclical capital buffer rate*, with the proviso that the MNB determines a 1 per cent *positive neutral capital buffer rate* even in a neutral risk environment. Policymakers should act prudently when applying gradual release, as there is the risk of reducing the capital buffer – and thereby the banking sector's shock absorbing capacity – right before a financial crisis. The decision on a gradual release should therefore be made on the basis of a fundamental analysis, capturing the current status of the economy and the lending cycle.

Upon gradual release of the countercyclical capital buffer two types of risks need to be minimised:

- i. Erroneous release, when the trends in systemic risks would justify a higher *applicable countercyclical capital buffer rate* in the medium term already.
- ii. Premature release, when the authority decides on a gradual release in a close-to-crisis economic environment, although even a full release may become necessary in the medium term.

Given the above risks, the following factors may need to be considered in order to mitigate the costs of release:

- The growth rate of the nominal credit aggregate (*total exchange rate adjusted nominal credit aggregate intermediated by domestic financial institutions*) had declined continuously in the 3 quarters preceding the decision.
- The *benchmark capital buffer rate* has not increased in any of the last 4 quarters compared to the previous quarter.
- The level of FISS signals no systemic risk exceeding the usual degree, i.e. it had not exceeded the predetermined threshold during the three months that preceded the decision.

The decline in cyclical risks and hence, the decline in the *benchmark capital buffer rate* is only reasonable until it reaches the level of the *positive neutral capital buffer rate of 1 per cent*; in other words, in the case of a gradual release the *applicable capital buffer rate* can only be reduced to 1 per cent at most.

ANNEX

1. Main elements of Recommendation ESRB/2014/1 on guidance for setting countercyclical capital buffer rates

In Recommendation ESRB/2014/1 on guidance for setting countercyclical capital buffer rates⁴ the ESRB proposes the following basic methodology. First, it makes a proposal for the calculation of the standardised credit-to-GDP gap, which is the deviation of the ratio of credits to gross domestic product (GDP) from its long-term trend, expressed as a percentage value. Secondly, it sets out the rules for calculating the capital buffer rate based on the standardised credit-to-GDP gap (hereinafter: standardised capital buffer rate). Thirdly, the proposed basic methodology recommends that upon making the decision on the capital buffer rate, the national authority should also consider a variety of supplementary indicators with a view to signalling the build-up of cyclical systemic financial risks. The Recommendation identifies the following groups of indicators: potential overvaluation of property prices, credit developments, external imbalances, the state of bank balance sheets, private sector debt burdens, potentially mispriced risks. It is also recommended to take into consideration indicators derived from models that combine the credit-to-GDP gap and a selection of the indicators belonging to the previous six categories.

At the same time, the ESRB recommendation permits national macroprudential authorities to depart from this basic methodology. In consideration of the special features of the financial intermediary systems of the respective Member States, national authorities may calculate self-calibrated, country-specific capital buffer benchmark rates that depend on the so-called additional credit-to-GDP gap, instead of the standardised credit-to-GDP gap. In addition, the recommendation also provides significant leeway in terms of the type of indicators used by the designated national authorities, and the form they take these indicators into consideration when formulating their decision on the capital buffer rate.

The ESRB recommendation provides even greater freedom in the formulation of the methodology related to the release of the *applicable and allocated countercyclical capital buffer*. The release of the allocated countercyclical capital buffer may take place in two situations based on two types of consideration. Based on the above, a distinction can be drawn between prompt release and gradual release.

Essentially, the ESRB provides specific recommendations with regard to the *prompt release*. It proposes using three different types of indicators: (i) high frequency (even daily) market variables, (ii) variables of good short-term projection capacity, used for the build-up of the countercyclical capital buffer, and (iii) indicators reflecting the banking sector's losses or asset quality.

As regards *gradual release*, the ESRB provides more of a conceptual definition. However, it notes that when making the decision on the release, there is more emphasis on the designated

⁴RECOMMENDATION OF THE EUROPEAN SYSTEMIC RISK BOARD of 18 June 2014 on guidance for setting countercyclical buffer rates (ESRB/2014/1)(2014/C 293/01).

authority's discretionary powers, since – particularly in the case of gradual release – the decision must be based on the complex analysis of the condition of the financial system.

2. Setting thresholds for the additional credit-to-GDP gap and the related rule-based rate

According to the ESRB recommendation, the definition of outstanding loans used for the standardised credit-to-GDP gap under the basic methodology includes all loans granted by resident and non-resident entities drawn down by domestic households and non-financial corporations, as well as the loans extended by domestic financial institutions to non-resident households and non-financial corporations. The recommended GDP value is the sum of nominal GDP in last four quarters at current price.

The ESRB recommendation proposes to derive the standardised credit-to-GDP gap from the credit-to-GDP time series using the Hodrick-Prescott Filter (HP Filter). The recommended HP filter is one-sided, univariate HP Filter with a smoothing parameter (λ) of 400,000. According to the methodological background study of the ESRB⁵, all available data of the credit-to-GDP time series should be used for the production of the gap indicator.

Based on the ESRB recommendation, the standardised capital buffer rate is derived from the standardised credit-to-GDP gap, in accordance with the following rule: the capital buffer rate is higher than zero only when the standardised credit-to-GDP gap exceeds 2 per cent, above which it has a linear relationship with the gap such that it takes the maximum value of 2.5 per cent when the gap is 10 percentage points. The final value of the standardised capital buffer rate is produced by rounding the result of the previous calculation to multiples of 0.25 per cent.

The characteristics of Hungarian financial intermediation differ in several important attributes from those of the euro area countries. Thus, instead of the standardised credit-to-GDP gap and the resulting standardised capital buffer, the MNB developed a methodology for determining the univariate additional credit-to-GDP gap and the resulting *benchmark capital buffer*. The additional credit-to-GDP gap taken into consideration by the MNB differs from the standard methodology proposed by the ESRB in several regards:

- **Narrowing the credit aggregate:** The credit stock underlying the additional credit-to-GDP gap is a narrower credit aggregate, i.e. outstanding lending by all domestic financial institutions to resident and non-resident non-financial corporations and households.⁶ This is because the credit aggregate proposed by the ESRB is deemed too broad for Hungary

⁵ European Systemic Risk Board (2014): Operationalising the countercyclical capital buffer: indicator selection, threshold identification and calibration options. *European Systemic Risk Board, Occasional Paper 5*.

⁶ Loans outstanding data are derived from the national economy's financial accounts data published by the MNB. The credit aggregate used for the credit-to-GDP gap indicator comprises the following items: For households: housing loans from credit institutions, consumer credits and other loans from credit institutions, housing loans from other financial enterprises, consumer credits and other loans from other financial enterprises. For non-financial corporations: loans from credit institutions, loans from other financial enterprises, debt securities.

compared to loans extended by the range of institutions that may be directly influenced by the CCyB requirement. The main difference is that the ESRB definition also includes loans granted by parent companies to their domestic subsidiaries, which in most cases could be classified as a capital injection rather than credit. Taking into consideration the size and classification difficulties of these stocks and the operational mechanism of the countercyclical capital buffer, the MNB narrowed the stock of loans used for the additional credit-to-GDP gap to outstanding lending by financial institutions.

- **Adjusting for exchange rate effects:** For the additional credit-to-GDP gap the exchange rate-adjusted values of the above outstanding lending were used in order to ensure that exchange rate movements, which are far more volatile than the financial cycle, do not generate wide fluctuations in the values of the credit-to-GDP gap. The exchange rate-adjusted figures were gained by converting outstanding foreign currency credit portfolios into forint at each point in time using the exchange rates applied for the conversion of household foreign currency mortgage loans into forint, which took place in the first quarter of 2015. The pegging of this exchange rate ensures that the time series of exchange rate-adjusted outstanding loans does not have a structural break at the time when foreign currency denominated loans were converted to forint denominated ones, which is advantageous in respect of sub-dividing the series into a trend and a gap.
- **Seasonal adjustment:** For the annualised GDP the sum of seasonally adjusted nominal GDP of the last four quarters was used at current price, where seasonal adjustment represents the departure from the ESRB's recommendation.
- **Filtering procedure:** for the sub-division of the trend and gap, the use of the univariate HP Filter with a smoothing parameter of 400,000 was retained; however, in order to obtain more intuitive gap values, the filtering commenced from 1998 Q1 such that in the first four years the division received from the two-sided HP filtering ran for the full time series (from 1998 Q1 to 2015 Q1) was used, and the one-sided HP filtering was used only for the dates thereafter.

The rule-based proposed rate that depends on the additional credit-to-GDP gap and serves as the starting point for determining the *benchmark capital buffer rate* differs from the standardised capital buffer rate rule included in the ESRB recommendation in two respects. First, the benchmark capital buffer rate depends on the additional, rather than on the standardised credit-to-GDP gap. Second, the lower threshold was raised from 2 per cent to 4 per cent for two main reasons. One of these reasons is that the optimisation process used in the ESRB's methodological background study returns 3.9 per cent as the lower threshold based on domestic data. This means that, based on previous Hungarian experience, additional credit-to-GDP gap in excess of 3.9 per cent signalled excessive credit growth that also carried the systemic risk of a financial crisis. Another reason for raising the threshold is that the deepening of the Hungarian financial system is expected to continue in the near future, which may raise credit-to-GDP gap values without generating systemic risk.

Supplementary indicators

Overheating indicators:

- credit-to-GDP gap indicators with various credit definitions (in addition to the aggregates used for the standardised and additional credit-to-GDP gap, the aggregate of credits extended by domestic credit institutions to non-financial corporations and households), in various sectoral breakdowns (granted to households, granted to non-financial corporations, total), and calculating with loans outstanding that are adjusted and not adjusted for exchange rate effects;
- credit-to-GDP gap developed by Hosszú et al. (2015)⁷;
- property price in proportion to household income;
- banking sector leverage;
- three-month reference interest rate;
- interest rate spread;
- ROE of the banking sector;
- market share of the five largest players in the banking sector;
- credit-to-GDP growth rate in the corporate and household segments.

Vulnerability indicators:

- credit-to-GDP gap applicable to the global credit portfolio in the ESRB's methodological background study;
- households' debt service burdens as a percentage of disposable income;
- gross external debt as a percentage of GDP;
- loan-to-deposit ratio of the banking sector;
- ratio of foreign currency loans in loans outstanding granted by domestic financial institutions to households and non-financial corporations;
- ratio of foreign currency loans in the previous stock of loans, including the loans of domestic non-financial corporations from abroad;
- current account balance as a percentage of GDP;
- capital adequacy ratio in the banking sector.

The MNB also monitors an internally developed, multivariate credit-to-GDP gap as a supplementary indicator. This is a multivariate credit-to-GDP gap based on data from the additional credit-to-GDP, which takes into consideration not only the historical values of the credit-to-GDP ratio, but also the development of the economic environment, as the evolution of the credit-to-GDP gap is explained by additional variables describing macroeconomic fundamentals. This methodological innovation provides a clearer view on the development of cyclical fluctuations, and the time series adjusted for these fluctuations yields trends which are more interpretable

⁷ Zs. Hosszú, Gy. Körmendi and B. Mérő (2015): Univariate and multivariate filters to measure the credit-to-GDP gap. *MNB Occasional Papers* 118.

structurally and in terms of economic context. It is novelty that the multivariate model is able to tackle household lending and corporate lending separately. As these segments differ in their driving factors, different explanatory variables are fitted for the subsectors. The final, aggregate model is given as the sum of the separated household and corporate trends and cycles.