

The Internal Capital Adequacy Assessment Process (ICAAP),
the Internal Liquidity Adequacy Assessment Process (ILAAP)
and their supervisory review, and the Business Model Analysis (BMA)

METHODOLOGY MANUAL FOR SUPERVISED INSTITUTIONS¹

Revised: November 2024

¹ This is the English version of MNB's handbook with the following title: „A tőke megfelelés belső értékelési folyamata (ICAAP), a likviditás megfelelésének belső értékelési folyamata (ILAAP) és felügyeleti felülvizsgálatuk, valamint az üzleti modell elemzés (BMA) módszertani kézikönyv a felügyelt intézmények részére” (“Internal Capital Adequacy Assessment Process (ICAAP), Internal Liquidity Adequacy Assessment Process (ILAAP), and their Supervisory Review Process and Business Model Analysis (BMA) Methodology Manual for Supervised Institutions.”). This translation is not official, the Hungarian manual shall be considered as normative text.

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Abbreviations

AIRB	Advanced Internal Ratings Based Approach	The advanced version of the Internal Ratings Based Approach to credit risk, incorporating PD, LGD and CCF estimates
AMA	Advanced Measurement Approach (operational risk)	
ALCO	Asset Liability Committee for the management of liquidity risk	
ASA	Alternative Standardised Approach (operational risk)	
AVA	Additional Valuation Adjustments	
BCM	Business Continuity Management	
BIA	Basic Indicator Approach (operational risk)	
BMA	Business Model Analysis	
Investment Services Act		
CCF	Credit Conversion Factor	
CEBS	Committee of European Banking Supervisors	
CET1	Common Equity Tier 1 capital	(for details, see CRR Part II, Chapter on Own Funds)
CCP	Central Counterparty	
CRD	Capital Requirement Directives	Directive 2013/36/EU
CRR	Capital Requirement Regulation	Regulation (EU) No 575/2013 of the European Parliament and of the Council on prudential requirements for credit institutions and amending Regulation (EU) No 648/2012
CVA	Credit Valuation Adjustment	
DA	Delegated Act	Commission Delegated Regulation (EU) 2015/61 of 10 October 2014 to supplement Regulation (EU) No 575/2013 of the European Parliament and the Council with regard to liquidity coverage requirement for Credit Institutions
FFAR (DMM)		foreign exchange funding adequacy ratio
DVP	Delivery versus Payment	
EAD	Exposure at Default	
EBA	European Banking Authority	
EL	Expected Loss	
EEA		European Economic Area
FIRB	Foundation Internal Ratings Based Approach (credit risk – PD estimation)	
Credit Institutions Act		Act CCXXXVII of 2013 on Credit Institutions and Financial Enterprises

ICAAP	Internal Capital Adequacy Assessment Process	
IG	Intergiro	
ILAAP	Internal Liquidity Adequacy Assessment Process	
IRB	Internal Ratings Based Approach (credit risk)	
IRRBB	Interest Rate Risk in the Banking Book	
JRAD	Joint Risk Assessment and Decision	
KRI	Key Risk Indicator	
LCP	Liquidity Contingency Plan	
LCR	Liquidity Coverage Requirement	
LGD	Loss Given Default	
LR	Leverage Ratio	
LTV	Loan to Value	
MNB	The Central Bank of Hungary	
NFSR	Net Stable Funding Ratio	
OCR	Overall Capital Requirement	
OLRR	Overall Leverage Ratio Requirement	
OTC	Over-the-Counter	secondary or derivative securities market
P1R	Pillar 1 capital requirement	Pillar 1 capital requirement amount
P2R	Pillar 2 (SREP) capital requirement	Amount of additional capital requirement defined under SREP
P2G	Pillar 2 Guidance	capital Guidance
P2G-LR	Pillar 2 Guidance for the risk of excessive leverage	
P2R-LR	Pillar 2 additional capital requirement for the risk of excessive leverage	
PD	Probability of Default	
PIT	Point-in-Time	A type of PD model that provides a PD forecast in view of the status of the business cycle at a particular point in time
SD	Settlement Date	
SL	Specialised Lending	Pursuant to Article 147(8) of the CRR, and MNB Recommendation No. 10/2017
SMA	Standardised Measurement Approach	new Standardised Approach (for calculating capital requirements for operational risk)
SREP	Supervisory Review and Evaluation Process	
RVP	Receive versus Payment	
T1	Tier 1 capital	(for details, see CRR Part II, Chapter on Own Funds)
T2	Tier 2 capital	(for details, see CRR Part II, Chapter on Own Funds)
TSA	Standardised Approach (operational risk)	
TREA	total risk exposure amount (P1R+P2R)	
TSCR	Total SREP Capital Requirement	

TSLRR Total SREP Leverage Ratio Requirement

TTC Through-the-Cycle

UL Unexpected Loss

VaR Value-at-Risk

MIS Management Information System

A type of PD model that captures long-term trends and provides an average value characteristic of a business cycle

Chapter 1 General guidelines of ICAAP, ILAAP and BMA reviews and definition of capital requirement

I. Introduction

The Hungarian supervisory authority first published its methodological guidelines on the Internal Capital Adequacy Assessment Process (ICAAP) and its Supervisory Review and Evaluation Process (SREP) for institutions under the CRD in 2008, which were subsequently reviewed regularly in accordance with legislative changes and practical experience. With the introduction of the CRD and the CRR in 2014, major amendments were made to the European-level regulations serving as the basis of the guidelines, which the Magyar Nemzeti Bank (“the MNB” or “the supervisory authority”) has followed up by radically transforming the structure of the guidelines, compiling a Manual that incorporates the principles of both the internal processes for the assessment of capital adequacy (ICAAP) and the Internal Liquidity Adequacy Assessment Process (ILAAP), and their supervisory review. In an effort to harmonise the practice and methodology of SREP reviews at the European level, the EBA developed the EBA SREP Guidelines², leading to additional changes in the Manual. As a result, a chapter on Business Model Analysis (BMA) was added to the Methodology Manual. EBA has revised³ its former SREP Guidelines and in March 2022 published the revised version, as a result of which the Guidelines were expanded with parts related to the leverage ratio and the management of excessive leverage. However, even with the new additions this Manual does not fully cover the overall SREP specified in the EBA SREP Guidelines, because it merely sets out supervisory expectations for the ICAAP/ILAAP reviews and BMAs, taking into account the common European methodology specified in the EBA SREP Guidelines, the Union’s regulatory provisions, as well as the lessons learned from Hungarian practice.

An important aspect of the current annual review of the Manual was the need to make the supervisory expectations and guidelines even more transparent so that they help institutions in their work more effectively.

The Methodology Manual contains the material and temporal scope of the review process, presents the fundamental review principles and addresses the grades of the supervisory review process. It discusses the elements of the ICAAP and the ILAAP, the fundamental methodology of business model analysis, and provides guidance on the interpretation of provisions. In addition, it explains the MNB’s view on the principles and methods by which, in its supervisory role, it intends to evaluate institutions’ capital requirement calculations and liquidity coverage, and review the viability and sustainability of their business and strategic plans.⁴

This Manual primarily sets out principles in view of the fact that regulatory expectations regarding the internal calculations of required capital and liquidity vary according to the type and size of the institution concerned, and to the complexity of its activities. As a standardised method that is equally applicable to all institutions cannot be provided, the MNB develops requirements for specific institutions with a view to the principle of proportionality.

I.1 ICAAP/ILAAP reviews and BMAs as reflected in the SREP

According to the EBA SREP Guidelines, under international and Hungarian regulations the supervisory review and evaluation process (SREP), in the broad sense, means the supervisory authority’s control and evaluation of the business model, corporate governance, risk profile and capital and liquidity position of

² Guidelines on common procedures and methodologies for the supervisory review and evaluation process (SREP) and supervisory stress testing, EBA/GL/2014/13

³ Guidelines on common procedures and methodologies for the supervisory review and evaluation process (SREP) and supervisory stress testing under Directive 2013/36/EU, EBA/GL/2022/03

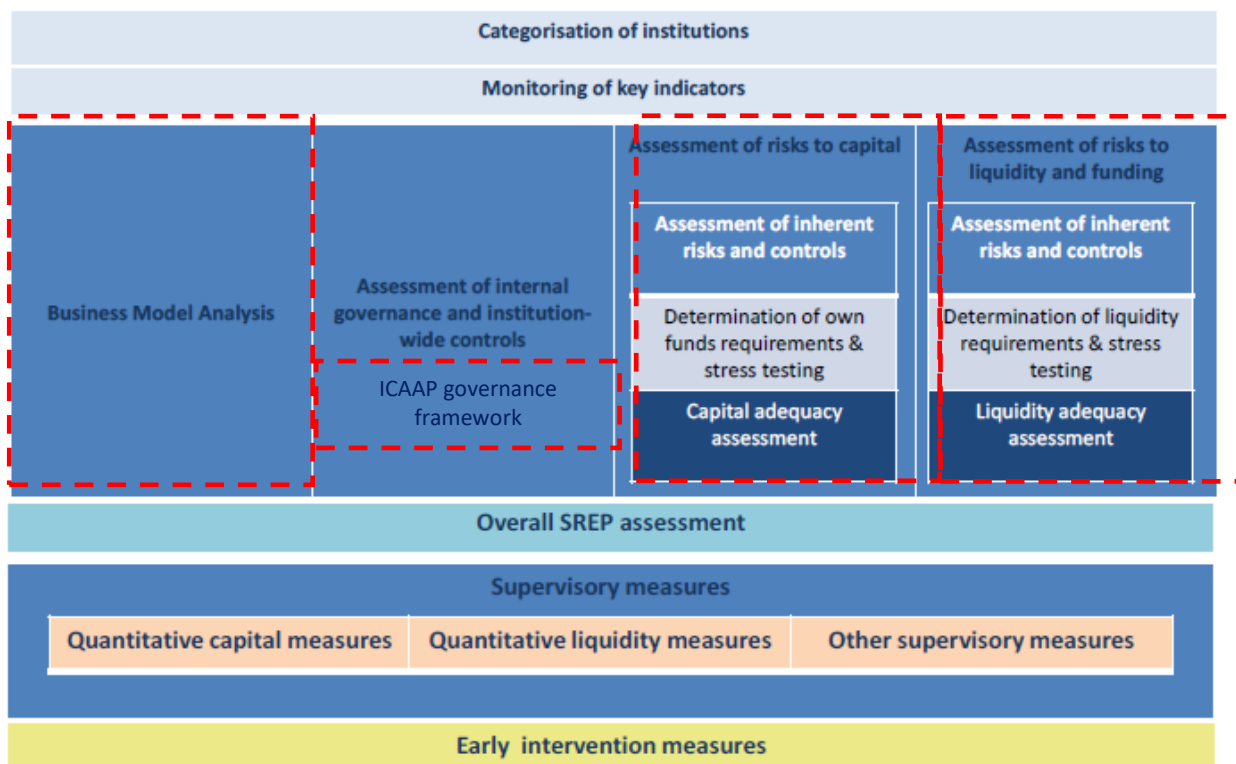
⁴ The Manual is based primarily on CRD/CRR, the relevant articles of the recommendations issued by the Basel Committee on Banking Supervision and the applicable recommendations of the European Banking Authority (EBA). Further sources of this Manual include materials published on the websites of other financial supervisory authorities, in particular authorities operating within the EU.

institutions. To cover the overall SREP, in addition to ICAAP/ILAAP reviews and BMAs the MNB provides ongoing supervision, and carries out on-site thematic and targeted reviews.

The CRD includes provisions on the supervisory review of capital positions⁵, under the framework of which the MNB assesses whether the institution has sufficient capital based on its strategy, regulations, established processes and internal procedures to cover the risks it is taking. Furthermore, the MNB reviews the business model and material risks of the institution, examines internal governance and the compliance and reliability of and internal capital and liquidity adequacy assessment processes and checks the fulfilment of minimum requirements set out in legal provisions. Clearly the supervisory review process can only be successful if the institution presents the risk models and the internal capital calculation and internal liquidity adequacy methodology it applies both comprehensively and in detail.

The significance of Pillar 2 processes lies in the fact that the long-term prudent and predictable operation of institutions can be safeguarded only by high-quality and extensive risk measurement and management procedures, because a high level of available own funds does not, by itself, guarantee total security. Accordingly, through this Manual the MNB wishes to emphasise that rather than being a standalone process, ICAAP/ILAAP reviews and BMAs are an integral and particularly important part of institutional supervision. As part of ICAAP reviews, the MNB assesses the adequacy of institutions' ICAAP governance frameworks.

The chart below illustrates the overall SREP as set out in the EBA SREP Guidelines, which has served as model for the MNB in the design of its own supervisory review processes. Within the overall process, the topics covered in this Manual are marked with a red dashed line in the chart below.



Drawing on the experience of past reviews, the MNB has developed procedures, a consistent methodology and an informed view on a number of elements in ICAAP/ILAAP reviews and BMAs. Accordingly, the Manual formulates a number of specific requirements, including for a wide range of risk types, and for the consideration of external factors. The more precise and more detailed formulation of

⁵ Directive 2013/36/EU

expectations is hoped to improve the information and risk awareness of supervised institutions and is expected to contribute to smooth reviews.

1.2 The Internal Capital Adequacy Assessment Process (ICAAP)

Hungarian and EU regulations on the determination of capital requirements require every credit institution [collectively: “institution(s)”] to develop its internal procedure for the calculation of capital requirements in order to assess, based on the institution’s own calculations, the amount of capital requirement which the institution considers necessary to cover the losses that may result from the risks that are taken by it, and actually arise.⁶ Thus the internal capital adequacy assessment process is designed to ensure that the institution

- operates a sufficiently sophisticated risk management system that adequately identifies, measures, summarizes and monitors all materials risks
- has a sufficient amount of capital to cover these exposures as determined based on the institution’s internal rules.

The internal process for capital requirement calculations applies to all the institutions that are subject to CRD; its use is mandatory. The primary responsibility for the proper implementation and quality of the internal capital requirement calculation process rests with the senior management of the institution. This responsibility is also there if the ICAAP is determined at group level.

The internal capital adequacy assessment process includes the following areas:

- comprehensive risk analysis to identify and assess the material risks of the institution;
- a well-established capital analysis to quantify the extent of risks and determine the required level of risk capital;
- adequate information to the institution’s board of directors and senior management, and their involvement in capital adequacy processes;
- establishment of an adequate review and reporting structure in which the institution can regularly present its risk profile and capital position;
- elaboration of adequate internal audit mechanisms, provision for independent review.

In the context of the ICAAP, the two pivotal terms in this Manual are capital and risk. Existing regulations basically require capital adequacy at institutions for covering unexpected losses⁷, with adequate capital also functioning as permanent collateral that enables the institution to operate prudently in any regular business and economic situation⁸. Accordingly, capital requirement refers to adequate capital that corresponds to the risks quantified by a particular method and the size of potential losses that may result from these risks.

As part of the ICAAP, in Pillar 2 the amount of economically needed capital is determined. Economically needed capital captures the risks deriving from the institution’s business activities through the statistical and/or probability estimate of potential future losses at a level of likelihood determined by the institution and for a certain period (usually one year).

When calculating capital adequacy, the institutions may compare the aggregate economic capital requirement covering all types of risk against the regulatory (Pillar 1) own funds; in the calculation of SREP

⁶ CRD, Article 73.

⁷ In case of operational risk, the capital must provide coverage for both expected and unexpected losses

⁸ Although the term “risk” is not defined explicitly either in the Basel recommendations or in EU legislation, when used in conjunction with capital it usually refers to unexpected losses. Nevertheless, it is true that during both budgeting and capital adequacy assessment the full amount of losses is to be compared against the sum of allowances for impairment, provisions and capital. It is only sufficient to assess capital adequacy in the light of unexpected losses if we can rest assured that the allowances for impairment and provisions furnish adequate coverage for expected losses.

capital adequacy, only such capital items may be accepted as capital available to cover risks. The MNB does not permit taking into account the formerly used other factors of adjustment to the Pillar 2 definition of own funds, for instance as an item reducing the risk capital requirement. In accordance with the EBA SREP Guidelines, diversification among risks may no longer be taken into account for the determination of the Pillar 2 capital requirement.

Beyond the regulatory capital requirements determined under Pillar 1, institutions are also required to calculate capital requirements under Pillar 2 according to their internal procedures. Due to the differences in approach, the two calculation methodologies usually deviate from each other. In Pillar 2, the institution is required to specify a capital requirement for all of its relevant risk types (including for the risks that are not managed in Pillar 1, such as risky portfolios, concentration risk, and interest rate risk in the banking book), and for Pillar 1 risks, both on a risk-by-risk basis and in the aggregate, the minimum capital level is set as the regulatory capital specified in the CRR. However, due to the additional capital requirement calculated for risks that are not captured in Pillar 1, the result of the internal capital calculation typically exceeds the regulatory capital requirement, causing additional capital requirements to be shown in Pillar 2. Institutions are expected to define the allocated capital requirement amount for each risk within Pillar 2. The internal capital requirement calculation may nevertheless yield a lower capital requirement in Pillar 2 for Pillar 1 risks; in this case, the minimum Pillar 2 capital requirement by risk type corresponds to the regulatory capital under CRR (Pillar 1+ approach, for details see the chapter on the determination of capital requirements). Also in Pillar 2, as part of the supervisory review the MNB assesses the need for additional own funds requirements on a risk-by-risk basis.

However, the purpose of Pillar 2 capital requirement calculations is not only to make the institution set up additional capital on top of the regulatory minimum level. What the MNB considers more important is the incentive effect which spurs the institution to apply more effective risk management techniques and internal procedures for detecting and measuring its exposures more accurately, and for managing them better. In that framework, institutions are also encouraged to enhance their calculation methods for Pillar 1 capital requirements, aiming for the implementation and enhancement of internal rating based approaches as appropriate for their size, as well as for the nature, scale and complexity of their activities. Therefore, embedded into day-to-day processes, the internal capital adequacy assessment process can greatly contribute to the prudent operation of the institution.

1.2.1 Supervisory principles for ICAAP design

The following is a description of the general ICAAP principles formulated at the European level, supplemented by the experience available to the MNB, provided as guidance to all institutions on the design of their internal capital adequacy processes.

ICAAP 1: Every institution must have a process for assessing its capital adequacy relative to its risk profile (an ICAAP).

Every institution must have adequate corporate governance and risk management procedures, including a strategy and processes aiming to achieve and sustain a capital level that is adequate to the nature of the institution's business activities and risks. The fulfilment of this principle can be examined both at group and individual company level.

ICAAP 2: The ICAAP is the responsibility of the institution.

The institution is responsible for devising an adequate ICAAP consistent with its risk profile and operating environment, and for internally defining its capital targets. The ICAAP should be tailored to the institution's circumstances and needs, and it should use the inputs and definitions that the institution uses for internal purposes. The ICAAP shall meet supervisory requirements and the institution should be able

to demonstrate that it does so. Institutions retain full responsibility for their ICAAP regardless of any outsourcing.⁹

If the institution is a group member and applies the parent company's methods models, then the institution is responsible for adapting these methods and models to local circumstances and conditions, for implementing and applying them according to its own risk profile, and must certify the group methodology's adequacy in terms of its risk profile to the MNB. Furthermore, the institution must be familiar, both comprehensively and in detail, with the group's methodology, and must examine and annually verify the feasibility of the method or model at hand prior to application.

ICAAP 3: The applied internal capital requirement calculation methods' design should be fully specified and fully documented. The management body (both supervisory and management functions) should take responsibility for the ICAAP.

The responsibility for initiating and designing the ICAAP rests with the management body (both supervisory and management functions). The supervisory function within the management body should approve the conceptual design (at a minimum, the scope, general methodology and objectives) of the ICAAP. The details of the design (i.e. the technical concepts) are the responsibility of the management function.

The management body (both supervisory and management functions) is also responsible for integrating capital planning and capital management into the institution's overall risk management culture and approach. The institution must have properly documented internal procedures for capital adequacy, which should be approved and regularly reviewed by the institution's senior management.

The results of the ICAAP should be reported to the management body.

ICAAP 4: The ICAAP should form an integral part of the management process and decision-making culture of the institution.

The ICAAP should be an integral part of institutions' management processes in order to help the management body to assess, on an ongoing basis, the risks that are inherent in their activities and material to the institution. Depending on the complexity of activities, this could range from using the ICAAP to allocate capital to business lines, to generate expansion plans and even to having it play a role in the individual credit decision process. Yet it is also important at smaller institutions that ICAAP considerations should already appear in decision-preparation both in their business and banking operations.

ICAAP 5: As the ICAAP is based on processes and procedures, the appropriateness of its operation should be reviewed regularly, at least once a year.

The ICAAP should be reviewed by the institution as often as deemed necessary (but at least once a year) to ensure that risks are covered adequately and that capital coverage reflects the actual risk profile of the institution. The annual review should also cover completion of the tasks defined during the previous year's MNB audit. The review should be essentially completed before the next supervisory review.

The ICAAP should be subject to independent internal review within the institution.

Any changes in the institution's strategic focus, business plan, operating environment or other factors that materially affect assumptions or methodologies used in the ICAAP should initiate appropriate adjustments thereto. New risks that occur in the business of the institution should be identified and incorporated into the ICAAP.

ICAAP 6: The ICAAP should be risk-based.

The adequacy of an institution's capital depends on its risk profile. Institutions should set capital targets which are consistent with their risk profile and operating environment, and this should be evidenced to

⁹ See the chapter on ICAAP compliance at group level, and the EBA Guidelines (EBA/GL/2019/02 EBA Guidelines on outsourcing arrangements)

the MNB. Furthermore, institutions may take other considerations into account in deciding how much capital to hold, such as external rating targets, market reputation and strategic goals.

Institutions must clearly identify the risks they are able to measure. Where the qualitative factors dominate in respect of the specific risks, the emphasis will be on risk management and the use of risk mitigation techniques.

Even institutions who apply simpler methods to measure Pillar 1 risks (credit, operational and market risks) are required to base their ICAAP and the related governance and supervisory functions on their actual risks.

ICAAP 7: The ICAAP should be comprehensive, covering every detail.

Institutions should record all their material risks. There is no standard categorisation of risk types and definition of materiality; institutions are free to use their own approaches and terminologies. The MNB requires that in the course of the supervisory dialogue the institution should be able to present in detail the approaches and conceptual distinctions it applies as part of the ICAAP (along with deviations from regulatory capital requirement calculation methods).

The ICAAP should be comprehensive and should take into consideration all relevant risks, the following in particular:

- Credit, operational and market risks captured under Pillar 1, including their handling in the ICAAP which is different from Pillar 1,
- Pillar 1 risks not sufficiently covered with simpler methods (e.g. residual risk),
- Pillar 2 risks (interest rate risk in the banking book, concentration risk, strategic and reputational risk),
- Risks of external factors (regulatory, economic, business environment).

ICAAP 8: The ICAAP should be forward-looking and future-oriented.

The ICAAP should take into account the institution's strategic plans and how they relate to macroeconomic factors. The institution should develop an internal strategy for maintaining capital levels, which should incorporate factors such as expected developments in lending, potential sources of a future capital increase, the dividend policy foreseen, and any cyclical effects of the degrees of risk applied in Pillar 1.

The institution should have an explicit, approved capital plan which states the institution's objectives and the time horizon for achieving those objectives, and in broad terms the capital planning process and the specification of individuals who are responsible for that process. The plan should also lay out how the institution will handle situations that call for immediate action.

The ICAAP calculation is based on exposures as of a particular reference date but, if justified, the significant impacts of future expected events or events occurring after the reference date may also be taken into account.

ICAAP 9: The ICAAP should be based on adequate measurement and assessment processes.

The ICAAP should be based on the adequate measurement and assessment of risks, but there is no single correct ICAAP method. As institutions are free to choose the method they wish to apply, the MNB considers several approaches acceptable and does not necessarily require the use of complex capital calculation models. Nevertheless, based on the principle of proportionality, the MNB requires institutions pursuing complex and diverse activities to apply sufficiently advanced quantitative techniques in line with their unique and systemic. Pursuant to Section 124 (3) of the Credit Institutions Act and in accordance with Article 77 of the CRD, the MNB must encourage credit institutions to use internal approaches. Large,

complex institutions with extensive clientele are particularly expected by the MNB to switch to the application of the internal model when calculating the capital requirement. Compared to the standardised approach, the risks inherent to the institution's operation are better reflected in the capital requirement calculated in the internal model; consequently, where an institution uses the latter the context of its ICAAP, the MNB can also better rely on it for the purposes of ICAAP reviews.

Certain risk elements and thus the related capital requirements may be difficult to calculate. Nevertheless, the MNB requires that these risk capital figures be determined by way of expert estimates.

Whenever an institution does not have in place the appropriate measurement of a particular risk, the MNB will expect it to use the conservative approach in the ICAAP. It is important that institutions not rely on quantitative methods alone in the course of the ICAAP, but apply qualitative considerations and prudent management estimates regarding model inputs and outputs.

ICAAP 10: The ICAAP should produce a reasonable outcome.

Once the capital requirement of specific risk types has been identified, the ICAAP should produce the total economic capital requirement of the institution. This figure must be reasonable, i.e. it must be proportionate to the actual risks of the institution and it must be adequately reconcilable with the level of regulatory capital. Where the SREP shows a significant disparity in the supervisor's expectations and the institution's own capital requirement calculation, the institution should be able to provide conclusive evidence for the adequacy and comprehensive nature of the methodology it applied.

I.3 The Internal Liquidity Adequacy Assessment Process (ILAAP)

The CRD, the CRR, the supplementary Delegated Act (DA)¹⁰, and both the Credit Institutions Act and the Investment Services Act contain detailed rules for the management of liquidity risk. Pursuant to the requirements of the Credit Institutions Act and the Investment Services Act, the institution must establish its liquidity risk profile in line with the nature, scale and complexity of its activities, and it must have effective, written procedures and policies for the following:

- identification, measurement, management and monitoring of liquidity risk over an appropriate set of time horizons, including intra-day, tailored to business lines, currencies and legal entities of the group, including adequate allocation mechanisms of liquidity costs, benefits and risks,
- measurement and management of all key sources and impacts of market liquidity risk and for managing liquidity shortages arising from short position due dates preceding long positions.

With a view to fulfilling the above, the credit institution's executive body with governing powers must, among other things, devise an adequate strategy and defined risk-bearing levels for every business line. The executive body must also review and annually revise its assumptions underpinning decisions on the institution's financial position, taking into account alternative scenarios for liquidity positions and risk-mitigating tools. Alternative scenarios must cover off-balance sheet items and other contingent liabilities, also with regard to SPVs for which the credit institution acts as sponsor or provides substantial liquidity support to.

Credit institutions must develop internal regulations for the identification, measurement, management and monitoring of funding positions, covering the current and projected material cash-flows from assets, liabilities, off-balance sheet items, including contingent liabilities, as well as any estimated cash flows from the possible impact of reputational risk. Credit institutions must use liquidity risk mitigation tools, including a system of limits and liquidity buffers in order to be able to withstand a range of different stress

¹⁰ COMMISSION DELEGATED REGULATION (EU) 2015/61 of 10 October 2014 to supplement Regulation (EU) No 575/2013 of the European Parliament and the Council with regard to liquidity coverage requirement for Credit Institutions.

events and an adequately diversified funding structure and access to funding sources; these arrangements must be reviewed regularly, at least once a year. Credit institutions must have plans in place setting out adequate strategies and proper implementation measures in order to address possible liquidity shortfalls; these plans (also applicable to branches established in other EEA member states) must be endorsed by the management body with governing powers and be regularly tested and updated on the basis of the outcome of the alternative scenarios, at least annually.

The requirement set out in the Credit Institutions Act applies to all affected institutions, of course, but the MNB expects an ILAAP to be devised in accordance with the principle of proportionality.

The internal liquidity adequacy assessment process includes the following areas:

- internal analysis of the adequacy and reliability of the institution's liquidity risk management system and the related indicators and key indicators;
- comprehensive risk analysis to identify and assess the liquidity and funding risks of the institution;
- a well-established liquidity coverage analysis which quantifies the extent of risks and determines the required level of coverage based on the institution's own calculations;
- adequate information to the institution's board of directors and senior management, and their involvement in liquidity adequacy processes;
- establishment of an adequate review and reporting structure in which the institution can regularly present its liquidity risk profile and coverage;
- elaboration of adequate internal audit mechanisms, provision for independent review.

1.3.1 Supervisory principles for ILAAP design

Institutions required to carry out an ILAAP must take into account the following fundamental principles when devising their ILAAP. These fundamental principles coincide in many areas with those defined for the ICAAP.

ILAAP 1: The ILAAP is the responsibility of the institution.

ILAAP 2: The applied methods' design should be fully specified and fully documented. The management body (both supervisory and management functions) should take responsibility for the proper operation of ILAAP, as well as for the approval and enhancement thereof.

ILAAP 3: The ILAAP should form an integral part of the management process and decision-making culture of the institution.

ILAAP 4: As the ILAAP is based on processes and procedures, the appropriateness of its operation should be reviewed regularly, at least once a year.

ILAAP 5: The ILAAP should be risk-based.

ILAAP 6: The ILAAP should be comprehensive, detailed, and adequately documented.

ILAAP 7: The ILAAP should be forward-looking and future-oriented. .

ILAAP 8: The ILAAP should be based on adequate measurement and assessment processes.

ILAAP 9: The ILAAP provides a clear and well-established final result, while also specifying the measures needed to address any risks that may be identified.

1.4 Business Model Analysis (BMA)

The purpose of the regular Business Model Analysis is to assess business and strategic risks and to form a supervisory view on the viability and sustainability of the institution's business model. The results of

Business Model Analysis are used by the MNB to assess all other elements of the SREP, in particular capital adequacy and liquidity adequacy, and also to support those assessments.

It is the responsibility of the management body of the institution to develop, regularly review and, if necessary, modify the institution's operating model by considering external and internal conditions and opportunities, so that the model is able to produce acceptable results and returns.

Regular reviews of the business model should assess the risks resulting from changes in the business environment, as well as the risks to the achievement of the targets set in the strategy.

Regarding the business model, the MNB requires that

- the model should be aligned with the institution's strategy;
- the model should be integrated into the governance and decision-making processes of the institution;
- the risk that have been detected and identified should be taken into account in the ICAAP/ILAAP, and should be managed in the course of business and strategic planning.

The MNB expects the institution to maintain detailed documentation of the development and review of its business plans, and the assumptions used.

I.5 General principles to be applied in ICAAP/ILAAP reviews

I.5.1 Internationally accepted principles

The internationally accepted principles of the supervisory review process are as follow:

- **Institutions measure their risk exposures on their own and ensure that the required levels of liquidity and capital are sustained.** Institutions must have capital requirement calculation procedures in place that correspond with their risk profile and a strategy for maintaining their capital and liquidity levels.
- **The internal procedures of institutions are reviewed by the supervisory authority.** The MNB examines and evaluates institutions' internal capital adequacy assessment processes, risk strategy, capital plan, liquidity adequacy processes and risk management framework. In the course of this it assesses whether the institution will be able to provide the level of capital and liquidity required for prudent operations. If the institution's capital or liquidity adequacy processes are deemed inadequate, the MNB takes measures.
- **The institution's available capital should exceed regulatory and supervisory requirements (corresponding to the OCR + P2G determined for the institution).** The supervisory authority expects and requires institutions to operate with a capital level that exceeds the regulatory expectation. **The supervisory authority recommends that the institution's capital should be greater by at least the P2G amount, and will verify whether that recommendation has been implemented.**
- The supervisory authority also requires institutions to operate with liquidity buffers that exceed the regulatory expectation. Since the required liquidity buffers are supposed to ensure the institution's liquidity, the buffers should be designed so that the institution's **liquid assets and stable funds meet at least regulatory expectations in the event of mild stress**, but can be used in case of severe stress.
- **In accordance with the institution's business model, the supervisory authority separately examines the availability of sufficient, sound and effective liquidity coverage, and the process of coverage calculations.**

- **The supervisory authority takes action if needed.** The MNB intervenes or takes corrective action in a timely manner if the capital adequacy, capital supply or liquidity adequacy of the institution is not deemed as being guaranteed.

Since the review extends to the overall operation and all risks of the supervised institutions – in line with the complexity of the activities conducted by financial institutions – it is a considerably complex and multifaceted review process. Accordingly, where appropriate, in the course of the supervisory review process the MNB will adopt specific supervisory expert decisions, taking into consideration institutions' individual features, and previous supervisory experience. In the context of its ICAAP and ILAAP assessment, the MNB follows a holistic approach, paying heed to the presence of controls needed for managing risks and sufficient capital for covering such risks at all institutions.

1.5.2 General principles applied in the context of the MNB's review processes

The above specified elements of the review process make up a well-founded and balanced system, built on additional general principles over and above the internationally accepted fundamental principles. These principles apply to the review process as a whole and exert a palpable impact on supervisory procedures in most areas of institution supervision.

The principle of proportionality

Based on the requirements and definitions of the CDR and the CRR, the principle of proportionality applies to the review process as a whole and to all institutions falling under its scope. It means that the extent and depth of supervisory expectations must be proportionate to the type, business model, size, activities and risk exposure of the given institution. Since a very wide range of institutions fall within the scope of the CRD, both the supervised institutions and the supervisors must exhibit flexibility and discretion when applying the relevant legal provisions. In the framework of the supervisory review process — as a rule of thumb — it is the institutions that are obliged to demonstrate to the supervisors that the methodology chosen by them covers all material risks and captures them in an appropriately sophisticated way.

The practical application of the principle of proportionality means that there may be significant differences from institution to institution in the depth and horizon of the supervisory review process and in the nature of the dialogue conducted with the institution as well as in its form and intensity. For credit institutions operating in branch office form, this means that they are not covered by the ICAAP-BMA review, and the ILAAP review for branch offices established in the EEA is typically carried out in a simplified form, without the institution being notified.

Primacy of risk management over capital generation and the creation of a liquidity buffer

The main function of the Pillar 2 review process is to become fully aware of institutions' risk processes and to identify their material risk exposures as accurately as possible. Based on the above factors, it is possible to define the capital level that can assure solvent operation and assess the institution's liquidity position. As a result of the process, both the supervised institutions and the supervisors can acquire a precise picture about the risk profile of institutions which is unquestionably the token for well-established and efficient business and regulatory decisions.

As a consequence of the above, the main objective of the review process is to raise risk awareness and to consolidate process regulation rather than to make an additional increase in the capital requirement under Pillar 2 or the creation of an extra liquidity buffer. In the course of the review, the MNB seeks to ensure the strict application of the above principle. In particular, alongside the requirements aimed at enhancing the standard of risk management, the determination of own funds requirements in addition to the ICAAP capital requirement is a provisional and involuntary measure which counterbalances institutions' deficiencies in risk measurement and risk management on the one hand, while also providing the institution concerned with incentives to elaborate better internal capital adequacy processes, and more generally, a better risk management framework going forward.

Tracking the continuous improvement of risk methods and expectations

The MNB's is of the firm view that given the constant change of financial, economic and risk conditions, and of the regulatory environment, the business processes and risk methods applied need continuous improvement in order to ensure the prudent operation of institutions. The supervised institutions consequently need to regularly reconsider the appropriateness of their risk management processes and capital and liquidity calculation methods. This need is highlighted by the fact that even the most advanced sectoral and regulatory methods have undergone further improvement in the recent past and are likely to follow suit in the foreseeable future as well, a tendency as a result of which supervisory expectations will also continue to become deeper and more extensive.

In the field of internal capital and liquidity adequacy procedures, the MNB expects institutions to make two adjustments: on the one hand, adjustment to the prevailing market and risk conditions, and continuous improvements in line with industry standards and regulatory expectations on the other hand. This means that the appropriateness of approaches and levels judged adequate in previous reviews is not automatically relevant in the present.

The equality and complementary nature of the two pillars of the review

The method of capital requirement calculation and the size of the capital necessary for prudent operation are defined by the legal regulations concerning Pillar 1 in a binding manner, based on uniform methodology. Due to the diversity of institutions, the capital required cannot necessarily be adjusted to the actual risk exposure in the regulatory pillar¹¹, therefore supervisory activity cannot be limited to examining compliance with regulatory minimum requirements. The Pillar 2 review process – among others – is aimed at ensuring that, in addition to formal legal compliance, the risk profile and capital adequacy of institutions may also be assessed from economic point of view in order to guarantee prudent operation.

The equality and complementary nature of the two pillars of capital requirement calculations derive directly from the regulatory concept according to which the management of risks covered under Pillars 1 and 2 bear the same importance. Nevertheless, while in Pillar 1 mandatory risk measurement solutions are prescribed for a well-defined group of risks, in Pillar 2 the risk-based approach can be used by institutions for all material risks in a free or optional way. As a result, in Pillar 1 the MNB places emphasis on compliance with legal requirements, whereas in the course of Pillar 2 review the MNB principally focuses on the quality, reliability and completeness of internal capital calculation processes.

It is exactly the above differences that justify the independent nature of the two pillars, but they also shed light on their mutual interdependence. Risk management experience collected, and methods developed in one of the two pillars (e.g. rating systems applied for credit risk models, parameter estimates) can be utilised or enhanced almost without exception in the other pillar, too.

¹¹ Henceforth the terms Pillar 1 and regulatory pillar are used as synonyms.

II. Scope of the ICAAP, the ILAAP, and their supervisory review

Articles 6-17 of the CRR defined the levels of application of compliance with capital and liquidity requirements. The requirements concerning the internal capital adequacy assessment process are defined in Articles 108 and 109 of CRD. Pursuant to the requirements formulated in the Credit Institutions Act and the Investment Services Act, the supervisory review and assessment must be performed in accordance with the provisions in Part One Title II of the CRR; the scope of the supervisory review should be aligned with the application levels concerning compliance with prudential requirements.

ICAAP and ILAAP reviews can be carried out as part of the SREP assessment at the level of individual institutions, or at group level on a consolidated or sub-consolidated basis (in accordance with Chapters II.1 and II.2).

The capital adequacy assessment review process of international banking groups is conducted in the form of a joint risk assessment with the participation of the competent supervisors. The central institutions of the joint assessment are the so-called supervisory colleges, in which the competent authorities performing the supervision of the given banking group (“host”), under the leadership of the consolidating supervisor (“home”), jointly assess the risk exposure and control of the group members. The joint assessment is concluded by a joint decision, as part of which the supervisory college decides by common agreement on Pillar 2 capital adequacy, at the same time it determines the total SREP capital requirement ratio (TSCR) required to be held at the consolidated, sub-consolidated and/or individual levels. Effective from 1 January 2014, the college has adopted its decisions on liquidity adequacy as well by common agreement in the joint decision process, so that the institution’s liquidity and funding risk assessment and liquidity adequacy assessment constitute a separate component of the review process. The rules for multilateral procedure are set out in Section 173 of the Credit Institutions Act, and Section 173/A of the Investment Services Act.

II.1 ICAAP and ILAAP compliance and the supervisory review process on an individual level

Evaluating the capital requirement

Pursuant to Article 108(1) of the CRD, the supervisory review of the ICAAP must individually apply to every institution within the scope of the CRR that is required to conduct an individual ICAAP and which has not been granted exemption by the MNB from compliance with the CRR’s requirements for capital.

Individual exemption from meeting capital adequacy requirements (pursuant to the supervisory authority’s decision) may be granted only in the following cases:

- the institution is the subsidiary of another institution, where both the subsidiary and the institution are subject to authorisation and supervision by the same Member State, and all the additional conditions set out in Article 7(1) of the CRR are satisfied;
- the institution is the subsidiary of a financial holding company or of a mixed financial holding company and the conditions set out in Article 11(1) of the CRR are satisfied;
- the institution is a parent undertaking in a Member State where that institution is subject to consolidated supervision in the Member State concerned, and all the additional conditions set out in Article 7(3) of the CRR are satisfied;
- the institution is permanently affiliated to a central body and the conditions defined in Article 10 of the CRR are met.

Assessing liquidity adequacy

The starting point for complying with liquidity requirements on the basis of the CRR is individual compliance, while the compliance with the liquidity data supply requirement at individual level is

mandatory without exception. Exemption from compliance may only be granted to institutions that are part of a liquidity subgroup or the cooperative integration.

II.2 ICAAP and ILAAP compliance and the supervisory review process on a group level

Evaluating the capital requirement

The internal capital requirement defined in the CRR should be applied at a consolidated level if:

- the institution is a parent undertaking in the country where it is authorised or supervised;
- the institution is controlled by a parent financial holding company or a parent mixed financial holding company, and is subject to consolidated supervision;
- the cases under Article 22 of the CRR (other sub-consolidated compliance) apply;
- the institution is a central body, along with its affiliated institutions.

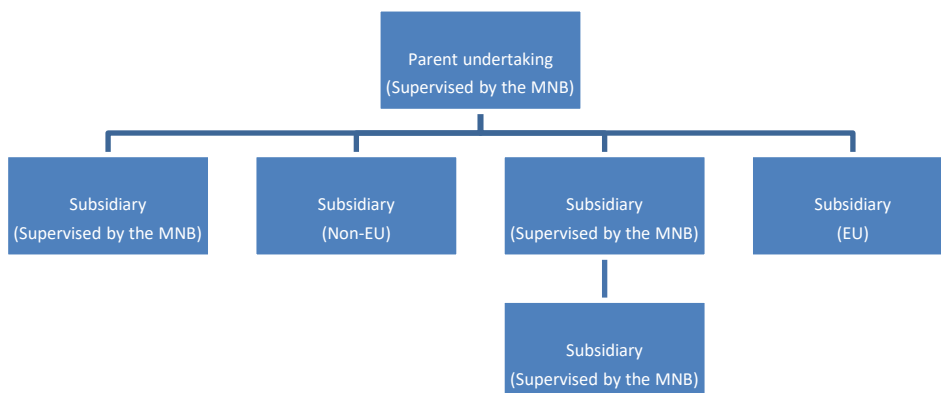
Pursuant to Article 108 of the CRD – for groups not exempted from compliance with the CRR’s capital adequacy requirements – the ICAAP must also be carried out both at the sub-consolidated and EU levels of consolidation.

Group-level ICAAP compliance and types of supervisory review process

- **International groups**

A. The group’s EU-level parent undertaking has a seat in Hungary

If the group’s EU-level credit institution parent undertaking, EU-level financial holding company and EU-level parent mixed financial holding company has a seat in Hungary, then consolidated compliance with the ICAAP represent a single consolidation level.



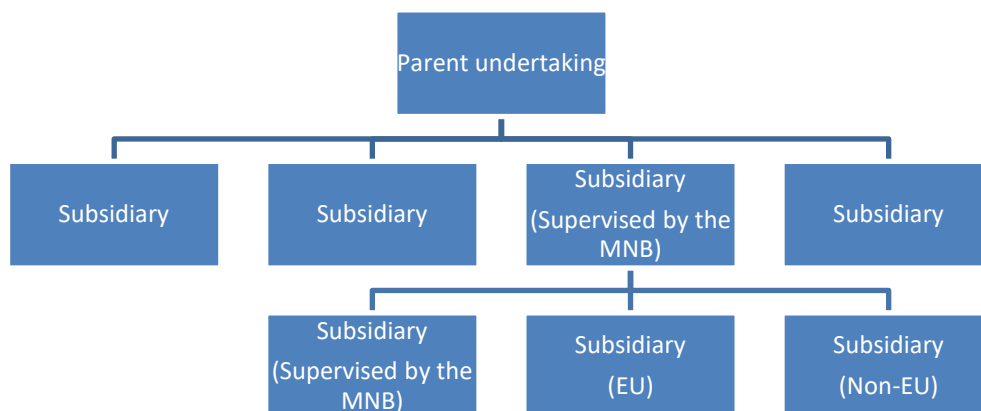
The supervisory review of the ICAAP is performed by the MNB in the context of a joint decision procedure. Article 20 of the CRR must be followed in the event of joint decision-making on capital.

B. The group’s EU parent institution has its registered office in another Member State¹²

Where the group’s EU parent credit institution, EU parent financial holding company or EU parent mixed financial holding company has its registered office in a country other than Hungary, under Article 108 of the CRD the MNB also expects compliance with ICAAP requirements at Member State level, i.e. that the Hungarian subsidiary should also conduct an ICAAP on a consolidated basis in respect of the institutions within the scope of consolidated supervision. The management of the Hungarian group is responsible for

¹² Where the parent undertaking is registered in a non-EU country (third country), proceed according to Sections 174 (5)–(7) of the Credit Institutions Act, or respectively Sections 161/B (5)–(7) of the Investment Services Act.

the quality of the capital requirement calculations even where processes for the Hungarian group’s capital requirement calculations are designed at a higher (EU) level. In this case, the strategy, the processes and the systems elaborated at EU level should be suitable for assessing the risks of institutions that belong to the consolidated supervision of the domestic group leader. Furthermore, they should also be suitable for measuring the risks against the capital requirement that matches the risk profile and for demonstrating all this to the MNB as the host supervisor in an acceptable manner.

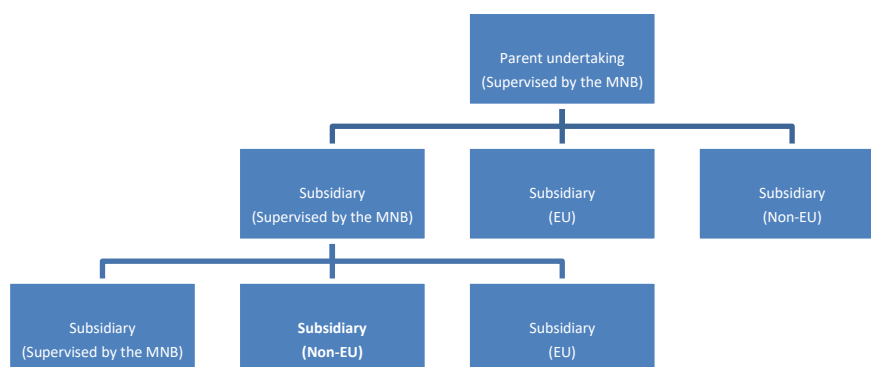


Domestic institution groups typically fall in this category as they have a foreign (EU-level) parent undertaking. Therefore, the ICAAP has to be applied both at EU level (consolidated for the overall group of the EU-level parent undertaking) and at member state level (for the institutions that belong to the consolidated supervision of the domestic subsidiary).

In this case, the MNB plays a dual role. On the one hand, it conducts the sub-consolidated ICAAP supervisory review process, and on the other hand, participates in EU-level joint decision procedures in accordance with legislative requirements.

C. Other sub-consolidated level reviews

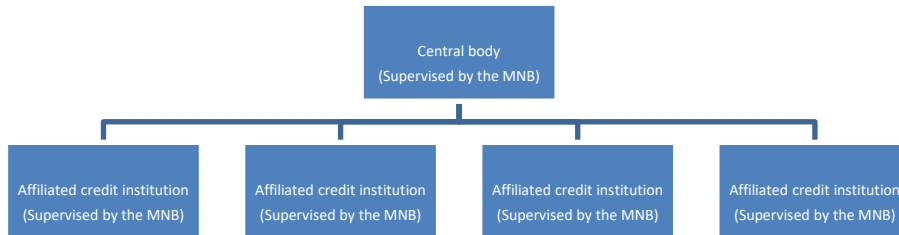
Still, if a subsidiary credit institution with a domestic parent undertaking has a credit institution, investment firm, financial enterprise or investment fund manager subsidiary or affiliate with a seat in a third country, the domestic subsidiary credit institution has to meet ICAAP requirements at subconsolidated level as well (without prejudice to the mandatory group-level compliance of the domestic parent undertaking), that is in consolidated form in respect of the institutions that belong the subsidiary’s consolidated supervision. The supervisory review process must therefore apply to this scenario.



- **Hungarian groups**

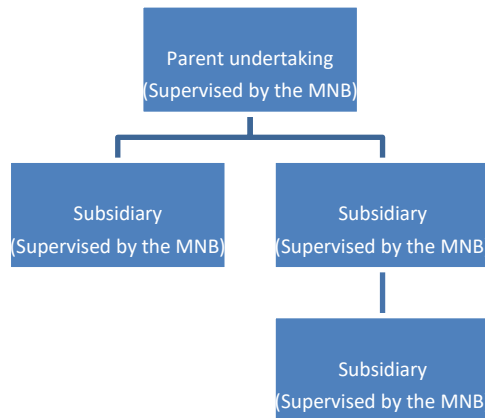
D. Credit institution permanently affiliated to a central body

The central body must fulfil the CRR's capital requirements together with its affiliated institutions on a group level, or each institution must fulfil them individually. Pursuant to Article 108(1) of the CRD, the application level of the ICAAP must also be adjusted to the decision adopted on the basis of Article 10 of the CRR. In case of central bodies with a seat in Hungary, the MNB is in charge of conducting the supervisory review process, in accordance with the above specified decisions. No joint decision process is applied in this case.



E. Hungarian group of institutions

In respect of institutions subject to consolidated supervision, a group of institutions with only a Hungarian parent undertaking and Hungarian subsidiaries must comply with the requirements for internal capital requirement calculations both for individual institutions and on a consolidated basis. Joint decision process is not applicable in case of such groups.



Assessing liquidity adequacy

The liquidity requirements defined by the CRR must be satisfied in the aggregate in respect of the parent institution, financial holding corporation or mixed financial holding corporation for institutions supervised by an EU-level parent institution, institutions supervised by an EU-level parent financial holding company and institutions supervised by an EU-level parent mixed financial holding company. Member state-level subconsolidated application is not yet a requirement, except in the cases defined in Article 8 of the CRR, i.e. if a liquidity subgroup was established or the central integration body complies with liquidity requirement on a consolidated level.

As the supervisory authority, the MNB considers that group-level ILAAP should be conducted for institutions subject to the SREP both on a sub-consolidated and on a fully consolidated basis. In the case of an international group, a key role is occupied by the examination of the operational and legal constraints that limit the free flow of liquidity, and of the currency consistency of liquidity buffers and potential outflows. As a Home authority, the MNB takes into account the assessment of the supervisory

authorities of the subsidiary banks, while as a Host authority it reports individual risks to Home supervisors.

III. Grades of ICAAP review and categorisation of supervised institutions

The frequency, intensity and granularity of the review and evaluation are defined by the MNB based on the size of the institutions, the significance, nature, scale and complexity of their activities, and their business models and risks, providing that the review and evaluation must be performed at least once a year. Three supervisory review process types are differentiated according to the depth of the review process and to the intensity of the dialogue conducted with the institution:

- comprehensive ICAAP review, during which we assess the adequacy of the ICAAP practice for all relevant risks of the institution
- focused ICAAP review, during which the review of certain parts of the ICAAP framework is in focus, while the MNB reviews other parts/portfolios relying on simpler methods, e.g. by applying benchmark models;
- simplified ICAAP review, which is carried out by means of a questionnaire completed by the institution and evaluated by the MNB.

The depth of the review process that appears reasonable for each institution is determined by the MNB on an annual basis.

IV. Conduct of ICAAP/ILAAP reviews and BMAs¹³

As a general rule, ICAAP/ILAAP reviews and BMAs are conducted annually. At the end of each year, the MNB draws up an SREP plan, which sets out the SREP schedule for the following year, and the depth of the assessments. In the course of planning, for international groups of institutions the MNB must also take into account joint decision processes.

The MNB nevertheless reserves the option to conduct a supervisory review process partially, for specific risk(s), in one or in a number of institutions at any time over and above the annual reviews. In accordance with the supervisory review process principles, the annual review does not necessarily mean that a comprehensive review process is carried out. In the course of the review, the impact of significant changes is to be evaluated based on talks, on-site and off-site inspections in the subject period as well as information gathered from other sources. Nevertheless, it may also occur that in the course of ongoing supervision, the MNB becomes aware of a change whose nature and magnitude warrant the launch of a comprehensive review process at a time other than that scheduled for the institution (even possible between two, annual ICAAP or ILAAP reviews).

The review process is to be developed and carried out prudently in coordination with the partner supervisors and with the supervised institutions in order to ensure that the stipulation of European and Hungarian legislation and EU guidelines are implemented in practice.

IV.1 Preparations for ICAAP/ILAAP reviews and BMAs

Applicable Hungarian and European legislations require supervisory ICAAP and ILAAP reviews to be carried out annually. In consultation with partner supervisors, the MNB establishes in advance the annual

¹³ In the context of simplified ICAAP reviews, the procedures described in this chapter are subject to proportionality considerations. Any differences in the practices of comprehensive, focused and simplified supervisory reviews are indicated specifically. The simplified supervisory review process is discussed in a separate chapter.

timetable for supervisory reviews at the end of the year preceding the year concerned in order to ensure the efficient and effective conduct of the process.

Prior to the reviews, the MNB will inform the institutions concerned in due time about the exact time of inspections, any requests for documentation, as well as presentation and other technical needs related to the review.

IV.2 Requests for documentation to support ICAAP/ILAAP reviews and BMAs

In each round of a review, the MNB expects the institution to submit official ICAAP and ILAAP documentation endorsed by senior management¹⁴, as well as a strategy and business plan for the BMA. The contents of the documentation must be aligned with the requirements set out in the supervisory Methodology Manual. With regard to the ICAAP and ILAAP documentation reviewed annually according to the applicable EBA Guidelines¹⁵, the MNB expects the following in particular:

- the documentation should contain the institution's ICAAP and ILAAP methodological guidelines, which should present in detail the approaches implemented, the risk management procedures and capital requirement calculation methodologies for each risk type, explain any deviations from Pillar 1 management, and contain accurate references to all elements of the ICAAP and ILAAP documentation,
- the ICAAP/ILAAP methodological guidelines should describe the ICAAP/ILAAP framework and its scope,
- the ICAAP/ILAAP methodological guidelines of the institutions should be sufficiently comprehensive and should include all relevant risks and risk management arrangements of the institution, as well as the mandatory elements indicated in the ICAAP Review Schedule,
- the ICAAP documentation must contain the so-called SREP Review Form, containing the results of capital calculation according to risk types,
- the ILAAP documentation must provide evidence to demonstrate compliance with additional liquidity requirements for the period under consideration,
- the available information and documents must clearly indicate what the institution concerned considers as the elements of the ICAAP and ILAAP.

In the context of the BMA the MNB expects the strategy and business plan to:

- be reviewed at least annually, at least in part,
- specify the main strategic directions and objectives,
- be aligned with the institution's declared risk appetite,
- provide an analysis of the business environment (e.g. macroeconomic environment, regulatory environment, competition),
- incorporate a forecast for key balance sheet and P&L account items over a time horizon of at least 3 years,
- include the main assumptions used for forecasting,
- ensure that the data, assumptions, and methods used are well-designed and documented,

¹⁴ The MNB makes the institution's ICAAP and ILAAP methodological guidelines and related regulations, as well as the ICAAP strategy (including risk appetite), subject to mandatory senior management approval, with a definite preference for the full ICAAP and ILAAP documentation submitted to the MNB with such an endorsement.

¹⁵ EBA/GL/2016/10 Guidelines (Guidelines on ICAAP and ILAAP information collected for SREP purposes)

- identify the main competitive advantages, vulnerabilities, and the major risks associated with implementation,
- include the ongoing and planned major actions related to the implementation of the plans,
- enable the subsequent back-testing of plan fulfilment.

The MNB sends its detailed documentation requirements for ICAAP/ILAAP reviews and BMAs to the institutions prior to the investigations, in due time. In addition, in the letter of notification the MNB will specify the institutional scope (consolidated, sub-consolidated or individual) and deadline for and by which the documents should be submitted to the supervisory authority, and determines the format and reference date (in the form of a specific Excel template, as the case may be), in and for which the data and calculations are requested. The MNB pays special attention to the quality of the data submitted and compliance with the deadlines, and may impose an add-on capital requirement during the review process in case of insufficient data quality already existing during the previous review, indicated to the institution in the review report or having a material impact on the capital requirement, or hindering the smooth conduct of the review, or the correct calculation of risks.

As part of ICAAP reviews, in the investigation phase the customised nature and intensity of the dialogue with the institution, as well as the type of investigation, may require the supply of further information to the MNB. The MNB may ask for updated ICAAP/ILAAP information in any phase of the review, if it believes that relevant information has meanwhile become obsolete.

IV.3 Supervisory evaluation of ICAAP/ILAAP reviews and BMAs

Institutions' internal evaluations are closely linked to supervisory evaluations, because the MNB conducts a dialogue with all supervised institutions on the outcome of investigations and the level of economic capital requirements. In the initial step the MNB is provided with the necessary documentation, while most of the dialogue (with or without on-site inspections) takes place in the course of the investigation, including subsequent written and/or oral discussions. The concluding moment in the dialogue is the establishment of the MNB's final view on the assessment. The intensity of the dialogue primarily depends on the type of the MNB investigation, the complexity of the institution's activity and the extent of differences between the two parties' assessments. When conducting comprehensive investigations, the MNB aims to strengthen the dialogue further and gain a better understanding of institutions' methodologies. In the course of focused investigations, the MNB focuses on the definition of Pillar 2 capital requirement calculations for the risks involving the highest amount of capital requirements. In the case of a simplified ICAAP review, the MNB sends a questionnaire to the institutions, which it expects to be returned with documentation supporting the questionnaire responses. After evaluating the responses, the MNB consults the institution in writing on any major deviations.

The ICAAP review dialogue is aimed at ensuring the full application of general supervisory expectations during the calculation of economic capital. In the spirit of methodological freedom, the MNB accepts all consistent, sound and sufficiently conservative internal capital calculation approaches, procedures and methodologies; however, in order to harmonise the review processes, it will follow its methodology elaborated in advance, relying on supervisory benchmarking models as required. The structure of the dialogue is based on the "building blocks" approach, i.e. certain elements of the capital calculation interpreted in the broad sense (e.g. risk types, capital elements, external factors, business processes, etc.) are relatively well-defined and are mostly assessed separately from each other. While certain elements of the methodology have been established in the manuals published by the supervisory systems and institutional protection schemes, other elements will only crystallise during the gradual development of institutional relations, in practical arrangements and procedural conventions.

The purpose of the dialogue on ILAAP reviews is to ensure the effective and proactive enforcement of supervisory expectations as well as to support supervised institutions.

IV.4 Risk mitigation measures and the determination of economic capital and liquidity excess reserve requirements

In the case of comprehensive ICAAP reviews, once the subject-matter parts of the assessment processes have been completed, the MNB prepares an evaluation report, which may include a detailed description of supervisory findings about the supervised institution's economic capital and internal capital adequacy, the risk mitigation measures required, and the SREP capital requirement considered appropriate by the MNB, upon determining which it may also take into consideration relevant information available within the framework of continuous regulatory oversight. The review report is forwarded by the MNB to the supervised institution, which has the opportunity to express an opinion on it within the timeframe specified. In the case of a focused ICAAP review, a much shorter summary evaluation is produced, and the institution is also given the opportunity to comment. The MNB takes into consideration the opinion of the institution for the purposes of finalising the report and adopting related supervisory measures. It is, however, not in a position to recognise any newly proposed methodological changes, interim modifications that the MNB has had no means to assess, or any initiatives for the partial re-run of an ICAAP review or a BMA. Changes in the institution's risks and portfolios after the reference date included in the ICAAP review letter will be considered by the MNB in the framework of the following year's ICAAP review.

IV.5 Joint risk assessment and decision process

In the case of international banking groups that fall under the jurisdiction of several EU supervisory authorities and are registered and operate in the European Economic Area, the final assessment of risks, the discussion of the applied methods and the definition of capital, as well as the determination of economic capital requirements and liquidity adequacy assessment are done within the framework of the international supervisory colleges. The institutional framework for international supervisory cooperation is set out in detail in Article 20 of the current CRR and Article 113 of CRD (implemented in Section 173 of the Credit Institutions Act and Section 162 (5)(d) of the Investment Services Act), while detailed provisions on the operational functioning of supervisory colleges and on the joint risk assessment and decision process are set out in Commission Implementing Regulation (EU) No 710/2014¹⁶

In the first step of the *joint risk assessment and decision process* (JRAD), following the evaluation phase of the ICAAP and ILAAP reviews the results of risk assessment, the findings made as part of ongoing supervision and on the basis of other supervisory reviews, as well as the fulfilment of the CRD minimum requirements are also evaluated by the national competent authorities in a uniform structure elaborated by the international supervisory community, with findings subsequently forwarded to the consolidating supervisor. In templates that serve as a basis of joint assessment the individual risk types and the individual ICAAP and ILAAP sub-processes are evaluated on a scale of 1 through 4, whereas compliance with CRD requirements is presented in a descriptive manner.

As the second main step of the JRAD the content of the uniform evaluation templates are summarised and synthesised by the consolidating supervisor on the level of the total group, and based on the above, the college dialogue is led and moderated by the consolidating supervisor with the participation of each and every competent supervisor. In the course of this dialogue, every important aspect of risk assessment, of ICAAP and ILAAP methodologies and of the CRD minimum requirements are addressed and discussed, as a result of which the risk characteristics and capital adequacy of each group member and the group as a whole are jointly assessed by the college members.

If there is full consensus among the college members, JRAD is concluded by an evaluation report produced by the consolidating supervisor with the consent of partner supervisors, a report that contains also the

¹⁶ <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32014R0710&from=HU>

joint decisions on capital and liquidity adequacy. The reports prepared are then forwarded by the consolidating supervisor to all partner supervisors concerned and to the institution at the head of the group, which concludes the overall SREP assessment.

If no decision is passed by the authorities within four months of the availability of the joint risk assessment in respect of the capital requirements and within one month for the liquidity buffer requirements, EBA mediation shall be sought in accordance with the relevant requirements. If mediation yields no result, the decision on the adequacy of the group's solvency capital and additional capital requirement, and its liquidity adequacy and additional liquidity assets holding obligation (in view of the risk analysis of associated companies and opinion of partner supervisors) is taken by the consolidating supervisor, whereas in the case of local institutions decision is taken by the host supervisors.

IV.6 Closure of ICAAP/ILAAP reviews and BMAs, supervisory measures

As a general rule, the Pillar 2 review process is closed with a review report (SREP Review Form) produced for the institution, or by the forwarding of a so-called prudential letter (if the participating parties have a consensus or an agreement).¹⁷

The prudential letter is a unique tool of the MNB which states the minimum level of Pillar 2 capital adequacy relying on and referring to the content of the evaluation report.

The prudential letter contains the following:

- executive summary,
- risk assessment for the main risk categories,
- summary on the expected risk mitigating measures, highlighting the key supervisory requirements,
- supervisory stress test result,
- the capital deemed necessary based on the ICAAP review.

In the prudential letter, the MNB establishes the total SREP ratio (TSCR ratio) required for the institution, the overall capital requirement (OCR) and the Pillar 2 capital guidance (P2G). Under the new regulations, the MNB also specifies the types of capital that institutions must use to meet these obligations.

Where the ICAAP, ILAAP or BMA reviews are not conducted at the same time, the prudential letters will be sent separately, each with contents specific to the investigation concerned.

The results of the ICAAP supervisory review process must be documented in the SREP Review Form. A resolution may also be issued where in the course of a review a condition warranting the use of supervisory measures arises (particularly where an institution fails to meet the supervisory expectations).

The introduction of supervisory measures is justified, in particular, by the following conditions:

- the supervised institution does not accept either the risk mitigating measures deemed necessary by the MNB or the specified level of the SREP capital requirement
- the MNB believes that the capital adequacy is not guaranteed according to the legal provisions,
- the credit institution has supplied implicit support within the meaning of Article 248 of Regulation (EU) No. 575/2013 more than once, without attaining any significant risk transfer,
- the MNB establishes that the credit institution's economic value (the present value of expected net cash flows from its assets, debts and off-balance sheet positions), calculated by

¹⁷ In the case of institutions subject to simplified reviews, with particular regard to the cardinality of such institutions, a review report is only generated where the supervisory review is carried out within the scope of a comprehensive investigation.

taking into account a sudden and unexpected change in interest rates, of an extent specified by the MNB, would decline by more than 20% of the institution's own funds compared to its economic value calculated without regard to the effects of the interest rate changes, as a result of a sudden, unexpected 200 basis-point change or otherwise as specified by the EBA.

- the MNB discovers any severe deficiency in the risk identification of the institution's internal methodology,
- the MNB finds that the internal methodology applied by the institution no longer complies with the requirements pertaining to it,
- when applying the internal model, there is a risk of the institution being unable to satisfy the requirements within the specified deadline and being unable to certify that the consequences of such non-compliance are not significant,
- the number of overruns when applying the internal model applied by the institution is indicative of the internal model's lacking or no longer sufficient accuracy in terms of market risk.

The prudential letter closing an ILAAP review contains the following:

- an overall evaluation of the institution's liquidity risk management,
- an evaluation of the numerical specification of legal and Pillar 2 requirements¹⁸,
- a statement on compliance with external and internal regulations,
- an evaluation of the quality of liquidity reporting not related to legal compliance,
- the establishment of deficiencies (if any),
- calls for action (if any).

IV.6.1 Cases in which measures related to the overall supervisory review and evaluation process (SREP) are applicable against credit institutions

The legal grounds for the measure	Possible measures
Case types subject to the MNB's discretion	
<p>The financial institution violates the Credit Institutions Act, legislation on prudent operations or other legislation governing its activities, or it manifestly fails to carry out its activities with due care, and in particular, its own funds fail to cover its risks or fall short of the capital requirements specified in Section 79(2) for credit institutions. <i>(Credit Institutions Act, Section 184(1))</i></p>	<p>All the measures provided for in Section 185 (1) of the Credit Institutions Act may be applied, thus especially the MNB may order the financial institution to formulate and implement an emergency action plan and it may also impose an extraordinary reporting obligation. <i>(Sections 185(1)(a)–(h))</i></p>
<p>The MNB may impose additional own funds requirements on the credit institution in the following scenarios:</p> <ul style="list-style-type: none"> - the credit institution fails to comply with the requirements in terms of its ICAAP, recovery plan or large exposure, 	<p>The MNB may impose additional own funds requirements on the credit institution. Guiding criteria for determining the extent of the additional capital requirements:</p> <ul style="list-style-type: none"> - the qualitative and quantitative aspects of the credit institution's internal capital adequacy assessment process,

¹⁸ Given the volatility of the liquidity situation, the additional requirement is not determined on a forward-looking basis

<ul style="list-style-type: none"> - the credit institution's capital requirement does not cover certain risks, - the measures that have already been applied are likely to fail in sufficiently improving the credit institution's systems, procedures or strategies, - failure to meet the requirements pertaining to the method applied by the credit institution lead to an inadequate capital requirement, - the credit institution has probably underestimated its risks, - the credit institution notifies the MNB that the outcomes of its stress tests significantly exceed its capital requirement for the correlation trading portfolio. (<i>Credit Institutions Act, 186 (1)</i>) 	<ul style="list-style-type: none"> - the adequacy of the credit institution's governance and risk management systems, and - the findings of the supervisory review carried out at the credit institution, and - the credit institution's systemic risk.
Cases in which the application of supervisory measures is mandatory	
<p>The own funds of the credit institution are less than 80% of the capital requirement specified in Section 79(2). (<i>Credit Institutions Act, Section 184 (3)(a)</i>)</p>	<p>All of the measures specified in Sections 185(1)–(2) of the Credit Institutions Act, and all of the exceptional measures specified in Section 189 of the Credit Institutions Act are applicable.</p>
<p>The own funds held by the credit institution are insufficient to ensure sound management and coverage of its risks, or</p> <ul style="list-style-type: none"> - its governance system, corporate governance system and risk management system, ICAAP or large exposure management framework does not comply with the requirements defined in this Act or in other legislation governing prudent operation.¹⁹ (<i>Credit Institutions Act, Section 184 (7)</i>) 	<p>All of the measures specified in Sections 185(1)–(2) of the Credit Institutions Act, and all of the exceptional measures specified in Section 189 of the Credit Institutions Act are applicable.</p>
<p>The credit institution has supplied implicit support within the meaning of Article 248 of Regulation (EU) No. 575/2013 more than once, without attaining any significant risk transfer. (<i>Credit Institutions Act, Section 177 (10)</i>)</p>	<p>Credit Institutions Act, Sections 185(1)–(2), all of the measures specified.</p>
<p>The MNB establishes that the credit institution's economic value (the present value of expected net cash flows from its assets, debts and off-balance sheet items), calculated by taking into account a change in interest rates under Section 177(5) of the Credit Institutions Act, would decline by more than 20% of the institution's own funds compared</p>	<p>Credit Institutions Act, Sections 185(1)–(2), all of the measures specified.</p>

¹⁹ If the credit institution is subject to consolidated supervision or consolidated supervision extends to it, prior to taking extraordinary measures vis-a-vis the credit institution, the MNB — with the following exception — must conciliate with the competent supervisory authority of the EEA member state where a credit institution under consolidated supervision with the credit institution can be found. The MNB is not required to conciliate with the competent supervisory authority of the other EEA member state prior to issuing its decision on the exceptional measure if the time required for such conciliation would jeopardise the execution of the decision. In this case, the MNB must immediately notify the competent supervisory authority of the other EEA member state of the decision.

to its economic value calculated without regard to the effects of the interest rate changes, as a result of a sudden, unexpected 200 basis-point change or otherwise as specified by the EBA. (Credit Institutions Act, Section 177 (12))	
Following a review, the MNB deems that the credit institution's recovery plan is deficient or there may be obstacles to its implementation.	Pursuant to Section 177(16) of the Credit Institutions Act, the MNB requires the credit institution to rework its recovery plan within three months.
The MNB discovers any severe deficiency in the risk identification of the credit institution's internal methodology. ²⁰	Pursuant to Section 179(3) of the Credit Institutions Act, the MNB <ul style="list-style-type: none"> - requires the credit institution to correct its methodology, or - adopts measures to mitigate the consequences of the deficiency, for instance by applying higher multiplication factors, imposing additional own funds requirements or using any other suitable and effective tools.
The MNB finds that the internal methodology applied by the credit institution no longer complies with the requirements pertaining to it.	Pursuant to Section 179(4) of the Credit Institutions Act, the MNB requires the credit institution to <ul style="list-style-type: none"> - prove that the consequences of such non-compliance are not significant, or - draw up a plan for restoring compliance, specifying a deadline. (In this case, the credit institution amends its plan if the MNB deems that the relevant requirements can in all likelihood not be fully complied with based on the original plan, or the set deadline is not acceptable.)
There is a substantiated risk of the credit institution being unable to satisfy the requirements within the specified deadline and being unable to certify that the consequences of such non-compliance are not significant,	Pursuant to Section 179(6), the MNB <ul style="list-style-type: none"> - revokes the licence on the application of the internal method, - limits the licence to areas complying with the requirements or complying with the requirements within a specified deadline.
The number of overruns when applying the internal model applied by the credit institution is indicative of the internal model's lacking or no longer sufficient accuracy in terms of market risk.	Pursuant to Section 179(7), the MNB <ul style="list-style-type: none"> - revokes the licence on the application of the internal model, - imposes adequate measures to immediately adjust the internal model.

²⁰ Section 179(1) of the Credit Institutions Act requires the MNB to review, at least every three years, the internal approaches that the credit institution is authorised to use for the calculation of its capital requirement, the satisfaction of the requirements necessary for their application, and the extent to which the approaches are elaborated and up to date.

V. The supervisory review of the ICAAP

V.1 ICAAP governance and control systems – risk management

As part of the supervisory review process, the MNB will assess the operation of the institution's internal governance and control functions. If they are assessed to be of low standard, the MNB may deem it necessary for the institution to hold additional capital under the ICAAP and improve its standard of risk management. The setup and operation of the governance and control functions are subject to the detailed regulations set out in the Credit Institutions Act, the Investment Services Act and the MNB recommendation on the establishment and operation of internal safeguards, and the governance and control functions of financial organisations. This Manual provides a summary of the ICAAP governance expectations for ICAAP reviews performed as part of SREP assessments.

V.1.1 ICAAP awareness

Risk is an organic part of the activities of financial organisations. Accordingly, financial organisations are expected to develop an integrated risk culture encompassing the entire institution/group, which ensures the identification, assessment and management of the arising risks in accordance with the risk appetite and risk tolerance level of the institution/group.

The primary tools for the establishment of the risk culture are the internal policies, regulations and guidelines, communication as well as employee training. Within the organisation risk management is not exclusively the task of risk experts or the organisational unit responsible for risk management. All employees must be aware of their respective roles in connection with the management of risks arising at the institution.

Middle and senior management are expected to have knowledge of Hungarian and international ICAAP regulations, as well as of the factors of the internal ICAAP risk measurement processes, designed according to such regulations, that are relevant to the managed area.

The MNB finds it important that daily risk management practices should be followed in accordance with ICAAP risk policies, procedures and controls.

The MNB recommends the implementation of a comprehensive ICAAP risk management practice that:

- covers the entire institution/group, as well as all organisational units, business areas, institutions and activities of the institution/group,
- goes beyond regulatory compliance and is built on the internal economic substance of the risks,
- manages all risks relevant for the institution in addition to the credit, market, liquidity and operational risks, e.g. it covers concentration, reputation, compliance and strategic risks as well,
- allows for the aggregation and breakdown of the risks from the bottom up and from top to bottom across business areas and reporting lines as part of the ICAAP, as well as for the assessment and maintenance of the risks in the framework in terms of contents and methodology within the institution and the group,
- assesses the viability of the institution over the medium-term (3 to 5 years) in addition to short-term risks arising over a time horizon of less than one year and exactly one year, and
- incorporates actual senior management decision-making on the basis of the above considerations.

ICAAP risk management should ensure that the institution takes informed decisions that are based on the identification, measurement or assessment and monitoring of risks, and are back-tested at regular intervals depending on the type of risk, i.e. daily e.g. for liquidity and market risks, and quarterly e.g. for

credit risk. For systemically important institutions in the domestic or international financial intermediary system, the expected frequency is at least quarterly, and monthly where required (for example, where justified by the institution's capital position, i.e. in cases where the free capital above the capital requirement determined by the prevailing OCR rate relative to the TREA is below 2%).

V.1.2 Level of ICAAP regulation, governance and internal audit

In order for the internal capital requirement calculation system to function, it is essential that the institution has an adequate level of ICAAP regulation, and an adequate structure for approvals and regular monitoring, and that the conditions are provided for the development and regular review of these aspects at least annual intervals. The MNB expects the institution's Board of Directors and Supervisory Board to approve the key components of the ICAAP, if those are materially amended (ICAAP framework, ICAAP strategy, risk appetite).

Once the framework has been approved, the internal audit function is responsible for reviewing whether the Risk Control functions enjoy sufficient independence within the organisation. Annually, the internal audit function should carry out a review of the proper functioning and organisational embeddedness of the ICAAP framework for the group as a whole (i.e. at the consolidated level) and individual group members as follows:

- The MNB deems it acceptable if the internal audit determines the review of operation and processes of the ICAAP framework and the frequency of auditing the individual elements of the framework based on the net risk (residual risk based on the degree of risk of and the risk control quality). The MNB considers as good practice when the audit of the individual ICAAP elements takes place on the basis of risk, with a frequency corresponding to their risk weight. However, the MNB expects that all risk types – i.e. also the elements of low risk – should be reviewed at least every 3 years.
- Internal audit should verify annually, prior to the ICAAP review, the fulfilment of the tasks prescribed by the MNB and submit the result of this assessment to the MNB in advance as part of the ICAAP review. During the audits the internal audit shall take into consideration the following: an appropriate annual ICAAP audit plan should be in place, and the relevant decision-making forums of the institution should receive quarterly reports on the fulfilment of the plan and on the extent to which the deficiencies identified during previous audits have been eliminated (i.e. whether the ICAAP findings of the internal audit function had been implemented by the responsible area within the deadline),
- The internal audit should cover all group members and the ICAAP model of the institution, which should also be carried out at the group level and in a group approach, except that a simplified ICAAP framework should be acceptable in respect of subsidiaries that operate in third countries or have a sub-consolidated balance sheet total of less than HUF 500 billion in the reference period of the investigation.
- The internal audit should review the ICAAP framework in a process approach.
- For institutions applying advanced method(s), an annual report should be prepared on each portfolio or risk assessed or rated using an advanced method, with a specific audit focus on the fulfilment of the rollout schedule,
- Senior management feedback based on an internal audit assessment is also required on actual ICAAP use.

As stated above, the internal capital requirement calculation process must be integrated into the institution's risk measurement and control processes. The steps of that integration should be implemented essentially along the following lines.

V.1.3 Framework set up for the internal capital adequacy assessment process

A fundamental expectation for the internal capital adequacy assessment process is soundness. To achieve an appropriate level of soundness, the institution must have policies, procedures and models commensurate with the nature, scale and complexity of its activities.

In its evaluation, the MNB will take into account:

- whether methodologies and assumptions applied by institutions are appropriate and consistent across risks, are grounded in solid empirical input data, use robustly calibrated parameters and are applied equally for risk measurement and capital management;
- whether the confidence level is consistent with the risk appetite and whether the internal diversification assumptions reflect the business model and the risk strategies.

Apart from soundness, a prominent role is also occupied by process effectiveness. As an essential part of risk management and capital management, the institution should apply ICAAPs at all necessary levels of decision-making and management processes. The interconnections and interrelated functioning between the risk appetite framework, risk management and capital management must be adapted to the institution's business model and its complexity. The management body should demonstrate appropriate commitment to and knowledge of the ICAAP and its outcomes. Accordingly, it should be involved in the approval of ICAAP frameworks and outcomes, and, where relevant, in of the approval of internal ICAAP validation outcomes. The forward-looking nature of the ICAAP should be ensured, one of the most important means of that being the coherence between the ICAAP and the capital plans and strategy.

In its evaluation of process effectiveness, the MNB takes into account whether the policies, procedures and tools of the institution facilitate:

- clear identification of the functions and/or management committees responsible for the different elements of the ICAAP,
- capital planning: the calculation of capital resources on a forward-looking basis (including in assumed stress scenarios) in connection with the overall strategy or significant transactions,
- the allocation and monitoring of capital resources amongst business lines and risk types (e.g. risk limits defined for business lines, entities or individual risks are consistent with the objective of ensuring the overall adequacy of the institution's internal capital resources),
- the regular and prompt reporting of capital and liquidity adequacy to senior management and to the management body. In particular, the frequency of reporting should be adequate with respect to risks and business-volume development, existing internal buffers and the internal decision-making process to allow the institution's management to put in place remedial actions before capital adequacy is jeopardised, and
- senior management or management body awareness and actions where business strategy and/or significant individual transactions may be inconsistent with the ICAAP and available internal capital.

Another expectation for the ICAAP is that, by virtue of its comprehensive nature, it should provide adequate coverage of business lines, legal entities, and the risks to which the institution is or might be exposed, while also ensuring compliance with legal requirements.

For the judgment of the above, the MNB will assess in particular:

- whether the ICAAP is implemented homogeneously and proportionally for all the relevant institution's business lines and legal entities with respect to risk identification and assessment;
- whether the ICAAP covers all material risks regardless of whether the risk arises from entities not subject to consolidation (special-purpose vehicles (SPVs), special-purpose entities (SPEs)); and

- where any entity has different internal governance arrangements or processes from the other entities of the group, whether these deviations are justified.

V.1.4 Integration of ICAAP

In order to achieve the appropriate organisational and process integration of the internal capital adequacy assessment process, the unit responsible for the institution's ICAAP risk management under the applicable internal regulations should ensure the following minimum requirements:

- clearly define responsibilities and mandates to avoid conflict of interests,
- present the risk management processes,
- taking into account the principle of proportionality, divide the risk management department into sub-divisions (define and present the transparency and functionality of the organisational structure, the level of segregation, and the level of segregation of business areas, back office and risk management),
- present the internal audit and control as well as the compliance functions, (including the degree of independence of the internal control functions from the activities subject to supervision and control), ensure that the ICAAP topics are subject to an assessment of adequate quality and frequency through internal audits,
- present the MIS, controlling and internal information system,
- define the nature, scope and frequency of reporting at different levels,
- present how the risk strategy is communicated and how risk awareness is developed within the organisation (information, training),
- apply and present the group-level risk management and coordination,
- apply and present a remuneration policy that harmonises with the risk management system.

V.1.5 Risk strategy

When designing its internal capital requirement calculation mechanisms, the institution should establish its approach to risks and risk management. This approach should then be summarised in a risk strategy elaborated by senior management and approved by the management bodies. The scope and extent of the document should be in line with the size and the activities of the institution.²¹

The risk strategy must include the parent institution's ICAAP-related requirements. Accordingly, the risk strategy must define at group level the main risk factors and the types and tolerable extent of risks that can be taken. Furthermore, it is necessary to break down (cascade) the group risk strategy consistently to the individual subsidiaries.

Regarding the IT, modelling as well as risk management and planning processes that are operated by the parent bank and are used at the local level, the MNB expects that the availability and high level of institutional knowledge at subsidiary banks is ensured through training and the allocation of adequate resources.

²¹ The principle of proportionality is a key consideration during the ICAAP review. The requirements concerning internal capital adequacy depend on the type and size of the institution, its business model, the complexity of its activities and the level of risks they convey. The same criteria must be applied to the scope and depth of the risk strategy.

The steps of preparing the risk strategy

V.1.5.1 Risk-taking policy

1. Identification of group members and the scope of the ICAAP

As the first step in developing a risk strategy, the institution must specify the group of institutions that the ICAAP covers and must define what is meant by “group level” and “institution-specific” along with the relation between the two.

2. Establishment of risk management guidelines/principles

As a precondition for standardised and prudent risk management, the institution defines its risk management principles which it sets out as requirements throughout the entire organisation (e.g. independent control, increase of risk awareness, etc.). When defining the risk management principles, special attention must be paid to the fact that according to Hungarian regulations, credit institutions subject to consolidated supervision must fulfil the requirements regarding the governance system and risk management also together with its credit institution and investment enterprise subsidiaries in which it holds a controlling stake. The establishment and enforcement of a risk culture throughout the institution (group) is the basis of implementing effective risk management.

3. Identification of risk/return trade-off

The institution must specify the extent of risk/return trade-off which it still considers acceptable at strategic level. This calls for defining the expectations that the institution will take into account, for instance shareholder expectations, customer expectations, supervisory expectations, etc. In addition, the institution should consider the following factors:

- types and extent of risks that the institution intends to take and the expected returns;
- whether the institution has comparative advantages in any area;
- capital requirement of actual risks.

The weighing of the above factors enables the creation of a strategic framework which contains the target market, the targeted segments and the range of key products and services. The definition of the strategic framework also includes the specification of key target variables and indicators and the linking of an appropriate measurement system to the targets based on the risk-taking principles of the institution.

4. Backtesting

It is important to embed the risk-taking policy into a dynamic environment. The operation of existing risk management systems and models must be monitored on an ongoing basis. Results must be backtested and the models must be improved based on the experiences.

V.1.5.2 Setting risk appetite and the willingness to take risks

Risk appetite refers to the amount of risk which an organisation is ready to take and is able to tolerate. Risk appetite may differ from group member to group member. If so, risk appetites need to be presented separately.

Institutions must identify (both at group and individual levels) the relevant internal and external risk factors and draw up an accurate risk map of the exposures that are applicable to them. (With regard to the risk definitions provided in the Manual.) (With regard to the risk definitions provided in the Manual.) Each institution (or group) must have a detailed understanding of the ratio, concentration and significance of specific risk types within its portfolio. The MNB recommends that the experience gained from risk maps at the individual level, and the risk assessment results they contain, should be incorporated into the group risk map.

The institution's management body and senior management are responsible for setting risk appetite and risk tolerance levels serving the business and risk strategy of the institution (group). When setting risk appetite and tolerance, all risks taken by the institution must be considered, including the exposures conveyed by off-balance sheet activities.

The process of setting risk appetite and risk tolerance must encompass the review and modification thereof in case newly obtained environmental, business and risk information and analyses call for it.

Risk appetite and risk tolerance levels can be expressed in different forms, either as qualitative or quantitative requirements (e.g. profitability, key risk indicators [KRIs], limits). They can also address areas where the institution's risk tolerance is minimal (e.g. not preferred sectors and products).

The fulfilment of targets and requirements specified in conjunction with risk appetite and tolerance must be measured on a regular basis. This approach ensures that the set limits, risk indicators, limit frameworks, etc. are consistent with the institution's risk appetite and risk tolerance even in a stressed environment. In the course of budgeting, the institution determines the percentage of risk capital and the way of allocating it to specific portfolios based on its risk appetite.

V.1.5.3 Target risk structure

The risk preference defined in line with the risk appetite must be compared with the business strategies. The prevalence of risk/return trade-off rules determined at strategic level must be verified. The toolset for all this might be a properly designed system of limits and indicators. In this respect, the following steps are needed:

- Assignment of the limit system and indicator system to additional levels (assignment of aggregate limits to specific risk types or to more profound levels),
- Elaboration of detailed requirements or methods, or reference to the thorough regulation thereof. Institutions must be able to show on their risk map how the internal capital requirement is determined for specific risk elements, what internal processes are used for managing risks (four eye principles, incorporation of KRIs and triggers) and how these items are monitored (monitoring).

The changes in risk appetite and the extent of risks taken can be monitored and verified by using the indicators that represent the specific dimensions. This approach ensures the permanent control of the desirable risk structure and its comparison to the actual one.

V.1.5.4 Stages of risk management:

1. Comprehensive risk identification

This stage involves the revealing, definition and recording of all potential risks. Its importance derives from the fact that it sets the course of the risk management process and its stages, for the institution can control and manage only the risks which it is aware of. As part of the ICAAP the institution can estimate the material risks which it considers relevant. The range of these risks may vary depending on the size and profile of individual institutions, and the complexity of their activities. The institution is required to record and document the risks revealed during the identification process (as part of its Risk Management Policy, ICAAP documentation, etc.).

The next step is to describe and define suitable processes and systems for measuring the risks identified and to define and retrieve the necessary data from available systems and databases. The risk identification process should be flexible enough so that it is able to manage any later and newly revealed risks.

2. Specification of the extent of risk (quantification of risks and coverage factors)

Risk quantification is essential to provide an objective benchmark for decision-making both for the ICAAP risk control function and the entire institution. Risk quantification is also important because it helps the

institution identify the limits of its risk-bearing capacity. Furthermore, it is also needed for assessing the performance of the independent control function.

Apart from and in relation to the quantification of risks, the institution must also quantify any existing and potential liabilities (capital and quasi-capital elements) that provide a coverage for the risks accepted by the institution, as well as any processes with an impact on the value of the elements used for the calculation (e.g. stability of results considered by the institution, hidden reserves, etc.).

During the identification and measurement of the risks the institution must use forward looking (e.g. stress tests) and back-looking tools with which it can filter out risk concentrations as well. Forward-looking tools can be used for the identification of risks that may arise in crisis situations. Back-looking tools are suitable for the comparison of the risk profile and the risk appetite/risk toleration ability of the institution.

During the evaluation of the risks it is advised to take quality considerations (e.g. expert valuations, presumptions and limitations of the risk assessment models) into account in addition to the quantitative information and data.

It is expected that the institution should possess a well-defined, appropriately documented internal reporting system approved by the management of the institution for the risk management activity. The task of the internal reporting system is to ensure that the management of the institution, as well as persons/organisational units involved in risk management and in the implementation of the risk control function obtain adequate, timely, clear, understandable, relevant and usable information on the extension (size and type) as well as identification, measurement or evaluation and monitoring of the risks.

3. Comparison of risks and risk mitigants

Once risks have been quantified, the resulting individual risk exposure should be aggregated. The result of the aggregation will be the institution's overall risk exposure within the ICAAP. In this step, it is necessary to ensure that no risks have been omitted during the process, that risks have not been recorded redundantly and that individual risk exposures can be aggregated. Moreover, it is also important to review the assumptions on risk correlations.

Decision makers need to have up-to-date information on the facts identified by the risk management process so that they have a clear and accurate view of the institution's position and take the necessary steps in order to manage risks. Risk management decisions can be taken after risks and coverage have been compared. The transparency and clarity of the institution's risk profile are indispensable for the determination of the institution's risk-bearing capacity.

Prevention is an effective instrument of risk management. One form of it is the use of pre-defined operational limits. For each independent risk-taking organisational unit, a maximum limit should be set up to which the unit is allowed to take risks. Ex ante control should also include the preparation of contingency plans which present extreme, unexpected situations and the stress tests designed for them.

4. Risk monitoring

Risk monitoring is the process whereby an institution ensures that its (actual) risk profile is in line with its (planned, expected) risk preferences.²² During monitoring, the utilisation of pre-defined limits is checked and the exercise should also address the consequences of increasing limit utilisation or potential limit overruns.

In the case of non-quantifiable risks, process-related expectations or quality requirements are monitored. The institution summarises monitoring results in internal (risk) reports. Therefore, crucial elements of internal ICAAP reporting are the obtaining and preparation of all information (risks and risk-mitigating instruments) regarding the risk positions of individual business lines as well as the overall institution.

²² The plans/facts comparison should be performed from time to time.

These reports should be prepared on a regular basis and with a view to the specific needs of recipients (institution management and business line leaders).

5. Ex post control, feedback

Internal reports are important starting points of actions taken during ex post control. The purpose of ex post control is to enable the active influencing of risk positions defined earlier and measures previously planned but now by taking account the actual risks. It can be implemented in the following manner:

- risk reduction: measures taken to mitigate risks (e.g. involvement of additional collateral in credit deals, insurance, etc.);
- risk transfer: transfer of receivables to a third party (e.g. sale of receivables, hedge transactions);
- Reallocation of risk capital, i.e. a limit increase. It is only possible if other units have not utilised their limits in full, or if the institution is able to allocate additional capital to cover the transaction. This method can be used due to certain business considerations, depending on the institution's risk tolerance.
- Raising of cover capital: raising of additional capital (e.g. capital increase, capital issuance).

Ex post control is the last stage of the risk management process. At the same time, it can serve as a basis of further steps.

In the course of an ICAAP review, the MNB assesses the institution's risk management framework and judges the quality of senior management's information on the ICAAP, how the ICAAP is presented in MIS reports and how it is integrated into the decision-making processes and into the institution's day-to-day activities. If the risk management framework is evaluated as of poor quality, the MNB may deem it necessary to prescribe the institution to raise additional capital for covering its reported risks, besides prescribing tasks to enhance the quality of risk management.

VI. Determination of capital requirement and capital guidance

Under Pillar 2, the institution is required to determine to its best knowledge the level of capital (economic capital) it needs to cover actual and potential risks. In the capital calculation process, all material risks of the institution should be observed along with the impact of the risks on one another (integrated risk management approach), as well as the ratio and quality of capital required for covering the risks with regard to the legislative framework.

VI.1.1 Differences concerning the degree of sophistication of applied methods

The level of sophistication of the method chosen by the institution may depend on the following:

- the size and complexity of the institution (based on the principle of proportionality, smaller and simpler institutions are not expected to apply sophisticated and complicated capital requirement calculation methods);
- the weight and relevance of the risk within the institution (an institution may apply very simplistic approaches like capital cushions for negligible risks and sophisticated models to material risks);
- available (especially intellectual) resources. The institution is expected to have a thorough understanding of the approaches it applies. It should not employ models which it did not have the capacity/time to learn adequately. (This point is closely related to the first one: larger institutions usually have more resources at their disposal);
- the institution's risk appetite. One definite expectation is that an institution which takes larger risks should employ more sophisticated and more accurate methods than a risk-averse institution – at least for material risks.

Therefore, depending on the complexity and risk appetite of the institution, various approaches can be used for determining the capital requirement. Even in the simplest scenario, the required capital in Pillar 1 can be used as a starting point and it can be supplemented with capital allocated to risks not captured (or not properly handled) in that pillar. This is actually a conservative margin. Even in this case, the institution is required to provide evidence that Pillar 1 methods render a good approximation for the risks handled therein and that other risks are negligible compared to these.

Institutions with a more complex risk profile may employ an internal model to determine the capital requirement of all material risks, regardless of which pillar these risks belong to.

VI.1.2 Potential differences between Pillar 1 and 2

The handling of the same (Pillar 1) risks may be different under Pillar 1 and 2. For Pillar 2 risk management, the MNB considers it appropriate that institutions apply more sophisticated and more advanced approaches compared to those in Pillar 1. For example, an institution may use a portfolio model (e.g. Creditmetrics, Creditrisk+) in Pillar 2 instead of the portfolio-independent approach²³ employed in Pillar 1. Or, as is still frequently the case, it may identify market risks for internal purposes with an internal model, while using a standardised approach in Pillar 1 (for the calculation of regulatory capital requirements).

This freedom of choice does not only apply to the methods that serve the calculation of capital requirement – it also means the freedom of selecting the approach and the risk metrics. Apart from providing criteria on risk types that should be considered, neither CRD nor the CRR sets requirements or provides recommendations on capital calculation methods under Pillar 2; indeed, they explicitly emphasise methodological diversity. To a considerable extent, this is attributable to the need to ensure that an institution which has been using capital requirement calculation methods that essentially already comply with the new requirements (which tends to be the case with advanced institutions) should not be forced to replace those methods solely because of the implementation of CRD and the CRR. In line with the core philosophy of CRD and the CRR, however, this freedom has a price: the institution must be able to demonstrate to the MNB's satisfaction the correctness and validity of the method it has chosen.

When calculating the adequate capital, usually the “going concern” or the “gone concern” principle is used.

When the calculation is performed on a going concern basis, an amount of required capital will be determined which enables the business to continue even when significant losses are suffered (thus this principle reflects the viewpoint of owners and employees who have an interest in maintaining the business). In these cases, typically an interim, alerting capital level is set as well. The drop of capital below that limit is still not a direct threat to business continuity, yet it is a warning sign that only a slight further decrease of capital is allowed and that actions are needed to avoid it.

The use of this approach requires more than just knowing the current situation. Some assumptions need to be used (although usually very simple ones) to take into consideration the future course of business. This thinking also involves the setting of a time horizon over which the institution wishes to guarantee the continuity of its business. The reasonable length of this horizon is subject to factors such as the time of resolving potential capital shortages or the rating period of credit rating institutions. Thus, this time horizon can also be freely chosen theoretically, however usually a one-year period is used in practice, due to various reasons. A differentiation is required between the holding period and the time horizon of the capital requirement calculations (especially with portfolios that can be terminated quickly, e.g. trading portfolios). The derivation of capital requirements for the latter requires further assumptions.

When the liquidation principle is used, the amount and composition of required capital will be determined in such a way that ensures the fulfilment of all liabilities in the case of immediate liquidation (this approach

²³ This is one of the most important differences. In Pillar 1, it is not allowed to apply an internal model to credit risk which would also recognize diversification effects.

represents the viewpoint of bank deposit holders and creditors). Here it is sufficient to know the current situation and time horizon is only mentioned as the time required for winding up the positions which may differ significantly per asset type (e.g. the ten-day typical holding period for trading portfolios and the one-year period applied to credit risks).

Concerning the extent of risk, it is increasingly common to use VaR and its more consistent variants (expected shortfall, etc.) besides “traditional” distribution methods. VaR-type metrics require the setting of a confidence level and it is an obvious expectation that this level should be identical for different risk types (although in Pillar 1 different levels belong to credit and market risk).

If the institution chooses to use the going concern basis and VaR-type risk metrics, the capital requirement has to be set in a way that it provides adequate coverage against potential risks for a certain period and at a specific level of security.²⁴

One may ask if a confidence level lower than that in Pillar 1 can be used for the calculation of economic capital. During the ICAAP capital requirement calculations, the MNB expects the application of a 99.9% confidence level. In the ICAAP, the institution may apply a confidence level which is different from that in Pillar 1, but then the two results will not be comparable. The institution, however, needs to provide for comparability, i.e. it must be able to demonstrate its capital requirement calculations for individual risks also at the confidence levels defined in Pillar 1.²⁵ The application of a higher confidence level reflects a more conservative approach and the MNB will accept it when performing the comparison to Pillar 1.

Another question is whether different holding periods can be applied to specific risks. Different holding periods are natural in the liquidation approach, because the termination time of individual portfolio types is not identical (which also explains e.g. the differences in holding periods in Pillar 1).

It should be borne in mind that, while the institutions must be able to base their choice of methods on appropriate arguments, they must also be able to demonstrate the relationship between their own capital requirement calculation and Pillar 1 capital requirement. The more distant the approach used in Pillar 2 is from its Pillar 1 counterpart, the more complex this task is. Accordingly, institutions are expected to be able to justify any disparities in Pillar 1 and Pillar 2 definitions.

There should be no discrepancy between the two pillars regarding the definition and amount of own funds, as the MNB will only accept, as of 1 January 2015, the own funds items defined as eligible in the CRR as capital available for covering risks during the calculation of SREP capital adequacy²⁶.

VI.1.3 Allocation of capital

In principle, except for the determination of the economic capital of group members, capital allocation is not closely related to capital adequacy. In reality, however, it controls capital requirement calculations through the breakdown and assignment, at the level of organisational units and exposures, of capital that has been determined and aggregated in other ways. If allocation is linked to performance measurement or pricing, it suggests that the institution takes the capital requirement calculation seriously and applies it in its day-to-day operations (use test). The MNB regards this circumstance a material criterion for its judgment on the reality and reliability of capital requirement calculations.²⁷

VI.1.4 Determining the required capital after the supervisory review

After the supervisory review process, the MNB determines the required capital of the institution. During this process, the MNB:

²⁴ This solution is the most common practice. The time horizon is typically 1 year but it can be longer in certain cases.

²⁵ The confidence levels required in Pillar 1 are more compliant with the stricter liquidation approach

²⁶ The MNB's expectation is in line with the EBA SREP Guidelines

²⁷ We found at several institutions that although allocation for the purpose of performance measurement and pricing exists, this allocation does not encompass Pillar 2 capital (but typically Pillar 1 instruments). If so, the MNB will be led to assume that the institution's Pillar 2 capital requirement calculations are rudimentary and lack internal acceptance.

- determines additional own funds requirements, subject to the Pillar 1+ approach in determining Pillar 2 capital requirements;
- establishes harmony between the additional own funds requirements, mandatory capital buffers and any macroprudential regulations that may have to be considered;
- defines and communicates the total SREP capital requirement (TSCR) and the SREP capital requirement ratio, and determines the overall capital requirement (OCR) taking into consideration the ICAAP+ rule;
- defines and communicates the total SREP leverage ratio requirement (TSLRR) and the related overall leverage ratio requirement (OLRR),
- assesses whether the prescribed total SREP capital requirement and the overall capital requirement are expected to be sufficient, under both normal and stressed conditions, as well as the SREP leverage ratio requirement and the total leverage ratio requirement.

VI.1.4.1 Determination of additional own funds requirements

The MNB determines additional own funds requirements in order to ensure that at the institution they cover:

- unexpected losses arising over the next 12 months and the difference between the calculated expected loss and the provisions made (shortfall),
- any risks arising from model deficiencies that result from an underestimation of the various risks measured by the models;
- any potential risks not covered or insufficiently covered by the methods applied in Pillar 1;
- any risks arising from governance and control functions or other deficiencies.

The additional own funds requirements determined by the MNB in order to cover unexpected risks must be met by institutions on a continuous basis, typically until the closure of the next supervisory review. The MNB determines additional own funds requirements on a risk-by-risk basis. Besides the institution's ICAAP calculations, for this exercise, the MNB relies on the results of supervisory benchmark calculations and any additional information available. When determining additional own funds requirements, the MNB will base its calculation on the ICAAP, provided that it has found it acceptable, adjusting it, to the necessary extent, on the basis of supervisory benchmark calculations and other relevant information. If the MNB does not deem the ICAAP calculations reliable, it will use supervisory benchmark calculations as a starting point and modify them on the basis of relevant inputs when necessary.

The MNB assesses the reliability of ICAAP calculations according to the following aspects:

- adequate granularity: the methods and procedures applied should be suitable for calculating not only aggregated risk but also individual risk types;
- credibility: the methods and calculations applied should be suitable for the measurement and assessment of the specific risk and should be based on adequate models and conservative assumptions;
- soundness, clarity: the basis of the applied methods and calculations must be determined precisely; "black box" is not acceptable as a calculation method. At supervisory request, institutions should be able to indicate the areas where the applied models proved to be imprecise or erroneous and explain how this will be considered during the ICAAP calculation;
- comparability: the holding period, risk horizon and confidence level used for the ICAAP calculation should be comparable to the relevant variables of similar institutions and to supervisory benchmark estimates.

During the calculation of the Pillar 2 capital requirement MNB applies the Pillar 1+ approach, wherein it regards the regulatory capital requirement as the minimum capital level on a risk-by-risk basis, and no longer accepts, for the coverage of additional own funds requirements, the regulatory capital required to cover the risks under Article 92 of CRR either for individual risk types, or at the level of the total capital requirement. The Pillar 1+ approach is to be applied both in the main risk categories (credit risk, operational risk, market risk) and in individual sub-categories of risk. Obviously, the latter should only be construed for risk categories managed in Pillar 1 (e.g. lending risk, counterparty risk, CVA, settlement risk, trading book and foreign exchange risk). Consequently, where an institution sets a lower Pillar 2 capital requirement than that under Pillar 1, the MNB will set the SREP capital requirement at the Pillar 1 level (unless additional own funds requirements are determined for other reasons, resulting in an SREP capital requirement that already exceeds the Pillar 1 capital requirement).

In Pillar 2, the lower capital requirement set by the institution is due to the methodological difference between the two pillars and the diversification effect within the risk. In accordance with the provisions of Article 98(1)(f) of CRD, within all major risk categories the MNB assesses whether the diversification effect in the capital requirement calculation should be taken into account; however, even when the diversification effect is taken into consideration the capital requirement calculated for the given risk must not be below the minimum regulatory capital requirement defined in Article 92 of CRR.

According to the EBA SREP Guidelines the diversification effect between the risks must not be taken into account when calculating the Pillar 2 capital requirement. Thus, for example, the diversification effect between banking book and trading book risk cannot be recognised.

The MNB determines additional own funds requirements in order to ensure that they adequately cover all relevant risks. If the additional own funds requirements calculated by the MNB differ significantly from the result of the institution's ICAAP calculation, the MNB will provide a justification for the result of its calculation, and will discuss it with the institution as part of a dialogue. If the MNB only considers aspects that are not uniquely specific to the institution, it shall apply its methodology on a consistent basis to ensure consistency between the institutions.

The MNB aims to take into account to a certain extent non-measurable, quantifiable factors and information in the determination of the SREP capital requirement, and to reflect the experience of continuous oversight in the capital calculation, thereby strengthening the link between the SREP capital requirement and the SREP viability score. To this end, the MNB may modify the SREP capital requirement defined by quantitative methods based on qualitative criteria. Upon a qualitative diversion of capital requirement, the risk score may be taken into account primarily for capital (credit and operational) risks, and the viability score for P2G , inter alia.

In its Recommendation published in May 2023²⁸, the MNB set out its expectations for the detection, prevention, avoidance and management of fraud through payment services, thus promoting the development of common practices in areas not covered by legislation. The MNB will assess the quality of the implementation of the Recommendation by the relevant institutions and the adequacy of cyber protection measures based on an internal set of criteria, which assessment may lead to the imposition of a second pillar capital add-on requirement in the ICAAP reviews starting in 2025.

VI.1.4.2 SREP Capital Requirement

Based on the Pillar 1+ method, the MNB determines the amount of the SREP capital requirement as the sum of the following items:

- **sum of minimum own funds requirements as set out in Article 92 of the CRR (P1R)**

²⁸ [Recommendation No 5/2023 \(VI.23.\) of the MNB on the prevention, detection, avoidance and management of fraud through payment services](#)

- and the additional own funds requirements established under the SREP and, if necessary, the additional capital requirement to cover significant concentrations of different types of risk (P2R).

The MNB determines the total SREP capital requirement as a percentage of the total risk exposure amount ($TREA = P1R * 12.5$) (TSCR).

When determining the TSCR ratio, the MNB shall also take into account the ICAAP+ methodology, according to which it regards the ICAAP capital requirement determined by the credit institution as a lower bound (floor)²⁹. Under SREP, the credit institution's capital requirement may fall below the level of the ICAAP capital requirement only upon enforcing the preferential capital requirement provided by the MNB³⁰.

In determining additional own funds requirements, the MNB follows the EBA SREP Guideline, which prescribes the application of the ratios applicable to regulatory capital requirements under Pillar 1 for the imposition of SREP capital requirements. Accordingly, the TSCR is composed as follows:

CET 1 capital ratio: minimum 56.25% (4.5/8) of TSCR,

T1 capital ratio: minimum 75% (6/8) of TSCR,

T2 capital ratio: maximum 25% (2/8) of TSCR.

In the letter closing the SREP, the MNB identifies for each individual institution the items to be used to meet the capital requirement, and may articulate stricter expectations than the ratios defined under Pillar 1 as appropriate. The institution may also meet the capital requirements set by the MNB with higher quality capital than required, i.e. the T2 capital requirement may be met with CET1 and T1 capital, and the T1 capital requirement with CET1 capital. The MNB may also prescribe the composition of the additional regulatory capital that should be used to cover specific risk types. As of 1 January 2015, the MNB may only consider items and instruments deemed eligible by the CRR for the determination of own funds in the calculation of the total SREP capital requirement.

The MNB ensures consistency in setting additional own funds requirements and communicating them to the institution and, where relevant, to other supervisory authorities. The communication toward an institution must include at least the SREP capital requirement as a percentage of the TREA, broken down in terms of the composition of the requirement and on a risk-by-risk basis.

VI.1.4.3 SREP ratio, TSCR ratio

The total SREP capital requirement is the sum of the Pillar 1 capital requirement and the Pillar 2 (SREP) additional capital requirement (P2R). $SREP\ ratio = 1 + P2R/P1R$, while $TSCR = SREP\ ratio * 8\%$.

In exceptional cases, the MNB is entitled to deviate from the calculation methodology presented above in order to prevent the additional capital requirement from dropping below a pre-determined level.

Example

Supervisory additional own funds requirements are established at 137.5% of Pillar 1 (SREP ratio 137.5%, TSCR = 11%), which is an additional capital requirement of +3% for TREA.

The regulatory capital of the institution is 100, its CET1 capital is 70, and its T1 capital is 85.

Its total risk exposure is 1000, overall capital requirement under Pillar 1 is 80 ($1000 * 8\%$), and its total Pillar 1 capital adequacy ratio: $100/1000 = 10\%$

Amount of the supervisory additional capital requirement: $80 * 0.375 = 30$

²⁹ If the overview sheet contains figures not supported by the institutional ICAAP calculations, the MNB may request that the overview sheet be resubmitted.

³⁰ The preferential capital requirements described in Section V.2.1.30.

TSCR is 11% of TREA, to be broken down as follows:

CET1 part: minimum 6.1875% (11%*56.25%), amounting to 61.875 (1000 * 6.1875%),

T1 part: minimum 8.25% (11% * 75%), amounting to 82.5 (1000 * 8.25%),

T2 percentage: maximum 2.75% (11% * 25%), amounting to 27.5 (1000 * 2.75%)

VI.1.4.4 Combined capital buffer requirement

In addition to the SREP Capital Requirement, other than the mandatory capital conservation buffer, additional macroprudential capital buffers may also be required for the institution in question, of the following types:

- Countercyclical capital buffer

The MNB is the authority designated to determine the Hungarian countercyclical capital buffer rate. On a quarterly basis, the MNB sets the benchmark countercyclical capital buffer rate as the basis for determining the countercyclical capital buffer rate for Hungarian exposures and publishes its methodology in a communication. The applicable countercyclical capital buffer rates are available on the MNB's website and updated quarterly according to the dates of Financial Stability Board (PST) decisions. Institutions must maintain institution-specific countercyclical capital buffers.

- Capital buffer for systemically important institutions

The legal status of globally and other systemically important institutions, as well as the prudential rules applicable to them, are governed by the regulatory framework of CRD (Credit Institutions Act). To identify other systemically important credit institutions in the European Union uniform principles are applied and it is carried out in accordance with EBA guidelines (EBA/GL/2014/10). The list of institutions identified by the MNB as systemically important as well as the extent of the related capital buffer requirement and the timing of the introduction are available on the MNB's website. The MNB will adopt specific decisions to notify individual institutions about the extent of the capital buffers to be maintained.

- Systemic risk buffer

Under the CRD, in the exercise of national discretion, national authorities in each Member State may require the credit institution sector or one or more subgroups of the sector to set up a systemic risk buffer in addition to minimum capital requirements. This is possible where there is a need to prevent or reduce non-cyclical systemic risks or increase the resilience of the financial intermediary system. The MNB will inform the institutions about the systemic risk capital buffer to be introduced by publishing it on its website. The MNB will adopt specific decisions to notify the institutions concerned about the extent of the capital buffers to be maintained.

All of the capital buffers listed above (including the capital conservation buffer) must be provided by the institution with the highest quality (CET1) capital in addition to the regulatory minimum and the additional own funds requirement set in the supervisory review. Capital buffers are set as a percentage of TREA (for example, the capital conservation buffer is 2.5% of TREA).

Within the meaning of Article 93 of the Credit Institutions Act, the combined buffer requirement is to be calculated by aggregating the capital conservation buffer, the institution-specific countercyclical capital buffer requirement, the capital buffer requirement for globally systemically important and other systemically relevant credit institutions, and the systemic risk capital buffer requirement. Under the rules of aggregation, the higher of the capital buffer requirement for systemically important and other systemically important credit institutions, and the systemic risk capital buffer requirement, is to be applied unless the systemic risk capital buffer requirement applies only to Hungarian exposures.

VI.1.4.5 Overall capital requirement (OCR)

Overall capital requirement includes the minimum regulatory capital requirement, the additional own funds requirements imposed as a result of the supervisory review process, the capital conservation buffer, and the macroprudential capital buffers listed above.

The overall capital requirement (OCR) is calculated as follows:

OCR = TSCR + combined buffer requirement

In consideration of the provisions of the CRR, the MNB also prescribes the required composition of the overall capital requirement (OCR):

minimum X% in Common Equity Tier 1 capital (CET1);

minimum X% in Tier 1 capital (T1).

VI.1.4.6 Pillar 2 capital guidance (P2G)

In line with EBA's expectation, the MNB introduced a new Capital Guidance (P2G) from 2019 on the capital adequacy of Hungarian credit institutions. Capital Guidance is a supervisory recommendation for maintaining additional capital over SREP capital requirement (TSCR) and the combined buffer requirement. The recommendation is expressed as a percentage of TREA. Since the recommendation does not qualify as a capital requirement, there is no direct sanction in cases where an institution's capital level falls below the minimum level set by the supervisory authority in the framework of Capital Guidance but does not violate the capital buffers (OCR); nevertheless, intensive supervisory dialogue will be initiated in such cases. Institutions must use items of Common Equity Tier 1 capital (CET1) to cover P2G.

VI.1.4.7 Pillar 2 capital guidance related to the risk of excessive leverage (P2R-LR)

In line with the expectations of EBA, from 2023 the MNB will integrate in the ICAAP reviews the assessment of the additional capital requirement related to the risk of excessive leverage.

In accordance with Article 104(1)a) of Directive 2013/36/EU, the MNB may prescribe additional regulatory capital requirement to manage the risk of excessive leverage. The MNB assesses the institution's risk of excessive leverage based on a system of ratios and limits, and depending on the result of that it may prescribe additional capital requirement.

VI.1.4.8 The Total SREP leverage ratio requirement (TSLRR)

Sum of the regulatory capital requirements specified in Article 92(1)d) of the CRR and the additional regulatory capital requirement calculated on the basis of Chapter **Error! Reference source not found.**

VI.1.4.9 Overall leverage ratio requirement (OLRR)

Sum of the total SREP leverage ratio requirement (TSLRR) and the capital buffer requirement for the leverage of global systemically important institutions, in line with Article 92(1a) of the CRR³¹.

In line with the EBA SREP Recommendation, requirements connected to the leverage ratio shall be satisfied by T1 capital, as a minimum, but – in justified cases – the MNB may also prescribe for the additional capital requirement the provision of capital of higher quality than that.

VI.1.4.10 Pillar 2 capital guidance related to the risk of excessive leverage (P2G-LR)

In line with the expectations of EBA, as of 2023 the MNB will integrate in the ICAAP reviews the assessment of the need for supervisory capital guidance related to the risk of excessive leverage. The

³¹ When the manual was revised in 2023, none of the institution falling within the scope of ICAAP reviews was a global systemically important institution; accordingly, TSLRR=OLRR.

purpose of this is to define the level and quality of the supervisory capital to be held by the institution in excess of the overall leverage ratio requirement (OLRR), similarly to the P2G methodology.

In line with the EBA SREP Recommendation, the capital guidance related to leverage ratio shall be satisfied by T1 capital, as a minimum, but – in justified cases – the MNB may also prescribe the provision of capital of higher quality than that.

VII. Supervisory expectations for the internal capital requirement calculation and liquidity adequacy assessment of small institutions, and the applicable supervisory review and evaluation process

VII.1 Application of the principle of proportionality

The principle of proportionality is a key consideration of any supervisory review. Supervisory expectations concerning the ICAAP and ILAAP depend on the

- nature,
- scale,
- complexity
- and, naturally, the risk exposure of the institution's activities.

Thus proportionality is a relative term and results from the review of multiple factors as listed above. It should be noted that the principle of proportionality applies to all institutions that are subject to the CRD, which means that both the depth of the supervisory review and evaluation process (SREP) and the intensity of the dialogue with the institution will vary according to the above factors. During the SREP, so-called small institutions should be mentioned and differentiated.

VII.2 Definition of small institutions

Credit institutions that meet most of the criteria listed below are considered small institutions:

- its activities are non-complex and focus on a limited product range,
- it has a relatively small market share,
- it does not use any advanced methods which are approved by the MNB to calculate the capital requirement of credit, operation or market risk,
- it mainly operates in the territory of Hungary and does not have any significant cross-border activities,
- it describes itself as a small institution in its own assessment.

The final decision is taken by the MNB as to whether an institution can be treated as a small institution.

Concerning the elaboration of the ICAAP and ILAAP at small institutions, the MNB recommends that interest representation organisations, central organisations and professional associations play a coordinating, directing role in that process. These organisations may elaborate guidelines and methods for the ICAAP or ILAAP for their member institutions, which the institutions can adapt and apply in their operations. In this case, the MNB will negotiate the compliance of the methods with the interest representation or other central organisations which elaborated them. Nevertheless, the MNB will review the application of the methods upon the review of individual institutions as well.

VII.3 Supervisory expectations concerning the ICAAP of small institutions

While individual principles can be applied proportionally, small institutions, too, have to meet all ICAAP related requirements of the MNB³².

This way, all relevant risks should be taken into consideration in the internal capital requirement calculation process. The purpose of making the ICAAP mandatory for institutions is not just to establish compliance with the capital requirement regulation, but to make the ICAAP a key management instrument for institutions that are subject to the regulation. The purpose of implementing and regularly employing the ICAAP is to strengthen the risk-aware governance of institutions, to measure the institution's risk level regularly and to determine the amount of capital that is necessary to cover unforeseeable losses. The ICAAP includes several elements which institutions have been using already: partly in their annual business and strategic planning processes and partly for calculating the capital adequacy ratio which has been a standard requirement to date.

Small institutions can comply with obligations set out in domestic ICAAP regulations by examining their exposure to risk types listed herein and the amount of capital which serves to cover those risks. There might be other risks; however, which are not presented in this material. In these cases, it is the institution's responsibility to ensure that the ICAAP considers such risks as well. Institutions should also be aware that capital is only the ultimate mitigant of risks and that the use of more efficient risk management and control methods can mitigate those risks.

VII.4 Methodologies applied by institutions subject to simplified ICAAP reviews

There is no one single correct process when setting up the ICAAP. Small institutions could, for example, adopt a method based on the Pillar 1 minimum capital requirement to assess the need for additional own funds requirements in respect of any non-Pillar 1 risk types.

An institution choosing this method needs to assess the following:

- whether the capital requirement calculated on the basis of Pillar 1 appropriately reflects all material risks on a risk-by-risk basis;
- amount of capital that should be allocated due to Pillar 2 risks and due to exposures deriving from external factors.

Similarly, small institutions can choose the building block approach, using different methodologies for the individual risk types and then calculating the sum of the resulting capital requirement. When choosing to employ this approach, the institution has to consider if it is able to collect the information necessary for operating this model and if it is in possession of the instruments required for capital requirement calculations.

An institution which chooses to use a structured approach will need to assess separately the capital amounts for all Pillar 1, Pillar 2 and external risks and then add up the capital requirement calculated for the individual risk types. Sensitivity analyses can be used for determining whether a risk type should be considered relevant or not.

VII.5 Steps of internal capital requirement calculations

Regardless which methodology a smaller institution decides to adopt, it needs to compare its actual and future capital with the actual and future internal capital need arising from the assessment. The preparation of a capital plan is of key importance. The internal capital requirement calculation consists of

³² Proportionality in the MNB's requirements is only applicable to compliance with ICAAP guidelines 6-10. Every institution must fully comply with the first five ICAAP guidelines.

a number of steps: the identification of risk exposures and, based on these exposures, the calculation of required capital.

- Risk identification: as the first step, the institution has to draw up a list of relevant risk types. When doing so, the primary reason of past losses should be identified along with the likelihood of the occurrence of similar losses. Upon compiling the list, not only historic information should be considered but expected future events as well.
- Capital assessment: for each risk listed as relevant, an assessment is to be made of the potential loss which the risk can cause to the institution. The amount of capital to cover these risks can be calculated as the sum of all such potential losses.
- Forward capital planning: the institution should not only consider the present situation but also assess the amount of capital which will be available to it and see if it is in line with the likely capital requirement based on the institution's business plan.
- Profit or loss that is in line with the profit or loss in the institution's Business Plan and its Strategy (the profit figure in the Capital Plan, which increases the regulatory capital figure, should match the profit planned in the Business Plan and the Strategy, taking into account the Dividend Policy).

Based on the above steps, the institution has to determine the amount of internal capital it should hold with a view to the actual situation and expected future events. It must determine the quality and ratio of the capital items required for covering the risks.

VII.6 Typical risks of smaller credit institutions

In respect of small institutions, typically the following main risks are assessed:

- control/management risk (internal governance),
- credit risk,
- concentration risk (individual customers, geographical, industry-specific),
- interest rate risk,
- liquidity risk,
- operational risk,
- strategic risk,
- risk of external factors.

Obviously, individual credit institutions may have further risks, which should be evaluated by the institution concerned.

VII.7 Supervisory review in small institutions

In the case of small institutions, the MNB conducts annual simplified reviews (except for small institutions where the MNB opts for a different ICAAP review method). This method can ensure that all of the information necessary for the MNB to make decisions in the course of the supervisory reviews are efficiently collected and processed despite the large number of small institutions.

The MNB updates the questionnaire every year and conducts its survey using this questionnaire; it compares its results with the information received from data supply as well as on-site and off-site reviews, as a result of which it identifies the institutions against which a supervisory measure needs to be taken in the context of the supervisory review.

If, in application of the ICAAP, the small institution identifies a need for a higher capital requirement and the MNB does not impose additional own funds requirements, the MNB will consider the higher capital requirement calculated by the institution as the total SREP capital requirement. The MNB will reduce the higher additional capital requirement calculated by the institution with the capital discounts applicable to green housing loans, corporate and municipal loans and/or the DLT project when determining credit risk capital requirement, while also ensuring the application of the Pillar 1+ approach, i.e. the credit risk capital requirement must not fall below the Pillar 1 capital requirement even after the discounts.

The assessment of the liquidity adequacy of individual institutions is also included in the supervisory review process (unless it is done during the annual ILAAP review). During the review, the MNB evaluates the institution's liquidity buffer and financing policy, as well as its regulations and mechanisms designed to measure and address liquidity and funding risks. When assessing the liquidity adequacy of small institutions, the MNB will give preference to appropriate risk management over raising an additional liquidity buffer.

VII.8 Supervisory measures relevant for small institutions

The main objective of the supervisory review is to ensure for small institutions a risk-conscious operation and efficient prudential supervision rather than imposing additional capital generation. Nevertheless, if the MNB deems necessary that, based on internal or external characteristics of the institution, its Pillar 1 or ICAAP capital requirements are not in conformity with the risks assumed, it may – similarly to large institutions – set an additional capital requirement.

The relationship between the deficiencies detected at small institutions and the supervisory measures to be applied within the framework of the supervisory review is presented in the tables included in the annex. The MNB provides the tables, the categorisation of deficiencies and the percentage of the additional capital requirement as a starting point, nonetheless, other aspects may arise and be considered.

The imposition of additional own funds requirements is not the only tool for measures taken within the framework of the supervisory review. Other tools may include requests for risk reduction, requests for the improvement of the quality of risk management, for the modification of internal regulation, or for organisational change, requirements for internal education and training, or proposals for hiring of new managers or experts. If the given problem or deficiency is eliminated, it is taken into account by the MNB during the next supervisory review. In justified cases, changes may take place in the institution's market position, business activity, risk profile or risk management system which changes significantly influence the internal capital requirement, the institutions may propose interim review of the capital ratio, or the MNB may decide to conduct an extraordinary SREP.

VII.8.1 Supervisory measures at small credit institutions

As part of the supervisory review, a demand for the implementation of measures must be issued, or additional own funds requirements must be imposed on a credit institution where any of the risks listed below exists and is accompanied by a deficient internal control system and insufficient capital coverage, and thus, overall, prudent operation is not guaranteed:

- the institution operates under conditions that are riskier than the average (e.g. geographical environment, higher-risk clients)
- any of its indicators shows a higher risk level (e.g. poor asset quality, operational losses, liquidity difficulties, high interest rate risk, concentration risk, etc.),
- the MNB or any other external audit reveals management, risk management or internal control problems,
- recent frauds, abuses or operational problems have been revealed jeopardising long-term operation,

- the institution is engaged in an activity that is not typical for small institutions (e.g. cross-border services, trading of advanced derivative instruments, purchase of foreign securities),
- the institution launches new activities or penetrates new markets which will presumably have a significant impact on its operation, and is continuously engaged in acquisitions,
- in contrast with its strategic objectives, the institution loses a significant market share in its scope of operation, the number of its clients and volume of its business fall to a level that jeopardises further operation,
- the financial terms and conditions the institution offers significantly differ from the usual market terms and conditions and, according to the MNB's assessment, this entails an unsustainable business model;
- the institution fails to comply with fundamental procedures set out in supervisory recommendations and methodology manuals thus jeopardising prudent operation;
- the institution lacks management knowledge, expertise or technical and IT conditions which would be indispensable for the activities it is engaged in or the risks implied therein,
- trust by its clients or market partners towards the institution declined,
- the institution's strategy cannot be regarded well-founded due to the expected macro-economic and sector-specific conditions and to its position and business activity,
- the quality of the ICAAP/ILAAP applied by the institution is not adequate,
- the institution does not perform sensitivity analyses or stress tests to determine the growth rate of its material risks in significant economic recessions and to define the volume of capital needed to cover such risks;
- the behaviour of the institution's owners does not allow for the efficient functioning of owner's control.

Due to the limited possibilities of tailor-made assessments, the level of the additional own funds requirements is calculated in a pre-regulated way according to the relative frequency rate of the MNB's risk categories: high (category 1), medium (category 2) and low (category 3). For the purpose of guidance, the typical presence of low, medium and high risks results in an additional capital requirement of 33%, 66% and 100%, respectively, of the regulatory capital requirement, but the actual final figure is mostly subject to further assessment.

VII.9 Closing the supervisory review

After processing the questionnaires and any other documents requested during the review, the MNB will send a prudential letter to the institutions to inform them of the review results (together with the results of consultations, if any). The MNB documents the quantified result of the supervisory review process in the SREP Review Form attached to the prudential letter. If the MNB does not see compliance with the prescribed total SREP capital requirement (TSCR) and the overall capital requirement (OCR) guaranteed, it may issue a resolution to call for the institution to provide additional capital.

Chapter 2 Assessment of material risks of ICAAP review

VIII. Overview of material risks

In this chapter we review the fundamental risks emerging in the operation of institutions in order to provide guidance for the identification and measurement of material risks in the internal capital adequacy calculation process. For each risk, we provide the definition of the risk concerned, its possible elements (risk segments), and the principles and main supervisory requirements for the management of the risk.

However, even the supervisory review process should not overlook the main provisions of the directly applicable CRR, or the related recommendations and implementing regulations, as they often offer guidance in respect of Pillar 2 requirements.

Institutions must seek to map each of their material risks to the risks defined in this chapter of the Manual. Special risks definitions as described in the chapter “Other risks” should only be used if the scope of the underlying risk is truly different from the risk types presented in this chapter.

Furthermore, after the identification of their material risks, institutions must make efforts to apply an integrated risk management approach for generating a standardised, single view of their risks. Individual risks are often difficult to separate, strong interactions may exist between them and a certain type of risk may transform into a different type as a result of external effects. One example is the impact that the increased exchange rate risk conveyed by foreign exchange loans have on credit risk.

For the proper identification and management of risks, it is essential that institutions have reliable and consistent data so that adequate data quality is ensured.

VIII.1 Credit risk

Definition

Credit risk refers to the threat of losses affecting the institution’s profitability and capital position as a result of the non- or non-contractual performance of contracted partners’ payment obligations arising from credit relationships, deferred payments or other credit-type relationships, i.e. failure to fulfil on- or off-balance sheet liabilities to the institution.

To assess credit risks, the institution should consider the following sub-types of credit risk:

- the default risk in relation to a bank loan as mentioned above
- the risk of certain investments (typically bonds), where payment is not executed in accordance with the contract
- default risk of other contractual partner or customer
- dilution risk
- counterparty risk (credit risk against professional financial and capital market participants)
- specialised lending exposures (exposures the risk of which depends on the profitability of the asset or project being financed, e.g. commercial real estate, power plant, commodity)
- risk of foreign currency lending
- settlement risk
- concentration risk
- country risk
- residual risk
- securitisation risk
- default risk of insurance companies.

Risk assessment and management

Institutions must cover credit risk through measures, procedures and/or capital.

During the ICAAP, the institution sets out the process whereby it calculates the capital requirements for credit risk, the systems of procedures for assessing and monitoring these risks (both inherently and as

part of controlling) and the process of verifying that the calculated capital requirement provides, overall, adequate capital for unforeseen/unexpected losses associated with credit risk.

In terms of credit risk, as part of their ICAAPs institutions should consider all the components that determine potential credit losses, and in particular: the probability of a credit event (i.e. default), or correlated credit events, that mainly concerns the borrowers and their ability to repay relevant obligations (PD); the size of exposures subject to credit risk (EAD); and the and the loss given default rate (LGD) of the credit exposures in the event of default For all these components, institutions should take into account the possibility that these components may deteriorate over time and worsen compared to expected outcomes.

The institution should assess not only its current credit risk but also its future credit risk, and link it to its credit risk strategy, planning, and stress-testing framework. To do this, the institution should take into account how macroeconomic developments related to baseline and stress scenarios affect the determinants of credit risk.

Within the ICAAP framework, the governance and risk management framework underlying the lending activity includes the following elements:

- a credit risk strategy and appetite that are reasonably and clearly designed and documented, and have been approved by the management body,
- an appropriate organisational framework to enable effective credit risk management, measurement and mitigation, with sufficient human and technical resources to carry out the related tasks,
- policies and procedures for the identification, management, measurement, mitigation, monitoring and reporting of credit risks, as well as practical procedures consistent with those policies and procedures,
- an internal control framework aligned with the credit risk strategy and appetite.

Capital requirement calculations

The CRR allows three approaches to calculate regulatory capital requirements for the credit risk of exposures in the banking book. The first two are the foundation (FIRB) and advanced (AIRB) internal ratings based (IRB) approaches. Supervisory approval is required for the application of these advanced methods.

The third, simplest approach is the standardised approach. Institutions applying the standardised approach are expected to ensure that the adequacy of classification according to exposure classes be supported by regulations and documentation. It is especially important to specify the conditions for inclusion in the retail portfolio at the policy level (e.g. in the risk taking and risk management policy, etc.), as well as to define other product characteristics (standardised products). The regulation must also include the definition of granularity³³.

During the calculation of the capital requirement the MNB accepts the following management solutions in connection with the management of granularity:

- classification of the products into so-called “pools”, i.e. identification of products that “behave” similarly (involving identical or standard conditions, limited amounts, etc.). Minimum transaction numbers should be determined for individual pools in order to meet the granularity requirement.
- Definition of the average size of credit per contract in connection with the exposures in the retail portfolio in accordance with points a) and c) of Article 123 of the CRR and the

³³ According to Article 123(b) of the CRR: “the exposure shall be one of a significant number of exposures with similar characteristics such that the risks associated with such lending are substantially reduced.”

subparagraphs thereof on the management and capital requirement of credit risks, and the provision of a relevant distribution threshold.

This means that the institutions must determine their retail exposures so that the individual exposure risks should be adequately small proportionately to the entire portfolio. The institutions may use indicators measuring the portfolio concentration to assess this.

Concerning the default risk, Pillar 1 does not allow the use of “real” credit risk models (i.e. models that also reflect portfolio effects) even in the case of AIRB, whereas Pillar 2 permits their use. Several of these models are available on the market (e.g. Creditmetrics, Creditrisk+), which, however, may carry significant model risks due to calibration difficulties³⁴. For the judgment of these models, the MNB tries to understand and reconstruct the model and its mechanism, but benchmarking is also an important tool for evaluating the model, during which the MNB compares the results of the portfolio model used by the bank with the results of the IRB model (or its simulation in cases where the granularity of the exposures is insufficient).

ICAAP review

Credit risks represent the most important risks for credit institutions falling within the scope of the CRD and constitute the vast majority of the total risk exposure and capital requirement. Accordingly, the MNB stresses that credit risk factors should be fully identified and adequately taken into account, and the credit risk capital requirement should be defined in a prudent manner.

With respect to the importance and complexity of credit risks, in parallel with the above, additional capital requirements are typically determined for institutions which are subject to comprehensive and focused ICAAP reviews and do not use risk sensitive methods based on internal ratings and calculations in Pillar 2. The additional capital requirement is typically warranted by the potential risk(s) stemming from the assessment of risk exposure without sufficient depth and sophistication. The MNB’s general assessment experience is that the standardised approach underestimates the risks. Accordingly, in its ICAAP reviews the MNB quantifies capital requirements on the basis of IRB simulations, supervisory benchmark methodologies and models for a more accurate judgment of the risks.

The MNB also avails itself of the ability to determine the capital requirements of a particular institution in application of benchmark models developed on the basis of other banks’ data, parameters, risk weights and peer group data, for example where the institution’s own data do not allow estimations, or the estimates obtained would not be reliable, observations for downturn periods are missing, or data quality is insufficient.

The evaluation methodology followed by the MNB in the course of Pillar 2 reviews cannot be precisely defined because of the complexity of lending processes and capital requirement calculations as well as due to the multitude of possible consistent and prudent approaches. Nevertheless, the general aspects associated with each element and area of credit risk models are clearly identifiable and they represent the necessary preconditions for prudent consideration. The MNB also presents the basic elements of its benchmark models. A summary of these elements is provided below.

VIII.1.1 Assumptions of the credit risk model

Advanced models for capital requirement calculation attribute credit quality changes to some underlying factor, whereas the starting point for capital requirement is determined by the stressed loss which is associated with the excessive swing of the above factor and which is subject to portfolio characteristics. The IRB model authorised in the regulatory pillar operates with one systemic risk factor, whereas the sensitivity which expresses changes generated by the default of transactions in this factor is defined by the correlation coefficient set out in legal provisions. Conversely, in the most widely used Pillar 2 credit risk models institutions have the opportunity to identify the risk factors, their number and their parallel

³⁴ Actually, this is why these are not acceptable for regulatory purposes (other than in Pillar 2).

movements as well as to select the nature and strength of their impact on credit quality. In the Creditrisk+ model, for instance, the sensitivity to underlying factor(s) is represented by the variability of the probability of default (PD), while in the portfolio models based on the multifactor Merton model, it is defined by factor weights and asset correlations.

In general, the MNB expects institutions using the IRB model in Pillar 2 to meet the minimum requirements set for the IRB method validated by the CRR, while also bearing in mind the principle of the continuous improvement of risk methods and expectations. If the given institution calculates capital requirement by using the Pillar 1 standard method, the MNB expects it to demonstrate the full scale of exposures covered by the IRB model, and also to report the possible discrepancies from the regulatory pillar when exposures are taken into account. If the institution concerned applies the very same IRB method in Pillar 1, then the possible most precise identification of the potential weaknesses and sensitive elements of the applied model is considered by the MNB as the most important Pillar 2 task concerning credit risk.

In the case of institutions applying an approach different from the IRB model in Pillar 2, the MNB has the following expectations:

- With regard to the selected underlying risk factor or factors they should demonstrate the close parallel movement of both the external factors which in reality define the credit quality of the institution's exposures and the time series of default rates. This is because if factors, largely independent from default processes, are chosen the underestimation of risk exposures cannot be avoided even by the use of higher asset correlations.
- In the absence of a sufficient data, calibrating the sensitivity of credit quality to the risk factor is a very difficult task, and it is indispensable to use expert estimates. The prudent approach must be followed with a consideration to statistical uncertainties which is especially justified by the instability of asset correlations experienced in stress periods. Since the sensitivity of defaults – e.g. the standard deviation of PDs in the Creditrisk+ model or the asset correlation in the Merton portfolio model – can easily be made congruent to the correlation coefficient of the IRB model in the case of single-sector approaches, the MNB expects institutions to carry out such comparisons.³⁵
- In the case of multi-sector models which operate with more than one systemic risk factor, the definition of relations between factors as well as the sensitivity (factor weights) to certain factors of the transactions often proves to be the delicate task. In the case of selecting observable factors, the capturing of the joint distribution of risk factors in a prudent way can be challenged due to the instability of empirical correlations, whereas in the case of latent factors, it can be challenged due to the modelling difficulties of decomposition. As a result of the above, in the case of applying multifactor models, the MNB has the following expectations from institutions:
 - on top of the risk characteristics of transactions, institutions should also use some other group formation features (e.g. sectoral rating in the corporate portfolio, exchange rate risk in retail models) in modelling;
 - they should be able to quantify the diversification impact created by model assumptions, i.e. even in the case of the complete parallel movement of risk factors the extent of stressed loss should be specified.
- Institutions should demonstrate the completeness of exposures covered under the Pillar 2 model, highlighting in detail deviations from the regulatory pillar and their justification. In

³⁵ It is an empirical fact in connection with the spread of default rates that sensitivity to the state of the economy decreases with the growth of the probability of default. Consequently, in the Creditrisk+ model it may be practical to select different relative spreads in the individual PD bands.

addition to the above, the MNB has the following expectations from institutions which use the IRB method validated in Pillar 1:

- with regard to parameters which do not have an influence on the mechanism of the Pillar 2 credit risk model – probability of default (PD), loss given default, (LGD) and credit conversion factor (CCF) – they should quantify the impacts of any deviation from Pillar 1;
- they should enable the comparison of the parameters used in the two types of methodology (CCF, PD, LGD, maturity factor, etc.) with the capital calculation results (risk-weighted asset value, expected loss, capital requirement) either at transaction level or at least at the level of rating models and/or rating categories.

VIII.1.2 Fundamental expectations for models and rating systems

The MNB has the following main general expectations for credit risk models and rating systems³⁶:

- complete, detailed and clear documentation,
- specification of concepts, procedures and processes,
- ensuring adequate data quality,
- adequate collection, storage and maintenance of the data used,
- annual validation,
- regular monitoring and reporting of model performance and stability,
- regular redevelopment of models based on validation or monitoring results (in the event of triggers being reached),
- development and application of an up-to-date, regularly updated model inventory to track the dates of model reviews and validations,
- use test: institutions must apply a rating system which is assessed as reliable, proven to function reliably by regular back-testing, and used in internal processes and capital requirement calculations,
- models and rating systems need to ensure a meaningful differentiation of risks, managing changes in internal processes and lending practices. The rating system must be able to reliably capture changes in the quality of the portfolio.

The MNB expects institutions to apply the CRR IRB requirements for models and rating systems, and to monitor developments in international regulation on modelling issues, in particular by taking into account EU requirements³⁷, ECB provisions³⁸, and, for IRB models, those described in the EBA validation manual³⁹, during the internal validation process for IRB models.

³⁶ Rating systems under CRR Article 142(1)(1).

³⁷ Guidelines on the PD, LGD and defaulted assets; RTS_Assessment methodology to use IRB approach. RTS on the specification of the nature, severity and duration of an economic downturn, Guidelines on the estimation of LGD under an economic downturn; Guidelines on credit risk mitigation for institutions applying the IRB approach with own estimates of LGDs

³⁸ https://www.bankingsupervision.europa.eu/ecb/pub/pdf/trim_guide.en.pdf

³⁹ <https://www.eba.europa.eu/publications-and-media/press-releases/eba-updates-timeline-implementation-irb-roadmap-and-publishes>

VIII.1.3 Rating models

Institutions applying advanced credit risk methods use rating (scoring) models to rate customers. The main purpose of rating models is to distinguish customers/transactions based on their riskiness and creditworthiness. In the rating model, institutions assess the riskiness of the customer/transaction on the basis of specific qualitative and quantitative variables, assign scores to them, then classify the customer/transaction into rating categories determined according to the final scoring result. A calibrated probability of default (PD) is assigned to each rating category (or directly to customers/transactions). Irrespective of the existence of any guarantees taken into account in capital requirement calculations, the institution must perform the overall credit assessment of the underlying exposure according to its rating model.

In relation to rating models, in both Pillar 1 and Pillar 2 the MNB basically expects compliance with the requirements set out in the CRR. Among its expectations, the MNB highlights the need to regulate the institution's choice of a rating model for specific exposures (segmentation). By having consistent and detailed documentation in place, the institution should ensure that rating staff have a clear understanding of which rating model should be applied for a particular transaction/customer. A particularly frequent concern is whether specialised lending exposures should be classified into the corporate or project segment, and how they should be rated. To facilitate this task, the MNB issued a guideline⁴⁰ in 2017.

The categories defined by the rating model should be monotonous, i.e. higher-risk customers/transactions (with higher default rates) should be classified into poorer rating categories, while lower-risk customers/transactions should be assigned to more favourable rating categories.

Institutions should draw up regular management reports to assess the risk of migration between rating categories. Where an institution detects an increase in migration risks (e.g. through migration matrices), it should investigate the underlying cause (e.g. whether the risk results from portfolio deterioration or the PiT character of the rating system). The risk of capital requirement cyclicity arising from the use of a PiT rating system is considered by the MNB as a risk to be covered by capital (see the chapter on TTC PD).

VIII.1.4 Estimating the probability of default (PD)

Institutions are required to estimate the probability of default (PD) for each exposure category by reference to the long-term average of annual default rates.

Default is defined in Article 178 of the CRR. The EBA has released guidelines to support the correct implementation of the concept described in the regulation⁴¹, while the Hungarian regulation strives to reduce the unjustified differences between the default definitions applied by individual institutions by issuing Recommendation no. 13/2019 (VII.2) and Decree 44/2018 (XII. 5.) of the Magyar Nemzeti Bank.

In spite of the availability of the EBA Guidelines and various other regulations, material differences may still remain between the definitions of default at different institutions (primarily in respect of historic observations), and this may have a material impact on the estimated credit risk parameters. In order to offset these impacts, the MNB uses its own benchmark definition of default in the ICAAP review to ensure that the parameters estimated for particular institutions are comparable and that the differences reflect solely the differences in inherent risks.

Although the use of conditional PDs reflecting the current state of the economy is expected for certain applications (e.g. pricing, provisioning), the IRB Capital Requirement Calculation Model expects an unconditional probability of default as the input variable, which is the long-term average PD of the transactions over the economic cycle.

Where the institution has a sufficiently long default rate series, it should examine the occurrence of the downturn and favourable years that can be identified in the series, and if it cannot be considered

⁴⁰ Recommendation No. 10/2017 (VIII.8.) of the Magyar Nemzeti Bank defining specialised lending exposures and speculative immovable property financing

⁴¹ The EBA has released its recommendation (EBA/GL/2016/07) on the application of the definition of default under the CRR.

representative of the economic cycle, the institution needs to adjust its time series by re-weighting the ratio of downturn to favourable years. Where a sufficiently long default rate time series is not available, the MNB considers it acceptable for the institution to examine the relationship between the default rate time series and macroeconomic variables in respect of the portfolio concerned and use the historical development of macroeconomic independent variables to estimate past default rates so that the length of the time series covers a complete economic cycle.

Accordingly, the estimation of PDs is adequate only if institutions

- apply a definition of default that meets the legal requirements;
- determine the PD on the basis of a sufficiently long, multi-year time series in accordance with Article 180(1)(h) of the CRR, relying on at least five years of experience⁴². Where the time series of at least five years does not contain a representative period that can capture the likely range of variability of default rates⁴³, the institution should apply a higher conservative margin in the parameter estimation to offset the estimation uncertainty;
- conduct not only a simple averaging of historical default rates, but ensure the through-the-cycles characteristics (by applying adequate weighting), and demonstrate the appropriateness of the PD estimation technique of their choice;
- Although seasonality (i.e. the consideration of the life cycle of transactions in estimating probability of default) is expected best practice, the MNB has found that it is difficult to measure accurately the impact of this variable and it therefore does not include it in its benchmark models.
- counterbalance the statistical uncertainty of estimation by means of conservative adjustments;
- take a forward-looking approach to estimation;
- demonstrate by means of regular (at least annual) back-tests that the rating system and PD calibration work properly, and that recent default observations are in line with the forecasts provided by the model. For that purpose, institutions should examine the relationship between the calibrated PDs and the average default rates for each rating category.

In addition, the MNB expects institutions to conduct their PD estimations based on a detailed methodology as laid down in the ICAAP documentation or the model documentation, rather than by relying on ad hoc solutions and procedures. If the data used during the estimation do not meet the requirements of the PD definition (e.g. the use of NPL ratios), then the assumptions used in the course of the estimation should be substantiated in detail.

VIII.1.4.1 TTC (Through-the-Cycle) PD

Most of the credit risk capital models define the possible largest extent of losses in view of the risk characteristics of portfolio elements. One of the most important risk indicators is a transaction's probability of default, which can be conditional or unconditional: the first expresses the credit quality status for a given point of time and/or circumstance, while the latter reflects the extent of the transaction's general or "fundamental" default risk. The short-term probability of default, which reflects the conditional state of the economy, is often referred to as Point in Time (PIT) PD, whereas the probability of default that is not dependent on the former and applies instead to the entirety of an economic cycle is referred to as Through the Cycle (TTC) PD.

IRB capital requirement calculations require unconditional PDs as their input parameter. In the CRR, this expectation is captured by the provision that the estimate should reflect long-term experience. According

⁴² The MNB expects the institution to have the longest available time series for its products and segments.

⁴³ likely range of variability of default rates

to the EBA guidelines on parameter estimation and the European Central Bank's guide for the Targeted Review of Internal Models (TRIM)⁴⁴, PD calibration should be of a TTC character, i.e. estimates may not be calibrated on short-term average default rates, but should be determined by reference to the long-term average of probabilities of default. The MNB checks the fulfilment of this condition by examining whether the expected default (central tendency) derived from the long-term average default rate for a particular segment/product is the same as the estimated average PD of that segment/product⁴⁵. At the same time, these regulations allow institutions to apply a PIT rating philosophy in their rating models. PIT rating models use cyclical risk factors that depend on the state of the economy, thus transactions are migrated between rating categories as the economic cycle evolves. The default rate for a rating category assigned in such models shows a low degree of variability, because these models follow the rising default rate of the entire portfolio by migrating debtors to poorer rating categories. Migration is lower in rating models of a TTC character, where the default rate of the given rating category will increase rather than migration intensifying.

The PIT rating philosophy can lead to the cyclicity of the calculated capital requirement even with TTC calibration, thus contributing to the pro-cyclical behaviour of the financial sector. The Basel III document by the Basel Committee also calls for the reduction of the pro-cyclicality that emerges in the minimum capital requirement itself. In addition, although even Basel II already sought to cushion pro-cyclicality, it acknowledged that risk sensitivity and pro-cyclicality were, to a certain degree, inseparable.

In its 2016 consultation document addressing the applicability of credit risk models⁴⁶, the Basel Committee argues that not only the PD calibration itself, but the rating model should also be TTC in character, i.e. that rating systems should be designed in such a way that assignments to rating categories generally remain stable over time and throughout business cycles, and that migration from one category to another should generally be due to idiosyncratic or industry-specific changes. In a slightly more qualified manner, the same expectation is expressed in the final Basel reform package of 2017⁴⁷, according to which a borrower rating must represent the borrower's ability and willingness to contractually perform despite adverse economic conditions, and that the corresponding assessments must be made in consistence with current conditions and those that are likely to occur over a business cycle. By design, in rating systems idiosyncratic or industry-specific changes are a driver of migrations from one category to another, and business cycle effects may also be a driver. This latter wording allows the institution to take into account the impact of external circumstances in its rating provided that such circumstances represent a change in the borrower's ability and willingness to repay, not merely a change depending on the current state of the economy.

During the ICAAP reviews the MNB observed that the supervised institutions most frequently use a combination of a PIT rating model and TTC calibration. In this approach, if the variables incorporated in the model correlate with the economic cycle, the PDs specific to individual years will also be volatile. Although the average of estimated PDs, observed over the full length of the calibration period, will be identical with long-term average of the default rates, the PDs specific to individual years will fluctuate around the average in correlation with the cycle, and in particular, the average PD measured on the performing portfolio of the final date considered may be significantly different from the calibration target. The extent to which the PDs specific to individual years differ from the average of the long-term default rate depends primarily on the proportion of the variables correlated with the economic cycle, and their sensitivity to the economic cycle. In the case of a rating system with a strong PIT character, PD calibration on the long-term average default rate will not reflect long-term experience, and may, depending on the cycle, soon lead to underestimations (in favourable years) or overestimations (in a downturn period) due to migrations.

⁴⁴ https://www.bankingsupervision.europa.eu/ecb/pub/pdf/ssm.guidetointernalmodels_consolidated_201910~97fd49fb08.en.pdf

⁴⁵ We consider it appropriate to use the term 'expected default' in view of factors such as portfolio composition, seasonality, etc. While the default target for the performing portfolio at any point in time may differ from the long-term average default value, it is estimated on that basis.

⁴⁶ <https://www.bis.org/bcbs/publ/d362.pdf>

⁴⁷ <https://www.bis.org/bcbs/publ/d424.pdf>

Migration resulting from cyclical effects (PIT rating model) and respectively PIT PD calibration carry risks that the MNB seeks to have covered with capital in the context of ICAAP reviews. While the MNB does not expect PIT rating systems to be replaced in the short term, it does expect institutions to complement it by developing a TTC rating system and PD under Pillar 2, and also calculate their capital requirements accordingly, and, where necessary, provide the required capital under Pillar 2. TTC customer ratings ensure that customers can only be migrated to another rating category in the event of a change in their individual risk. In the retail segment, the practical implementation of this is more straightforward, as the application ratings used typically incorporate variables that are, overall, largely independent of the economic cycle (e.g. socio-demographic variables, PTI at disbursement). In the corporate segment, the MNB primarily expects institutions to examine how PDs and capital requirements change when independent variables such as past due status and negative monitoring information, the main drivers of cyclicity, are removed from the models.

TTC rating models tend to provide lower separation power. In the longer run, the models have limited capacity to separate groups with high PDs. PiT models, on the other hand, provide for adequate separation in the short term, primarily by separating items that are already past due (showing poor monitoring results). At the same time, PiT models tend to be ineffective in the division of non-past due items into risk groups, which leads to high concentration in good rating categories. The MNB does not consider a diminishing separation power to be problematic and regards it as a natural corollary of the long-term approach.

VIII.1.4.2 Retail TTC PD – supervisory benchmark

Benchmarks are calculated to ensure that institutions are judged by the same standards. Until the publication of EBA's RTS on the definition of default, the relevant legislation provided institutions with substantial leeway to define their own default indicators and the materiality threshold for the 90-day delinquency. As a result of this, even when all requirements applicable to the definition of default were satisfied, there were significant differences between banks in terms of classifying certain transactions as default and the time of setting the default status. The application of the RTS related to the definition of default and the related MNB Decree as well as the MNB Recommendation on the materiality threshold for the defaulted credit liability, reduces the differences between banks due to different definitions only if banks are able to estimate the size of their default rate, retrospectively for a long time, had they always applied the new default definition. However, the historical data necessary for this are not available for all institutions. Differences in the identification of defaults will eventually also appear indirectly in capital requirement calculations:

- through the calibration of PD models (a relatively strict default definition identifying a large number default events that are subsequently cured – a higher observed default rate)
- through LGD models (a high number of cured default observations will reduce observed LGD)
- through the correlation of defaults (default events arising from the same cause but identified at different times will distort the relationship observed between the economic environment and default rates)

For retail portfolios, the MNB's benchmark models consistently use the same modified default definition to estimate TTC PD for all institutions. Pursuant to the Pillar 2 default definition on which the models are based, only permanent past due status qualifies as a default (at least 360 days past due in the case of mortgages and 180 days for unsecured transactions), with recurring past due items aggregated in all cases, taking the date of the first arrears (of a small sum) or the first restructuring date as the start date. A transaction will only be considered cured if it is classified as less than 90 DPD permanently (for at least 1 year) and until the end of the available time series. In the event of restructuring, cured status presupposes a period of 2 years in the less than 90 DPD category. The MNB does not take into account default indicators other than the past due status (it does not consider even restructuring as such an indicator), and it assumes that any transaction involving a loss will also be recognised as past due. The extent to which banks' default definitions lead to distorted risk metrics is, in addition to the high proportion of the

transactions reported as cured and of multiple defaults, also indicated by the low risk parameters (low CCF, low LGD) of “soft” defaults that are not the result of past due balances.

For time series based on the modified default definition, the MNB has developed PD models by running logistic regressions for each product using the application variables supplied by major banks. The independent variables used for that purpose do not include past due customer indicators or any other indicators pertaining to the economic cycle. The advantage of the model calibrated in this way is that it takes into account the overall development and change in portfolio quality, while preserving the unconditional (TTC) character of the estimated PDs.

The MNB does not expect banks to apply the above methodology, but where an institution’s Pillar 2 capital requirement is significantly influenced by the default definition or modelling methodology applied, or it does not have a reliable historic database that covers a full downturn period, the MNB may determine the SREP capital requirement based on the results of its product-level benchmark models developed in accordance with the aforementioned method based on the data of major banks.

During focused ICAAP reviews, the MNB will rely primarily on the benchmark models when assessing the capital requirement calculations and will review the appropriateness of the banks’ own PD models in detail during its comprehensive audits. At present the MNB’s benchmark models contain the following variables, regularly reviewed by the MNB:

- Variables applied in the case of housing loans and home equity (mortgage) loans: transaction-level PTI at disbursement, LTV at disbursement, original maturity (in months), highest level of education;
- Variables used for personal loans: transaction-level PTI at disbursement, original maturity (in months), number of months the borrower has been employed at the time of disbursement, highest level of education, marital status (married or other).

VIII.1.4.3 Corporate PD – supervisory benchmark

In case of the institutions without a corporate PD model appropriate for the internal capital calculation (i.e. developed based on data of adequate quality and length) or where the MNB identifies major shortcomings in connection with the estimate, the MNB quantifies the IRB SREP capital requirement using a corporate PD benchmark model developed based on the default databases of large banks. The MNB developed the corporate PD model using a default rate time series of 12 years that only contain purely corporate observations (i.e. excluding e.g. projects, financial institutions) and also include downturns. In terms of structure, the corporate model is a logistic regression between the financial indicators (and their WOE – weight of evidence – values) generated from corporate balance sheet and profit and loss data, and the default indicator. The indicators of the model were selected considering the modelling experiences of large banks, and they also include size, long-term and short-term liquidity, profitability, indebtedness and debt service coverage ratio. The PD parameter was calibrated separately for the micro, small/medium-size and large corporate segments. The corporate PD benchmark model was published in the Financial and Economic Review.⁴⁸

VIII.1.4.4 Applying EU benchmark PDs

Pursuant to Article 78 of the CRD, the EBA carries out an annual EU level benchmarking exercise for the results of the internal models used to calculate capital requirements for credit risk. The scope of the EBA’s analysis includes both high default portfolios (HDPs) and low default portfolios (LDPs). The EBA publishes the report on the analysis on its website⁴⁹. The EBA also examines specific international companies, institutions, banks and sovereigns in terms of the parameters calculated by institutions holding an IRB permit; it collates the relevant descriptive statistics (minimum, maximum, median, averages, quartiles,

⁴⁸ <https://en-hitelintezetiszemle.mnb.hu/letoltes/fer-19-3.pdf>

⁴⁹ <https://www.mnb.hu/en/pressroom/press-releases/press-releases-2024/eba-publishes-annual-assessment-of-banks-internal-approaches-for-the-calculation-of-capital-requirements>

standard deviation etc.) in a database enabling comparisons and places this information at the disposal of the supervisory authorities. The MNB uses these confidential results which concern specific customers for benchmarking the capital requirement calculation for portfolios with low default observation (international companies, banks). The MNB calls the attention of institutions to significant and unjustified PD differences in the individual reviews, and it may enforce the capital requirement resulting from the difference within the framework of SREP. The MNB may also use the EBA benchmark values for quantifying concentration risk.

VIII.1.4.5 Application of a sovereign floor

In Pillar 2, the MNB expects institutions using advanced methods to apply the sovereign PD as a minimum limit for customers that operate and/or have their registered office in Hungary. The MNB does not expect the use of Hungarian sovereign floor for large international corporations that have their registered offices and establishments abroad as their risk is completely independent of Hungary's country risk.

VIII.1.5 Estimation of the loss given default (LGD)

VIII.1.5.1 Principles for estimating LGD

The loss given default (LGD) ratio is a risk characteristic of equal importance with the probability of default. In the MNB's view, in LGD estimations, as opposed to PD estimations, the use of expected values in unfavourable (i.e. downturn) situations represent the logically consistent solution rather than the use of long-term averages. It is the MNB's fundamental expectation for institutions to collect historical information about the amounts of losses actually incurred, as well as about the initial collateral structure in place and the recovery process used when the losses were incurred. Where data are available on the specific loss-reducing effect of a particular collateral, it should be measured separately by the bank, and the bank should have data concerning returns on collateral⁵⁰ for major types of collateral (residential and commercial real estate, cars, guarantees), and should also collect data on indirect and direct expenses. Where in respect of a particular portfolio segment an institution does not have sufficient loss data that reflect actual returns and afford a reliable statistical estimate of LGD, it should rely on conservative expert assumptions. In LGD estimations, special attention is required for the following:

- To determine the downturn value, the institution may assess the macroeconomic factors that may affect LGD and the determinants of LGD, and quantify the downturn LGD by modelling the value of these macroeconomic factors in a downturn year. For downturn estimations, particular attention is required for the cyclical components used for LGD modelling (e.g. LTV, payments by customers, recovery other than returns on collateral) as well as for the factors observed in the current portfolio that are not representative of the data used for the estimation⁵¹.
- The observed characteristics and distribution of the status of transactions after their classification as defaulted must be used for the estimates (e.g. recovery, sale of receivables and collateral, closure). In order to appropriately estimate the downturn, it is not sufficient to project past trends, rather the characteristics of the period since the crisis as well as the possible changes in the conditions of returns must also be thoroughly considered.
- Furthermore, it is not sufficient to focus only on closed transactions, since for many portfolios a significant proportion of the transactions that were once in the non-performing category are still in the process of being closed or sold. In the case of unclosed exposures, the estimation should also consider the fact that in transactions that are in default for a long time cannot be expected to yield the rate and outcome of returns which transactions closed with

⁵⁰ Institutions are also required to collect data about returns on collateral under Section 16 (2) (g) of MNB Decree no. 40/2016. (X. 11.)

⁵¹ The MNB essentially expects the institutions to apply the provisions of the *RTS on the specification of the nature, severity and duration of an economic downturn* and the *Guidelines for the estimation of LGD appropriate for an economic downturn* issued by EBA

relative speed produce. Therefore, the MNB expects that the default characteristics of closed and unclosed transactions are be compared.

- In the case of the application of non-linear capital functions in the PD (such as the IRB model), the MNB challenges the approach which interprets the cure back or restructuring of non-performing transactions as a recovery which influences LGD. This is underlined by the fact that if such transactions represent a high share within the portfolio – due to the non-linearity of the capital function according to PD – may result in the underestimation of capital requirements. In such cases, the MNB considers it expedient that the effect of the above-mentioned „technical“ defaults should be disregarded in the course of LGD estimation, or that the cure rate should be taken into account in a particularly conservative manner.⁵²
- To complement the above, institutions are expected to manage multiple default events through the appropriate merge of such events, and the definition of a curing period.
- If the LGD estimation is not based on actual recovery data, it does not suffice to conduct an exclusive use of collateralisation levels in a direct way (e.g. an overview which compares exposures with the liquidation value of the collateral). In such situations, the MNB believes that the reliable and expedient method is to jointly and item-by-item take into account collateral values, external environmental impacts (e.g. exchange rate devaluation) and coverage levels (LTV). In the absence of the above, the MNB also accepts simulation methods which utilise empirical distributions characterising the coverage level for the given portfolio.
- In addition to the above requirements, institutions should have separate loss rate estimates for non-performing portfolios, which should take into account risk characteristics that deviate from those of performing portfolios. Institutions should, on the one hand, have a best estimate of expected loss (ELBE) for non-performing exposures based on the current economic situation and exposure status (current collateralisation, recovery status, customer’s willingness to repay, etc.). On the other hand, in addition to the ELBE, an institution must also estimate any additional unexpected losses that may arise during recovery (unexpected exchange rate stress, collateral depreciation, unexpected deterioration of the customer’s willingness to repay). The loss rate estimate, which also incorporates unexpected losses over expected losses, produces the LGDs for non-performing portfolios. The LGDs for performing and non-performing transactions should be consistent in the sense that there should be no “cliff effect” in the LGD of former performing transactions that have recently been assigned a non-performing status.

Similarly to PD estimation, institutions must record in the ICAAP documentation the detailed methodology of LGD estimation and its Review Schedule, which is expected to be carried out with at least an annual regularity. Furthermore, the MNB expects institutions to also analyse the relationship between recoveries expected in the course of LGD estimation and group formation characteristics of the exposure (e.g. the size of the exposure, the extent of delay, the time length of collection or the extent of collection costs).

VIII.1.5.2 Retail mortgage LGD – supervisory benchmark

The MNB carries out benchmark calculations to verify LGD estimates for retail mortgage loans. Benchmarks are calculated to ensure that institutions are judged by the same standards. Institutions may provide explanations for their deviation from the applicable benchmark, but where an institution’s model is inadequate, the MNB will determine its TSCR by reference to the benchmark. The MNB’s benchmark LGD models the downturn value of two recovery outcomes: 1) the curing ratio characteristic of the restoration of the customer’s solvency, and 2) the level of loss observed in the case of returns on collateral.

⁵² In capital requirement calculations it may be justified to reduce input PDs in proportion with the absence of adjustments to the LGD.

The MNB determines the downturn value of the curing ratio by reference to the year with the worst curing ratio. In order to eliminate the distorting effect of multiple defaults and curing on estimates, the MNB will combine multiple default events. For non-performing transactions, curing is measured as a function of the time spent in default, without other variables being used to model downturn curing, given that most of the independent variables can be considered cyclical.

As regards returns on collateral, the MNB uses a single coverage factor to express the potential decline in market value in a downturn, the price reduction due to forced sale, and the costs of enforcing the collateral. The MNB derives the present value of the returns on collateral as a function of the time of sale and a properly chosen interest rate that incorporates both funding and operating expenses. Where the effect is material, for the purposes of calculating the returns on collateral the MNB may also take into account the additional risk arising from the volatility of the coverage factor. In the LGD estimate, the MNB also takes into account the impact of a possible downturn in the real estate market by the indexation of current values. The MNB performs regular estimates and back-tests for the coverage factor, the discount rate, and the time of sale, with regular reviews of these parameter values. The MNB pays special attention to developments in real estate market prices when defining the coverage factors.

LGD should be a downturn value, and in particular LGDs for non-performing transactions should also include unexpected losses over expected losses. Precisely for that reason, while calculation of provisions and expected losses may immediately reflect positive changes (such as improvements in the customer's ability to repay, and improving prospects for the real estate market), the LGD must also provide coverage for any unfavourable movements (deteriorating willingness to repay, declining real estate market), and unexpected losses.

As a result of its benchmark calculation, the MNB may impose additional own funds requirements, but it does not rely on this calculation for its assessment of the adequacy of provisions.

VIII.1.6 Treatment of off-balance sheet items (CCF)

The requirement to fully take into account credit exposures also applies to the proper management of off-balance sheet items. Institutions that are subject to comprehensive and focused ICAAP reviews are encouraged by the MNB to produce their own estimates of the credit conversion factor (CCF), also taking into account the principles of proportionality. For own estimates, the MNB fundamentally expects the conditions under the CRR to be met in Pillar 2 as well.

Particular regard should be given to off-balance sheet exposures (usually credit limits, and guarantees given) with 0% regulatory CCFs due to the option of immediate termination, and to off-balance sheet items of low/medium risk with 20% CCFs, for which, both in the MNB's experience and according to institutions' own estimates, the CCFs applied fail to capture the real risk of these items. In the case of these exposures, setting a higher 50% parameter value as an incentive for the production of own estimates appears appropriate in Pillar 2.

Credit limits are set up for projects relatively rarely but may represent high risk. These off-balance sheet items are typically credit limits related to later phases of project implementation, or possibly e.g. treasury limits to hedge for exchange rate or interest rate risks. The probability of these limits being drawn at default is difficult to measure statistically, but, in the MNB's judgment, utilisation may be very high in downturn scenarios. In the context of estimating utilisation, the MNB considers it important for the institution to be able to establish whether the transactions used for estimation are operational or in the development/investment phase. In the case of projects in operation, off-balance sheet exposures are typically required for management and operations; accordingly, given that it is in the interest of the institution that operations should be maintained, it can be assumed that off-balance sheet exposures will be drawn under negative circumstances. By contrast, in the investment phase, it is not for the customer to decide whether the off-balance sheet exposure should be utilised, it being conditional on the fulfilment of contractual terms, which gives the institution the option to consider whether it is worthwhile to provide additional funds in the event of a negative situation. Accordingly, the MNB is of the view that the phase of the transaction at default is a cardinal point in estimating the utilisation of off-balance sheet items;

therefore, in cases where the institution does not have a reliable bank estimate/back-test, the MNB determines the Pillar 2 CCF for the segment concerned depending on the phase of the transaction (or, in the absence of this information, on the current utilisation rate). On those grounds, the MNB uses the Pillar 1 CCFs set out in CRR under for transactions in the development/investment phase (as well as for limit utilisation rates below 50% at default), but a CCF of at least 50% in any case, while for transactions in the operational phase (as well as for utilisation rates of 50% and higher), setting the CCF at a 100% in Pillar 2 appears appropriate.

Mindful of the principles of proportionality, the MNB expects institutions that are subject to comprehensive and focused ICAAP reviews to develop their own reliable downturn CCF estimates for retail credit card debt and overdraft facilities. In the absence of this, the MNB applies a 100% CCF in determining the TSCR.

In the case of internal approaches, the MNB expects institutions support and explain, in professional terms, their choice out of the most commonly used CCF estimation methodologies (bootstrap simulation, decision tree, confidence intervals for the calculation of margins of conservatism).

When the risk sensitive approach is applied, the MNB expects the use of an approach that takes into account the empirical fact that the greater the probability of default, the greater also the probability of drawdowns against credit limits. Irrespective of the chosen approach, the MNB finds it necessary to get to know the institutions' analyses as to what extent off-balance sheet exposures were drawn down until the date of the defaults. Accordingly, the MNB expects that in cases where the estimation demonstrates a significant correlation between the default rate and the credit conversion factor, the estimated factor should include a higher margin of conservatism. The MNB has found that there is typically a significant positive correlation between the limit utilisation and size, implying the need for this relationship to be considered in the estimation of the credit conversion factor.

The MNB also expects the institution to assess the behaviour of limits with low and high utilisation rates, and the impact of that behaviour on CCF estimation/back-testing, and to determine the CCF in view of the result. In order to cater for downturn estimates, institutions should handle the cyclical behaviour of the independent variables used in their CCF estimation. In special cases where limit utilisation is correlated with the default rate, the risks will also be present in the migration between utilisation levels, and should be covered in the downturn CCF estimate so that the exposures at default, as estimated using the CCFs, reflect the higher limit utilisation observed during the downturn period.

In its CCF estimation, the institution must estimate the proportion of the undrawn limit that will be drawn. Accordingly, by definition the observed CCF cannot take a negative value. Where an institution calculates the CCF on the basis of the exposure difference between the observation date and the default date, and thereby factors in the effect of interim repayments, the MNB expects the institution to set a floor in order to limit the estimated transaction-level CCF within the observation sample. In this context, institutions should assess the effect (i.e. the direction and extent of distortion) of limit changes on the estimate.

The MNB has found that the estimation of the credit conversion factor for individual products provides a significantly more accurate result if, for the product segment being considered, the credit conversion factor is estimated separately within each sub-segment defined according to various levels of limit utilisation. For the purpose of segregating transactions, the supervised institution may rely on expert opinion or a statistical method in setting a threshold for the level of limit utilisation. Within product segments subdivided by limit utilisation, a different CCF parameter may be used for the determination of exposure at default where it can be demonstrated statistically (for example, by means of non-overlapping confidence intervals for the two parameters) that the two parameters obtained differ significantly.

VIII.1.7 Specialised lending exposures (SL)

VIII.1.7.1 The concept of PD-LGD estimation of specialised lending exposures (SL)

The Hungarian banking system has incurred its most severe losses on specialised lending exposures (SL), particularly on income producing real estate financing projects. This is due to an uncontrolled build-up of concentration in these portfolios, and their sensitivity to the economic cycle. Given the characteristics of project portfolios, the MNB expects special care and awareness from the institutions in various areas of risk management and measurement. Accordingly, institutions must:

- formulate and consistently apply the segmentation principles and the definition of default,
- develop a project appraisal and rating system that takes into account the specificities and risk characteristics of such exposures, in particular the financial strength characterising the project's profitability, the LTV, DSCR, and their stress tolerance, as well as the other characteristics of the asset, the political and legal environment, sponsor strength, PPP revenue, and other collateral,
- pay proper attention in their internal parameter estimation procedures to the uncertainties of estimation attributable to the typically small number of such exposures and to their low representation in rating categories, and also manage the close correlation between the customer's risk and the value of the asset (property), i.e. the coordinated movements of PD and LGD,
- determine, in the case of non-performing projects, adequate capital requirements for any further unexpected deterioration in the value of the project and its profitability.

The MNB expects institutions to manage specialised lending exposures consistently in separation from companies, in terms of segmentation, rating, parameter estimation, capital requirement calculations and reporting. The MNB also expects institutions to act in accordance with the MNB's recommendation⁵³.

Apart from segmentation, appropriate risk measurement is based on proper default definition and default detection. Although it is already showing an improving trend, identifying the default status of income producing real estate finance transactions, especially for projects in operation phase, has often been a problem in the past. Reduced interest and principal burdens resulting from forbearance, balloon/bullet arrangements, and contractual repayments often conceal the fact that the customer's profitability is insufficient to repay the loan even with the sponsor taken into account, which is a precondition for the concept of default as set out in legislation.

With the appropriate number of defaults, institutions are expected to apply risk measurement and capital requirement calculations on a PD/LGD (and possibly also loss rate) basis, taking into account the principles of proportionality. In the parameter estimation used for internal capital requirement calculations, a number of problems arising from the specific risk characteristics of SL exposures were identified during supervisory reviews and the determination of capital requirements, addressing which must remain in the focus for institutions going forward, with particular regard to the following:

- Managing the estimation and statistical uncertainties resulting from the number of elements with a margin of conservatism.
- Managing the close correlation between the PD associated with project creditworthiness, and the LGD associated with the value of the project property.
- Determining the downturn LGD in relation to the cyclical sensitivity of the value of the project property and its profitability.

⁵³ Recommendation No. 10/2017 (VIII.8.) of the Magyar Nemzeti Bank defining specialised lending exposures and speculative immovable property financing

- Selecting a sample period that is representative of the complete economic cycle, taking into account downturn periods with the appropriate weight, also with regard to the fact that in the case of income producing real estate finance, the effects of the crisis may last significantly longer than for ordinary corporate exposures.

Particular attention should be paid to the issue of cyclicity, which is relevant to the finance of income producing real estate. The value of the financed property can be extremely volatile, and can often change during the lifetime of the transaction as a result of various market events. Due to the close correlation between the customer's risk and the value of the property, the low LTV due to momentarily low property prices will not necessarily result in a low loss potential, because customer default and drastic falls in property value tend to coincide, which at the level of risk parameters, indicates a correlation between PD and LGD. In addition, risk parameters are not only correlated with one other, but also with the state of the economy, which may cause pro-cyclicality in capital requirements; namely, capital requirements will increase in a downturn period and decrease in expansion, which may deepen the economic crisis by further weakening or strengthening the willingness to lend. In addition to cyclically changing risk parameters, capital requirements may be underestimated in good years, and overestimated in bad years. The purpose of supervision is that the capital requirement should preferably be cycle-independent, which should be taken into account in the assessment and measurement of the risks of the income producing real estate portfolio. Cyclicity should be treated according to the TTC concept described in the chapter on the PD⁵⁴.

Where institutions are unable to produce reliable estimates of the PD and LGD parameters due to the low number of observations, the MNB considers it appropriate that institutions should use slotting approach designed for specialised lending that takes credit quality into account by means of simple weighting; however, even in such cases institutions are expected to back-test their PD estimates on a quantitative basis, and calibrate it on the slotting categories.

In the SL segment, particular attention is required for the problem associated with the cyclicity of cyclical rating variables. In this segment, the variables of the rating system typically correlate strongly with economic variables, as a result of which the capital requirement will also be cyclical due to migrations that follow the changes in the economy. This problem may be addressed through the cycle-independent assessment of specific risk factors, in particular the value of the project property (including its LTV and DSCR) over a long-term horizon, as well as by giving more thorough consideration and, for rating purposes, more weight to the stress tolerance of project value. The use of a rating system that implements these aspects enables institutions to carry out forward-looking assessments of the risks of newly disbursed exposures, and to ensure that cycle-independent changes occurring in lending practices and risk profiles are incorporated into the capital requirement.

A common problem is where an institution bases its capital requirement calculation methodology on the assumption that its former poor-quality project portfolio is no longer representative of the current project portfolio. However, the MNB expects the institution to be able to provide quantitative evidence for the improvement of its portfolio quality. The MNB notes that a more favourable risk profile for newly disbursed projects can be supported by the application of a TTC-based rating system that takes into account the aspects detailed above.

It can be also stated in general that in the case of non-performing income producing real estate finance exposures, institutions failed to act with due care when assessing the risks, as they recognised the required provisions over a longer period of time. While in 2009–2012, the sometimes spectacular rise in coverage by provisions was due to the deliberate postponement of recognising impairment losses, in later years the increase in collateralisation levels was driven by the further deterioration or stagnating outlook for the commercial real estate market, and by the conservatism of valuation. The MNB therefore

⁵⁴ For projects, reliance may be made on variables such as the object (nature) of the project, whether the project is in construction or completed, the quality and experience of the sponsors, the FX risks taken, the sensitivity of the cash flows generated by or estimated for the project (e.g. to interest rates, OPEX, exchange rates, etc.). While these variables are much more stable, they cannot be considered to be 100% non-cyclical.

continues to pay special attention to the adequate quantification of the risks associated with non-performing property finance portfolios, and the coverage of risks by capital and provisions. In this regard, the MNB expects institutions to develop risk measurement models that are capable of suitably identifying risks arising in the operation of the portfolio and, in the case of profit-generating property, primarily with respect to the cash-flow generated by the property. Besides the calculation of expected losses, these models should be also able to ensure an adequate calculation method for possible unexpected losses incurred during collection and for the capital requirement needed. One possible implementation of this could be a stress on the cash flow on which the project appraisal is based. Institutions are expected to assess the stress tolerance of a given SL exposure, which can be examined primarily by stressing the cash flow plan of the project, by incorporating exchange rate stress, falling rents or other deteriorating property market trends.

Recent supervisory reviews have found major improvements in provisions training in the Hungarian banking sector, both in terms of the prudent management of the portfolio and the design of the methodology for estimating expected losses. Overall, the levels of the provisions made by Hungarian banks are increasingly approximating expected losses, i.e. the carrying amount net of allowances provides an adequate approximation of project value, in view of which capital only needs to be allocated to unexpected losses. Based on the experience of the MNB, in their internal capital requirement calculations institutions may be expected to determine a capital requirement of at least 12% of the net non-performing SL exposure to express the “unexpected” decrease in the value of projects appraised in accordance with expected conditions. The MNB will review the adequacy of the 12% benchmark level depending on the economic cycle, given that additional depreciation may be significantly greater in an upturn than in a downturn scenario⁵⁵.

Where the supervised institution lends to a real estate fund, the MNB will take into account the risk weights of commercial real estate projects as benchmarks when examining the capital requirement for these exposures.

VIII.1.7.2 Income producing real estate projects’ capital requirement and expected loss calculation – supervisory benchmark

Based on the lessons learnt from the 2008-2009 financial crisis, the MNB deems the level of the standard capital requirement inadequate to properly cover the risk of Income Producing Real Estate (IPRE) transactions. In the absence of a statistical model that is based on reliable data (originating from large-scale data collection), the MNB determines the risk weights of these transactions relying on its own benchmark model. The purpose of the model is to assess the risk level of portfolios according to identified risk factors and to make the applied capital requirement levels comparable.

MNB considers the following risk factors in its benchmark PD model:

- type of the financed assets (in descending order of risk: land plot, hotel, industrial property/warehouse, retail, office and residential project).
- Development phase (project under development and operating project)
- In the case of operating projects, the actual DSCR, which is determined on the basis of the income available for the last actual debt service and the original loan amount, assuming 10-year steady repayment of the principal exposure only.
- Project size (decreasing PD as size increases)

In the benchmark LGD the following factors are examined:

- Liquid collaterals (security deposit, institutional guarantee, state guarantee – full amount is recovered without discounting)

⁵⁵ On that subject, see the following article in the Financial and Economic Review: <http://www.hitelintezetiszemle.hu/letoltes/szenes-mark-tomsics-andras-kutasi-david.pdf>

- In the case of operating projects the last known LTV based on value assessment (in the case of development phase, the prospect LTV is not examined, uniform LGD, 65%)
- Location, in descending order of risk: countryside, Budapest
- Funding currency: No adjustment for HUF funding. In the case of EUR funding and funding in other currency the LTV is increased by a 15% and 35% shock to EAD, respectively. The application of the FX shock also deteriorates the uniform LGD values of the projects in development phase.

The capital requirement is determined by applying large corporate asset correlation, with standard 5-year maturity parameter. In the case of residential projects for sale, the MNB approximates the shorter maturity with 2.5 years.

The MNB uses the benchmark model resulting in the risk weight primarily with small institutions that do not have their own methodologies and data; however, it may also use it with major banks applying the advanced methodology for comparison and to determine capital requirement.

When assessing the capital requirement of the income producing real estate segment, the MNB pays special attention to examining the appropriateness of the bank's segmentation based on the relevant considerations of the MNB recommendation⁵⁶

VIII.1.8 High-risk portfolios

Every year, the MNB publishes its Guidelines on high-risk portfolios (see Annex 4), presenting portfolios and risks undertaken that, based on the MNB's opinion, give rise to supervisory concern in the Hungarian market in the given period on the basis of analysis and supervisory information. In order to manage such risks it is justifiable and expected that the institutions concerned hold additional capital. As a general rule, the MNB foresees the identification and monitoring of high-risk portfolios in respect of the risks and activities identified in the risky portfolios, but the method of determining the additional own funds requirements for the portfolios of foreign subsidiaries, if justified by local circumstances, may deviate from that described in the guide.

VIII.1.9 Concentration risks

Definition

The concentration of risks refers to the exposures that may arise within a single risk category (intra-risk) or across different risk categories (inter-risk) with the potential to produce (1) losses large enough to threaten the institution's regular business operations (of usual and expectable profitability) or (2) a material change in the institution's risk profile. While previous efforts to manage concentration risks focused mainly on the concentration of credit risks (market risk concentration was typically managed by market risk models)⁵⁷, the crisis highlighted the fact that risk concentrations often make an impact via various risks (credit, market, operational, liquidity risk) and in close interworking with each other. As their combined impact may exceed the extent that would derive from the separated handling of individual exposures, concentration risks must be managed with an integrated approach.

Risk assessment and management

The concentration of risks may be a source of significant losses and therefore the MNB expects institutions that the handling of concentration risks should always be an integral part of risk measurement and management efforts as supported by written procedures and rules. As a minimum requirement, these documents must address the following:

- Each institution must have a risk-taking policy and procedure approved by senior management in respect of concentration risks. The risk-taking policy must be reviewed

⁵⁶ <https://www.mnb.hu/letoltes/10-2017-sl-ajanlas.pdf>

⁵⁷ Accordingly, concentration risks may not be regarded as risks fully covered in Pillar 2.

regularly, taking into consideration the changes of the institution's risk appetite and the business environment as well.

- Institutions must elaborate internal systems and methods for identifying and measuring concentration risk which are in line with the institution's activities, size and complexity and which are able to reveal the effects of concentration across multiple risk categories.
- Stress tests are an especially useful supplement to indicators. Under normal business conditions, concentration risks rarely cause problems as concentration mostly remain in the background. Therefore, the detection of concentration threats with stress testing is of outstanding importance.
- Institutions must operate limit structures for concentration risks that are consistent with their risk appetite and risk profile.
- Institutions must have adequate governance arrangements in place which enable them to mitigate concentration risks and to monitor, assess and manage the related policies, procedures and limits.
- Institutions must be able to assess the adequacy of assumptions that served as a basis in the capital allocation process for setting the level of capital for covering concentration risks.

Methods suitable for keeping concentration risks under control:

- Application of limits for concentration indicators. For setting the limits, the institution must have a clear risk-taking policy and must provide for ongoing monitoring. (Regarding credit concentration risk, the requirements in the CRR for large exposures are suitable starting points, but should be supplemented with measurements for industry, currency, country, product/transaction, and hedge concentrations).
- When converting risks to market instruments and "selling" them, the institution buys protection provided by structured securitisation or credit derivatives, collateral, guarantees, etc.
- Many institutions allocate capital beyond the regulatory minimum for covering concentration risks albeit not separately but in relation to the underlying risks.

ICAAP review

The concentration of exposures is an important risk factor because the underlying assumptions used in capital requirement calculations for not fully diversified individual and partial risks may often be mistaken leading to the underestimation of capital requirements. In the case of even the relatively moderate sectoral concentration or product type concentration, the real capital requirement may be underestimated by as much as 20-40 percent by using the IRB method which assumes perfect granularity of the portfolio when assessing credit risks.

It is a very complex task to identify and take into account concentration in a prudent way because the concentration of exposures may occur in a number of different dimensions (connected with individual transactions, groups of connected clients, according to geographical, sectoral or product types, associated with denominations, within or across risks, etc.).

The guidelines of the international supervisory community point out that concentration risks cannot solely be interpreted as a derivative element of credit risks, but they need to be assessed and managed in respect of most risk types. Consequently, the MNB expects institutions to assess and manage concentration risks in respect of the widest possible range of risks in line with the EBA SREP Guidelines by means of the possible broadest set of tools (sound and effective limit system, regular concentration analysis, stress tests and alternative model calculations, and – in justified cases – intervention into the processes, etc.). The MNB emphasises that real estate owned, including property used for banking

operations may also represent excessive concentration risk, which the institutions must manage with the capital requirement under ICAAP.

The MNB presumes the materiality of concentration risks for each institution, and the burden of proof is imposed on the institution to provide evidence of the contrary. The MNB determines the capital requirements for concentration risk in view of the assumptions of the capital requirement calculation models applied, the consistent application of the methods they incorporate, and their quantified results. In the absence of a separate capital requirement calculation model for concentration risk, the MNB quantifies the reasonable amount of economic capital required by reference to the distribution and characteristics of exposures, taking into account the Pillar 2 risk methods applied, by means of sensitivity analyses and simulations.

Concentration risks of lending

The concentration of credit risks is interpreted as a distribution of exposures to customers and trading partners where potential default by a relatively small group of counterparties or large individual counterparties is driven by a common underlying cause and may hazard the “business-as-usual” operation of the institution (uninterrupted operations with the usual and expectable profitability). The term individual customers and trading partners does not only refer to individual counterparties but also to groups of individual customers/partners that are closely connected (through ownership and/or financing).⁵⁸

In practice, the expression large exposure is used as a reference to cases that involve small groups of individual counterparties.⁵⁹ Concentration in a broader sense also includes the following: concentration by economic sector or geographical location, product concentration, concentration in a specific foreign exchange and concentration of credit-risk mitigating measures (concentration of the type or issuer of such assets), etc.

Based on the definition, there are two main types of concentration risks:

- concentration of exposures on particular clients/groups of clients (large exposures): the source of risk lies in the non-performance of exposures on the clients or groups of interrelated clients,
- sectoral concentration: the risk of non-performance attributable to a shared reason/reasons.

Pursuant to Section 108(5)(b) of the Credit Institutions Act, in respect of managing the risk concentration arising from the application of credit risk mitigation techniques, all credit institutions must have in place effective written procedures and policies for addressing concentration risk arising from exposures to clients, groups of connected clients (including central counterparties), and counterparties, clients in the same economic sector, geographic region or from the same activity, and from the application of credit risk mitigation techniques.

When discussing the concentration risk of credit risk, institutions applying advanced and standard methods should be mentioned separately. The main issue for these institutions relates to the fact that the IRB capital function used for calculating the risk weighted asset value assumes a fully granulated portfolio, thus it theoretically underestimates the actual capital requirement for the credit risk of the institution’s portfolio. Therefore, the aforementioned distortion is an issue for every institution which may call for the setting of an additional capital requirement in Pillar 2. This will be judged (both on the part of the institution and the MNB) depending on the extent of risks and the adequacy of the risk measurement and management tools applied.

For supervised institutions, the MNB measures the concentration risk of large exposures to individual clients and groups of connected clients on a consistent benchmark basis by means of IRB simulation,

⁵⁸ See: Article 4(1)(39) of the CRR.

⁵⁹ The undertaking of large exposures is regulated in Article 395 of the CRR.

irrespective of whether an institution relies on other methodologies (e.g. management within a portfolio model, Gordy-Lütkebohmert model, Herfindahl–Hirschman index or other simulation techniques) to assess its concentration risk.

The methodology for supplying missing parameters

Regarding institutions applying the standard methodology, the risk parameters are defined and supplied using supervisory benchmark methodologies. This allows for the quantification of the capital requirement of concentration risk with IRB simulation for these institutions too.

The Benchmarking Exercise conducted pursuant to Article 78 of the CRD (V 2.1.8: EU benchmark PD) had the objective of enabling the supervisory authorities to compare every year the results of the advanced Pillar 1 models used by the supervised institutions for calculating the credit and market risk capital requirements. In order to facilitate this benchmarking process, the EBA has compiled an analysis and a database enabling comparison. This makes available non-public statistics of the validated IRB PD estimates of European Banks for the low-default portfolios (sovereigns, institutions, large corporates), from which the MNB takes the median PD value in its own methodology. Where the EBA benchmark PD value is not available for a sovereign debtor, we provide a probability of default estimate based on the available external ratings, assuming a logarithmic relationship between the rating category and the PD. We use data from the 3 major international ratings agencies⁶⁰ to arrive at the rating category. Similarly to sovereign exposures, we take over the PD values made available to the MNB based on the EU benchmark in order to establish the PD parameters of financial institutions. For debtors where the EBA database does not contain any data, we establish the PD value by regression from the international rating of the particular financial institution⁶¹.

Supervisory simulation methodology

For the simulation the MNB relies on the one-factor model underlying the IRB capital functions, generating, for each simulation step, a standard realisation from factors representing systemic risks and item-specific realisations from factors representing individual risks, then examining whether the ability to pay falls below the threshold corresponding to the unconditional probability of default. During the simulation, the MNB aggregates the supervised institution's outstanding/performing transactions that are assigned to a PD/LGD parameter at the level of groups of connected customers. The MNB defines customer groups primarily on the basis of Article 4 (39) of the CRR, but the supervisory review may also identify certain shared risk factors not covered under Pillar 1 that may make it necessary for customers that are unrelated under Pillar 1 to be allocated to the same customer group and for sufficient capital coverage to be provided under Pillar 2 for the event of their potential joint default. During the aggregation process, the risk parameters (PD, LGD, R) are calculated by EAD* LGD weighting. During the simulation, the MNB divides the analysis of outstanding transactions aggregated at the level of groups of connected customers thus obtained into two parts: (1) non-retail customers and retail customers with exposures above the granularity limit⁶², as the non-granular part of the portfolio, for which IRB simulations are used, and (2) retail customers with exposures below the granularity limit, for which a conditional expected loss is quantified (eliminating the risk factor that represents the individual risk) per simulation step. In order to reduce the calculation needs of the simulation, the MNB accepts the further aggregation (based on e.g. PD-R parameters) of retail customers representing the granular part of the portfolio. In the IRB simulation, the sum of the loss determined on the basis of transactions (customers, groups of connected customers) representing the non-granular part of the portfolio, and the conditional expected loss quantified on the basis of the transactions representing the granular part of the portfolio, will comprise the loss distribution,

⁶⁰ Moody's, Standard and Poor's, Fitch Ratings

⁶¹ The additional parameters necessary for quantifying the FIRB capital requirement are determined as follows: short term (maximum 3 months): M=1; long term (more than 3 months): M=2.5. Pursuant to Article 153 (2) of the CRR, we used 1.25 times the large corporate asset correlation in the case of large entities in the financial industry.

⁶² The granularity limit is determined by expert judgement based on the size of the bank's performing loan portfolio.

the difference between the 99.9th percentile of which, and the unconditional expected loss, is the capital requirement that also covers potential large exposure concentration risk. The resulting capital requirement is compared with the so-called “clean IRB” capital requirement, wherein the MNB eliminates the SME multiplier, the maturity adjustment and the 1.06 multiplier from the supervised institution’s original transaction-level IRB capital requirement calculations in view of the fact that these adjustments also cannot be taken into account in the simulation methodology. The MNB quantifies the additional own funds requirements⁶³ to cover concentration risk on the basis of the quotient of the clean IRB and the capital requirement for concentration risk, which also covers the risk of concentration:

- the MNB derives the IRB capital requirement adjusted for granularity, where the IRB capital requirement is the actual capital requirement without the 1.06 factor (but including a maturity adjustment and an SME multiplier), and the granularity adjustment is quotient of the simulation-based capital requirement (which also covers concentration risk) and the clean IRB ratio
- the additional own funds requirements which the MNB may determine as a hedge for concentration risks is derived as the difference between the resulting IRB capital requirement as adjusted for granularity, and the actual IRB capital requirement of the supervised institution (incorporating the 1.06 and SME multipliers, as well as a maturity adjustment).

The review and revision of concentration risks are of special importance in the case of smaller institutions and institutions that pursue specialised activities (e.g. mortgage banks). Smaller size and a special activity profile should not imply larger concentration risk on their own because the drawbacks of a limited market and specialised profile may be offset by comparative advantages like a deeper knowledge of the market and higher proficiency. At the same time, this institution segment is far more sensitive to shocks deriving from a common underlying cause. Therefore, the potential need for additional capital is always a valid question in their case, noting that the assessment of risk concentrations should always receive more attention at smaller institutions than at larger ones.

Metrics applied to measure credit risk concentration:

- Size of top ‘x’ large exposures relative to relevant (“appropriately selected”) numeraire (e.g. balance sheet total/own funds/total exposure),
- size of top ‘x’ connected exposures relative to relevant (“appropriately selected”) numeraire (sensitivity analysis),
- portfolio concentration metrics (Gini coefficient, Herfindahl-Hirschman index, credit risk-weighted Herfindahl-Hirschman index),
- Portfolio correlations and variance/covariance,
- Sophisticated institutions do not necessarily perform separate concentration tests. Instead, they manage concentration under the framework of integrated risk management systems.

Concentration risk ratio for small banks (weighted HHI)

Small banks were usually unable to adapt the supervisory simulation methodology presented above to quantify their portfolios’ concentration risk. Accordingly, for the measurement of the concentration risk of individual clients and client groups, the MNB recommends the quantification of a credit risk-weighted Herfindahl-Hirschman index (weighted HHI). HHI is a widely used concentration index; however, from the concentration risk calculation perspective the HHI calculated on the basis of exposures is unable to differentiate between transactions with identical exposure amounts but different credit risk profiles. The credit-risk weighted HHI concentration ratio tries to minimise this shortcoming by also taking into

⁶³ In determining the additional own funds requirement, the MNB does not take into account exposures to the parent company and to the subsidiaries of the parent company in accordance with the regulations on large exposures. At the same time, it expects the effects of the above-mentioned exposures on concentration risks to be presented.

consideration the collateral coverage data and client rating systems (PD value), also available to small banks, and the risk characteristics of the respective segments.

In order to ensure that the concentration risk HHI index also measures, in line with the supervisory expectations, the client group concentration, the calculation should be performed for the performing clients' exposures aggregated at client group level. For supervisory purposes, it is not necessary to take into consideration the concentration risk of exposures to the Hungarian State (and equivalent) and to the parent bank; accordingly, these exposures may be excluded from the calculation.

$$HHI_{korr} = \text{sum} \left(\frac{\text{if}(s = 1; EAD * w_{ij} * x_k; 0)}{\text{sum}(EAD * w_{ij} * x_k)} * 100 \right)^2$$

where

$s=1$ is the non-granular portfolio⁶⁴;

w_{ij} is the weight determined on the basis of LTV and PD rating:

$s=1$

w_ij		LTV ⁶⁵				
		1 (<0.325)	2 (<0.433)	3 (<0.65)	4 (<1.3)	5 (>1.3), uncovered
rating (PD)	1 (<1%)	0.88%	1.47%	3.04%	3.95%	4.79%
	2 (<2.5%)	2.77%	5.13%	7.13%	8.36%	10.63%
	3 (<5%)	3.83%	6.58%	9.32%	10.70%	13.89%
	4 (<7%)	5.00%	8.21%	11.30%	13.67%	16.89%
	5 (>7%)	7.00%	10.46%	14.57%	16.83%	21.64%

$s=0$

$$w_{ij} = 8\%$$

and x_k is the segment-based risk adjustment:

segment risk	x_k
low ⁶⁶	30%
normal ⁶⁷	170%

There is an approximate linear relation between the weighted HHI and the granularity adjustment applied in the ICAAP review to determine the SREP capital requirement for concentration risk:

$$gran_{korr} = 0.0015432 * HHI_{korr} + 1.0099386$$

It should be noted that the granularity adjustment thus obtained is only an approximate value to the granularity adjustment obtained as a result of the supervisory simulation methodology presented earlier, as the precise value is based on the credit risk parameters revised during the ICAAP review.

⁶⁴ the granularity limit is determined on a professional basis, depending on the size of the bank's performing loan portfolio. The total portfolio may be regarded as non-granular in the case of small banks.

⁶⁵ market value-based LTV (loan to value)

⁶⁶ bank, institutional exposures

⁶⁷ all other segments

On the other hand, the presented HHI ratio proves to be a good tool to monitor concentration risk. The scale below serves as guidance with regard to the degree of the portfolio's concentration (green – no or low concentration; yellow – moderate concentration; red – strong concentration):

HHI_adj	granularity adjustment
300	1.47
200	1.32
100	1.16
80	1.13
60	1.10
40	1.07
32	1.06
20	1.04
0	1.01

Note: under a granularity adjustment level of 6%, during the ICAAP reviews the MNB will not impose additional capital requirement to cover concentration risk.

Supervisory measures applied upon the breach of the large exposure limit:

- As of 1 January 2014 the CRR does not permit the breach of the large exposure limit; it no longer permits the institution to – in accordance with the former practice – deduct the overdrawn amount from its regulatory capital until the elimination of the breach. Accordingly, if such event occurs, the institution must report it to the supervisory authority, which – in accordance with Article 396 (1) of the CRR – obliges the institution to terminate the breach immediately or by a specified deadline. If the breach is not terminated by the deadline, the MNB imposes a penalty.
- During supervisory review process the MNB verifies the compliance with the large exposure limits. If the breach exists during the ICAAP review, the MNB may set the overdrawn amount as a capital requirement add-on within the framework of the concentration risk.

VIII.1.10 Non-performing items, expected loss and provisions

Items classified into the default category based on the default definition under Article 178 of the CRR, which applies uniformly to institutions using the standardised and IRB approaches, are an important part of risk exposure. Coverage for the risk and potential losses of non-performing exposures is basically provided through provisions; however, as demonstrated by the former steady increase in the risk costs of non-performing IPRE (Income Producing Real Estate) projects and retail FX mortgage loans, significant unexpected losses may be incurred on the non-performing portfolio.

For the purposes of its review, the MNB expects institutions to assess the risk of non-performing exposures in Pillar 2, by demonstrating, on the one hand, the existence of sufficient provisions for expected losses and, on the other hand, calculating an adequate capital requirement for unexpected losses over expected losses. To this end, as described in the chapter on the estimation of the loss rate, the institution must develop a reliable ELBE or LGD estimate in respect of their non-performing portfolios.

The MNB's experience to date has been that a larger proportion of institutions did not have appropriate ELBE or LGD estimates for non-performing exposures. In the absence of reliable parameters, the MNB assumes ELBE (expected loss) as an equivalent of provisions, with regard to the interrelated concepts of provisions and expected loss. While theoretically an institution may allocate provisions in excess of expected losses, this has not been corroborated by the outcomes of previous reviews and developments in risk costs. An institution seeking to recognise excess provisions on its non-performing portfolio must provide conclusive evidence through its ELBE estimate that it actually has an impairment methodology in place that produces provisions in excess of expected losses. Even in cases where the existence of excess

provisions can be verified, consideration will be given to whether the excess of a particular non-performing exposure can actually be used to cover other risks in the future.

Institutions using IRB also distinguish between expected and unexpected losses in their capital requirement calculations: they allocate capital to unexpected losses, while recognising the IRB shortfall (derived as the difference between expected losses and provisions) in own funds. Since the value of own funds must be equal under Pillar 1 and Pillar 2, for institutions using IRB in Pillar 1 the value of the IRB shortfall, overridden in Pillar 2, should be recognised in the Pillar 2 capital requirements. In the case of institutions using a standardised approach in Pillar 1, the value of the IRB shortfall is obviously part of the Pillar 2 capital requirement.

Regarding the calculation of capital requirements for the IRB shortfall and the non-performing portfolio, the MNB will be guided by the provisions of the CRR on the IRB approach that incorporates an LGD estimation of its own (AIRB), i.e. the expected loss on the non-performing portfolio is assumed to be equivalent to the ELBE estimate, subject to Article 159 of the CRR in cases of excess provisions for the non-performing portfolio. Obviously, in the absence of an ELBE estimate, when it is substituted by the MNB for provisions, no excess (or shortfall) of provisions is recognised for non-performing exposures.

For non-performing exposures, the capital requirement is calculated using $\max\{0;(\text{LGD}-\text{ELBE})\}$ under the AIRB. To the extent that the institution has a reliable LGD estimate, the LGD will include unexpected losses over expected losses; consequently, the relation $\text{LGD} > \text{ELBE}$ will always be satisfied. However, where an institution does not have LGDs, which tends to be the case with non-retail portfolios, the regulatory LGD will be considered sufficient to cover the risks depending on the risk profile (e.g. collateralisation) of the portfolio segment or the group of customers of homogeneous risk. The MNB's experience is that in certain non-retail segments regulatory LGDs do not provide adequate coverage for the risk of non-performing exposures, and impairment is also higher than the regulatory rate of approximately 45%. In the absence of a reliable LGD estimate, the MNB considers the provisions raised as the ELBE value and determines the unexpected losses above that value as a minimum of 8 percent (or 12 percent for SL) of net exposures, by analogy to the standard capital requirement.

In the case of performing exposures, relative to the expected loss calculated as the product of the long-term average default PD and the downturn LGD, and excess of provisions may accumulate naturally, typically in a downturn accompanied by high default and loss rates. In such cases, providing that reliable PD and LGD estimates are in place, the MNB accepts that the provisions will also cover part of the unexpected losses over the expected loss. The quantification of the Pillar 2 IRB shortfall (excess) does not differ substantially in Pillar 1 between STA and IRB banks. Banks using IRB in Pillar 1 net the Pillar 2 calculation with the value of the shortfall or excess already taken into account in own funds and include this net effect in Pillar 2 as an add-on.

In the more favourable years of the economic cycle with low rates of default and loss, provisions are typically not required in excess of the expected loss (derived as the product of PD and LGD), but if this were nevertheless the case, then during the ICAAP review the MNB will check the reasons for raising excess provisions, whether such excess is likely to survive on a longer term and to what extent the excess is justified by differences in capital requirement calculation and provisioning regulations. Such excess amounts may be taken into consideration against the IRB shortfall values of other segments only if these excesses survive on a longer term and are raised due to regulatory differences. The surveyed banks may assist in this work by breaking down the difference between the expected loss and provisions level considered in the Pillar 2 IRB shortfall calculation into relevant factors (regulatory differences, methodologies, expectations, management expectations, etc.) for each risk segment.

VIII.1.11 IRB shortfall limit

In the ICAAP reviews, the increase in the Bank's provisions levels caused an excess reduction in ICAAP capital requirements for a number of Banks. In general, the MNB's findings on the increase in provisions levels are as follows:

- the provision excess that became a feature of the Covid period did not prove to be transitory, becoming a decisive factor in several large bank calculations. In fact, practices emerged that aim to cover risks under provision for which bank credit risk models are not prepared. This raises the possibility that the bank's expected loss estimates are unreliable or do not correspond to the provisions levels being compared due to a known error.
- based on the experience of previous reviews, the MNB found that in some cases the provisions are inconsistent with the VaR estimate for credit risk, with the Bank provisioning for a multiple of losses expected per 1,000 years for certain segments, which also indicates inconsistency in degrees of risk.
- several large banks have not adjusted the IRB provision excess value for the excess provision compensating effect already taken into account in CET1 under CRR 473/a either.
- several large banks have already applied the RWA limit in their ICAAP practices, which the MNB considers a good general practice.

Based on the above considerations, the MNB generally applies a maximum limit (CRR 62/d) in ICAAP reviews to the extent that it allows for the reduction of unexpected losses. Accordingly, the MNB will limit the provision excess that can be taken into account in Tier 2 to 0.6% of the risk-weighted asset value (RWA) of the portfolios under IRB calculated under the SREP of the Bank concerned. Provision above the calculated upper limit is set by the MNB as a capital requirement excess in the ICAAP reviews compared to the Bank's Pillar 2 calculation.

VIII.1.12 Application of the SME supporting factor

With the entry into force of the CRR, the definition as set out in Article 5(9) of the CRR shall apply in respect of SME supporting factor eligibility..⁶⁸

VIII.1.13 Capital requirement of securities issued under the MNB's Bond Funding for Growth Scheme

Upon determining the credit risk capital requirement for securities issued under the Bond Funding for Growth Scheme (BGS), supervised institutions may choose between two approaches.

- Based on the provisions of Article 138 of CRR, the institution should also nominate the Scope and Euler Hermes rating agencies (which usually rates the BGS bonds) and rely on those ratings to determine the applicable risk weights specified under Article 122 of CRR to calculate the Pillar 1 capital requirement of BGS bonds. In this case, the MNB will not enforce an add-on in Pillar 2 compared to the standard risk weights.

OR

- The institution may continue to use the risk weights determined on the basis of the ratings by currently nominated credit rating agencies in Pillar 1. However, in Pillar 2, the MNB enforces the capital requirement calculated with the parameters specified during the ICAAP review, with the proviso that it may not exceed the standard risk weights specified on the basis of the rating applicable to the BGS bonds, published on the MNB's website (Article 122 of CRR).

The mapping of the international ratings and the CRR categories is included in Commission Implementing Regulation (EU) 2019/2028⁶⁹.

⁶⁸ <https://eur-lex.europa.eu/legal-content/HU/TXT/HTML/?uri=CELEX:02013R0575-20240709>

⁶⁹

VIII.1.14 Holdings (Equity exposures)

A comprehensive risk assessment also requires an assessment of the risk of holdings. As part of such an assessment, the institution must assess the risks of its subsidiaries that are subject to consolidated supervision, as well as of any holdings outside the scope of consolidated supervision.

In terms of holdings, the MNB primarily expects compliance with the rules for regulatory capital adjustments and risk weighting as set out in the CRR⁷⁰.

In the ICAAP review, the institution should present the differences between its Pillar 1 and Pillar 2 risk management and capital calculations. Institutions must segment the assets of the entities under consolidated supervision into the exposure categories appropriate for the methodology used, and apply the level of risk appropriate for each exposure class. The risk weighting of holdings must be determined for investments in entities that are not subject to consolidated supervision.

As part of ICAAP reviews, the MNB expects information on the following:

- a complete list of entities in which the institution has a direct, indirect or synthetic holding, defining the degree and type of each investment (e.g. significant/non-significant investment in a financial sector entity), the gross value of the investment, and the amount of provisions, and risk weighting under Pillars 1 and 2,
- The list should also include the details of credit provided by the institution for the purposes of acquiring any participation,
- the activity profile of the entities,
- the nature of the assets held by the entities (in particular, intangible assets, real estate)
- changes in holdings (during the period under review),
- upon request, the institution must disclose when, for what purpose, and in what circumstances a particular holding was acquired, the activities and main risks of the entity in which the institution has a holding, the results of the most recent accounting valuation of the holding, as well as any changes expected concerning the entity in question (disposal, voluntary liquidation, recapitalization of the entity, etc.).

In the case of Hungarian institutions, the MNB does not consider the risk of holdings to be significant; accordingly, it does not expect Pillar 2 assessment approaches to be different from those applied under Pillar 1. However, where the risk of holdings in entities not subject to consolidated supervision is higher (which may be indicated by a higher share of exposures shown as holdings as a percentage of the balance sheet total, significant past provisions on the holdings, or provisions recognised by the institution on economic value or goodwill related to the holdings), the MNB expects the institution to use its own internal capital requirement calculation methodology under ICAAP:

- in addition to the regulatory classification, the institution (primarily non-financial institutions) should perform risk-based segmentation,
- segregate real estate market investments,
- manage the risks involved in an adequate and prudent manner, and quantify the capital requirement.

As part of ICAAP reviews, the MNB examines in particular the risk weighting of holdings on which significant past provisions were recognised in the supervised institutions, or which may present a higher risk. These include in particular:

- holdings in which the asset side of the entity's balance sheet is predominantly comprised of real estate that generates profits or is to be sold,

⁷⁰ Assistance for the interpretation of the provisions of the CRR is provided in László Seregdi: The role of own funds in the prudential regulation of credit institutions.

- holdings acquired in an enterprise that a deteriorating debtor of the institution.
- holdings acquired in an enterprise that does not have a meaningful financial history and its income-generation ability is difficult to assess.
- the acquisition of a holding in an undertaking not closely linked to the institution's core business, with a higher degree of risk-taking, for profit.

In the case of the risky holdings specified in the previous paragraph, the MNB will be guided by the risk weights specified in the CRR for IRBs:

- as a general rule, a risk weighting of 370% as per Article 155(2) of the CRR;
- the application of lower risk weights or expected losses to exchange traded shares and equity instruments (units), and to well-diversified portfolio investments, will only be accepted for exposures where the application of preferential weights is supported by a high free float, the volume of trading, or the level of diversification of the portfolio;
- the application of a 90% LGD and a 1.25% PD floor under CRR Article 165 to equity exposures subject to the PD/LGD method.

Where a holding is acquired for the repossession of collateral property, the ICAAP risk weighting may not result in a lower capital requirement compared to the application of the risk weighting expected by the MNB to the properties being repossessed.

VIII.1.15 Counterparty risk

Definition

Counterparty risk means potential losses from a counterparty's failure to perform its contractual obligation before the conclusion of the specific transaction (i.e. before the final settlement of cash flows). As a type of credit risk, this risk affects derivatives, repo and other securities financing transactions. Another characteristic feature of counterparty risks is their bilateral character; in other words, the respective positions can take on an opposing (market) risk profile from the perspective of the counterparties participating in the given transaction which, among other things, provides an opportunity for netting positions and settlements. Regarding other definitions, the MNB will be guided by the definitions provided in Article 272 of the CRR.

Risk assessment and management

The assessment and management of counterparty risks is significantly different from the risks of direct lending. On the one hand, generally transactions carrying counterparty risk are primarily not made to take credit risk, but to hedge for or take market risks. Another important difference is that the exposure of the position changes on a daily basis, which means that potential future changes in exposures should be regularly monitored and taken into account.

For the purposes of managing counterparty risk, the MNB expects institutions to:

- monitor customers on a regular basis,
- evaluate transactions and exposures to customers at least daily,
- monitor collateral received and given, as well as initial and variation margins, at least on a daily basis,
- monitor wrong-way risks,
- set limits on customer exposures,
- follow a conservative approach in the calculation of the limit charge of the transactions, taking into account the risk of each transaction, as well the netting and margin framework agreements with the counterparty,

- ensure the regular and reliable reporting of transactions to the EMIR database in accordance with the legislation in effect.

The MNB recommends that, in line with the risk management arrangements in modern money and capital markets, in the greatest possible number of cases, institutions should:

- enter into netting agreements with their customers,
- ensure the required collateralisation,
- ensure that a framework agreement is in place for the settlement of initial and variable margins, and is operated on an ongoing basis, and
- arrange for clearing via a central counterparty.

ICAAP review

Although counterparty risk is classified by the CRR under credit risk, in view of its nature the MNB expects the risk management unit to be familiar with the market risks of the products, and the infrastructure of money and capital markets. The new standardised approach (SA-CCR) is more risk-sensitive than the previous market pricing methodology widely used in the domestic sector, and thus it results in regulatory capital requirements that better reflect the risks associated with institutions' derivatives transactions.

When calculating the Pillar 2 capital requirement, institutions shall assess whether the degree of risk justifies the application of the more complex and more conservative capital calculation approach compared to Pillar 1. However, in general cases, the MNB also considers the SA-CCR methodology to be sufficiently risk-sensitive for the calculation of Pillar 2 capital requirements. For institutions using the original exposure method, due to the simplified and less risk-sensitive nature of the applied methodology, it is recommended to use more conservative values in Pillar 2 than the factors specified in Article 282(4) for the determination of potential future exposure in Pillar 2.

In determining capital requirements for counterparty risk, the MNB expects institutions to proceed as follows:

- Take into account transactions in both the banking book and the trading book.
- Apply a consistent capital requirement calculation methodology for a particular type of transaction.
- Carry out systematically checks on the quality of the data used to calculate the capital requirement, including the assessment of the transaction.
- Carry out the assessment of collateral received and given in relation to the management of counterparty risk at least daily at the level of the customer or the netting set.
- Have the means, for the purposes of their capital requirement calculations, to identify written options (including any transactions whose market value is never positive) and whether the option premium has already been paid or will be paid in the future, as well as transactions where the terms are regularly re-established on an MTM basis so that the market value of the contract is 0.
- Have the means, for the purposes of their capital requirement calculations, to identify whether the individual transactions have been concluded via a central counterparty, and if so, which one, and whether indirectly or directly.
- Based on the definition provided in Article 291(1) of the CRR, the MNB considers a risk to be a specific wrong-way risk in cases where a high expected future exposure to the counterparty is accompanied by a high probability of default of the counterparty. Pursuant to Article 291(5) of the CRR, an institution identifying a transaction that carries a specific wrong-way risk must quantify the capital requirement for that risk in a separate netting set.

- The recognition of netting in capital requirement calculations is subject to supervisory authorisation in accordance with Articles 295–298 of the CRR.
- Written options are also subject to a potential future exposure add-on if they are included in a netting set where there are also options that have not been written and as such potentially have a positive value, as described in EBA Q&A 2013_666⁷¹ and EBA Q&A 2015_2195⁷².
- In the case of transactions concluded indirectly via a central counterparty, the institution should be able to assess, for each member of the clearing chain, that the relevant transactions and collaterals are separated and segregated, and are bankruptcy remote.
- The methodology and parameters used for the calculation of counterparty risk weights should be the same for counterparty and direct credit exposures under both Pillars 1 and 2.
- Where an institution uses different methodologies for calculating capital requirements under Pillar 1 and Pillar 2, the institution must provide a detailed description of the difference in its documentation, and must be able to present the numerical differences at the transaction or netting set level when calculating its capital requirements.
- According to EBA Q&A 2014_907⁷³, institutions may not use deltas to determine the nominal value for option contracts.
- In the case of netting agreements recognised by the authority, the replacement cost shall be determined in accordance with Article 275 of CRR. When the institution has no netting agreement or its netting agreements are not recognised by the authority, (pursuant to Article 274(1) of CRR) upon calculating the replacement cost each transaction shall be treated as a separate netting set.
- For the purposes of calculating the replacement cost, collaterals received and given shall be taken into consideration in accordance with Articles 275 and 276 of CRR.
- A conservative approach is required for exotic derivatives and underlying products.

VIII.1.16 Credit valuation adjustment risk (CVA)

Pursuant to the regulatory changes effective as of early 2014, the scope of risks to be quantified and the regulatory capital requirements for exposures were extended to include credit valuation adjustment (CVA) risk, a type of risk that is a counterparty risk by nature but is defined separately under the CRR.

Institutions should design (or develop) and operate the rules, processes, methods, procedures and systems intended to manage risks in such a manner that they adequately cover the newly emerging elements of risks as well, with special regard to risks related to CVA. Based on current regulatory requirements, the risks associated with quantified CVA can be considered to be relatively low among Hungarian institutions. Mindful of the principle of proportionality, given the presence of adequate in-process components the MNB currently does not consider the use of advanced internal models in the ICAAP as essential for determining the magnitude and capital requirements of this risk. Obviously, where justified by the size and/or complexity of the risk positions, or possibly changes in regulation, the development of the method applied is also expected.

In calculating the capital requirements for CVA risk, the MNB expects institutions to:

- regularly check the exemptions under Article 382(4) of the CRR for customers,
- provide details, in the course of the ICAAP reviews, supported by analytical evidence, on transactions with non-financial counterparties as defined in Article 2(9) of Regulation (EU) No

⁷¹ http://www.eba.europa.eu/single-rule-book-qa/-/qna/view/publicId/2013_666

⁷² http://www.eba.europa.eu/single-rule-book-qa/-/qna/view/publicId/2015_2195

⁷³ http://www.eba.europa.eu/single-rule-book-qa/-/qna/view/publicId/2014_907

648/2012, as referred to in Article 382(4)(a) of the CRR, and transactions concluded with non-financial counterparties established in third countries, and on the process of determining the grounds on which they shall be excluded from the calculation of the capital requirement for CVA risk, where relevant,

- provide details of their exposures arising from securities financing transactions, supported by analytical evidence, during ICAAP reviews for the purposes of the verification of Article 382(2) of the CRR,
- regularly monitor the credit rating of customers,
- present the steps of their capital requirement calculations to the MNB, supported by analytics,
- where an institution uses different methodologies for calculating capital requirements under Pillar 1 and Pillar 2, the institution must provide a detailed description of the difference in its documentation, and must be able to present the numerical differences at the customer level when calculating its capital requirements,
- describe to the MNB which of the capital requirement calculation methodologies they have decided to introduce of those related to the new CVA risk to enter into force on 1 January 2025 in relation to the planned amendment to the CRR, and the expected capital requirement impacts.

VIII.1.17 ***FX lending risk***

Definition

FX lending risk is the potential threat of a loss from lending in a currency other than the legal tender of the country of the borrower's residence.

Risk assessment and management

As part of their credit risk assessment, institutions must separately assess the credit risk arising from the foreign currency-denominated exposures to unhedged borrowers⁷⁴, and the materiality of that risk. The risk inherent to foreign currency lending is characterised by a non-linear relationship between credit and market risks, as the market risk stemming from the appreciation of the foreign currency exerts a disproportionate impact on the credit risk of the institution's foreign currency loan portfolio, and occasionally can even impact the institution's entire risk profile. Foreign currency lending can imply higher residual risk in case the value of the collateral does not follow the rise in the exposure value stemming from the increase in the exchange rate; in addition, institutions may also face the concentration of credit risk if the majority of their loan portfolio is denominated in the same foreign currency or in closely correlated foreign currencies.

In accordance with the EBA SREP Recommendation, FX lending risk may be assessed as material when the outstanding foreign currency-denominated exposures to unhedged borrowers account for at least 10% of the institution's total credit portfolio (for this purpose the total credit portfolio means the total outstanding credit portfolio to non-financial corporations and household customers), in cases where the total credit portfolio thus defined accounts for at least 25% of the institution's total assets.

ICAAP review

The MNB expects institutions to operate adequate risk management mechanisms for measuring and controlling FX lending risks. In this context, the MNB expects the institutions to:

⁷⁴ "unhedged borrowers": borrowers without a natural or financial hedge that are exposed to a currency mismatch between the loan currency and the hedge currency; natural hedges include in particular cases where borrowers receive income in a foreign currency (e.g. remittances/export receipts), while financial hedges normally presume that there is a contract with a financial institution);

- determine their risk appetite for foreign currency lending and their foreign currency lending policy, and set specific limits (e.g. exposure-specific thresholds),
- adhere to the limits set for foreign currency lending, while also having preventive and ex-post risk management procedures in place in case of potential overruns,
- ensure that FX lending risk is integrated into the institution's valuation methods, transaction approval and review processes,
- ensure that the risk identification, monitoring and reporting procedures also cover FX lending risks,
- have, for monitoring purposes, information on the foreign exchange risk of the transactions, whereby the level of coverage, the natural hedge (including the existence and turnover of a foreign exchange account) of foreign currency lending exposures should be monitored,
- ensure the continuous monitoring of the impact of exchange rate movements on the credit risk of portfolios denominated in foreign currency,
- have appropriate knowledge of possible future trends and exchange rate volatility,
- incorporate into their collateral valuation policies the rules for the prudent management of higher risk due to FX-denominated collateral (e.g. by applying higher haircuts) and to prescribe the treatment of foreign exchange deviation (FX mismatch) arising from the different currencies of the exposure and collateral, and periodically review the hedging position of foreign currency borrowers,
- consider, in their rating systems/PD models, for the purposes of rating borrowers without a natural hedge, the additional risk of foreign currency-denominated loans and the consequences of the exchange rate fluctuations,
- incorporate a potential exchange shock effect into their EAD calculations.

The MNB expects the institutions to treat the risks arising from the foreign currency loans outstanding to customers with no natural hedge separately in ICAAP:

- they should assess the non-linear correlation between the market risk and credit risk with appropriate procedures,
- they should determine the related capital requirement in a prudent and forward-looking manner, also taking the concentration risk (dominant currencies) into consideration;
- during the capital planning they should consider the future capital requirement arising as a result of the properly stressed environmental variables.
- In case of stress tests, they should apply sufficiently severe scenarios.

The MNB expects the institution to carry out a regular review of the natural hedge at least annually, not only on credit approval. In submissions, the institution must examine the existence of a natural hedge in a separate chapter. The review of natural hedge should also cover the following aspects:

- the borrower's foreign exchange risk hedging strategy,
- the borrower's current and future foreign currency expenditures,
- analysis of the borrower's income, including, among other things, the currency in which the borrower's income arises, whether the borrower's indirectly bears any foreign exchange risk (e.g. if, despite the EUR rent, the tenant's income is generated in HUF), or which country the borrower sells to (for example, to a currency resident country, to the home country, or to a third country. In the latter two cases, it is necessary to analyse the sensitivity of demand to changes in foreign exchange rates).

In the course of the ICAAP review, the MNB applies the above criteria to assess whether the risk management and capital requirement calculation processes and models for foreign currency lending are adequately designed, and examines the adequacy of the capital requirement calculated to cover the risk.

If the MNB identifies shortcomings in the relevant processes of the institution, or the institution is unable to substantiate the adequacy of the capital requirement calculated for the relevant risk, for the purpose of the proper management of the risks the MNB may impose measures and additional own funds requirements.

VIII.1.18 Residual risks

Definition

Residual risks are risks associated with the significant devaluation or limited applicability of collateral covering credit exposures. In other words, residual risk is the risk that recognised credit risk mitigation techniques used by the credit institution prove less effective.

The CRR enables institutions to employ risk mitigation techniques to reduce the capital requirement of credit risks. While institutions mitigate these risks by way of collateral, such collateral can pose additional risks (legal, documentation and liquidation risks) which may deteriorate the impact of risk mitigation.

For example,

- the liquidation of the collateral following the customer's default is either problematic or time consuming,
- collateral was valued inappropriately (e.g. overvaluation).

Risk assessment and management

Residual risk must essentially be managed by means of written procedures and policies. Institutions must be able to prove to the MNB that they have proper risk management procedures in place to control risks that derive from the use of credit-risk mitigating collateral. The institutions should have in place appropriate governing and control systems, valuation procedures, internal regulations and assigned responsible individuals for the prudent handling of risks that occur. These procedures should be subject to regular review.

Risk limits can also be used to monitor and mitigate residual risk. The institution may apply residual risk limits, including those related to (i) the enforceability of collateral (e.g. success of drawing guarantees), (ii) significant shifts in real estate prices (e.g. changes in price index), and (iii) the frequency of and losses from fraud and legal procedures related to collateral (possibly within operational risk) to limit its risk. It is important that the domain reports at regular intervals to the management area on the results of the limits, or at least on the values that reached or exceeded the effective trigger level, as well as the action plans that have been drawn up, and the measures implemented.

Where the MNB does not find the procedures and approaches employed by the institution under Pillar 1 appropriate and comprehensive, it may require the institution to take specific action (e.g. change the haircuts on the volatility of collateral) or raise additional capital for covering residual risks.

ICAAP review

Residual risk is closely connected to the approach used in loss rate estimations because in sufficiently conservative LGD estimations the residual risk is already directly reflected in the credit risk capital requirement.

In the course of comprehensive ICAAP reviews, the MNB examines the method and capital requirement for residual risk for institutions only in relation to the LGD estimation methodology. However, there are also supervisory requirements for residual risks that include, but are not limited to, the management, valuation, record-keeping, and enforceability of collateral that are typically assessed by the MNB in the context of ongoing supervision and comprehensive and targeted reviews.

The MNB expects at least the following in a comprehensive ICAAP review:

- Institutions should measure and monitor the distribution of guarantors and collateral, and take the necessary measures where appropriate (e.g. in the case of significant concentration).
- Institutions should go beyond the statistics-oriented approach of LGD estimation in assessing residual risks, they should also take into account and analyse in detail the risk factors which may be responsible for the possible future devaluation or limited applicability of collateral.
- Institutions should collect data on returns on collateral, costs related to returns, and produce regular analyses of the experience, and quantify potential losses from the depreciation and limited enforceability of collateral.
- Institutions should develop a detailed methodology for reviewing and back-testing the rules for collateral discount rates. Institutions should carry out documented back-tests, at least annually, for the appropriateness of the collateral value discount they use on the basis of actual experience and of data on returns on collateral. Where justified by the result of the back-testing, the discount should be adjusted.
- Institutions should investigate the relationship between the collateral and the creditworthiness of the collateral provider and, if there is a significant correlation, take the necessary steps (e.g. more conservative margin multiplier or LGD using other margins of conservatism)⁷⁵.
- Institutions should adequately manage their collateral-transaction allocation in their systems, risk management, and capital requirement calculations.

In their own LGD estimates, institutions should take into account previous burdens as well as the real returns on collateral (e.g. through back-tested collateral value discounts) when determining the hedging value used. It is also important that, in the LGD estimation, institutions should ensure the adequacy and accuracy of the estimate with the appropriate data quality for the hedge data.

VIII.1.19 Settlement/delivery risk

Definition

Settlement risk is the risk that one counterparty to a transaction⁷⁶ does not fulfil its delivery/payment obligation at the time of settlement, or fails to do so contractually, causing a financial loss to the other party. Settlement risk may also include credit and liquidity risk elements, to the extent that it may result from the deteriorated solvency or potential bankruptcy of the defaulting party, or unfavourable developments in market liquidity conditions.

Risk assessment and management

When assessing settlement risk, according to the methodology set out in Article 378 of the CRR, apart from the value of the transaction the magnitude of the risk also depends on the length of delay in settlement. The CRR considers the settlement risk to be actual in case of Pillar 1 from the fifth business day after the delivery deadline (SD⁷⁷+5), i.e. in the event of a delay of more than four business days.

Under regular market conditions in Hungary, non-performance of delivery is mostly of technical nature; i.e. transactions are simply settled with a delay.⁷⁸ In view of the fact that transactions delivered (settled)

⁷⁵ In accordance with Article 181(1)(c) of the CRR.

⁷⁶ For the purposes of this point, a transaction in general is an agreement for the exchange of money market or capital market products, foreign exchange, securities or commodities.

⁷⁷ SD = Settlement Date

⁷⁸ In relation to settlements, market players take varying levels of risk depending on whether the settlement of the transaction is guaranteed (involves a CCP).

within SD+4 days may also involve additional replacement cost, the MNB considers that such transactions should also be monitored and managed in the ICAAP.

The basis for the quantification of the settlement risk is the market value of the outstanding transaction at the time of settlement and the positive difference between the contracted (binding) value, i.e. the replacement cost. The extent of the risk is thus influenced by the volatility of the exchange rate and the length of time between the transaction and contractual performance. Non-performance by the counterparty may mean loss of the exchange rate gains available on the transaction, i.e. the replacement cost defined as the difference between the contract price and the rate at default may be supplemented by the “alternative cost” of the loss of the exchange rate gains, or its realisation at a reduced value.

Credit risk-related liquidity risk derives from the potential failure of the counterparty to fully deliver (the contractual amount) in due time, which may lead to the following consequences:

- the duly delivering seller needs to seek other sources of liquidity to fulfil further contractual obligation(s) (take out loans or sell certain assets),
- the duly delivering buyer will have to obtain the financial instrument concerned from another seller so as to be able to deliver on further transaction(s).

For credit institutions and investment service providers operating under tight liquidity conditions, defaults on high-value transactions (delays) may cause significant problems. This risk type should especially be taken into consideration in the case of financial instruments that have a modestly liquid market (for the purchase of the instrument is more difficult and delivery defaults are more frequent under such conditions).

The greater the distance between the seller and the buyer in the transaction (the number of intermediary counterparties or in terms of time zones), and the longer the (custodian) chain, the greater the probability of partial, late, or non-performance. If the institution also provides clearing agent services to its customers (sub-clearing members), it bears further risks due to the fact that as general clearing member, it has to warrant for each sub-clearing member’s delivery to the central counterparty (only the institution is in contractual relation with the CCP). This risk can be kept at an appropriate level by setting risk limits, requiring adequate coverage and elaborating a proper monitoring system.

The extent of replacement cost risk depends on the institution’s agreements with other investment service providers. Frame contracts (e.g. on securities lending) may be proper risk management means. If the institution does not have an appropriate procedure in place for handling this risk, an additional capital requirement may be justified in the case of volatile markets.

ICAAP review, capital requirement calculations

According to the CRR, the additional own funds requirement in Pillar 1 is based on the positive difference between the market value of the not delivered transaction at the time of settlement and the contract value (strike price), i.e. capital requirements are derived as the product of the replacement cost and the weights in Table 1 in Article 378. For delays of less than 5 business days, the table contains a zero percentage weight, and there is no need to allocate capital in the regulatory pillar for the risk of such transactions.

In the ICAAP review, the MNB considers the approach used in Pillar 1 to determine the capital requirement to be essentially appropriate, while in some respects it considers that a more rigorous procedure should be in place. On the one hand, instead of a delay of four business days, it is advisable to reduce the possibility of using a zero percentage weight to a delay of 2 business days, given that the replacement cost also arises for these transactions. The risk weight to be applied is the same as that assigned to the 5-15 day band of the table referred to above, i.e. 8%.

VIII.1.20 Free deliveries

Definition

A free delivery risk arises in the case of transactions in securities, foreign exchange, commodities or derivatives thereof, when one of the parties to the transaction irrevocably fulfils its contractual obligation and the other party has not yet settled, i.e. in the case of a delivery before the other party pays, or a payment before the other party delivers. As a result of unilateral performance, there is essentially a credit relationship where the non-performing party is the borrower.

Risk assessment and management

The risk of open delivery is essentially a credit risk, with the exception that the credit relationship is not derived from a classical credit transaction. In contrast to the replacement cost arising in case of default risk, the amount of risk exposure is equal to the total value of the delivered instrument or the total purchase price paid.

The risk from free deliveries can be eliminated or mitigated through DVP (delivery versus payment) or RVP (receive versus payment) settlements, a central counterparty (CCP)⁷⁹ interposed between the counterparties, or the use of the CLS system⁸⁰. Since, by applying these instruments and principles, the mechanisms of settlement systems mostly ensure that the risk from free deliveries is minimised, the risk of settlements via central counterparties (CCPs) is limited to replacement cost. In the course of transactions settled bilaterally outside the CCP, however, the risk of free deliveries should also be considered, monitored, and managed, depending on the counterparty's rating. The reason is that in this scenario, there is no third party or mechanism between the dealing partners which could enforce the DVP (RVP) principle. In this respect, the institution is expected to apply limit and partner evaluation systems and to perform appropriate monitoring.

ICAAP review, capital requirement calculations

The criteria for determining the capital requirement for open deliveries in Pillar 1 are set out in Article 379 of the CRR. For the purposes of ICAAP reviews, the MNB will accept the management of these risks according to the CRR also under Pillar 2, and will thus be guided by the provisions of the Article referred to above in determining the capital requirement for the risk, and in judging the institution's determination of the capital requirement.

VIII.1.21 Securitisation risk⁸¹

Definition

Securitisation is an alternative form of financing complementary to bank resources. Typically, in a traditional securitisation technique, a service provider (e.g. a bank) with a significant stock of assets (e.g. retail mortgages, SME loans, car loans) typically sells its receivables from different financial packages to a company set up for this purpose. This company generates the consideration for the purchase of receivables by issuing securities, so that the service provider obtains the rightful consideration for the sale of the receivables without having to borrow or carry out other financial operations that would increase its indebtedness. In the case of non-traditional, "synthetic" securitisations, the receivables are actually not transferred, only their risk is transferred to the issuing company.

⁷⁹ A central counterparty is an organisation that is interposed, directly or indirectly, between the parties to the transaction, taking over their rights and obligations by acting directly or indirectly as a buyer with all sellers and as a seller with all buyers.

⁸⁰ The forint was introduced to the CLS system in November 2015. The CLS (Continuous Linked Settlement) system operates on the basis of a Payment versus Payment (PvP) approach to manage settlement risk. The system is operated by CLS Bank, which, however, does not qualify as a CCP given that it does not assume the rights and obligations of the counterparties to the transaction.

⁸¹ Securitisation is covered in detail in Chapter 5 of the CRR, the Regulation of the European Parliament and of the Council laying down a general framework for securitisation, the related secondary legislation, technical standard, the EBA guidelines, the relevant MNB recommendations, as well as Article 82 of CRD, and paragraphs 155 to 157 of the EBA SREP Guidelines.

Risk assessment and management

Risks deriving from securitisation deals for which an institution acts as an investor, originator or sponsor should be evaluated and managed through appropriate procedures to ensure in particular that the actual economic content of the transaction is fully reflected in risk evaluation and management decisions. Institutions which are originators of revolving securitisation transactions involving early amortisation provisions must have in place liquidity plans to address the implications of both scheduled and early amortisation.

ICAAP review

The scope of the review and evaluation includes an assessment of the extent to which the level of own funds held by the institution in respect of the assets which it has securitised are adequate having regard to the economic substance of the transaction, including the degree of risk transfer achieved.

Institutions are expected to have internal methodologies that enable them to assess the credit risk of exposures to individual obligors, securities or securitisation positions and credit risk at the portfolio level. The internal methods may not rely solely or mechanistically on external credit ratings.

The supervisory evaluation is essentially based on the provisions of the CRR, the Regulation of the European Parliament and of the Council laying down a general framework for securitisation⁸², the related secondary legislation, technical standards, the relevant EBA guidelines detailed below⁸³ and the MNB's recommendations⁸⁴.

The EBA Guidelines on the transfer of significant credit risk as set out in Articles 243 and 244 of the CRR (EBA/GL/2014/05) were released on 7 July 2014 with the following objectives:

- to stipulate requirements for those originator institutions that wish to transfer the material credit risk belonging to the securitised exposure to third parties and (in accordance with the provisions of Articles 243(4) and 244(4) of CRR) prove that the reduction of the regulatory capital requirement is justified by the transfer of the credit risk to a third party, and
- to provide the competent authorities with guidance for the proper valuation of the transaction (based on Articles 243(2) and 244(2) of CRR) and for the assessment of the transfer – corresponding to the rate of the reduction – of the credit risk to a third party.

If the initiator institution transfers a material part of the credit risk belonging to its exposures to a third party, it may also reduce its regulatory capital requirement in proportion to the transferred risk. The competent authorities have important powers in this respect. On the one hand, they permit the initiator to regard the material credit risk as transferred, if it can prove that the reduction of the regulatory capital requirement is justified by the transfer of the credit risk to a third party, and – on the other hand – they may decide on ad hoc basis that the material credit risk may not be regarded as transferred to a third party (if the decrease in the risk-weighted exposure values is not justified by the transfer of the credit risk to a third party).

Released on 24 November 2016, the EBA Guidelines on implicit support for securitisation (EBA/GL/2016/08) define what constitutes a level playing field for the purposes of Article 248(1) of the CRR, as well as the transactions under which no support is provided.⁸⁵

It is necessary to assess and manage in Pillar 2 all risks deriving from securitisation transactions undertaken by institutions as the party who assumes risk, as the party who transfers risk or as sponsor.

⁸² Regulation (EU) 2017/2402 of the European Parliament and of the Council of 12 December 2017 laying down a general framework for securitisation and creating a specific framework for simple, transparent and standardised securitisation, and amending Directives 2009/65/EC, 2009/138/EC and 2011/61/EU and Regulations (EC) No 1060/2009 and (EU) No 648/2012 ;

⁸³ For the relevant EBA guideline see: <https://eba.europa.eu/regulation-and-policy/securitisation-and-covered-bonds>

⁸⁴ <https://www.mnb.hu/letoltes/3-2020-abcp-ertekpapirositas.pdf> ; <https://www.mnb.hu/letoltes/4-2020-nemabcp-ertekpapirositas.pdf>

⁸⁵ [https://www.eba.europa.eu/documents/10180/1672271/Guidelines+on+implicit+support+for+securitisation+transactions+\(EBA-GL-2016-08\)_HU.pdf/c66b1d41-be92-45d9-b7f5-f119c6c3afbe](https://www.eba.europa.eu/documents/10180/1672271/Guidelines+on+implicit+support+for+securitisation+transactions+(EBA-GL-2016-08)_HU.pdf/c66b1d41-be92-45d9-b7f5-f119c6c3afbe)

Regulation 2017/2401/EU amending the CRR⁸⁶ introduced the maturity of securities tranches as a supplementary parameter for the calculation of securitisation positions' risk weights. As a result of this amendment, the institutions applying internal ratings based or external ratings based approach (SEC-IRBA or SEC-ERBA) must provide this parameter when calculating the risk-weighted exposure to be applied to their securitisation positions.

According to Article 257 of the CRR, for the purposes of determining the maturity of a tranche two alternative approaches may be used. The maturity of a tranche may be determined as the weighted average maturity of contractual payments due under the tranche (WAM method)⁸⁷ or according to the final legal maturity of the tranche⁸⁸. Institutions may choose between the WAM method and the final legal maturity approach at their discretion.

On 4 May 2020, EBA published guidelines on the methodology to determine the weighted average maturity of contractual payments due under the tranche of a securitisation transaction (EBA/GL/2020/04),⁸⁹ where it also defines the contractual payments referred to in Article 257 of CRR, the data necessary for the application of the WAM method as well as the monitoring and implementation of that.

The MNB expects institutions within the ICAAP review to allow access to all of their securitisation positions irrespective of materiality, as well as to demonstrate the systematic monitoring of risk in the portfolio underlying securitisation. In order to establish the relevant risk weights and capital requirements, the MNB acts with consideration to compliance with the provisions laid down in the CRR, related secondary legislation, technical standards and the EBA Guidelines and MNB recommendations, to the quality of the process, to its results, to the business function of securitised positions and to the identical interests of entities sharing the risk.

VIII.1.22 Country risks

Definition

Country risk is defined as the threat of potential losses that may be generated by an (economic, political, etc.) event that occurs in a specific country, where the event can be controlled by that country (government) but not by the creditor/investor.

The components of country risk are as follows:

- transfer risk: the risk that the obligor of a contract (loan borrower, securities buyer, etc.) is unable to meet his payment obligations in the contractual currency while he has the necessary amount in local currency,
- sovereign risk derives from the insolvency of the country in which the institution has an exposure,
- collective debtor risk derives from the fact that an event impacting the whole country leads to default by a large group of debtors.

Specific elements of country risk are also addressed in the CRR:

- exposures denominated in different currencies but belonging to the same debtor may be classified in different rating classes – consideration of transfer risk,

⁸⁶ Regulation (EU) 2017/2401 of the European Parliament and of the Council of 12 December 2017 amending Regulation (EU) No 575/2013 on prudential requirements for credit institutions and investment firms

⁸⁷ Article 257(1)a) of CRR

⁸⁸ Article 257(1)b) of CRR

⁸⁹

https://eba.europa.eu/sites/default/documents/files/document_library/Publications/Guidelines/2020/Guidelines%20on%20the%20determination%20of%20the%20weighted%20average%20maturity%20of%20the%20tranche/Translations/886818/GLs%20on%20WAM_COR_HU.pdf

- differentiation between the risk weights of exposures to the central bank based on denomination,
- collective debtor risk is incorporated into the measurement of credit concentration risk with a view to correlations between defaults.

Risk assessment and management

In order to manage country risks, the credit institution or investment service provider should develop the rules of country-risk management and set out the following items therein:

- country limit for specific countries,
- factors and sources of information taken into consideration for setting country limits,
- person or organisational unit responsible for determining country limits,
- person or organisational unit in charge with approving country limits,
- person or organisational unit in charge with verifying country limits,
- mechanisms and frequency of reviewing country limits.
- monitoring process for the utilisation of country limits,
- procedural principles for exceeding country limits.

ICAAP review

Country risks cover all risks associated with lending which derive from economic, regulatory, political or social events occurring outside Hungary and which represent a potential loss for the creditor. In this sense, this term is much broader than the sovereign risk expressing the solvency of sovereign governments, because country risks also include certain forms of transfer risks and collective debtor risks.

The MNB expects institutions with material exposures outside Hungary to manage such risks by applying the effective limit system specified in rules and regulations, and also to cover them by the appropriate calibration of the model parameters for capital requirement calculations, or by additional capital generation relying on the results of suitable stress tests.

In the course of its assessment of country risks as part of ICAAP reviews, the MNB evaluates:

- the degree of concentration within each type of country risk exposure, including exposures to governments, in proportion to the credit portfolio of the institution as a whole (per client and per amount),
- the economic strength and stability of the borrower's country and its past performance in terms of accurate payments and the occurrence of serious default events,
- the risk of other forms of government intervention that could significantly impair the creditworthiness of borrowers (e.g., freezing of deposits, expropriation or punitive taxation),
- risks arising from the possibility of an event (such as a natural or social/political event) affecting the whole country and leading to the default of a large group of borrowers (collective borrower risk),
- transfer risks related to cross-border foreign currency lending.

VIII.1.23 Risk of other assets

The MNB does not expect a separate Pillar 2 capital requirement calculation methodology for other assets (primarily real estate, other non-lending claims, etc.), where supervised institutions may use the risk weights of the regulatory pillar. The MNB fundamentally does not support the application of lower risk weights than the regulatory pillar, only to the extent that the institutions are able to prove the applicability of lower weights by reliable means.

Concerning the risk of repossessed property, special rules are provided in the sub-chapter on risky portfolios.

If the bank holds investment certificates in a real estate investment fund, the MNB examines the level of the capital requirement for this exposure with a capital requirement calculated taking into account the historical annual volatility of the net asset value of the fund, derived using the following simple formula:

Capital Requirement = NORM.INV (0.999, 0, S), where S is the variability derived from the annual changes in the net asset value of the units.

If there is a significant difference between the bank's internal approach and the MNB's benchmark calculation, the MNB will pay particular attention to the adequacy of the bank's solution.

VIII.1.24 Calculation of capital requirements for credit risk

When internal rating based credit risk models are used, Pillar 2 capital requirements are principally calculated as the unexpected loss (UL) of performing portfolios based on the long-term (TTC) or downturn risk parameters of the exposures, on the exposure characteristics of the credit portfolio and on the underlying assumptions of the capital requirement calculation model. The outcome of the capital requirement calculation model can only be automatically translated into capital requirements for credit risk if the expected loss (EL) of the portfolio is fully covered through impairment or provisions. Since the extent of justified provisioning is typically quantified by means of conditional, short-term (PIT) PDs and LGDs, the two values usually differ (the difference may also be attributable to other causes).

With the "impairment less EL (expect loss on the portfolio)" difference the CRR prescribes the appropriate adjustment⁹⁰ of the capital available in Pillar 1. Based on CRR the negative difference (shortfall) between the expected loss and the impairment must be deducted, in the case of institutions applying IRB, from CET1 capital, while the surplus may be considered as Tier 2 capital up to 0.6% of the RWA.

Paragraph 324 of the EBA SREP Guidelines provides that in Pillar 2, expected losses (EL) insufficiently covered by provisions must be covered by additional own funds requirements. Based on the Recommendation, the regulator's intention is to ensure that the regulatory capital does not differ in Pillar 1 and Pillar 2 either in terms of quality or in terms of volume. Accordingly, as of 2015 MNB prescribes the impairment shortfall (or, in the case of institutions applying IRB, the shortfall difference relative to the Pillar 1 value) calculated during the ICAAP review as a capital requirement both for institutions applying the standardised approach and for institutions applying the IRB approach.

If during the ICAAP review the audit detects the inadequate application of the IRB risk parameters at institutions that use IRB in Pillar 1, and the IRB shortfall difference is attributable to this in Pillar 2, then the bank must handle the relevant findings with regard to the model, stipulated in the report or in the supervisory resolution after the review, in its Pillar 1 model. However, the MNB will impose additional own funds requirements to cover the risks that are insufficiently covered due to incorrectly set parameters, with the proviso that if the institution modifies its Pillar 1 model in accordance with the MNB's requirements, the MNB may review the level of the requirement.

VIII.1.25 Preferential capital requirements prescribed by the MNB

Preferential capital requirement for green housing loans

From 28 January 2021, the MNB launched its Preferential Green Capital Requirement Programme for housing loans, which may be enforced in respect of Energy Efficient loans disbursed between 1 January 2020 and 31 December 2025 (Period) to private individuals, condominiums or building societies for the purpose of construction or sale and purchase of new residential buildings, renovation or modernisation of existing residential buildings, complying with the *Notice on the amended criteria for the Preferential*

⁹⁰ the decrease of the capital by the impairment shortfall, or the increase thereof by (part of) the excess provisions

Green Capital Requirement Treatment for housing loans (Notice),⁹¹ published on the MNB's website. The basis of the preferential capital requirement (Discount) shall be the gross (on-balance sheet and off-balance sheet) exposure calculated on the performing portfolio of Energy efficient mortgage loans and personal loans disbursed during the Period, outstanding at the end of the calendar years of the Period, which have been participating in the Discount for up to 5 years.

The rate of the Discount shall be calculated projected on the Discount base. Upon the purchase or construction of a new home, for loan contracts signed before 09.06.2022, for classification of up to 90 kWh/m²/year and energy efficiency rating "BB", for loan contracts signed between 09.06.2022 and 31.10.2023, for classification of up to 80 kWh/m²/year and energy efficiency rating "BB", for loan contracts signed after 01.11.2023, for classification of up to 68 kWh/m²/year for the combined energy efficiency attribute and energy efficiency rating "A+", the rate of the Discount shall be 5%. For building permit applications submitted by 31 October 2023, where the energy efficiency rating is "AA", and for building permit applications submitted after 1 November 2023, where the energy efficiency rating is "A++" or better, the rate shall be 7%. It shall be 5% in the case of modernisation measures, except when the loan contract is dated before 31 October 2023 and following the implementation of the modernisation measure the energy efficiency rating of the residential building is "AA" or better; then it shall be 7%. It shall be 5% for renovation and the purchase of second-hand residential buildings, except if the energy efficiency rating of the second-hand residential building purchased after the renovation is "AA" for building permit applications submitted by 31 October 2023 or "A++" or better for building permit applications submitted after 1 November 2023, then it shall be 7%. The maximum Discount shall be the value of the SREP additional capital requirement for the transactions of the entire retail segment as determined during the ICAAP review, so that the total capital requirement amount determined under the SREP taking into account the discounts may not fall below the level of the Pillar 1 capital requirement on the total retail segment portfolio. The total amount of the preferential capital requirement for green corporate and municipal and for green housing loans may not exceed 1.5% of the credit institution's total risk exposure amount (TREA). The Discount shall be deducted from the credit risk part of the total SREP Capital Requirement (TSCR index).

The MNB applies the Discount at portfolio level for 10 years: for the first time, it is determined during the 2021 ICAAP review for the appropriate part of the portfolio outstanding at the reference date of the ICAAP review, and in the following 10 years the MNB will "update" it during the ICAAP reviews, calculating it for the outstanding green lending of the year each year. That is, the last time the Discount may be applied is the 2031 ICAAP reviews. At the transaction level, i.e. for an exposure identified with a given HITREG ID, the Discount may be applied for a maximum of 5 years, and may thus be applied during a maximum of 5 consecutive ICAAP reviews. The Discount is available for exposures incurred on or before 31 December 2025. The Discount shall be enforced retrospectively, within the framework of the ICAAP review performed in the calendar year following the date taken into consideration upon determining the basis of the Discount, in accordance with the entry into force of the TSCR index determined during the ICAAP review.

For the detailed conditions of benefiting from the Discount, not regulated in the Manual, see the Notice published on the MNB's website.

⁹¹ At the time of publishing the manual it is available at <https://www.mnb.hu/letoltes/tajekoztato-zlt-20230906-public.pdf>.

Green corporate and municipal preferential capital requirement

Due to the *transition risk*⁹² as a result of climate change and other environmental anomalies, the MNB deems it beneficial to increase the ratio of environmentally sustainable (green) industries and clients in banks' balance sheet compared to the ratio of "brown" industries and clients, i.e. more exposed to the tightening environmental regulation (and thus being riskier in the longer run).

To this end, starting from the ICAAP reviews of 2021, the MNB wishes to improve the risk profile of the banking sector and reduce the banking sector's exposure to transition risks through positive incentive, by waiving in Pillar 2 part of or the entire capital requirement for the respective year of environmentally sustainable corporate and municipal exposures fulfilling the criteria specified in the Annex to the Product Notice⁹³.

The rate of the Discount shall be 5%, or – upon full compliance with the EU Taxonomy – 7% of the total gross exposure of the stock outstanding on the ICAAP review reference date, subject to the following two limits. The maximum Discount shall be the value of the SREP additional capital requirement for the transactions of the entire corporate segment as determined during the ICAAP review, so that the total capital requirement amount determined under the SREP taking into account the discounts may not fall below the level of the Pillar 1 capital requirement on the total corporate segment portfolio. The total amount of the preferential capital requirement for green corporate and municipal and for green housing loans during the ICAAP reviews may not exceed 1.5% of the credit institution's total risk exposure amount (TREA).

Conditions of using the discount:

- a) applying the green flag, indicating the application of the 5% or 7% discount, in the loan subledger to be submitted in the ICAAP review, and
- b) fulfilling a quarterly, voluntary data supply to the MNB, listing the HITREG identification of the respective transactions, and
- c) indicating the Green Ratio, described in the Annex to the Product Notice, both in the ICAAP subledger and in the voluntary data supply.

The green flag must be indicated at transaction level, and it should also be used when a transaction finances green loan purpose only partially. The MNB will publish the latest version of the precise content of the voluntary data supply (table format and filling instructions⁹⁴) on zoldpenzugyek.hu.

Deadlines:

- Starting from the 2021 ICAAP reviews until the termination of the scheme, banks should apply the green flag and indicate the green ratio in the ICAAP subledger.
- The data supply under point b) shall be submitted by the 50th calendar day after the end of the reference quarter.
- Loan disbursements and bond purchases between 1 January and 31 December 2020 shall be first included in the data supply for the reference date of 2020 Q4. During the ICAAP reviews commencing in 2022 or later, credit institutions using the Discount for the first time should submit the first data supply for the status as at the end of the last closed quarter preceding the ICAAP

⁹² business risk stemming from the economic and social changes generated by the climate change and other environmental anomalies, which increases primarily the credit and market risk of banks' exposures due to the deteriorating profitability of companies operating in an unsustainable manner.

⁹³ For the Product Notice and the Annex thereto, please refer to [tajekoztato-zvt-20230906-public.pdf \(mnb.hu\)](https://www.mnb.hu/tajekoztato-zvt-20230906-public.pdf).

⁹⁴ For the table format and filling instructions applicable to the voluntary data supply for the scheme, see <https://www.mnb.hu/letoltes/zvt-adatszolgaltatas.zip>.

review, the deadline of which shall be the 50th calendar day after the end of the reference period, but not later than the start date of the ICAAP review.

The MNB will verify whether the transactions benefiting from the discount indeed fulfil the environmental sustainability indicators specified in the Annex by sampling.

The discount reduces the capital requirements for credit risk, but only to the extent to which the Pillar 1+ approach is applied, i.e. the total capital requirements for credit risk may not fall below the Pillar 1 capital requirement even with the discount taken into account.

The MNB applies the Discount at portfolio level for 10 years: for the first time, it is determined during the 2021 ICAAP review for the appropriate part of the portfolio outstanding at the reference date of the ICAAP review, and in the following 10 years the MNB will “update” it during the ICAAP reviews, calculating it for the outstanding green lending of the year each year. That is, the last time the Discount may be applied is the 2031 ICAAP reviews. At the transaction level, i.e. for an exposure identified with a given HITREG ID, the Discount may be applied for a maximum of 5 years. Thus, after the first ZVT ID code data supply in which an institution has reported an exposure with a given HITREG ID, the same institution may report the same exposure and HITREG ID in up to 19 additional consecutive quarterly data supply periods, or, for the given exposure, may claim the Discount in 5 consecutive ICAAP reviews. The Discount is available for exposures incurred on or before 31 December 2025.

The definition of environmentally sustainable placements in respect of which the green corporate and municipal preferential capital requirement may be applied is included in the Annex to the Product Notice. The MNB continuously assesses the possibility of expanding the list of definitions in the Annex.

The sample calculations related to the preferential capital requirement are included in Annex 14 to the manual, and the calculation from a supervisory perspective is described in detail in an article by Kim et al. (2024) published in the *Hitelintézet* (Financial and Economic Review)⁹⁵.

DLT project – preferential capital requirement

The MNB intends to foster the resolution of the communication difficulties between banks and insurers and the inter-sectoral data exchange problems, existing for years with regard to the feasibility of managing home insurance collateral, reducing the credit risk of credit institutions, using the Distributed Ledger Technology (DLT). The first area of the developments is the range of home insurances taken out for properties serving as collateral for mortgage loans.

It is the MNB’s express intention to achieve that as many members of the banking sector as possible join the DLT system (Blockchain) to reduce the credit risk of institutions through increasing the eligibility of underlying collaterals. Furthermore, the increase in the number of institutions joining DLT also reduces the costs per institution. At the banks’ side the payment scheme would be elaborated in proportion to the portfolio and the payment of fees would result in the payback of the MNB’s investment in 5 years. The MNB asked for a letter of intent from credit institutions and insurers, where the declarants commit to participating in the DLT home insurance project and paying the part calculated based on the principles of cost distribution.

The MNB will provide the joining credit institutions with preferential Pillar 2 (SREP) capital requirement for mortgage loans. The current rate of the discount is 2% of the SREP capital requirement of the retail mortgage portfolio.

⁹⁵ Donát Kim – Eszter Raciborski – Bálint Várgedő (2024): Experiences of the MNB’s Green Preferential Capital Requirement Programme and the extension of the programme, *Hitelintézet* (Financial and Economic Review), 23(3) 195-211

VIII.1.26 Capital requirement reduction effect of (counter-)guarantees with a cap

The capital-reducing effect of (counter-)guarantees provided with a cap typically cannot be taken into account in Pillar 1 because the requirements of Article 213 and Article 215(1) of the CRR are not met. The extent to which the cap applies to the financed transaction is not known to the lender (the extent of the credit protection is therefore not clearly defined and incontrovertible), and also the management and actual utilisation of this cap is outside the direct control of the financier. In the event of a possible call for redemption, especially in a crisis situation, it is not ensured that the (counter-)guarantee will always have a margin available within the cap and that the guarantee to the lender can thus be honoured.

If the capital requirement reduction effect of the guarantee cannot be taken into account in Pillar 1 for these schemes, the MNB will apply the lower capital requirement linked to the quality of the (counter-)guarantor in the annual ICAAP reviews, using the SREP factor.

VIII.2 Operational risks

VIII.2.1 Operational risk

Definition

Operational risk pursuant to Article 4(1)(52) of the CRR, ‘operational risk means the risk of loss resulting from inadequate or failed internal processes, people and systems or from external events, including, but not limited to, legal risk, model risk and information and communication technology (ICT) risk, but excluding strategic and reputational risk.’

The Regulation amending Regulation (EU) No 575/2013 as regards requirements for credit risk, credit valuation adjustment risk, operational risk, market risk and the output floor⁹⁶ also includes fundamental changes to the treatment of operational risk and mandates the EBA to develop various regulatory technical standards (RTS), implementing technical standards (ITS) and recommendations (GL), which will be implemented in several phases. When these regulations and recommendations enter into force, the expectations set out in this Manual will also be amended.

VIII.2.1.1 Risk assessment and management

As a basic principle, all institutions should have the capability to assess their operational risk profiles and exposures and raise sufficient capital to cover these. Under the ICAAP, all institutions should lay down the capital calculation methods for operational risks, the systems of procedures for assessing, monitoring and managing these risks and the process of verifying that the calculated capital requirement and the risk management system are suitable for reducing and covering the institution’s expected and unexpected losses from operational risks in a prudent manner. Institutions should put in place risk assessment and management operations with governance and control that is proportionate to their size and their operational risks, with the purpose of reducing the institution’s operational risk exposure to an acceptable level that is within its resilience/risk appetite.

The senior management of the institution should be aware of the institution’s operational risks in terms of both realised losses and potential exposures. To this end, operational risk reporting lines and reporting frameworks should be established and the governing bodies responsible for accepting and/or mitigating operational risks should be designated.

Operational risk exposures are realised when risk events are occurred. All institutions are expected to develop a process, criteria and thresholds for collecting such events and to have up-to-date records of the operational risk events they have incurred. The data collection threshold shall be determined in proportion to the size of the institution.

⁹⁶ [Regulation \(EU\) 2024/1623 of the European Parliament and of the Council](#)

An assessment of the operational risk profile can be considered exhaustive only if, besides identifying past losses, it also covers the present and future risks of the institution. Accordingly, the MNB expects institutions to use methods that also capture potential operational risks, taking into account the proportionality principle. These methods include

- the operational risk scenario analysis, which quantifies potential events with low probability of occurrence but high loss effects,
- the definition, collection and evaluation of key risk indicators, intended to signal shifts in the level of operational risks,
- the operational risk self-assessment, which identifies and assesses the operational risk inherent in the institution's processes and their controls.

The management of operational risks is an activity that is adapted to the nature of specific operations and event types and is carried out and monitored subject to centralised control; it incorporates the following:

- the prevention and/or recurrence of risk events (through in-process, IT-systems and management control as well as systems of protection),
- the management of critical situations (through immediate action plans and business continuity management), and
- measures for the purpose of mitigating the losses incurred (through e.g. insurance covers and operating debt management processes).

Defining and monitoring the risk mitigation measures and back-testing their impacts are essential preconditions enabling an institution to identify its residual operational risks.

VIII.2.1.2 ICAAP review

The MNB's experience shows that in the domain of risk awareness and risk management there is a qualitative difference in Pillar 2 in favour of institutions which use the advanced method primarily because the loss distribution-based approach requires the detailed and comprehensive assessment and evaluation of the institution's operation and processes. The MNB therefore expects all institutions subject to ICAAP review to carefully examine and identify their operational profile and risks in Pillar 2.

As regards the risk identification methodologies, the MNB distinguishes especially banks providing complex financial services and/or being of large size versus small size (with total assets below 1000 billion) in order to put the principle of proportionality into practice⁹⁷:

- all institutions are required to collect their historical loss data and evolve and keep up-to-date a loss database on that basis,
- all large banks are expected to monitor the key risk indicators, conduct scenario analyses and operational risk self-assessments,
- small banks are expected to choose at least one of the following methodologies in order to assess their potential operational risks: the monitoring of key risk indicators, scenario analysis or operational risk self-assessment. The requirements applicable to the selected methodology are the same as for large banks.

In respect of individual elements of the framework, the MNB expects institutions to develop and integrate the following practices and will examine compliance regularly, during the ICAAP review:

⁹⁷ For the practical application of the principles of proportionality see the paper entitled *Principles of Proportionality in Credit Institutions' Operational Risk Management*, published in the September 2020 issue of the Financial and Economic Review. For the paper see: <https://hitelintezetiszemle.mnb.hu/letoltes/hsz-19-3-t3-kozma.pdf>

1. The operational risk framework

- The institution should have a well-documented and regulated operational risk management framework in which risks are identified, assessed and managed along well-defined roles and responsibilities.
- The operational risk management framework should be subject to regular independent reviews of at least annual frequency. Such reviews may be integrated into other risk management frameworks or conducted independently.
- Operational risk management needs to be closely integrated into the business, risk management and support processes and overall risk management framework of the institutions.
- The monitoring of the institution's operational risk profile, the verification of the proper functioning and quality of control processes must be ensured at all times.
- Effective representation is also needed for the interests of the operational risk management function, in addition to its executive role, in senior management decision-making, which makes it essential to report operational risk regularly in operational risk reports, of at least quarterly frequency.

2. Loss data collection

- The institution should have in place a loss data collection process covering its full operation, and provide for the independent validation of the recorded events, losses and recoveries (4-eye principle). It is expected that only validated⁹⁸ events are included in the Pillar 2 capital requirement calculation.
- The data collection should cover at least those events (exceeding a limit to be set by the institution) the impact of which is recorded in accounting system (general ledger or subledger); it is recommended to also collect events that, while they do not have a direct impact on capital or profits, will require risk mitigation action. Such events may include lost profit, near miss and loss events of unquantifiable impact.
- The data collection should also cover the operational risk events associated with credit and market risks. In the data collection process, events should be marked as such if they are attributable to the same underlying cause⁹⁹, i.e. are associated with a series of events/a group of events.
- Operational risk events should be allocated to the event categories defined in Article 324 of the CRR and the lines of business defined in Article 317 of the CRR. If an event concerns the entire institution or several lines of business, it should be subdivided by line of business or the option to categorise it as a total-bank event should be provided. The effective regulation shall provide for the classification of events affecting several business lines.
- Losses arising as a result of risk events should be classified into loss types, which may be write-offs, legal costs, fines, unpaid recourse, customer and other compensation, loss of tangible assets, provisions, loss of legitimate revenue etc. Similarly to losses, it is also necessary to classify recoveries according to the type of resource identified by the institution.

⁹⁸ Institutions are expected to use a validation for the events included in the calculation of capital requirement, where all information used in the capital requirement calculation (e.g. business line, event type, gross loss, recoveries, credit risk relevance etc.) are validated

⁹⁹ The losses related to the COVID-19 pandemic should be regarded as events attributable to the same cause, which are treated in accordance with the circular entitled *Supervisory guidelines of operational risk management principles related to the COVID-19 pandemic*, sent to the Hungarian Banking Association.

- To ensure the completeness of the loss data collection, the institution should ensure that the staff involved in the activity receive training at least once a year, covering both the identification of operational risks and the data collection process.
- Institutions should develop a control mechanism to assure the quality of the data collected and the comprehensiveness and appropriateness of the data collection process and put it in place within their regular monitoring activities. An option for doing this is by identifying the realised losses in the general ledger or subledger accounting records, using the method of double-entry general ledger reconciliation. This includes the monitoring of the late capturing of losses as well as examining the consistency of the dates of loss detection, recording, occurrence and posting.
- As part of the aforementioned control mechanism, it is necessary to identify the realised losses in the general ledger or subledger accounting records by bilateral reconciliation, to be performed for the relevant loss and recovery accounts regularly, at least quarterly. The range of the accounts subjected to reconciliation should be reviewed annually in order to identify new accounts containing operational risk losses.
- The losses identified during the data collection shall be presented in aggregate, while the largest specific losses shall be presented item by item in the management reports, together with the related risk mitigation measures.

3. Key risk indicators (KRI's)

- The institution's operational risk profile should be adequately covered by key risk indicators, i.e. covering all the relevant business lines and event types; this makes it essential to regularly assess its risk profile. In order to capture risks in full, the MNB expects institutions to examine the relevance of the indicators in Annex 13 and document the results.
- KRI coverage is considered acceptable if the institution can convincingly demonstrate that the set of KRI's it operates actually capture significant risks and measure them adequately in terms of substance and threshold relevance, and KRI's are set for all the significant risks for which loss data are not available due to the nature of the risk.
- In order to adequately identify the risks associated with each indicator, a trigger (still acceptable) and critical level threshold should be set for each key risk indicator.
- The institution should monitor the changes in indicator values at all times and should have in place approved procedures for when an indicator reaches the trigger or critical level.
- The relevance and threshold review of key risk indicators should be conducted at least annually and documented appropriately.
- The indicators reaching the critical level and the associated risk mitigation measures should be included in the management reports.

4. Operational risk self-assessment

- Institutions should conduct regular operational risk self-assessments, covering the entire organisation in at least two-year cycles.
- This activity should incorporate the identification and assessment of the risks and controls of the processes/organisational units included in the self-assessment. Institutions should develop a quantitative or qualitative scale to assess risks and controls, ensuring the comparability of the inherent and residual risks identified.
- In their self-assessment of processes, institutions are expected to provide participants with additional information matching the risk profile (e.g. loss data, key risk indicators, scenarios, media news).

- The comprehensive result of the self-assessment and the high risks identified during the assessment process, together with the related risk mitigation measures, should be properly documented and included in the management reports.

5. Scenario analysis

- The institution should assess the risk of high-loss, low-frequency events in the framework of scenario analyses. The institution is expected to have a scenario to cover each of the Basel event categories. In order to capture risks in full, the MNB expects the institutions to examine the relevance of the scenarios in Annex 13 and document the results.
- All relevant departments should be involved in the scenario analysis process. The MNB considers as good practice the workshop-based estimation process using the Delphi method; it also considers as good practice if an institution includes the worst-case scenarios in its operational risk self-assessment.
- In their scenario analyses, institutions are expected to provide participants with additional information matching the risk profile (e.g. loss data, key risk indicators, self-assessment results, media news).
- The institutions should explain the changes in their scenario analyses (compared to the previous year), in terms of both scenario formulation and the estimation of severity and frequency.
- The institution is expected to carry out consistency checks of scenarios, i.e. the validation of the results (e.g. by comparing the estimated parameters with external and internal loss data, the institution's assets and income) in order to avoid formulating scenarios that exceed the size of the institution.
- The results of the scenario analysis should be properly documented and these results and the related risk mitigation measures should be included in the management reports.

6. Recording and monitoring the risk mitigation measures

- The institutions are expected to either accept by management approval the operational risks identified or to mitigate them with various measures. If the institution's regulations already incorporate the specific risk mitigation procedures applicable to a particular risk, then no further action will be required.
- The institution should collect risk-mitigating measures from all relevant sources (loss data, KRIs, self-assessment, scenario analysis) in a standardised structure, recording at least the following: the source, description, status, owner and deadline of the measure.
- Institutions are expected to have procedures in place regarding who is entitled to approve the completion of a risk mitigation measure or a potential request for extending the deadline, and what escalation mechanism is available if the measure is not implemented on the deadline.
- Based on criteria defined by it, the institution should back-test regularly, at least annually – quantitatively and qualitatively – whether the risk mitigation measures completed last year have reached their objectives.
- It is also expected that status reports, impact analyses and back-tests on the measures should be presented to management.

Based on the MNB's past experience, institutions using advanced measurement approach should consider the following as well:

- In the case of group-level capital requirement calculation, institutions must also assess their own (single level) risk exposure and be aware of the sensitivity of the capital requirement to change

the input variables of the model (i.e. the structure, methodology and parameters of the group-level model used to calculate the capital requirement must also be known at local, expert level).

- if the institution determines its Pillar 2 capital requirement based on an internal model used by the parent company, as part of the group level capital requirement allocated to the local level, the institution must provide evidence to the supervisory authority, by means of qualitative and quantitative tools, that the capital requirement allocated to it adequately covers the operational risk profile of the institution;
- the completeness and representative nature of loss data used in capital requirement calculations as well as the adequacy of the applied scenario parameters and the adequacy of fitted functions should also be demonstrated;
- the information (loss data, results of self-assessments and scenario analyses, stress tests, KRIs, etc.) for calculating internal capital requirement should be used in risk management to mitigate risk exposure.

Given that, in the advanced methods for operational risks, qualitative requirements are at least as important as the specification of the applied capital requirement calculation model, the MNB accepts the result of the advanced method as the capital requirement only on the condition that the institution exhibits carefully planned, high-quality performance in the areas listed above.

In the light of the foregoing, the MNB expects all institutions to develop an operational risk management framework that involves capturing the institution's risk profile and the setup of control processes that are proportionate to risk exposure.

If the MNB finds

- that the calculated capital for operational risks under Pillar 2 does not cover the institution's existing and potential operational risks
- finds deficiencies in terms of the appropriateness and/or application of the selected methodologies and the quality and reporting of data
- it will impose an additional capital requirement to cover risks in full.

VIII.2.1.3 Calculation of capital requirements and annual operational risk loss

Calculated and accumulated capital is intended to function as a buffer covering the residual risk that is a function of inherent risks as mitigated by controls and is therefore changing over time.

In the context of the Basel III finalisation, the Basel Committee on Banking Supervision has revised the standards for the calculation of the operational risk capital requirement. Experience shows that current standard methodologies are not sufficiently risk-sensitive, while large differences between the internal modelling methodologies used in the Advanced Measurement Approach (AMA) framework are identified that make them difficult to compare. In view of this, the amendment to the CRR, as part of the EU implementation of the finalisation of Basel III, introduced the use of a single new approach in Pillar 1 to replace all currently applicable approaches: the Standardised Measurement Approach (SMA). The new rules shall apply from 1 January 2025.

The new Standardised Approach combines an indicator based on the size of the institution's business (Business Indicator Component, BIC) with an indicator that takes into account the institution's historical loss data. The definition of the SMA own funds requirement for operational risk is detailed in Title III, Chapter 1 of Regulation 2024/1623¹⁰⁰.

¹⁰⁰ [Regulation 2024/1623](#)

The annual operational risk loss¹⁰¹ is calculated as the sum of the net loss for each operational risk event (net loss = gross loss - third party recovery e.g. insurance). The loss event based component of the operational risk capital requirement (ILM¹⁰², Internal Loss Multiplier) calculated according to the SMA methodology is not applied under Regulation 2024/1623, but the MNB expects it to be quantified for all institutions subject to the complex SREP review. The minimum number of operational risk events to be taken into account in the calculation of the annual operational risk loss shall be those for which the net loss is equal to or exceeds EUR 20,000. If the ILM exceeds 1, the MNB may impose an additional capital requirement to fully cover the risks.

Until the new standardised methodology enters into force, the use of the TSA and ASA approaches under Pillar 1 must be reported to the supervisory authority, while the use of AMA is subject to supervisory approval after its validation.

- With the Advanced Measurement Approach (AMA), risks should be quantified and qualified through a complex assessment of the impact of operational risks on the institution. This comprehensive approach incorporates the impacts of past events as well as a consideration of the possibility of extreme operational risk events (scenarios), change in external circumstances and in internal control environment, forced and intended changes in strategy and the changes in the regulatory environment as well. When examining the risks of specific activities / work processes, the loss impact of the of risk events should be also evaluated along with their probability.
- The comprehensive oversight and reasonable mitigation of operational risks is mandatory and forms part of the corporate governance system also when the simpler methods (BIA, TSA or ASA) are applied. Institutions should have procedures in place to demonstrate the sufficiency of the capital they have calculated, which – in addition to comparing capital to the losses actually incurred – should be based on a systemic assessment of risks. As capital requirement calculations render only an approximate result when the simpler methods are used and may sometimes (e.g. in the case of institutions with low profitability) render a lower capital against actual operational risks, these calculations must be supplemented with further analysis, and the capital requirement must be increased, if necessary.

In order to determine the capital required in Pillar 2 for covering expected and unexpected losses in addition to the applied risk management practices, institutions may use the following methods, taking into account the Pillar1+ rule:

- own model-based Advanced Measurement Approach (AMA), which quantifies the capital requirement in a risk-sensitive manner, using the probability distribution of potential losses, or
- simpler methods proportionate to the size of the institution and based on the use of fixed risk weights (Basic Indicator Approach (BIA) as well as the standard (TSA) and alternative standard (ASA) methods), which calculate the capital requirement based on a relevant indicator aligned with business profit.
- the new standard (SMA) method, which combines an indicator based on the size of the institution's business with an indicator based on historical loss data, which is also used to determine the regulatory minimum capital requirement.

In the case of institution groups, the systems targeted at the identification, measurement, management and analysis of operational risks should be established for the group of institutions that are subject to consolidated supervision. A procedure is to be established for allocating the group-level capital requirement for operational risks as calculated under the AMA. This procedure should adequately reflect

¹⁰¹ Its calculation is detailed in Title III, Chapter 2 of Regulation 2024/1623.

¹⁰² Its calculation is detailed in [OPE25 - Standardised approach \(bis.org\)](#), Chapter 25.8

the operational risk profile of individual subsidiaries and their contribution to the consolidated capital requirement.

VIII.2.1.4 Legal and conduct risk

Definition

Legal risk is defined as a risk originating from a failure to observe or comply with legislation, a failure to monitor changes in legislation and any breach of the law through any act or omission in providing financial services, regardless whether committed willfully or negligently.

Legal risk incorporates conduct risk, which is a risk that arises from the inappropriate supply of financial services, including willful, inadmissible behaviour or business conduct.

Risk assessment and management

Legal and conduct risks should be treated and interpreted as a subset of operational risks. Institutions should assess their legal risks arising from their not fully legitimate or ethical business conduct, and identify the potential threats from their operations, their market position, the implementation of their strategy and offered products and services (hereinafter: products) that may trigger conduct risk.

Increased risk may also be signalled by, amongst others, the higher number of customer complaints, litigations, higher legal costs, administrative penalties imposed on the institution for unfair/illegal conduct, personal penalties imposed on the executive officers of the institution or the administrative penalties imposed on other institutions of the sector.

Based on the EBA guideline on the supervisory review process, special attention should be given to the fact during conduct risk identification and assessment that conduct risk may appear primarily in the following elements:

- inappropriate sale of retail or corporate products,
- forced sale of products to retail customers tied to some other product, such as forcing the customer to use services additional to current account servicing that the customer does not actually need,
- conflicts of interest in the conduct of business¹⁰³,
- manipulating the market benchmark used to determine interest rates, foreign exchange rates or any other financial instrument or index to increase the institution's performance,
- hindering the possibility of switching between financial products or financial service providers,
- running a badly designed sales system that includes conflicts of interest or bad incentives,
- penalising the customer in the course of automatic product renewals or the termination of a service, improper handling of customer complaints.

ICAAP review

All institutions should be aware of their legal and conduct risk exposures by developing procedures for identifying and managing their legal and conduct risks. In addition, they should collect and manage the loss data related to these risks, and incorporate in their scenario analysis and self-assessment processes and KRI frameworks the identification and monitoring of legal and conduct risks.

During the supervisory dialogue institutions are expected to account for their most important institutional characteristics that may carry (or reduce) risk.

¹⁰³ For example, in the case of products sold on a commission basis, there are conflicting interests between the banking associate and the client (e.g. higher commission vs. needs) and the employee and the management (e.g. higher commission vs. higher client satisfaction).

In respect of individual elements of legal and conduct risk, the MNB expects institutions to develop and integrate the following practices and will examine compliance during the annual ICAAP review.

1. The introduction and application of procedures for identifying risks, preventing the related losses, risk management and reporting:
 - setting out the concept of legal and conduct risk, its expected management in the internal regulation of the institution,
 - ensuring the reporting of events linked to conduct risk and the flagging of events linked to conduct risk in the losses database (continuously from 1 January 2011),
 - inclusion of indicators to collect and monitor legal and conduct risk alerts in the institution's key risk indicator system (introduction of indicators defined in the context of e.g. customer complaints, lawsuits, legitimate customer complaints, regulatory fines, internal fraud and changes in legislation, with developments in indicator values monitored continuously),
 - including legal and conduct risk in the institution's practices of self-assessment and scenario analysis by identifying all processes and associated risks that may give rise to legal or conduct risk,
 - ensuring the monitoring and back-testing of measures adopted in connection with loss events, scenario analyses and legal and conduct risks identified in self-assessments,
 - incorporation of events, processes and measures related to legal and conduct risks identified in the context of loss data, self-assessments and scenario analyses into the reports prepared for management.
2. In view of the complexity of processes that are relevant to conduct risks, in order to fully and comprehensively capture these risks the institution is expected to compile a product inventory document, which can be used to assess and monitor the extent to which individual products or product groups carry potential threats, and to identify the controls that can reduce the frequency of negative outcomes occurring, or the severity of the losses incurred. It is recommended to develop the product inventory document covering all relevant business lines in a breakdown by product or product group, taking into consideration a materiality threshold based on objective considerations, and covering the following information:
 - generic product features, which may include the following:
 - product/product group names, versions, segments, owners
 - information on product introduction (date, related forums etc.)
 - legislation and IT systems specific to the product
 - the sales channels and objectives of the product
 - the conduct risk category of the product, taking the following into account:
 - related (mandatory or optional) products and services
 - any information asymmetry regarding the product
 - identification of conflicts of interest or potential aggressive sales
 - reference values related to the product
 - any difficulties/obstacles to cancelling or replacing the product
 - complaints received, operational risk events identified and adverse decisions/fines imposed over the past year
 - related internal audits and their results over the past year
 - assessment of product controls:
 - the existence and quality of in-process controls (in terms of their ability to reduce operational risk)

- training related to the product
- automated calculators related to the product and their validation
- customer information on discontinued products and the name of the replacement products.

The product inventory document shall be revised once a year and it must be presented to the management together with the action plan to manage the identified risks.

3. The MNB recommends that institutions operate the following control mechanisms at an adequate level in order to reduce conduct risk:

- corporate governance and risk management systems, one of the most important elements of which is that managers have an adequate understanding of the actual risks of financial products, are aware of potential losses from conduct risk, and commit themselves to reducing conduct risk,
- internal control systems, including internal audits and in-process controls that can prevent negligent or deliberate damage,
- strict legal and risk control in the development of new products to assess the potential risks of a new product (prior to its launch), both to the institution and to customers, especially for long-term products,
- tightening the practices of manager selection so that managerial positions are only available to people who are able to understand the risks of their products, think in terms of long-term outcomes, and focus on maintaining customer confidence,
- giving prominence to ethical and fair banking, which only seeks to sell financial products that the customer actually needs, and does not exploit any benefits that may be gained from information asymmetry or the institution's financial expertise or economic dominance to the customer's detriment when developing product conditions,
- simplifying products, improving customer decision-making advice, improving financial literacy and awareness,
- providing sales and remuneration incentives and internal trainings to enable product sales staff to explain the risks of the product and its potential problems in a way that the customer can understand, rather than encouraging the unconditional sale of the product,
- designing the appropriate product structure, using automatically tied financial products only in the most justified cases (e.g. supplementary life or property insurance), while ensuring the proper and fair management of their legal risks at the contract level,
- conducting customer suitability tests, whereby before the sale the institution examines whether the financial product is actually needed by the customer, and whether the product is in line with the customer's financial position and competence, even if this slows down the credit assessment process,
- providing more resources for managing customer complaints to ensure that legitimate and well-grounded customer complaints are resolved quickly, and that for non-legitimate complaints, the customer is adequately informed of why their claim was found to lack grounds,
- Institutions applying advanced methods must also adequately factor in conduct risk when calculating capital requirements.

Conduct risks must overall be controlled by means of ethical and effective processes designed in compliance with the laws. In the event of questionable institutional practices, the MNB may also require the generation of additional capital until the introduction of proper processes and in order to cover losses that originate from the previous practice and can no longer be mitigated.

VIII.2.1.5 ICT risk

As part of its assessment, the MNB evaluates the ICT risk profile and exposures of the institution, i.e. identifies the material inherent ICT risks to which the institution is or may be exposed, and assesses the extent to which the institution's ICT risk management framework, procedures and control mechanisms effectively mitigate these risks.

As part of the process of identifying ICT risks that have a potentially significant prudential impact on the institution, the institution should determine which ICT systems and services are critical, according to whether they relate to critical or important functions of the institution.

The institution's ICT systems and services may be rated critical in terms of business continuity and availability, security and/or confidentiality. For the purposes of assigning a critical rating, the institution should consider that critical ICT systems and services must be related to or support critical or important functions.

According to the so-called DORA Regulation, i.e. Regulation No 2022/2554 on digital operational resilience for the financial sector, a "critical or important function" means a function, the disruption of which would materially impair the financial performance of a financial entity, or the soundness or continuity of its services and activities, or the discontinued, defective or failed performance of that function would materially impair the continuing compliance of a financial entity with the conditions and obligations of its authorisation, or with its other obligations under applicable financial services law.

The MNB examines which risks should be subject to closer and/or in-depth reviews; for that purpose, identified ICT risks that have been rated material are classified into the following ICT risk categories for assessment:

- ICT availability and continuity risk,
- ICT security risk,
- risk of ICT changes,
- ICT data integrity risk,
- ICT outsourcing risk.

VIII.2.2 Reputational risks

Definition

Reputational risks should also be evaluated within the category of operational risks. Reputational risk is the current or prospective indirect risk to liquidity, earnings and capital arising from adverse perception of the image of the financial institution on the part of customers, counterparties, shareholders, investors or regulators. It is manifested in the fact that the external opinion on the institution is less favourable than desired.

Reputational risk may originate in the lack of compliance with industry service standards, failure to deliver on commitments, lack of customer-friendly service and fair market practices, low or inferior service quality, unreasonably high costs, a service style that does not harmonise with market circumstances or customer expectations, inappropriate business conduct, isolated or recurring outages of IT systems and service disruptions directly affecting customers, or unfavourable regulatory opinion and actions.

There may also be a reputational risk of excessive concentration of operations involving prestigious, primarily private banking customers (e.g. providing more risky investment products, more risky asset management, sale of derivative products), because any negative circumstance could hurt investor confidence, which could have a serious impact on institution's profitability and capital position.

Signs of significant reputational risk include the extensive and repeated voicing of a negative opinion on the institution's performance and overall quality by external persons or organisations, especially if such negative opinion receives broad publicity (e.g. in the media or social media), along with events poor performance by the institution which may lay the grounds for such opinions.

There might be some externalities that give rise to reputation risks despite being independent of the activity of the specific institution (e.g. the reputation of the parent bank, the reputation of the entire sector has been damaged by a different institution, etc.).

ICAAP review

As a part of measuring reputation risks, the MNB sets two requirements for institutions. On the one hand, during the supervisory dialogue institutions should give account of their most important institutional characteristics, events and measures which potentially carry (or alternatively, reduce) reputational risks. Such characteristics may, among others, be the following:

- adverse decisions, measures and penalties imposed by public authorities (MNB, Hungarian Competition Authority, National Tax and Customs Administration) against the institution,
- evaluation of the results of customer satisfaction surveys,
- the general statistical characteristics and trends of the number, the subject matter and the management of customer complaints received,
- pending and closed criminal and civil litigation proceedings, and
- recent IT system downtime, service outages, significant ICT-related events and their consequences, impact on customers and other stakeholders,
- internal and external fraud in the institution and the measures taken in response,
- media allegations, whether or not substantiated, which pose a threat to reputation,
- the institution's most important social and charity activities.

On the other hand, the MNB expects the institutions to consider in detail the possible situations involving direct reputational risk (e.g. unfavourable media coverage, loss of investor confidence, crisis, crisis situation, etc.) and their potential consequences, and appropriate institutional processes (e.g. press and social media monitoring, scenario analysis), demonstrating the ability to effectively detect and manage these events, referring to mechanisms and action plans. It is important to emphasize that reputational risk management tools should be an integral part of the institution's corporate governance framework and approach and proportionate to the size and role of the institution.

When assessing the appropriateness of risk control, the MNB takes into account, among other things, the transparency of the division of labour between areas, organisational units, forums and committees (e.g. marketing and communications, legal and compliance, potential crisis committees, crisis management forums, etc.) that are primarily concerned with managing reputational risks, clarity of powers, effectiveness of regulation and processes, the role of these areas in product and service development and pricing processes initiated by business areas, in order to avoid or mitigate the damaging effect of improper market practices and conduct risk on reputation. It should also be examined to what extent the institution takes into account the impact of its strategy, business plans and, in general, its behaviour on its own reputation. The MNB also expects the institution to regularly monitor, assess and quantify the risks of and exposures to private banking customers, and the concentration of such risks and exposures, as part of

which it should rate its portfolios in terms of riskiness, considering the measures that might be needed to manage or prevent customer attrition, as well as the degree of loss that the institution may incur.

In the MNB's view, reputational risks should be managed primarily through policies, effective processes and action plans. However, in the case of worrying institutional practices and significant reputational risk, the MNB may consider the allocation of additional capital to be necessary, until appropriate mechanisms and process control are established, or to cover losses originating from the previous practice that can no longer be mitigated or may potentially reoccur in the future.

The MNB's requirements regarding the category of operational risks are summarised for the supervised institutions in the table below:

Category	Element of framework	AMA Bank	Large Bank	Small Bank
Basic requirement	Regulation	x	x	x
	Capital calculation	x	x	x
	Regular reporting	x	x	x
	Risk governance	x	x	x
	Risk mitigation actions	x	x	x
Pillar 1 methodologies	Loss data collection	x	x	x
	<i>control of data collection</i>	x	x	x
	<i>regular training</i>	x	x	x
	<i>data collection software</i>	x		
	<i>external data</i>	x		
	Scenario analysis	x	x	x
	Risk self assessment	x	x	
Key risk indicators	x	x		
ICAAP-SREP methodologies	Product inventory	x	x	
	Model inventory	x	x	
	Reputational risk management	x	x	x
	ICT risk management	x	x	x
	Conduct risk management	x	x	x

VIII.3 Market risk

Market risk: the current or prospective risk of losses on balance sheet and off-balance sheet positions arising from changes in market prices (changes of bond prices, security or commodity prices, exchange rates or interest rates that impact the positions).

VIII.3.1 Trading book risk

Definition

In the course of the ICAAP, institutions keeping a trading book must assess whether the procedures established and the models applied by them properly handle market risks, and whether the capital set aside for market risks provides sufficient coverage for such risks at all times. As the institution has to provide for capital adequacy on an ongoing basis, it is advised to build the ICAAP on internal risk measurement and management processes and thereby it should form an integral part of the institution's

internal governance system. The institution must have a clear strategy that contains guidelines on managing interest and exchange rate risk.¹⁰⁴

The elements of market risk are as follows:

- position risk: interest rate and exchange rate risk in the trading book
 - specific and general risk of debt securities
 - specific and general risk of equity instruments
 - specific risk of securitisation and of correlation trading positions;
- foreign exchange risk conveyed by the activity;
- commodity risk conveyed by the activity.

The elements of the trading book include positions consisting of financial instruments or commodities held by the institution for trading purposes or for hedging the elements of the trading book.

VIII.3.1.1 Risk assessment and management

The management of the institution must regularly review the positions in the trading book exposed to market risk, the external market environment, and respond to external and internal changes in a timely manner. It is advisable for the institution to set up a dedicated unit/committee for this task. In addition to the institution's liquidity risk, the committee must monitor and regularly check equity positions, interest rate and foreign exchange positions, various balances (interest rate, foreign exchange and liquidity balances), the changes of key items, the changes in the yields of different asset groups, and the impact of all these on profit.

The institution must also have a policy approved by the senior management for managing the risks of stock positions. This policy must define the purpose and the reason for holding stock positions for own account, the range of stocks and stock-related derivatives that are allowed to be held as positions, the size and composition of the portfolio for own account, the revenue targets and profitability requirements of speculation activities and the main methods of managing the risks of stock positions.

The institution must develop a policy for managing foreign exchange risk. This policy must specify how this risk arises and how it is taken, identify deals that generate major foreign exchange risk along with off-balance sheet activities that affect this risk, describe the evaluation of foreign exchange positions (in particular foreign exchange options), set the value of foreign exchange positions that can be taken, specify the related profitability targets and the key methods of managing foreign exchange risk.

The institution must use appropriate control mechanisms to keep market risks within the limits designated by the strategy/policy/internal regulation defined or approved by the management. It must operate a proper limit system for controlling exchange and interest rate positions in the trading book, furthermore commodity and foreign exchange risks. In addition to the volume limits which control the size of positions exposed to risk, it is advisable to use limits to maintain the extent of the risk (e.g. VaR limit) or loss (e.g. stop loss). The limit system includes intraday and overnight limits, where appropriate, for dealers, instruments, currencies, and various positions.

Market Risk Management is responsible for monitoring and recording limit overruns. These processes and sanctions must be regulated in rules.

¹⁰⁴ The MNB will expect an effort from the institution that is commensurate with the level of complexity and risks of its activities. The principle of proportionality dictates that institutions should perform their ICAAP with a level of diligence that is in proportion with the market risks they take and thus with the complexity of their trading book positions. Naturally, if an institution does not keep a trading book or if the book includes very few items while its foreign exchange risk in the banking book or commodity risk is significant, then the MNB expects the institution to elaborate and apply a more detailed process with a view to these risks.

The operation of the limit system must be reported to the senior management on a regular basis. Furthermore, the marketability of positions in the trading portfolio must be analysed regularly based on the availability of relevant market prices, market turnover and size. Institutions with a significant portfolio which regularly expand their product range are expected to have procedures also for the management of the new products. The contents of the trading strategy, the risk relevant policies and the trading book must be cross-checked on a regular basis and results should be reported to the senior management. When the institution presents the ICAAP results to the MNB, documents on backtesting must be filed as an attachment.

Valuation must be fully separated from trading activities and, whenever possible, it should use market prices as a starting point. If no market price is available, institutions should price their positions conservatively, by means of model-based pricing.

As part of the valuation process, the institution must have procedures in place which set out the rules for setting up valuation reserves. The purpose of these reserves is to have the institution set aside capital for covering the risk of events and phenomena that may derive from the imperfection of markets or internal processes. The regulation declares that within the scope of these procedures, at least the following reserves should be considered: unrealised interest gains, close-out costs, operational risks, prepayment, investing and funding costs, future administrative costs and, where relevant, model risk. Furthermore, formal procedures are required for determining the adequate level of reserves¹⁰⁵ for book positions that are becoming illiquid¹⁰⁶.

The output of prudent valuation is the additional valuation adjustment (AVA), which results in the adjustment of the fair value. If prudent valuation yields a value lower than the fair value, the absolute value of the difference must be deducted from the regulatory capital.

VIII.3.1.2 Capital requirement calculations

The measurement of market risks and the determination of the capital requirement for risks are expected in case of positions in the trading book, or exchange rate and commodity risk conveyed by the activity.

The MNB expects the supervised institutions to ensure that the calculation of the Pillar 1 capital requirement and the reporting obligations related to that comply with the CRR2/FRTB requirements and the related guidelines (e.g. EBA/GL/2020/09 – Guidelines on structural FX).

All institutions with trading portfolios and positions are expected to use more accurate, risk-sensitive methods to measure market risk, including foreign exchange risk across the entirety of their activities. Therefore, regardless of which method these institutions apply to meet supervisory reporting obligations (standard or internal model method), they are expected to develop and employ as part of the ICAAP an advanced methodology that is based on value at risk (VaR). In the latter case, for operative risk management purposes (e.g. when setting limits), it will be acceptable for an institution applying an internal model to use parameters which, in its own judgment, better reflect its risks¹⁰⁷, rather than those specified in the regulations; however, for VaR-based calculations the MNB expects a 99% confidence level for the calculation of capital requirements, as well as holding period of 10 days. Furthermore, taking into account the Fundamental Review of Trading Book (FRTB), the application of the expected shortfall (ES) model is also acceptable. (Note: When applying the ES model in the alternative internal model under Pillar 1, the MNB expects the institutions to follow all published EBA guidelines, e.g. Guidelines EBA/GL/2021/07 on criteria for the use of data inputs in IMA.)

In the case of credit institutions subject to simplified supervisory reviews, the VaR model on the Supervisory Authority's website or the internal model developed by the institution is also required for

¹⁰⁵ Illiquidity may derive from market imperfection but may also be generated by the institution itself by e.g. holding an excessively concentrated portfolio.

¹⁰⁶ In case an institution is of the opinion that the setting up of such reserves is sufficiently handled by the accounting regulations, it is not a mandatory requirement to raise additional capital (on top of what is already required by accounting provisions).

¹⁰⁷ E.g. holding period, confidence interval, correction factor, etc.

foreign exchange risk, even if the size of the open positions does not exceed the threshold set by the CRR at 2% of the regulatory capital.

Regarding the limitations of internal models, the institutions must run regular stress tests and analyses of extreme events. The results and conclusions of these should also be reviewed at senior management level.

EBA published guidelines¹⁰⁸ for the institutions calculating the regulatory capital requirement of market risk with the Internal Model Approach. The Guidelines on Stressed Value At Risk¹⁰⁹ contain guidance for the definition of the stress period, the stressed VaR methodology and the use test. The MNB expects institutions using internal models for their ICAAP to design their model by taking into account the EBA Guidelines referred to above.

In determining Pillar 2 capital requirements, the MNB expects banks to take the stressed value-at-risk into account by ensuring that where the greater of (a) the most recent stressed VaR and (b) 1.5 times the average stressed VaR for the preceding 60 days¹¹⁰ exceeds the normal VaR-based capital requirement, the value calculated on a stressed value-at-risk basis should be taken as the capital requirement under Pillar 2.

$$\text{Capital requirement}_{Total} = \text{Max}(\text{Capital requirement}_{SVaR} ; \text{Capital requirement}_{VaR})$$

$$\text{Capital requirement}_{SVaR} = \max (1,5 * \text{average}(\text{preceding 60 days SVaR}), SVaR_{t-1})$$

$$\text{Capital requirement}_{VaR} = \max (k * \text{average}(\text{preceding 60 days VaR}), VaR_{t-1})$$

where k is the adjustment factor depending on the back-test outcome, minimum = 3

For institutions using internal models, the regular backtesting and evaluation of the model's performance are fundamental requirements. The senior management body responsible for managing market risks should review the results of backtesting and evaluation on a regular basis.

Irrespective of the postponement of the introduction of the FRTB until 1 January 2026, the MNB expects institutions to determine their capital requirements also under the FRTB and to take into account 50% of the difference as a capital requirement adjustment item under Pillar 2 – if the Pillar 2 capital requirement is below this level –, thus ensuring a gradual adaptation of institutions to the new (capital) requirements. So, if the Pillar 2 capital requirement exceeds the Pillar 1 capital requirement by more than half of the difference between the FRTB capital requirement and the Pillar 1 capital requirement calculated using the current methodology, the MNB will not impose an additional capital requirement.

VIII.3.1.3 ICAAP review

The mapping of market risks within the ICAAP, in an ideal case, is carried out by means of the risk sensitive internal method. This is justified by the principle nature and function of the credit institution's activity as well as by the complex relationship of market risk factors and their high dimensions. In line with this, the MNB requires within the framework of the ICAAP review that all institutions which have a trading portfolio should assess their risk exposures by using historical or mathematical-statistical methods with regard to all significant risk factors. In the absence of the above, to cover market risks in the trading books the MNB imposes additional capital requirements, as appropriate to exposure profile concerned, on the institutions subject to comprehensive and focused ICAAP reviews.

¹⁰⁸

¹⁰⁹ EBA Guidelines on Stressed Value-At-Risk (Stressed VaR) (EBA/GL/2012/2)

¹¹⁰ The multiplier of 1.5 corresponds to the level applicable to FRTB Expected Shortfall. Given that in terms of substance stressed VaR also seeks to capture extreme values, and that calibration on a fixed, high-volatility period is not expected to produce excesses during back-tests, a multiplier of 1.5 is also deemed to be sufficient to cover the uncertainty stemming from model risk and disregard for intraday variations in exposure (a multiplier of 3.0 is used in the case of normal VaR).

In conformity with the philosophy of internal capital calculation, for VaR and sVaR calculations, the MNB does not specify the concrete method of implementation, it allows institutions to freely choose from among variance-covariance-based, historical or simulation-based approaches. However, in application of the principle of proportionality, for institutions subject to comprehensive and focused ICAAP reviews, the MNB only accepts the management of market risks in Pillar 2 as fully adequate where the following conditions are satisfied:

- The institution should also have an indicator expressing the „stressed value-at-risk” (sVaR).
- Stressed value-at-risk should play a role in the process for the determination of capital requirements.
- The institution should also calculate the VaR and sVaR numbers for the following risk categories in addition to total risk VaR and sVaR (interest rate risk, foreign exchange risk, equity risk, commodity risk). The institution may not apply Pillar 1 methodologies to any of the risk factors.
- In addition to the separate VaR numbers for individual risk categories, the MNB recommends that the institution should also have component or incremental VaR calculations.
- Daily and local level measurements should be complemented with regular back-testing involving ex-post comparisons between the extent of risks generated by the model and the actual and hypothetical historical value changes in the portfolio. A hypothetical change in value is considered to be the effect of the unchanged end-of-day positions on profit. For actual changes in value, the fees, commissions and net interest income should be deducted from the daily result. Here, the MNB expects the institution to back-test both the VaR values for the individual risk categories and the aggregated risk VaR values.
- In addition to the foregoing, the MNB recommends that the institution should subject its risk model to the PLA test provided in the Basel FRTB Recommendation, or a similar procedure, to verify the completeness of the model.
- Internal trading and exposure taking limits should be in line with the institution’s risk appetite and with the sophistication of its risk measurement system.
- Daily risk measurement should be complemented with periodic stress testing programs which should extend to the examination of changes in all relevant risk factors.
- The market risk database should be continuously updated, and the extent of the shocks applied should be re-evaluated.
- The set of market risk factors used in modelling should extend to the inherent risks of the trading book position, in particular, to
 - relevant risk factors,
 - non-linear features of derivatives (the preferred method is full revaluation),
 - characteristics deriving from the structure of the yield curve,
 - risks deriving from the volatility of foreign exchange rates and asset prices,
 - concentration risks.
- In the case of the application of empirical correlations between risk factors, assumption of normality as well as the consideration of the holding period by means of scaling (e.g. by the square root of time), the appropriateness of the applied method can be and should be demonstrated.

- When selecting risk factors to be included in the risk model, the risk factor best suited to the specificities of the products should be selected. For example, for the risk assessment of IRSs and government securities the IRS yield curve and the deviating government bond yield curve should be used. In the case of an open option position, the relevant volatility should also be included as a risk factor, since in this case the vega value of the option position is not zero, i.e. the position is sensitive to changes in implicit market volatility.
- When calculating the interest rate risk VaR, it is not recommended institutions to model the relative change of the effective or logarithmic yields (directly proportional to the current level). This approach is needed because a historically measured volatility of e.g. 10% results in varying yield shocks depending on whether the yield environment is high (e.g. 0.8 ppt for 8%), medium (e.g. 0.3 ppt for 3%) or zero-bound (e.g. 0.0 ppt for 0%).
- In the case of banking groups, market risks are measured, and capital requirements are determined on a consolidated level.

In the case of calculations that are non-transparent, inconsistent or difficult to evaluate, the MNB may set additional capital requirements in consideration of positions and risk limits.

VIII.3.2 Interest rate risk in the banking book

Definition

Interest rate risk originating from the banking book is the possibility that income and/or the institution's economic value of equity stemming from banking book positions changes adversely as a result of changes in market interest rates.

All on- and off-balance sheet positions not included in the trading book should be regarded as banking book positions, typically including loan and deposit portfolios, non-trading security portfolios and interbank transactions, investments, other assets and liabilities, non-trading derivatives, etc. In calculating banking book interest rate risk, all interest-sensitive instruments should be taken into account; positions that are not interest-sensitive e.g. assets deducted from CET1 capital and equity exposures in the non-trading book are not to be included. Institutions must have clear internal policies and procedures for the classification of instruments.

VIII.3.2.1 Risk assessment and management

In order to assess and measure interest rate risk, the institutions are expected to employ at least one profit-based indicator and at least one method of measuring economic value as well; together, these should take into consideration all the interest rate risk components originating from the banking book (repricing, basis and option risks).

The income effect can be identified by using a number of indicators, of which the net interest income (NII) and net interest margin indicators are applied the most frequently. In addition to indicators, any other ratios or indices quantifying the institution's income position and changes thereof may be used, provided that they have demonstrated their suitability to identify current and expected future developments in the income position and that they take account of all elements that have a significant impact on profitability.

The institution's economic value of equity is to be calculated as the net present value of the total cash flow of the assets, liabilities and off-balance sheet items constituting the banking book, by taking into account asset and liability cash flows and off-balance sheet items with the sign corresponding to the direction of the position concerned. Total cash flow means that all cash flows emerging until the final (actual or estimated) maturity of certain positions are to be included in the calculation.

In terms of its source, the interest rate risk in the banking book may be classified into three main types:

- repricing risk: the risk arising from the repricing structure of assets and liabilities and off-balance sheet items, including the risk arising from changes in the level, shape and slope of the yield curve;
- basis risk: risk deriving from the imperfect relationship or correlation between two instruments serving as a basis for the pricing of assets, liabilities and off-balance sheet items and between the priced item and the interest rate of the instrument;
- option risk: the risk deriving from options pertaining to the – explicit or inherent – characteristics of banking products that influence the interest rate risk of the product.

In the case of the banking book, the most significant risk type of those mentioned above – in terms of its impact – is usually the repricing risk.

For detailed criteria on identification and methods of managing the 3 sub-components of the interest rate risk see Appendix 1 of 2022/14 EBA GL.

For the purpose of actively supporting management decisions, it is expected that internal reports to the management body are produced and presented at the relevant levels of aggregation, with a sufficient level of detail and at least quarterly, but preferably monthly and, among other things, contain comparisons of the actual exposures and limits, the action to be taken in the event of any limit overruns, the risk measurement results, and the amount of, and changes in the capital requirement.

VIII.3.2.2 ICAAP review

The MNB considers interest rate risks in the banking book as material risks for all institutions and expects them to measure and manage those with a wide range of quantitative tools and appropriate models (proportionately to the institution's exposure to interest rate risk and the complexity of its positions), according to the following aspects:

- The models must be able to measure the interest rate risks' short-term impact on income and long-term impact on equity value and apply generally accepted and understood risk management methodologies and procedures.
- The model estimating the interest rate sensitivity of income must also include, in addition to net interest income, other income elements representing relevant exposure being sensitive to the fluctuation of market interest rates. These include primarily the securities portfolios, receivables and derivative portfolios included in the banking book, measured at fair value and in accounting posted against P&L or other comprehensive income. The interest sensitivity of the individual elements included in the measurement (e.g. net interest income, revaluation profit/loss) must be quantified and stated in the reports separately.
- The models must be capable of evaluating and quantifying all interest rate risk types arising in relation to assets, liabilities and off-balance sheet items not registered in the trading book.
- The models must cover all balance sheet items and off-balance sheet items that are exposed to interest rate risks, and beside interest-bearing assets, liabilities and off-balance sheet items not registered in the trading book, non-interest expenditures and revenues that are sensitive to changes of market interest rates (fees and commissions) as well, if they play a relevant role in income developments.
- In order to determine, as precisely as possible, the effect of interest rate risks on income and equity value, the data applied (volume, interest rates, maturity pricing information, options, etc.) should be specified properly and in line with the nature and magnitude of the institution's activities and risks. Furthermore, these data should be available in, or generated from, the credit institution's records with adequate accuracy in a timely manner.

- The underlying assumptions should be valid, properly documented, prudent and consistent over time. Assumptions are of special importance for the products and assets/liabilities, whose maturity or repricing period differs from the original contract conditions or is not defined by contract. Staff involved in assessing and quantifying risks must have a perfect understanding of the methodologies and assumptions, adjusted them to the business strategies and subjected to regular (at least annual) stress testing, validation and reviews. Key changes should be documented and are subject to approval by executive management.
- The handling of interest rate risks in the banking book should be an integral part of the credit institution's risk management activity. The management and the board should take into consideration information derived from the risk management model when making decisions on interest rate risks.
- Standard interest rate shocks expected as per international recommendations should form a part of the credit institution's practice of measuring interest rate risks in the banking book.
- The credit institution should operate an IT system which adequately supports both at an individual level and at a group level, the procedures and processes required to measure, control and report interest rate risks. The systems must have the capability for the recording of all transactions fully and clearly, for calculating economic value and financial result indicators and for running flexible, varied stress scenarios.
- If the institution applies internal deals for the purpose of transferring the risk between the banking and the trading book, these must be clearly documented, reflect valuation based on market prices and should not be aimed at reducing the capital requirement.
- The diversification effect between the interest rate risk in the banking book and the trading book risks and foreign exchange risk cannot be recognized, the capital requirements for the two portfolios are added up when determining the overall capital requirement.
- Institutions should model how interest rates and volume of sight deposits change as a result of changes in market interest rates. For detailed requirements related see Appendix 3.
- Institutions should monitor and model the interest rate risk effect of prepayments on loans. Similarly, the interest rate risk characteristics of early withdrawal of deposits and non-performing exposures should also be assessed, and these impacts should also be taken into consideration in interest rate risk calculations. When assessing the interest rate risk effect of loan prepayments, the MNB regards the following steps to be performed as good practice:
 - Depending on the available data, the Institution assesses the monthly development in the prepayment rate at transaction level or on homogenous portfolios (broken down at least by currency, main product type and type of repricing).
 - Based on historical data, the Institution estimates the anticipated future prepayment rate in the baseline interest rate scenario.
 - The institution examines the link between the available prepayment rates and market level of interest rates, based on which it determines the rate changes in the respective interest rate scenario.
 - In the individual interest rate scenarios the Institution examines the effect of prepayments on the risk indicators, and if deemed significant, integrates the effect in the calculation of the interest rate risk capital requirement.
 - Institutions are not allowed to take into account early repayments in the same way in all scenarios without reflecting the effects of the distinct interest rate scenarios. The effects

of early repayments must be modelled separately for each scenario and the resulting scenario-dependent effects must be incorporated into the interest rate risk calculations.

- For the time being, and taking into account the proportionality principle, at least O-SII institutions should quantify the basis risk of their banking book portfolio. At a minimum, the MNB expects the modelling of the effect of imperfect correlation between the yield changes of different types of instruments underlying the repricing of transactions (e.g. 3-month BUBOR and 3-month benchmark government bond), but optionally the measure of term basis risk (e.g. between 3-month and 6-month BUBOR rates) can also be calculated as part of the methodology. For the time being, the MNB does not set strict expectations on the methodologies used by institutions and does not expect them to be consistent with its own methodology, but only considers it necessary to monitor risk in order to enhance risk awareness. Furthermore, the MNB does not – for the time being – set out specific and strict requirements for the quantification of capital requirements either. In its own calculations, the MNB quantifies at least one EVE sensitivity indicator for basis risk, which is calculated on the basis of yield curves corresponding to the repricing of the transaction, and which is used to calculate the forward rates needed to forecast the expected interest payments on the transaction, which may be affected by shocks other than the yield curve shocks used in the discounting of cash flows. The MNB determines the correlation matrix between the movements of the different forward and discount curves on the basis of historical time series and calculates the shock measures on the yield curves taking this into account. To take account of correlation, more complex simulation calculations may need to be carried out by the institutions.
- For EVE calculations (including FV calculations), institutions are required to discount cash flows with a risk-free yield curve for all currencies. The risk-free yield curves used by institutions for each currency are expected to be constructed from the interest rates of the instruments with the lowest payment frequency (money market rates, FRAs, futures and swaps)¹¹¹ observed on the reference date of the calculation. The standard interest rate shocks are expected to be applied to the (spot) zero coupon yield curve calculated from the risk-free yield curve used in the baseline interest rate scenario, consisting of continuous interest rates.
- Under the conditions listed in the international recommendations, institutions may also opt to reduce contractual cash flows used to calculate EVE and FV sensitivity by credit risk spread or commercial margin.
- The MNB expects that in the calculation of EVE and FV, institutions should seek to estimate the total cash flows of principal and interest until maturity for variable rate transactions, taking into account the complex interest rate fixing conventions specific to these transactions (e.g. use of multipliers (factors), averaging, delay of the reference interest rate), while respecting the principle of proportionality. Interest cash flows are determined by the institutions from the yield curves used in each interest rate scenario, based on forward rates calculated as nominal rates.
- When calculating the net interest income sensitivity, the MNB expects institutions to use transaction (client) rates including spreads, which are determined from the yield curves used in the baseline and stress scenarios, based on forward rates calculated as nominal rates.

¹¹¹ If available for a given currency, an OIS yield curve should be used, otherwise a yield curve consisting of, for example, money market rates with a maturity of one or three months, FRA or futures transactions and swaps with a corresponding interest payment frequency.

- Institutions should assess and if necessary, take into account automatic and behavioural options inherent in products.
- Institutions should take into account any interest rate floors being in effect based on statutory or contractual background, or stemming from the typical behaviour of clients. The relevant law¹¹² do not differentiate the requirement for applying deposit interest rate floors either by currency or product range. The deposit rate on any deposit contract with a natural person shall exceed 0%, while in the case of legal entity customers, the interest rate may be 0% or negative. Also on the basis of the statutory background¹¹³, if the money debt subject to an interest payment obligation would become interest-free or bear negative interest if the interest rate conditions change, the money debt shall be treated as bearing interest at the rate of 0.01%, unless the parties expressly provide otherwise, until such time as the interest rate exceeds that rate. Furthermore, relevant international guidelines and recommendations restricting the degree of potential downward interest rate changes should be also taken into consideration when determining the negative market interest rate shocks. Institutions may not use interest rate floors in their interest rate risk calculations for unjustified reasons.
- Institutions may quantify the extent of the potential risk-mitigating effect of the correlation between the movements of the yield curves for HUF, EUR and USD currencies and the value of the end-of-period capital requirement calculated on the basis of the dVE or dINC for HUF, EUR and USD currencies aggregated, reduced by this diversification effect, and reduce the amount of the end-of-period capital requirement by a corresponding amount, but not more than 15%.
- As regards the management of the banking book's overall interest rate risk in ICAAP, the issues not detailed in this manual shall be governed by the provisions of the relevant BIS¹¹⁴ and EBA¹¹⁵ guidelines.

VIII.3.2.3 Stress tests related to the interest rate risks in the banking book

As part of the management of interest rate risks in the banking book, institutions are expected to perform regular (at least quarterly) stress tests that show the potential impact of a material change in the interest rate environment on the short-term profitability and long-term economic value of equity of the institution. The stress tests should include at least one scenario with a prompt and unexpected shock, a persistently changed interest rate level and parallel shifts of different magnitude and direction in the yield curves. Beyond the parallel yield curve shock scenarios, the MNB expects a more thorough assessment of risks by using scenarios simulating further shocks to the interest rate and changes in the shape and steepness of yield curves.

The institution is required to model the effect of standard interest rate shocks separately for the banking book and to also take this into account in determining capital requirements for each currency on its balance sheet that meets at least one of the following conditions:

- a) the sum of its assets, liabilities and off-balance sheet transactions denominated in the relevant currency and not recorded in the trading book exceeds 5% of the total banking book items portfolio or, their combined amount accounts for at least 90% of such portfolio (i.e. if currencies

¹¹² Section 6:390(1) of the Civil Code, Section 280 of the Banking Act

¹¹³ Section 52/A of the Ptké. [Act on the entry into force and implementation of the Civil Code]

¹¹⁴ BCBS (2016): Standards – Interest rate risk in the banking book

¹¹⁵ EBA/GL/2022/14 Guidelines issued on the basis of Article 84 (6) of Directive 2013/36/EU specifying criteria for the identification, evaluation, management and mitigation of the risks arising from potential changes in interest rates and of the assessment and monitoring of credit spread risk, of institutions' non-trading book activities

with a share of more than 5% do not represent 90% of the total banking book, those with a smaller share are also included in the capital requirement calculation)

- b) the given currency is an official currency/legal tender in a country where the institution's group members included in the group's prudential perimeter of consolidation are established
- c) according to the institution's preliminary estimates (simplified calculation, expert judgement), the risk exposure in the currency denomination concerned, measured by income sensitivity and/or economic capital value sensitivity indicators, exceeds 5% of the sensitivity indicators calculated for the total banking book.

VIII.3.2.4 Supervisory outlier tests

In addition to the Bank's internal stress tests, pursuant to Article 98 of CRD, the Supervisory Authority shall regularly review the institutions' non-trading book interest rate exposure as part of the supervisory outlier tests. For the purpose of calculating those the provisions of the relevant EBA RTS¹¹⁶ should be followed:

- In connection with the EVE sensitivity, the 15% threshold specified formerly in EBA/GL/2018/02 (and in Article 172(12) of the Credit Institutions Act) remains valid, computed as the ratio of the largest negative impact of the economic capital reduction calculated in the 6 EBA scenarios and the institution's T1 capital.
- Regarding the net interest income sensitivity, the ratio of the worse of the losses in the 2 parallel EBA yield curve scenarios (i.e. the negative amount with higher absolute value) and the institution's T1 capital shall not exceed the prevailing rate specified in the EBA's relevant regulatory technical standard (RTS). The MNB considers the timing of the limit becoming effective in line with the indicated timing in the respective RTS.

For additional parameters of the supervisory outlier test and the procedure to be applied upon breaching the ratios see the RTS referred to before and Article 76(12) of the Credit Institutions Act. It should be emphasised that from 2023 the shock rates of 250/350/160 basis points, specified in the previous version of the MNB's ICAAP manuals, applied to Hungarian Forint in the yield curve scenarios shall be replaced by 300/450/200 basis points, as recommended by EBA.

Accordingly, the MNB expects the institutions to quantify the level of the two outlier indicators regularly and present it in their internal interest rate risk reports. Furthermore, institutions are expected to submit to the MNB a written notification, addressed to the supervisor of the institution, within 5 working days after detecting the limit breach (completion of the 9R and/or COREP report), where in addition to the fact and degree of the breach and the designation of the respective interest scenario, they also provide information on the reasons and plans to terminate such breach. In assessing a potential breach of the Net Interest Income Supervisory Outlier Test (NII SOT) threshold, the MNB will follow the opinion issued by the EBA. That is, in the case of the NII SOT, a limit violation is not necessarily followed by a supervisory response of the same strength as that applied to EVE limit violations. When assessing the limit breach, other aspects are also taken into account (e.g. the extent of the violation, the historical development of the NII SOT indicator, the value of the Bank's current and historical EVE SOT indicator, the examination of other interest rate risk indicators, etc.).

In terms of reducing the risk exposure, these actions may equally be targeted at increasing capital or reducing risk exposure. In the absence of these measures the MNB initiates the reduction of the credit institution's risk exposures and the reinforcement of risk management processes. Before taking such

¹¹⁶ EBA/RTS/2022/10 Draft Regulatory Technical Standards specifying supervisory shock scenarios, common modelling and parametric assumptions and what constitutes a large decline for the calculation of the economic value of equity and of the net interest income in accordance with Article 98(5a) of Directive 2013/36/EU

steps, however, the MNB always assesses the sufficiency of the actions taken by the institution itself and considers the form and means of supervisory action accordingly.

VIII.3.2.5 Additional stress tests

Reverse stress tests are also recommended for identifying severe interest rate scenarios and sensitivities due to strategy or customer behaviour.

In an environment of low interest rates, negative interest rate scenarios are also recommended to be taken into account.

If necessary, it is recommended to use scenarios that are significantly larger and more extreme than the requirement. Examples include significant changes in the relations between important market interest rates or changes in the assumptions on correlations between interest rates.

Larger and more complex institutions are recommended to use more sophisticated and complex scenarios, in which the assumptions also depend on interest rate changes.

The MNB expects institutions to incorporate the stress testing of banking book interest rate risk into their overall stress testing practices. During stress testing, they should take into account the outcomes of stress testing for other risk types (credit risk, market risk etc.) as well as the interaction between various risk types and any secondary impacts.

The modelling of standard interest rate shocks is a minimum requirement, which is recommended to be supplemented with approaches aligned to the specific characteristics of the institution according to the above.

VIII.3.2.6 Capital requirement calculation

The MNB considers interest rate risk in the banking book to be a material Pillar 2 risk for all institutions and expects institutions to have procedures and processes that provide a level of control appropriate to their risk situation to identify, measure and manage this risk.

The MNB expects institutions to determine the capital requirement for the quantified interest rate risk in the banking book within the ICAAP and to allocate capital to cover risks. In determining its capital requirement, a methodology is to be used that is based on internal risk measurement results and takes into account both short-term (income) and longer-term (changes in the economic value of equity) effects.

When quantifying the income component of the capital requirement, the principle to be followed is that it should contain at least the net interest income and the valuation changes of positions measured at fair value (typically securities, receivables and derivative transactions) measured as a result of the assumed interest rate shocks. It is an additional principle that the decline in the income (change occurring in an interest rate shock of negative impact) alone does not serve as a basis for determining capital requirement; the capital requirement arises when the sensitivity of the income exceeds the degree of the expected capital increment estimated from the income. In practice it means that banks may take into consideration as a factor reducing income sensitivity the specific part of net interest income that – after deducting costs and tax – may be a source of the bank's capital increase.

In determining the capital requirement, institutions need to use stress scenarios other than normal market conditions that pose a higher risk than the normal interest rate environment. In order to avoid the unjustified fluctuation of the calculated capital requirement, the actual capital requirement is determined by taking into account the results of the year preceding the calculation and the trend of the capital requirement instead of exclusively the calculated value for the end of the given month. However, the volatility of capital requirements – compared to what appears more stable over time – actually indicates a higher level of risk, which is also expected to be addressed in the calculations. [If there has (have) been

a change(s) in methodology during the period covered by the calculation, the calculation must be performed using the current methodology for the entire period. However, it may also be useful to perform calculations according to the previous methodology in order to show the impact of methodological changes.]

The bank must use its own calculation to determine the capital requirement and must not rely solely on the results of supervisory calculations. When assessing the adequacy of the capital requirement set by the bank, the MNB takes into account the results of its own benchmark calculations (as well). The most important parameters of the benchmark calculations are as follows:

- The MNB applies a static business scenario for the calculation of NII sensitivity, i.e. it assumes volumes of balance sheet items and risk profiles being constant and substitutes maturing exposures with new exposures of the same risk characteristics and volumes. An exception to this is the management of the sight deposit portfolio, the ratio of which – within the total deposit portfolio of constant volume – is not considered constant from time to time. The evolution of these exposures, at the expense of term deposits, may vary in different market scenarios.
- EVE sensitivity is determined by using the ‘run-off’ model, where the exposures currently in the balance sheet are assumed to run off by the contractually stipulated or estimated terms.
- For the purposes of these calculations, the MNB uses 6 market scenarios as set in international recommendations¹¹⁷ (2 reverse, parallel yield curve shocks, 2 yield curve slope changes, 2 yield curve deformations). The procedure used and the extent of interest rate shocks are shown in Appendix 2.
- We perform the calculations separately for all currencies accounting for at least 5% of total banking book assets/liabilities, but collectively for at least 90% of the total exposures. (If the currencies with a share of more than 5% do not account for 90% of the total banking book, then those with smaller shares will also be included in the calculation.) In the calculation of capital requirements, we also take into account currencies that are the official currency/legal tender in a country where the institution’s group members included in the group’s prudential perimeter of consolidation are established, or whose sensitivity to income and/or economic capital value exceeds 5% of the sensitivity indicators calculated for the total banking book according to our preliminary estimates (simplified calculation, expert judgement).
- The potential risk-reducing effect of the correlation between the movements of the HUF, EUR and USD yield curves (diversification effect) is taken into account by reducing the value of the end-of-period capital requirement by a maximum of 15%. The methodology used by the MNB to calculate the degree of diversification effect is set out in Appendix 4.
- In determining the capital requirement, market scenarios are incorporated in terms of their effects on both income and on the value of equity (sensitivity of the economic value of equity).
- In addition to net interest income, income sensitivity also includes the valuation changes in the securities portfolio, receivables and the derivatives interest rate position and any additional position measured at fair value occurring as a result of an interest rate shock. Of the positions measured at fair value those that are held for hedge accounting purposes should not be included when quantifying income sensitivity. The calculation of FV sensitivity should also exclude cash flows from transactions that occur within one calendar year of the calculation date.

¹¹⁷ see, BCBS: Standard: Interest rate risk in the banking book; EBA/RTS/2022/10 Draft Regulatory Technical Standards specifying supervisory shock scenarios, common modelling and parametric assumptions and what constitutes a large decline for the calculation of the economic value of equity and of the net interest income in accordance with Article 98(5a) of Directive 2013/36/EU

- At the income sensitivity component of the capital requirement, the measured sensitivity is reduced by the potential capital increment estimated from the net interest income.
- Within the instruments with undefined interest rate risk characteristics, the sight deposits' – which make up the most significant proportion in banks' balance sheets – parameters required for the calculations are determined by models. Demand deposits whose interest rate is linked to a reference interest rate or index are treated as variable rate transactions for the purpose of interest rate risk calculations. Appendix 3 contains a more detailed description of the model.
- Time horizon for measuring the sensitivity of income: 1 year.
- When calculating the net interest income sensitivity, the MNB expects institutions to use transaction (client) rates including spreads.
- The effective capital requirement is determined on the basis of a method that also takes trends and variability into account rather than relying exclusively on current values calculated for the end of the monthly period concerned. In practice, this means taking into account the average value and standard deviation derived from the time series of end-of-period capital requirement amounts determined according to the same methodology.
- For both the EVE and INC (income) sensitivity calculations, the baseline scenario is determined based on the current yield curve on the market at the reference date of the calculation.
- In the income sensitivity calculations, the MNB uses as an alternative baseline scenario where the interest rates of assets, liabilities and off-balance sheet items are assumed to remain unchanged at the current interest rates in the balance sheet that have been effective since the last interest rate fixing date. The sensitivity of income is determined based on the differences in the interest rates in the stress scenarios compared to these interest rates.

A detailed description of the calculations is provided in Appendix 1, while the definition of the interest rate scenarios used by the MNB is shown in Appendix 2.

VIII.3.3 Banking book credit spread risk

CSRBB risk is defined in the EBA/GL/2022/14 document. The CSRBB includes the risk of a variable spread on an asset, but excludes the impact of a change in credit quality over the observation period (i.e. a downgrade/upgrade of a counterparty or asset, which is considered as a reclassification risk) and does not include non-performing exposures. When assessing changes in credit risk premiums and liquidity premiums, institutions should take into account the currency-specific dimensions (i.e. HUF, EUR, USD, etc.), credit risk classification dimensions and should not exclude a priori instruments in the banking book from the scope of the CSRBB, including assets, liabilities, derivatives and other off-balance sheet items, regardless of their accounting treatment. The possible exclusion of instruments from the relevant scope shall be implemented in the absence of sensitivity to credit spread risk and shall be appropriately documented and justified. In no case may institutions exclude assets carried at fair value.

Taking into account the principle of proportionality, for the time being at least O-SII credit institutions should develop and apply their own calculation methods for the assessment of the CSRBB as part of their internal measurement system, but these should include a methodology to quantify the impact of changes in credit spreads on at least the NII and EVE measures. In addition, institutions may rely on other measures to identify and measure CSRBB, including CS01 (Credit spread 1bp), other sensitivity-based measures, parametric measures, historical simulations.

The activity and the measured risk level related to the CSRBB should be recorded by the institutions in their regular internal reports. The frequency of monitoring and reporting may vary depending on the internal reporting practices of the institutions. However, the frequency of internal reports focusing on the CSRBB should be at least quarterly.

As regards the management of the CSRBB risk in the course of the ICAAP review, the issues not detailed in this Manual shall be governed by the provisions of the relevant, prevailing BIS¹¹⁸ and EBA¹¹⁹ guidelines. For the time being, the identification, measurement and monitoring of the CSRBB is aimed at enhancing risk awareness, and the MNB does not – for the time being – set strict requirements for the quantification of the capital requirement, and although the MNB also quantifies the degree of risk, it does not yet expect institutions to apply the same methodology as the MNB.

VIII.4 Model risks

Definition

The new EBA SREP Guidelines distinguish two different forms of model risks:

- a) the risk of potential underestimation of the quantified capital requirement by a model approved by the regulator,
- b) the risk arising from inadequate development, implementation and use of models used by the institution for decision-making (product pricing, valuation of financial assets, customer rating, impairment training, etc.).

With regard to point (a) above, the EBA SREP Guidelines clearly state that the risk is to be managed within the risk type concerned, while the risks described in point (b) as model risks should be managed under operational risks.

VIII.4.1 Risk assessment and management

It is rather difficult to quantify the model risk shown in (a); practically it is next to impossible as quantification calls for an estimation of both model deficiencies and their economic impacts. Model deficiencies can be isolated with sensitivity analyses and stress tests, yet the conversion of their results into economic loss figures is a rather difficult task. Therefore, in the case of this risk, the recommended way of protection is not coverage with capital but adequate risk management. A conservative approach that is based on sensitivity analyses, the use of subjective elements (also required in Pillar 1) and the permanent monitoring of the models' performance may provide sufficient protection against such unfavourable impacts.

The use of simpler capital requirement calculation methods (underestimation of credit risk when a standardised approach is used or the underestimation of operational risks in the case of BIA or a standardised approach) may also result in a lower capital requirement relative to the actual risks. The institution should assess the potential deficiencies of the applied methods and should take them into consideration during the ICAAP.

Where the supervisory review finds that the methods, parameter estimates, and procedures applied by the institution are not satisfactory, data quality is inadequate, or that the minimum own funds requirements shown by the institution are not sufficient to cover its risks, in Pillar 2 during the ICAAP review the MNB may, apart from instructions for the improvement of risk control, impose additional own funds requirements by giving proper explanation.

The MNB consistently regards all risks deriving from the inherent uncertainty of capital requirement calculation procedures or from their negligent application as material risks, including the standardised approaches, models based on validated internal ratings or widely used sectoral approaches applied by institutions. Thus, in managing model risks the tasks of institutions are the following:

¹¹⁸ BCBS (2016): Standards – Interest rate risk in the banking book

¹¹⁹EBA/GL/2022/14 Guidelines issued on the basis of Article 84 (6) of Directive 2013/36/EU specifying criteria for the identification, evaluation, management and mitigation of the risks arising from potential changes in interest rates and of the assessment and monitoring of credit spread risk, of institutions' non-trading book activities

- to be fully aware of the mechanism of the applied and alternative approaches as well as with their general characteristics and characteristics specific to them, and to be able to justify their choice;
- to make every effort to precisely map and support risk exposures by using sensitivity analyses and stress tests,
- to use adequately conservative parameters to counterbalance the possible capital reducing effect of model deficiencies, and to manage potential distortions due to poor data quality,
- to continuously monitor model outputs, their conformity with reality and to apply immediate adjustments on detecting problems.

Model validation by an organisational unit independent of the modelling area or by the parent bank may be a risk mitigant. When risk exposure is assessed with an insufficiently supported model, with the lack of prudence or with unjustified simplification – in the absence of the required conservatism and monitoring – the MNB imposes a model risk capital requirement in the context of the supervisory review process by carefully considering the results of alternative approaches.

In the assessment of **model risk, which is listed in point (b) and as such classified under operational risks**, the MNB identifies the business lines/activities in respect of which the institution's model use is relevant. For business areas where the use of models is significant, the MNB assesses how significant the impact of model risk may be.

In particular, the MNB assesses and expects the following as part of identifying and managing model risk:

- the institution appropriately identifies its model risks, and has established a control mechanism for their management that is prudent, and reasonable in terms of methods, frequency, back-testing, etc. (e.g. calculation of market boundaries, internal validation or back-testing, cross-checking with expert advice, etc.), which includes the process of model approval, validation and maintenance,
- the institution uses the models prudently (e.g. by increasing and decreasing the relevant parameters according to the direction of the positions, etc.) where it is aware of the deficiencies of the model, or market or business developments,
- the modelling framework and the knowledge related to its application have been properly communicated within the institution (this includes both the adequacy of the management information system and reporting to support management decision-making, as well as the supply of appropriate information to staff using the models and the enhancement of their knowledge and training as needed),
- the modelling framework and its application are well documented and regulated, and in particular the institution has a model inventory document, for which the MNB has the following minimum expectations:
 - the institution should formulate a materiality threshold for the models, for which, in the MNB's opinion, appropriate indicators may include e.g. the sophistication of the models, or the size of the portfolio managed by the models,
 - the model inventory should describe each credit risk model in detail at the individual level rather than merely at the level of , i.e. not only at PD-LGD-EAD level,
 - the model inventory should include when the model was last validated and when the institution plans the next validation, and whether this validation is done internally or externally (with the involvement of an external counterparty) and when the model was approved, as well as the applicable responsibility,

- the inventory should show which version of the model is currently implemented and the date of this implementation,
 - the inventory should indicate whether regular monitoring reports are made for the model (if a particular model has regular monitoring, the regularity of monitoring, the date of the last monitoring and its most important results should also be presented),
 - responsibilities for the model's operation should be designated at the model level¹²⁰,
 - the inventory should indicate whenever a product or segment is associated with the model,
 - the inventory should briefly describe the purposes for which the models used by the institution are used, including not only credit risk models, but also those employed in pricing, provisions, asset valuation.
- In the spirit of risk-aware operations, the MNB expects that the model inventory is reviewed annually and included in management reports to ensure that management is adequately informed about the models operated by the institution and the associated risks. The MNB also expects that the risks arising from the inappropriate operation of the models will, if necessary, be covered by the institution by capital requirements.

VIII.5 Risk of excessive leverage

In line with the expectations of EBA, from 2023 the MNB will integrate in the ICAAP reviews the assessment of the additional capital requirement related to the risk of excessive leverage.

In accordance with Article 104(1)a) of Directive 2013/36/EU, the MNB may prescribe additional regulatory capital requirement to manage the risk of excessive leverage. The MNB, considering the recommendations in the consultation document issued in connection with the EBA SREP Recommendation,¹²¹ assesses the institution's risk of excessive leverage primarily based on 5 main criteria:

- a) the current level and historical volatility of the leverage ratio,
- b) stability of profitability,
- c) stability of funding,
- d) stability of business model,
- e) degree of concentration.

Based on the ratio and limit system well representing the aforementioned categories in terms of leverage, the MNB assesses the institution's risk of excessive leverage. In relation to this, additional capital requirement may be prescribed, on the one hand, depending on the final weighted score of the institution and on the other hand, in the case of breaching the limits specified for the individual ratios.

VIII.6 Other relevant risks

ICAAP 7 requires that the institution's internal capital allocation process should capture all risks which have not been identified earlier but are material for the institution. This may involve risks that are specific to the institution and derive from its non-standard activities or clientele but fall outside the scope of usual risk definitions. The institution is free to use its own terminology and definitions for other material risks; however, it should be able to explain these to the MNB in detail, along with the related risk measurement and management procedures.

¹²⁰ For example manager / expert responsible for (1) development and review, (2) validation, (3) business application, and (4) implementation of the model. For group models (4) is the manager/expert responsible for local implementation.

¹²¹ Consultation on revised draft Guidelines on common procedures and methodologies for the supervisory review and evaluation process (SREP) and supervisory stress testing, EBA/CP/2021/26

The MNB will not provide a detailed list of other risks. It is the institution's responsibility to map out other relevant risks for which it has to elaborate an adequate risk identification mechanism. The institution needs to examine the materiality of the identified risk and the result of the assessment. Furthermore, it has to be able to explain these satisfactorily to the MNB.

Materiality: in the context of an institution's activities, all risks which affect the achievement of business objectives should be considered material (significant). Other risks are usually difficult or impossible to quantify, thus their measurement and management typically call for qualitative methods. Therefore, institutions are advised to elaborate detailed methodologies for their evaluation and management which enable the revealing of risks and help keep them under control.

There might be a strong link between these risks and other risks, either because the former may amplify the latter or because they stem from the escalation of basic risks (e.g. IT problems carrying a high operational risk may also result in the fast increase of reputation risk if they impact customer systems). Thus the assessment of the materiality of other risks is a highly subjective exercise. The MNB takes a stand on this matter in the course of the supervisory review process and during the dialogue between the MNB and the institution, based on the submitted documentation.

VIII.6.1 Risks of the regulatory environment

Definition

Risks of the regulatory environment are risks that affect equity or profitability directly or indirectly, and arise from the change in the rules prescribed by international or national authorities that are applicable to the institution, or from the prescription of new rules.

In order to mitigate the risks arising from changes in the regulatory environment, institutions are definitely required to regularly monitor legislative preparations both in Hungary and at the EU level, including in particular the publication of any commencement orders related to the CRD and CRR packages. Institutions may manage the risks arising from the regulatory environment through processes and/or by determining capital requirements.

ICAAP review

In the framework of the supervisory review, the MNB assesses the extent to which the institution, in the course of its ICAAP, considered risks deriving from the regulatory environment. The institution is expected to strive for proper awareness and to monitor changes in the regulatory environment. Continuous regulatory oversight is essential for proper risk management. It is also expected that not only the legal area of the institution should be informed about the relevant changes, but also that the management and the employees concerned will be properly informed. The MNB will assign a positive assessment in cases where the institution prepares regular summaries of legislative changes both for management (through reports) and for employees (by providing access to information material at least on the intranet).

The MNB also expects the institution to align its internal policies with the external regulatory environment and to review them on a regular basis (at least annually, or more frequently in the event of relevant legislative changes) and to harmonise them with the legal framework. In the event of changes in relevant legislation affecting specific fields or the entire institution, it is necessary that the institution first identifies the internal organisational units affected by the legislation and then examine the effects of regulatory changes with the involvement of the affected areas and, if appropriate, prepare training material (possibly through organised training).

The MNB expects the institution to incorporate any significant changes resulting from the current and projected regulatory environment into its strategy and planning processes (e.g. business and capital plans, etc.). In the event of legislative changes that significantly affect the activity of the institution, the review and analysis of potential impacts, the preparation of scenarios, the elaboration of action plans, and the modification of the strategic and business plan are also necessary in advance.

IX. Chapter 3 Other risks related to the capital guidance and the components and supervisory review of the ILAAP

IX.1 Stress tests

Stress testing, as a concept, covers all quantitative and qualitative techniques and risk management methodologies which financial institutions can employ to gain an overview of their exposure or vulnerability to the impacts of exceptional but possible events that may occur due to rare risk events that can have severe consequences. Due to the previous financial and economic crisis, the MNB attaches great importance to stress tests in order to effectively mitigate the negative impact on institutions of a potential future economic downturn.

The Pillar 2 stress tests required under the ICAAP are supposed to provide a forward-looking, comprehensive and integrated assessment on all of the institution's material risks (including credit risk, counterparty risk, securitisation, market risk, operational and conduct risk, liquidity risk, non-trading risk, concentration risk, FX lending risk). This way, the scope of stress tests (including but not limited to the risk types discussed earlier) includes the consideration of the impact of all market, economic, institutional or political risk factors which may have a substantial impact on the prudent and solvent operations, and profitability, of the institution concerned. In this sense, the stress testing methodology discussed herein definitely exceeds CRR requirements. This is equally true for credit risk stress tests¹²² to be applied under Pillar 1 by institutions using internal ratings based (IRB) approaches and for general regulations that relate to Pillar 2 stress tests¹²³

In the MNB's view, there is no single "correct" stress testing methodology. The range of approaches acceptable in respect of a particular institution largely depends on factors including but not limited to its size, organisational structure, type of authorised activities and services, business model and strategy applied, complexity of its activities, risk appetite, and quality of risk management. Having regard to the principle of proportionality, however, the MNB expects the stress testing methodology applied to be sufficiently sophisticated in the light of the above factors. Major and more complex institutions need to have more sophisticated stress test programs also on a consolidated level, while small and less complex institutions and groups (on a consolidated level) can also implement simpler stress test programs. However, the MNB definitely expects institutions under the comprehensive SREP to have an advanced, complex and integrated stress testing framework.

The MNB is in favour of a sophisticated approach and expects the simultaneous application of different methodologies (sensitivity analysis, scenario analysis, "reverse" stress test) from institutions under the comprehensive SREP:

- **Sensitivity analysis:** is a stress test that measures the potential impact of a specific risk factor on a particular portfolio or institution as a whole on capital or liquidity. In the first step, the institutions should identify the relevant risk factors and ensure that the analysis covers all relevant types of risk factors. Institutions should maintain a list of the risk factors identified. Where the institution also relies on expert estimates, these estimates need to be explained in detail. If combined occurrence is assumed, the individual risk factor analyses should be supplemented with analyses involving multiple risk factors without the need for a scenario definition.
- **Scenario analysis:** the test of an institution or a portfolio for its ability to resist a scenario comprising a series of risk factors. It is important that stress test scenarios are not only based on historical events, but should also take into account hypothetical scenarios based on non-historical

¹²² Compliance with Article 177 of the CRR is a pre-condition for obtaining the supervisory authorisation required for the adoption of the IRB method, according to which an institution should have in place stress tests to properly identify the impact of potential adverse events on its loan portfolio, and it should demonstrate that it is resilient to such events.

¹²³ The CRR regulates Pillar 2 tests in a rather general manner but sets out more specific regulations for certain risk types (e.g. interest rate risk in the banking book, concentration risk of lending, etc.)

events. Institutions should ensure that scenarios are forward-looking and take into account systemic and institutional-specific changes in the present and the foreseeable future. Institutions should determine the severity of the scenario by taking into account the specific weaknesses of the institution (e.g. exposure to international markets). Institutions should make sure that they choose a scenario that is sufficiently serious both in relative and absolute terms.

- **“Reverse” stress test:** an institutional stress test that starts out from the specification of a predefined output (e.g. where an institution's business model becomes non-viable or insolvent or likely to become an insolvent institution), then reveals the scenarios and circumstances that may lead to its occurrence. In the reverse stress test, institutions identify the predefined outputs to be tested, identify possible adverse circumstances that would expose them to severe weaknesses, and trigger predetermined output, assess the probability of events in a scenario leading to the predetermined output, and adopt effective provisions, processes, systems or other measures to prevent or mitigate the risks and weaknesses identified.

IX.1.1 ICAAP review

In terms of ICAAP reviews, the most appropriate form of stress testing involves the so-called “bottom-up” stress test, which relies heavily on the institution's own methodology. In this framework, risk parameters, results and their impact on capital adequacy are calculated by the institution itself, according to the rules imposed by the Supervisory Authority.

As set out in the Manual, in the MNB’s understanding the concept of stress tests involves a comprehensive set of tools and procedures. The large degree of freedom and flexibility in stress testing as an approach is especially useful for two different reasons. On the one hand, the capital requirement calculation methodology geared to considering the individual risk types independently does not in reality offer an opportunity to examine the interaction of risks. In a Hungarian context, it primarily (not exclusively) means that the mutual interdependence of credit risks and exchange rate risks, market and liquidity risks can only be captured within a comprehensive stress test which supplements the individual risk methods. On the other hand, the capital requirement calculation procedures for individual risks may – due to their nature – apply restrictive and simplifying assumptions (e.g. relating to independence, normality) which result in the considerable underestimation of actual risk exposures.

Stress tests are essential building blocks for risk-conscious operation, and for preparations for potential crisis situations. Consequently, in the context of the supervisory review, the MNB expects each supervised institution to have a thorough knowledge about the guidelines on stress testing published by the international supervisory community, about the quantified impact of changes in the most significant environmental factors on the institution’s position and about the main shortcomings of the methods applied in capital requirement calculations. In keeping with the principle of proportionality, the MNB also requires that stress tests be developed with the same level of professionalism as the major risk types and form an integral part of the economic capital requirement calculation. In the MNB’s opinion, this can only be accomplished if

- the individual stress tests raise unambiguous questions, they have a rational concept and their methodology is developed with the recognition that the capital requirement of most risk types represents in itself a potential loss associated with an extreme stress scenario;
- one of the key elements of stress tests is the model which determines the transmission (i.e. its impact on the institution) of external environmental shocks which is developed by methodological sophistication and by utilising both past experience and (if possible) granular level data of the portfolio, with the proviso that the stressed point-in-time risk parameters should not be lower than the long-term average (TTC) parameters;
- the individual stress tests enable the joint capture of credit and exchange rate risks and the investigation of market and liquidity risks in a uniform framework;
- stress tests, if possible, take into account feedback (e.g. institutional reactions, risk mitigating steps) and secondary effects (e.g. risk spill-over, possible forms of risk aversion), and the

credibility of the expected outcome of potential action plans is assessed by the supervisory authority, subject to a sufficiently reasoned explanation provided by the institution;

- stress tests also extend to mapping shortcomings in the individual capital requirement calculation methods applied within the framework of economic capital calculations, and if possible, they indicate the capital requirement sensitivity linked to the individual risk types for the purpose of changing the methodology and the assumptions used.

The MNB views stress testing primarily as a diagnostic tool because for most risk types the capital requirement is, from the outset, specified to cover a possible extreme loss.

IX.1.2 Reliability of the risk models applied

The risk exposure of institutions is determined by the operation of the financial system, which is a complex network. The interactions within this network and their uncertainty make the clear identification, accurate pricing and proper management of risk very difficult. Due to the complexity of the system, models for the calculation of economic capital requirements can only capture the aggregate risks of the institution in an indirect manner and must employ various assumptions regarding correlations between asset prices and risk factors. Empirical experience shows the latter tend to grow significantly (in absolute value) in a stress situation, thus models which focus on regular operations often underestimate the actual risks under a crisis. This problem not only applies to risks within specific risk types but also to the interrelations of risks. Therefore, the MNB requires institutions to have a clear view of the performance of their risk models in crisis situations.

IX.1.3 Adoption of an integrated risk management approach

For a number of reasons, risk types are discussed separately in existing business and regulatory practice and thus they supply inputs for economic capital requirement calculations independently of each other. Recent developments (the integration of money and capital markets, securitisation, economic based accounting techniques, spreading of derivatives, etc.), however, blurred the differences between risks in many aspects. A typical example to be mentioned is loan products offered with floating rate and denominated in foreign currency (a product category of special significance for the Hungarian financial system). In the case of these products, market risk and credit risk factors cannot be separated clearly; and the crisis highlighted the organic relationship between liquidity risk and the two previously mentioned risk types.

The MNB considers the integrated, comprehensive approach to risk management to be of paramount importance, because in many cases, the risk exposure will be assessed to be higher than the expectations of the institution when interactions are also factored in. The MNB expects integrated stress tests at a consolidated level to be carried out for all institutions subject to comprehensive SREPs.

IX.1.4 Supervisory minimum requirements for the institutions' internal stress testing

In the light of the considerations outlined above, stress testing methodologies that are limited to changing the input parameters of internal risk models (e.g. shifting of PDs, increase of LGDs) are not considered sufficient by the MNB. Furthermore, the MNB requires institutions to have a clear-cut and identifiable stress testing programme that is set out in a policy of adequately high standard. We also consider it necessary that supervised institutions should interpret and understand the results of their stress tests so that test results can serve as a basis of clearly defined risk mitigation measures. The MNB expects that the stress testing programme is communicated effectively across all business lines and at management level in order to increase risk awareness, improve risk culture, and promote the dialogue within the organisation on potential risk management measures. As a prerequisite for this, the MNB requires the responsibility and proper awareness of the supreme management body of the institution.

Regarding the values used for the tests, the MNB requires that the stress tests (also) reflect the effect of environmental shocks that are really exceptional and significant.¹²⁴ The MNB considers it indispensable that institutions use their experiences gained during the crisis when selecting risk magnitudes and methods and act in a sufficiently conservative manner.

Therefore, stress tests must be defined in accordance with the characteristics of the institution's portfolio, the risks taken by the institution, and the prevailing environmental conditions. In case any change (or expected change) occurs in these factors, the applied tests must be revised. The MNB requires institutions to carry out this revision annually even if the changes of the aforementioned factors would not call for it. The MNB requires that stress tests are run more frequently than that.

In the current situation, the MNB believes that stress tests must indispensably become organically integrated into the risk management practices of institutions and that their results should be utilised by the institution in the following areas:

- verification of the results of capital requirement calculations and the identification of their reliability
- during the evaluation of the liquidity position and capital planning;
- during the elaboration of the risk strategy;
- overall senior management decision-making, e.g. elaboration of emergency scenarios, setting of limits, etc.;
- potentially for the determination of additional regulatory capital requirement after consultation with the MNB;
- if necessary, for taking adequate risk-mitigating measures (equity raise, strategy, use of stricter limits, etc.)

In order to ensure that regulatory requirements are fulfilled in practice, the MNB requires institutions to have a comprehensive stress testing policy that is documented in detail and has been approved by the institution's senior management. This should include all relevant aspects of the stress testing process:

- the methodology applied (detailed description of models, reliability of parameters, support of model conditions, need for management actions),
- purpose,
- frequency,
- the data applied (the data used in the stress test, time series, parameters, portfolios should be consistent with those used in other areas of the organisation, i.e. risk management / controlling / reporting / capital requirement calculations),
- use of results,
- IT infrastructure,
- responsibilities.

It is also important that the institution should have sufficient resources and an adequate pool of experts for stress testing. It should be noted that the MNB also expects the reverse stress test to be performed by institutions subject to comprehensive SREPs as a complement to multiple stress test methods. When a reverse stress test is applied, with a view to mapping out the weaknesses of the institution, scenarios and parameters are sought which would lead to a major deterioration in the institution's position (e.g. by causing a significant loss, loss of capital or a liquidity stress). The resulting parameters are then analysed based on the probability of their occurrence (monitoring). The application of the method contributes to the more effective detection and management of risks and enables the Supervisory Authority to identify systemic problems in the cross-sectional evaluation of results.

In order to assess systemic risks in a more reliable manner, the MNB reserves the option to require the supervised institutions to apply specific stress scenarios. The benefit of that exercise would be that the

¹²⁴ Due to the presence of nonlinear risk correlations, the MNB considers it useful to test stress scenarios of different severity and probability.

cross-sectional comparison of models and results would enable both the MNB and the institutions to gain a more accurate picture of the institutions' risk exposures and the suitability of their stress-testing procedures.

When defining scenarios, the extent of the shock of each factor is important, i.e. the probability of occurrence and the evolution of economic processes should be proportional to each other. It is also important to ensure the internal consistency of the scenarios, i.e. that the evolution of individual factors along a path should not lead to contradiction. All relevant factors should be taken into account in the stress test (currency, interest rate and yield, stock market, commodity market shocks, elements of economic growth). During stress tests, concentration risk and large exposures shall be measured on the assumption of default of the institution's largest exposures. In the estimates, the institution has to perform the calculations in a conservative manner in terms of the magnitude of the losses.

MNB expects all institutions to produce a standard stress test documentation, in which they describe the stress types used, their methodologies, the related limits, and the management information and decision points. An enhancement of procedures is recommended in order to prevent excessive risk concentration within the institution. It cannot be overemphasised, however, that these documents should not be limited to reactive action plans for the event of specific risks occurring but should instead aim at the proactive identification and timely management of risks in the case of exposures that represent excessive risk.

In addition to the generalities listed above, the MNB is guided by the EBA Guidelines on Institutions Stress Testing (EBA/GL/2018/04)¹²⁵, published on 19 July 2018 and its methodological note entitled 2021 EU-Wide Stress Test¹²⁶, published on 29 January 2021, which it applies in forming judgments the stress tests of institutions. The MNB expects supervised institutions to study the content of these and strive for complying with the provisions of those, particularly in respect of the following:

- (1) The stress scenario should reflect the development of a severe, but plausible stress situation. (EBA Final Report on Guidelines on institutions' stress testing 4.6.4. Severity of scenarios chapter)
- (2) Institutions should quantify the impact of the scenario in terms of credit losses (i.e. provisions) and income. (EBA Final Report on Guidelines on institutions' stress testing 4.7.1 Credit and counterparty risks chapter, paragraph 112)
- (3) In addition to credit losses, the impact of the realisation of other risk types (NII, market, operational, etc.) on income should be also quantified; accordingly, institutions should have stressed P&L, show the impact of an economic shock on regulatory capital, and based on this quantify potential capital loss. (EBA 2021 EU-Wide Stress Test Methodological Note 1.3.10 Risk coverage chapter)

In addition, the Supervisory Authority expects that:

- (4) The stress horizon should be at least 2 full years from the quarterly results treated as the actual period.
- (5) Calculations should be run without the anticipated capital increases, since the realisation of the anticipated capital increases is uncertain in the stress scenario.
- (6) The leverage ratio reflecting the impact of the economic shock over the horizon of the stress test should be quantified (Article 429 of CRR).
- (7) The reverse stress test should include at least the stress testing of the PD parameter, which should impact the institution's capital adequacy at least through the recognition of impairment and the change in RWA.

¹²⁵ [https://eba.europa.eu/sites/default/documents/files/documents/10180/2282644/2b604bc8-fd08-4b17-ac4a-cdd5e662b802/Guidelines%20on%20institutions%20stress%20testing%20\(EBA-GL-2018-04\).pdf](https://eba.europa.eu/sites/default/documents/files/documents/10180/2282644/2b604bc8-fd08-4b17-ac4a-cdd5e662b802/Guidelines%20on%20institutions%20stress%20testing%20(EBA-GL-2018-04).pdf)

¹²⁶ https://www.eba.europa.eu/sites/default/documents/files/document_library/Risk%20Analysis%20and%20Data/EU-wide%20Stress%20Testing/2021/Launch%20of%20the%20ST/962559/2021%20EU-wide%20stress%20test%20-%20Methodological%20Note.pdf

(8) Large and complex institutions should assess whether the shift in the yield curve has any impact on the credit risk costs (both in the retail and corporate segments).

(9) Compliance with MREL should be assessed over the horizon of the stress test.

(10) Compliance with the overall leverage ratio requirement (OLRR) should be assessed over the horizon of the stress test.

(11) Compliance with liquidity requirements (LCR) should be assessed over the horizon of the stress test.

(12) It is also an expectation to know and have local results for each type of risk when running a parent bank methodology and stress test. If there is no local stress effect for a risk type, the MNB expects an expert estimate of it and its inclusion in the local results.

IX.1.5 Supervisory minimum requirements for the institutions' internal climate risk stress testing

From 1 January 2025, the MNB will require credit institutions subject to the complex SREP to assess climate change and environmental risks, together with those considered material, through scenario analysis or stress testing, as set out in the Green Recommendation. The MNB expects the credit institution concerned, when conducting a scenario analysis or stress test on climate change and environmental risks, to take into account how the transition risks, primarily, and the physical risks, secondly, may affect the credit institution's capital adequacy and business model. It is expected that climate risks will be analysed under several scenarios covering both short and medium term risks, but at least those arising over a 2-year horizon.

It is recommended, but not required, to assess the sustainability of the business model through longer-term scenario analysis or stress testing under various climate change and environmental risk scenarios. As part of its capital planning, a credit institution is expected to assess its capital adequacy against a credible baseline and several adverse scenarios. As regards adverse scenarios, the MNB recommends that the credit institution should assume extraordinary but realistic developments of sufficient severity in terms of their impact on capital adequacy.

It is expected that the credit institution's stress testing policy will be reviewed with regard to climate change and environmental risks. For each institution, the MNB expects the preparation of a climate risk stress test documentation that fully describes the climate risk stress test methodology (as part of the general stress test documentation, where applicable). The MNB may request banks to present the completed climate risk stress test methodologies during the review process. This way, as part of the supporting supervision, institutions may receive feedback on their methodologies and the MNB can make suggestions for improvement in response to any shortcomings.

The MNB is running a single supervisory climate risk stress test to assess the risks to the banking system, which currently has no capital requirements or capital adequacy implications. The methodology of the exercise is described in detail in a paper by Várgedő (2022) published in the *Hitelintézet* (Financial and Economic Review)¹²⁷.

IX.1.6 The practical application of the principle of proportionality at small institutions

In line with the principle of proportionality, the MNB does not expect smaller institutions with less complex operational characteristics to develop reverse stress tests. Nevertheless, it expects them to take advantage of the opportunities offered by the wide range of instruments available for testing shock tolerance as best suited to the specifics of the institution. It is important for smaller institutions to also work towards developing their scenario analysis, as this would offer them a comprehensive view of their

¹²⁷ Bálint Várgedő (2022): Klímakockázati stresszteszt: a karbonár-sokk csődvalószínűsége kifejtett hatása a magyar bankrendszerben (Climate risk stress test: the impact of carbon price shock on the probability of default in the Hungarian banking system), *Hitelintézet* (Financial and Economic Review), 21 (4) pp. 57-82.

actual risks and their impact on capital. The MNB disapproves of institutions not having an overall practice of creating a statistically demonstrable link between the main factors determining the bank's profitability and capital accumulation capacity on the one hand and the financial and macroeconomic variables critical for banking operations on the other. The MNB takes the view that developing a model on empirical foundations would offer banks a suitable understanding on the level of risk in their operations and the potential losses that also impact on capital adequacy.

Furthermore, the MNB expects the institutions to prioritise the identification of risks unique to their specific operations, to document the methodology of identifying the potential unique sources of risk (e.g. collateral shock) and to quantify their impact on the financial situation of the institution. This is especially important for institutions whose unique business models result in specific risks (clearly delineated field of operations, clientele, special lending terms, coverage requirements etc.).

IX.2 Presentation of the stress testing frameworks used for the definition of the Supervisory capital guidance (P2G)

In line with the EBA's expectation,¹²⁸ the MNB introduced a new Capital Guidance (P2G) in 2019 on the capital adequacy of Hungarian credit institutions in order to ensure that supervised institutions remain solvent in stressed scenarios as well.

The extent of the Capital Guidance is determined by the supervisory stress test, which is carried out by the MNB. In this calculation, the MNB may also take into consideration the results of the institution's own stress test. Capital Guidance is not part of the quantified TSCR in the ICAAP review nor can it be considered a capital buffer. While its breach does not involve direct sanctions, all cases it will result in a close monitoring of the capital position, in which the MNB may request a review of the capital plan of the credit institution and its regular presentation to the MNB, however, in the absence of cooperation, it may as well apply sanctions impacting the capital. By calculating Capital Guidance, the MNB communicates to the institution's management that it estimates the minimum free capital level to be maintained over the TSCR and capital buffers, which ensures the secure operation of the institution. It is calculated within the stress-testing framework and primarily quantifies the extent to which the institution's CET1 capital adequacy (CET1 quality regulatory capital / regulatory pillar TREA) decreases along the stress path. When quantifying the Capital Guidance, the MNB may take into consideration – based on single methodology – also such unquantifiable, qualitative criteria that derive from the continuous oversight experiences of the institution. The amount of the Overall Recovery Capacity quantified for the institutions in relation to the Recovery Plan may also influence the rate of the supervisory capital guidance.

The MNB has developed a top-down stress-testing framework (hereafter: supervisory stress test), which relies mainly on the supervised institutions' regular reporting to the MNB. The MNB considers it important that the results obtained about the different banks should be comparable because this serves as the basis for the supervisor's Capital Guidance in effect since 2019. As a result, the MNB benchmark uses stress testing models developed on banking sector data to quantify the negative impacts of a simulated economic downturn. Considering the observable trends in the market and in the banking sector, supporting a realistic – yet conservative approach – the balance sheet assumption is dynamic, i.e. the balance sheet total may increase even in the stress scenario. On the other hand, it may decrease not only due to an increase in NPL, but also as a result of amortisation potentially exceeding the volume of loan disbursements. The main elements of this stress testing methodology are explained below.

An important difference from the framework developed by the EBA is that the MNB's supervisory stress test quantifies the impact of macroeconomic shocks other than those defined by the EBA, which better reflects the mechanisms of the Hungarian economy. The quantification of Capital Guidance depends on

¹²⁸ In 2018, the European Banking Authority revised the EBA SREP Guidelines to include the Pillar 2 Guidance (P2G) as a direct capital requirement implication of stress testing. The P2G is also expected to be incorporated into CRD V.

the institution's estimated capital adequacy on the stress path¹²⁹, while the simulated baseline scenario forecast provides a better understanding of the results and a basis for comparison. The balance sheet dynamic captures the trends in changes in exposures over the recent period and observed during the last crisis. The characteristics of new assets and liabilities reflect the market conditions observed in the baseline and the stressed scenarios and the characteristics of run-off exposures. The dynamic balance sheet assumption also influences the development of risk-weighted assets, which are decisive for capital adequacy, as RWA is also altered by changes in the portfolio. Another important factor from the point of view of capital adequacy is the level of capital available to the institution, which is determined by the risks realised during the forecast period and the capital accumulation capability characteristic of the institution.

Among the risks, credit risk is one of the most significant, the impact of which is also reflected in the supervisory stress test through several channels. On the one hand, we calculate a smaller impairment requirement in the stress scenario for sovereign exposures, where the stressing of PDs is based on a regression model utilising macroeconomic correlations, while the LGD remains constant over the entire horizon. The model corresponds to the top-down methodology used in EBA's EU-level stress test. On the other hand, we also stress client loans that generate, much more material impairment increments, in accordance with the following framework.

In the stress scenario, the environment determined by the macroeconomic shock results in a rise in the probability of default, which is based on the models incorporating the macroeconomic factors estimated by the MNB and the customer and transaction characteristics. In addition, the coverage of non-performing assets by provisions increases during the stress period, in line with the worsening economic outlook and rising loss rates. The credit risk loss model is fully in line with IFRS 9 requirements. Compared to the earlier impairment calculations under IAS 39, the main change is that the model not only manages the actual impairment but also the expected lifetime of the loan. Impairment on loan portfolios broken down into different segments¹³⁰ and impairment categories (stages) are revised to reflect the negative credit risk effects of the deteriorating economic environment on the level of impairment for the entire life cycle. If the residual maturity of the loan exceeds the three-year duration of the stress path, the model assumes that the economic and credit risk parameters will gradually, linearly return to the baseline values in the six years following the stress, and then hold them until maturity. One exception to this comprises the credit risk parameters of "Stage 3" exposures, which retain the values assumed as of the end of the stress scenario. The credit risk parameters used in the impairment model are calculated as follows.

As a first step, the probability of default for different years along the stress path, which is formed according to the macroeconomic indicators¹³¹ involved in modelling, is estimated based on the current loss rates. The calculated probability of default of a given segment for a given impairment category will gradually return to the projected baseline as described above. After the third year of the baseline scenario, the model assumes that the value of the last year remains unchanged until the maturity of the loan portfolio under review. In the case of high-quality, performing ("Stage 1") loans, the expected loss will be calculated over the next 12 months using conditional PD values dependent on economic cycle (*PiT, point-in-time*). This means that the value of impairment on "Stage 1" loans is completely recalculated three times during the stress path, as the intensity of shock varies from year to year. In the case of deteriorating quality, underperforming ("Stage 2") loans, the model calculates expected losses for the entire lifetime, similarly using *PiT* PDs, except that if the average maturity of the loan portfolio exceeds the length of the stress path, a return to the baseline after three years is also factored in. For non-performing ("Stage 3") loans, the PD value is 100%, as the model assumes no curing for defaulted loans. In the case of FX-denominated loan portfolios, the PD values calculated by the model are adjusted by a penalty factor due

¹²⁹ It is important to highlight that the stress path used in the supervisory stress test is fully customised, thus none of its elements are in line with the adverse paths of the stress test communicated through other forums of the MNB (e.g. the Financial Stability Report).

¹³⁰ Sovereign / local government, financial institution, large enterprise, micro, small and medium-sized enterprise, project, hedged retail, unhedged retail

¹³¹ E.g. Investment, GDP, Unemployment rate, Inflation, Exchange Rate, Net Exports, Sectoral average wages, Household Savings

to the additional risks of these exposures. This factor is calculated on the basis of the currency movements of the financial and economic crisis and the subsequent volatile period.

The next step is to calculate the transition probabilities between different categories of impairment. The probabilities of migration to the non-performing category as calculated for the stress path are derived through the modelled relationship between the initial probabilities and simulated PD values. The probabilities of two-way transition between the two performing categories are calculated using historical data. In all cases, the sum of the probability of migration from the given category to the other two, as well as the probability of staying in the given category, must be 100%. The probability of migrating from “Stage 3” to the other two categories is 0% due to the prohibition of curing, so it follows from the above rule that the probability of remaining in the non-performing category is 100%. The two remaining probabilities (staying in “Stage 1” and “Stage 2”) are calculated on a residual basis by topping up the sum of the probabilities assigned to the two impairment categories to 100%. In addition, the probability of migration from “Stage 1” to “Stage 2”, and that of reverse migrations are also be limited. The former may not fall below the initial value, while the latter may not increase above the initial value.

The third step is stressing LGDs. The losses expected in the event of default are offset by the model using two types of shock. One is the FX shock applied to FX-denominated loans. The other economic break is the property market shock affecting collateralised loans. Other collateral (guarantee, financial collateral etc.) values are stressed on the basis of historical changes. The probability of curing for a given loan portfolio is reflected in the LGD modelled for the bank under review as of the start of the stress test, and will thereby remain present throughout the stress path.

With a dynamic balance sheet assumption, the credit conversion factor (CCF) may also change, so that the off-balance sheet exposures included in the quantification of credit risk in a stress scenario will also be based on historical processes observed in a past crisis.

The final step in quantifying credit risk parameters is the calculation of lifetime expected credit losses for transactions that migrate from “Stage 1” to “Stage 2” during the three years of the stress path. This exercise will also cover transactions starting in “Stage 2” in the period under review, whether they remain in that category or become non-performing later on. For “Stage 3” transactions, the cost of lifetime expected credit risk will be the LGD for these transactions, PD being at 100%. The cost of lifetime expected credit risk is derived as the product of current exposure, marginal PD and LGD. The methodology assumes that as a result of the dynamic balance sheet assumption the new exposure added to the portfolio is disbursed under such characteristics that under the amortisation of the old exposure it will modify neither the average maturity of the entire portfolio, nor its other credit risk attributes.

From 2021 the calculations used until now for the estimation of the probability of default and migration will be replaced by new models. The growth in the information content and granularity of banks’ reporting (e.g. the introduction of HITREG) enables the MNB to estimate the quantification of the realisation of credit risk in a stress situation on a more detailed information base than previously.

The basis of the model used for this has been created in the corporate segment by a multibank customer-level default database, which covers an entire economic cycle (2007-2017). Owing to this the previous portfolio-level (segment) approach is replaced by customer-level information, i.e. when determining the probability of default and migration, the MNB uses both financial and non-financial information characterising the respective company, and thus in addition to the indebtedness, profitability and liquidity situation, variables such as enterprise size, nature of activity and ownership structure are also used. For the purposes of determining the probabilities of migration the model tries to harmonise the Hungarian institutions’ IFRS9 impairment policy by a set of uniform stage rules. The new methodology supports that building on a wide range of macroeconomic and customer-level set of variables, under adequate discriminatory power, enterprises can be segregated based on quality, both PiT PD, relevant for the stress test, and the transition probability can be estimated at enterprise level, thereby approximating the stress impairment add-on.

The stage-migration model, forecasting the behaviour of the retail segment, is also based on a customer-level bank database, which also covers a full economic cycle (2005-2018). Accordingly, the previous model, which ignored customer qualities, is replaced by a model that takes into consideration both transaction and customer properties. In the new model first the “rating” categories are defined along the aforementioned properties, i.e. debtors of better and worse quality are segregated. Thereafter the probability of these categories’ migration between the IFRS9 Stages is estimated along separate time series regressions, which include the macro variables best capturing the movements. Due to their different characteristics, mortgage loans and consumer loans have been segregated in the modelling of the retail segment. The impairment expected on the stress path is calculated from the PDs obtained from the changes in the probability of migration, the separately stressed LGDs and the transaction maturity. As with ICAAP, credit risk incorporates counterparty risk and CVA risk. In the case of counterparty risk, in line with the basic assumptions of the EBA stress test, the methodology assumes the default of the two most risky clients of the 10 largest. When selecting the largest clients, the exposure underlying the ranking is determined at group level, on a net basis. The clients under review do not include exposures to sovereigns, central banks, and within the banking group. The identity of the two riskiest counterparties is determined by the counterparty risk weight belonging to them. In addition to the counterparty risk, qualitative factors (e.g. counterparty sector) may also be considered upon selecting the counterparties to be subjected to default. The exposure value is calculated in accordance with the CRR rules applicable to counterparty risk. The loss shall be determined by multiplying the counterparty risk exposure under the CRR by the relevant LGD or other expected loss on the transaction in the event of a bankruptcy event determined under the Standardised Approach and shall be deducted in full in the first year of the stress scenario. The CVA risk loss is quantified on the basis of the relevant capital requirement under the ICAAP, which appears as a one-off loss in the supervisory stress test in the first year, as with the counterparty risk. It is important to mention that counterparty risk and CVA loss only weaken the result of the stress path, whereas in the baseline they are assumed to be 0.

In addition, an important source of risk is market risk, which for stress testing purposes is subdivided into aggregated banking and trading book risks. In the case of banking book exposures, stressed value is coupled with interest rate risk and foreign exchange risk. The shifting of an exposure measured at fair value triggered by a change in exchange rates after the introduction of the dynamic balance sheet will be meaningful because it entails a change in the balance sheet total. In addition, the effect of the revaluation of foreign currencies can appear in credit risk through the PD values and in the trading book due to measurement at amortized cost. Interest rate risk in the banking book is quantified based on the benchmark model of the MNB, and is guided by the average interest rate rise over the three years of the stress path.

The revaluation of securities (both bonds and derivatives) along the paths is calculated from analytical data for live portfolios in the reference period, taking into account its maturity. The cash flows of the securities are discounted using the forecast yield curves, broken down separately into forint and foreign currency. The difference between the predicted market values is used in the stress test as the revaluation result.

- The revaluation of the FVOCI securities is stated in the other comprehensive income throughout the stress period.
- The combined revaluation of IRSs entered into to hedge securities and other interest rate derivatives is reflected in the trading result due to the current lack of detailed hedging information.
- The revaluation of the FVTPL portion of available-for-sale securities is calculated according to a similar mechanism and is included in the trading result.

Foreign exchange risk in the trading book applies to assets denominated in foreign currencies, both securities and their off-balance sheet hedges, and its extent depends on the intensity of the exchange rate shock. Other risks in the trading book (e.g. equity risk, commodity risk) are determined taking into account the capital requirement for them. The treasury earnings on trading instruments that are also held

in the profit and loss account are projected as the average of the results of the last three full years before the stress path. All of the profit and loss items associated with market risk described above are also reflected in the baseline scenario, the difference between the two calculations is the interest rate and yield development used.

The operational risk is also the projection of the average of the results of the last three full years before the stress path, with two differences compared to the calculation of the trading result. The first difference is to take into account the effect of one-off items (such as losses recorded on the conversion of retail loans denominated in foreign currency to forint) in determining the final value, the second is the number reflecting the effect of the increase in risks, with which the projected value is multiplied on the stress path. The values projected for the operational risk baseline are the same as the average value calculated over the last three years.

The level of capital available to the institution is determined by the ability to accumulate capital alongside the realisation of risks. The stress test shows the effect of the change in major revenue and expense items. The P/L of the bank is seriously affected by the development of net interest income, which is determined by the following factors and assumptions in the supervisory stress testing framework. The basic assumption is that the interest rate rise for each quarter will take place in a single step right at the beginning of the quarter and that level will remain unchanged until the start of the following quarter. Assets and liabilities in the bank's books, as well as off-balance sheet items, are classified into several categories and sub-categories in order to forecast the net interest income as accurately as possible. The breakdown of asset and liability categories into fixed and floating rate parts, as well as the calculation of the average repricing period, determines how quickly and at what intervals the interest paid or received on a given portfolio should be changed based on the macro scenarios applied to the different paths. In addition to loans denominated in foreign currency and forint categories listed under credit risk, the stress test classifies deposits into corporate and retail, and foreign currency and forint categories, while also distinguishing government securities and off-balance sheet items. Deposits are the only product whose interest rate does not change with the rate of shift in the yield curve. The rate of the shift is based on the MNB's benchmark model, which predicts the evolution of the interest rates of sight and term deposits due to its historical link to the yield curve. In addition, the stress test takes into account the change in the ratio of term and sight deposits, which is also mainly dependent on the evolution of the 3-month BUBOR. On the basis of the observation, the correlation between the two variables is positive, so the proportion of term deposits in the total deposit portfolio increases with the rise of interest rates, including under scenarios defined for the stress test. The sum of the net interest income on the different paths is determined by reference to the value reported for the last observed year, to which only the differences depending on the rate of change in interest calculated for each year are added. As a combined result of these factors, in the case of a positive interest rate shock net interest income may typically increase on the stress path improving the capital position of the institution.

Of the remaining P&L items, the net fee and commission income is calculated, both in the baseline and stress scenarios, on the basis of a regression relationship on historical data (2000-2013), also considering the special features of the Institution and the change in the macroeconomic environment. The development of operating costs is influenced by three main factors. One is the balance sheet total, which may develop in a number of ways as a result of the introduction of the dynamic balance sheet assumption. The level of wages may rise in the baseline, increasing operating costs, while on the stress path by the average level observed in the crisis it falls slightly in the first year and stagnates next. A higher operating profit adjusted for risk cost enables credit institutions to operate at an increasing level of operating expenses, while a deteriorating profit will exert a slight downward pressure on costs. Other costs and revenues included in the income statement are determined on an expert basis by eliminating one-off items occurring in the actual year on both the primary and the stress paths.

The special bank levy, extra profit tax and financial transaction levy paid by the institution are determined separately along the stress path. The special bank levy varies in proportion to the balance sheet total as determined by the stress path, while the financial transaction levy varies in proportion to net fee and

commission income, both based on the tax rate paid in the actual year. The forecast of the extra profit tax is based on the current government communication, which estimates the projected amount of the tax at the bank level. The tax payable on the profits realised by the institutions is determined on the basis of the current corporate tax rates and the local business tax and the Innovation contribution paid by the Institutions are also taken into consideration for the purposes of calculating the after-tax profit.

During the estimation phase of the stress test, individual potential management actions (e.g. cost reduction) cannot be taken into account, but corrections that have already been started or approved in a justified case at the conciliation stage may be applied to a reasonable extent.

In the three-year forecast of credit risk RWA, the model assumes that Pillar 1 risk weights at the end of the actual year used by the bank remain unchanged during both the stress and the baseline scenario. The model also handles separately the loan portfolios covered by the different methods (IRB, STA), as well as performing and non-performing exposures. The total RWA forecast values are shaped by credit risk RWA as well as market and operational risk RWA. While the market risk RWA develops in proportion to the change in the securities portfolio, the operational risk RWA develops in proportion to the change in the balance sheet total over the horizon under review.

A further, indirect effect of the dynamic balance sheet assumption is that foreign currency denominated assets and liabilities are also repriced according to the size of the FX shock applied in the stress scenario. This is important also in the sense that in a stress scenario, capital elements held in foreign currency may also be repriced, which may change the Bank's capital adequacy, in line with the extent of the repricing of foreign currency risk exposures. Accordingly, the FX stress testing may have not only indirect effect on the capital through the relevant items of the profit and loss account and the balance sheet, but may also impact it directly.

Compliance with the MREL requirements is included in the horizon of the supervisory stress test. The starting point for determining the future stock of MREL-eligible assets is the list of MREL-eligible securities submitted by the Institution. Based on the maturities and planned issuances included therein, the amount of MREL-eligible resources available under a stress path shall be determined. Should additional MREL resources be required to be issued as a result of the stress, they will be added using a single monitoring methodology and parameters, with benchmark parameters set on the basis of historical MREL issuances. In addition to the MREL compliance test, the impact of the issued MREL security on the net interest income was included in the stress test.

Furthermore, the MNB examines the evolution of the LCR rate in the three-year forecast. The dynamic balance sheet assumption gives the change in each balance sheet item, for which average outflow multipliers can be used to determine the change in net liquidity outflows and the value of the liquidity buffer.

IX.3 Pillar 2 capital guidance related to the risk of excessive leverage (P2G-LR)

In line with the expectations of EBA, as of 2023 the MNB will integrate in the ICAAP reviews the assessment of the need for supervisory capital guidance related to the risk of excessive leverage. The purpose of this is to define the level and quality of the regulatory capital that may be prescribed for the institution, as a guidance, in excess of the overall leverage ratio requirement (OLRR), similarly to the P2G methodology, which contains both econometric correlations and expert assumptions.

The rate of P2G-LR is determined by the supervisory stress test (performed by the MNB), also used for defining P2G. In this calculation, the MNB may also take into account the results of the institution's own stress test. P2G-LR does not form part of TSLRR, quantified in the ICAAP review, and it may not be regarded as a capital buffer either. By calculating P2G-LR, the MNB communicates to the management of the institution what it considers to be the minimum level of free capital to be held over the OLRR to ensure the safe operation of the institution. It is calculated in the stress test framework, also used for P2G, and it primarily quantifies the rate of the decrease in the institution's leverage ratio (T1 capital / total leverage exposure) in the stress scenario. When quantifying P2G-LR, the MNB may take into consideration – based

on single methodology – also such unquantifiable, qualitative criteria that derive from the continuous oversight experiences of the institution.

An essential difference between the P2G-LR and the P2G methodology described in Chapter V.4 is that at the latter the denominator of the ratio quantifying the stress effect includes the risk-weighted exposure, while at the first changes in the risk weights have no effect on the calculation of the exposure.

In line with the EBA SREP recommendation, the capital guidance related to the risk of excessive leverage shall be satisfied by T1 capital, as a minimum, but – in justified cases – the MNB may also prescribe the provision of capital of higher quality than that.

IX.4 Components and supervisory review of ILAAP

IX.4.1 The institution's internal assessment of liquidity and funding risks

Liquidity is the institution's ability to finance the growth of its assets and meet its maturing obligations without incurring significant and unexpected losses. Liquidity risk is embodied in long-term lending from short-term liabilities (maturity transformation carried out for the sake of profitability), mass disinvestment before maturity, the renewability of funds, changes in funding costs, environmental effects and the uncertainty of the behaviour of other market participants.

Liquidity risk in the broad sense may appear in a variety of specific forms. This includes the risk of short-term liquidity and long-term funding risk, currency mismatch between outflows and liquidity buffers, rollover risk, concentration of funds, etc. Funds may also be concentrated in terms of customer, sector, geographic region, transaction, maturity, etc. There are specific regulatory constraints on several liquidity risks, but the institution is expected to produce its own risk inventory, which should also cover liquidity risks not covered by the legislation. In addition, the institution must assess the individual risks according to its own business model and, if necessary, set internal limits that are additional to or more stringent than the legislation. The institution should take into account the fact that different types of reserves needed to cover each risk, with limited compatibility.

Institutions are required to manage liquidity risks effectively. To this end, institutions must have an adequate liquidity risk management framework in place and apply effective risk mitigation techniques which provide them with appropriate liquidity and include a buffer (additional reserves) for covering unexpected market shocks.

The following considerations should be observed regarding this framework:

- The institution should clearly determine the level of liquidity risk which it can tolerate with regard to its business model and market position.
- The executive management of the institution should elaborate a strategy (and regulation guidelines) which keeps liquidity risk under the identified critical level and provides the institution with adequate liquidity. This strategy (and guidelines) must be reviewed at least once per year. The decision on approval and modifications must be made by executive management or a competent body (ALCO), which should also submit a report to the board.
- The institution's executive management or competent body should incorporate liquidity costs, revenues and risk into internal pricing.
- The institution must have a reliable system, indicators, key risk indicators (KRI) and relating limits in place for identifying, measuring, monitoring and controlling liquidity risks. In the course of risk identification, the institution must specify the liquidity risk elements which appear in its operations. This system is expected to be capable of taking into consideration the cash flows that derive from assets, liabilities and off-balance sheet items within one year according to the contract.

- The institution must establish and apply its own early warning indicators (EWI), which allow the institution to forecast the intensifying liquidity risks.
- The institution must monitor and oversee its liquidity risk exposures and funding needs, taking into consideration all applicable legal, regulatory and operational limits that relate to the accessibility and transferability of liquid assets.
- In order to manage liquidity concentration risks, institutions are expected to gain a thorough understanding of their assets and liabilities structure. Taking into consideration the nature of their business activities, they should identify the sources of concentration risks and take adequate measures to eliminate these sources. It is important that the related analyses also consider off-balance sheet items.
- The institution's risk management system must be capable of efficiently diversifying liabilities based on funding terms and must help the diversification of funding resources. The institution should monitor funding concentrations (in particular customer-level concentrations for deposits reaching 1% of total deposits). Furthermore, the institution must assess regularly how quickly it can renew the various liabilities. It must identify and monitor factors which impact the availability and cost of various funding opportunities.
- Institutions that also hold foreign exchange accounts are expected to manage and plan liquidity per currency type. The risk management framework must assess and observe the liquidity impacts of off-balance sheet hedge deals, especially in respect of the deterioration of the forint exchange rates and the potential operating failures of swap markets.
- The distribution of work within the group is a requirement concerning the liquidity management system of group member institutions and so is the clear specification of mandates and responsibilities. The rules must set out the liabilities and obligations of the governing institution to the governed institutions along with the liquidity management responsibilities and duties delegated to governed institutions.
- The institution must actively manage its intraday liquidity positions and risks and must operate suitable payment and settlement systems for this purpose.
- The institution should assess its liquidity risks associated with the operation of the Hungarian RTGS Instant Payment System outside business hours and create an appropriate buffer (e.g. on-call duty procedures, action chain) to cover these risks in order to ensure that potential problems are identified and the contingency plan is activated as soon as possible.
- During the use of stress tests that have been elaborated with a view to regularly run institution-specific and market scenarios, the institution must identify potentially liquid assets and ensure that actual exposures remain under the threshold set by the institution itself. Institutions are expected, as a minimum, to use a one-month survival period in stress testing and are advised to pay special attention to the first one-week period. Because of the other risks identified, the MNB considers it good practice to include liquidity risks (maturities, termination options) that arise within 60 or 90 days in stress tests. It is still important to phase out stress tests until the cut-off date from which the institution is no longer able to cover net outflows with liquid assets (time-to-wall). The results of stress tests must be taken into account in liquidity management processes, in the risk management strategy and policy, in the contingency plan¹³², in the size of the necessary liquidity buffer and potentially in the capital requirement.
- The institution must have a compliant contingency plan in respect of the liquidity crisis, which specifies the steps to be performed in case of an unexpected emergency in order to maintain

¹³² Contingency Plan, Emergency or Business Continuity Plan – legislative provisions use a variety of terms.

liquidity. The timeliness of the contingency plan must be tested every year in respect of responsible parties, tasks, reporting and contact.

- Using high quality liquid assets, the institution must set up a liquidity buffer preparing for situations predicted in the stress scenarios. The institution must specify the range of assets to be taken into account as liquidity buffer and rank them by liquidity in an internal regulation. The creation of a liquidity buffer shall not substitute either careful preparation for stress situations or any other measures that serve to manage funding gaps and resources.
- The institution should put in place and maintain a suitable information system and database able to support the other processes (identification and management of risks, reporting etc.).
- Institutions should use the following measurement and modelling methods proportionate to their sizes and risks in order to quantify the various liquidity risks.
 - The modelled areas should include 1) identifying the exposures not clearly defined in legislation (e.g. defining operational deposits and the operational balance in the LCR), 2) defining the factors for which the legislation only stated the minimum and maximum applicable factors (e.g. deposits with higher outflow rates in the LCR) and back-testing compliance with legally stipulated factors, 3) carrying out the modelling that carries no consequences but is required by legislation (deposit/loan/credit facility run-off in the Maturity Matching table), 4) modelling based on factors other than legislative requirements (e.g. stress testing, recovery plan).
 - Wherever applicable, the baseline scenario and a number of different stressed scenarios should be modelled.
 - Instead of aggregate figures (general ledger, transaction type totals), the calculations should be preferably based on individual transactions.
 - Wherever applicable, the maximum outflow rather than the outflows of a 30 day fixed time window should be taken into account. Furthermore, wherever applicable, the start date of the periods under review should also be considered as variable (e.g. salary transfers at the start of the month may result in an underestimation of the maximum outflow of retail deposits if the bank compares the change consistently to the end of the preceding month)
- Institutions should be able to produce the LCR indicator on a daily basis, taking into account the principle of proportionality. Efforts should be made to ensure that the calculated value contains as few estimates as possible. If the LCR indicator of an institution is likely to be close to the legal or MNB limits, the institution is expected to calculate its indicator on a monthly or daily basis and to use this as a basis for forecasting the short- and medium-term evolution of the indicator. Institutions are also expected to run daily LCR calculations at certain intervals, even if not otherwise justified by risk considerations.
- Institutions are expected to run the supervisory liquidity stress test (FLST) at least quarterly, taking into account the proportionality principle, and to include the results of the FLST regularly in internal risk/executive reports and to report those to the MNB in quarterly textual reports (20AA, 20AB reports).

Information must be disclosed regularly by the institution to enable market players to assess its liquidity position and liquidity risk management system.

The institution can analyse the expected changes in its liquidity position by comparing the timing (maturity match) of its receivables and payables. It can perform a so-called static analysis which relies on the assumption that payables and receivables will be realized in line with the related contracts (no new loans provided and no new deposits are placed). The other option is a so-called dynamic analysis which assumes the renewal of portfolios. Analyses should cover both normal business operations and liquidity stress scenarios.

The limit system and the specific limit values are important elements of the liquidity management system. The MNB expect the institutions to specify in their liquidity risk management rules the limits and the procedures to follow in case of limit violations, and to prepare a report on limit utilisation. The latter must contain the decision of the organisational unit in charge on the elimination of possible limit violations. Limit values must be reviewed at least annually.

Compliance with the limits defined in legislation is expected at all times. This means compliance on a daily basis even if reporting regulations and decrees impose a less frequent reporting obligation; institutions are expected to comply at a time of lower stresses as well. In the event of appropriate over-performance and the indicator's stability, it is not necessary to monitor the indicator in the periods between official reports.

In case the institution takes liquidity risk or certain elements thereof into consideration under another risk type, the MNB requires the declaration of this in the relevant rules. The rules on the risk concerned must include a detailed description of the measurement/management of liquidity risks

IX.4.2 Supervisory liquidity adequacy assessment process

IX.4.2.1 Comprehensive assessment of liquidity and funding risks

The financial crises and market changes of recent years have focused considerable attention on the intraday, short and medium-term liquidity of credit institutions and the sustainability of their long-term funding capacity. The Basel III regulatory framework was essentially implemented in full in Europe by the entry into force of the NSFR in 2021 with respect to liquidity, but the regulatory environment is constantly evolving and changing. Institutions are expected to continuously follow changes in international and national legislation and recommendations and incorporate them into their risk management systems. Institutions are expected to interpret "legislative changes" broadly, e.g. changes in large exposures regulations or even in the monetary policy toolbox may have an impact on liquidity. The MNB will focus on the application of recent regulatory changes in banking and their impact.

From the perspective of supervisory authorities, the monitoring of liquidity risks play a particularly important role in the analysis of financial stability risks at the microprudential and macroprudential level. The primary reason for this is the fact that the liquidity shocks sustained by individual financial institutions may spill over, through various channels of contagion, not only to another credit institution, but also to the financial system as a whole, undermining its stability. These external effects, as well as excessive reliance on certain markets, resource types and counterparties by similar institutions' funding and risk management profiles, generate additional risks that justify additional requirements compared to individual institutional risk management. (For example, it does not necessarily pose risk buying government securities from unstable funds at the individual level, but withdrawal of funds from several such institutions, the selling pressure on government securities may already cause systemic disruptions.)

The basic activity of institutions is focused on cash flow transformation as a result of which they are inherently exposed to liquidity and financing risks. For this reason, as a rule, the MNB regards liquidity and financing risks as material risks, which are to be mandatorily managed under Pillar 2. Furthermore, the MNB expects institutions to continuously diversifying the liability portfolio and to actively manage their dependence on funding.

The MNB expects institutions to be fully aware of the documents referred to above and of essential regulatory changes as well as to adjust themselves to them particularly with regard to the Basel III liquidity indicators.

As part of the supervisory review process, the MNB assesses the institution's inherent liquidity and funding risks, as well as how they are managed and addressed. It examines the extent to which the institution has assessed the risk factors relevant to liquidity and how successfully it has addressed the related risk exposures.

Upon evaluating the inherent liquidity risk, the MNB shall

- assess the institution's short-term and medium-term liquidity risk. In this context, it reviews the institution's maturity liquidity balance, including contractual maturity gaps and their concentration, broken down by currency, the going concern liquidity balance and gaps; moreover, it examines money market dependency, with special regard to short-term parent bank funding;
- reviews the institution's own stress test, uncovered liquidity, drawdown-related liquidity risk and survival period (time to wall survival analyses);
- evaluates the results of the supervisory liquidity stress test¹³³;
- assess the level of excess liquidity; the quantity and quality of the liquidity buffer and the counterbalancing capacity, including transferable assets and transferable assets that are of extremely high / high liquidity and credit quality, the related market liquidity risks; and the institution's liquidity coverage ratio (LCR) with the relevant calculations and their analysis.

Upon evaluating the inherent funding risk, the MNB shall

- review the funding profile of the institution along with funding structure and concentration and its development over time, in consideration of the size, share and structure of parent bank funding and the possibilities of accessing funds from money and capital markets,
- assess the stability and sustainability of the institution's funding and FX maturity transformation with the FFAR (DMM)¹³⁴ and NSFR¹³⁵ indicators,
- evaluate the financing plan along with the related structural gaps based on the business model of the institution.

With a view to managing and addressing liquidity and funding risks, the MNB shall

- review, based on the business model available, the liquidity strategy and risk appetite of the institution together with the relevant regulatory and internal limits and targets;
- judge the management of intraday liquidity risks, in the context of which it reviews the management of daily liquidity positions broken down by foreign currency, the execution of IG1¹³⁶, IG2 and Instant Payment System payment transactions together with the related coverage, as well as the process of meeting the central bank requirement in respect of mandatory reserves;

¹³³ In accordance with EU standards (Article 100 of the CRD), supervisory authorities are required to run various stress tests on a regular basis. Supervisory liquidity stress tests enable the MNB to judge the liquidity risk of individual institutions under uniform circumstances across various time horizons and stress scenarios, to obtain additional information compared to the institutions' own internal stress tests, to identify and measure special liquidity risk areas and to receive assistance for the assessment of the general and relative (as compared to other institutions) liquidity risks of individual institutions.

¹³⁴ foreign exchange funding adequacy ratio

¹³⁵ net stable funding ratio

¹³⁶ Intergiro

- assess the institution’s risk management processes and control points, the adequacy of compliance with regulatory limits, the institution’s internal indicator and limit system, key indicators, early warning indicators, internal and external reports;
- examine the risk management processes: 1) monitoring within the month, 2) indicator forecasting (e.g. loan disbursements, liaising with holders of large deposits), 3) proven and fast mechanisms to increase the buffer (e.g. credit facility from parent bank)¹³⁷,
- evaluate the Liquidity Contingency Plan (LCP).

IX.4.2.2 Additional Requirements due to risk management deficiencies

Institutions typically manage liquidity and funding risks through processes, limits, diversification of their liabilities and liquidity buffers. If weaknesses in risk management systems, procedures, indicators and limits result in significant liquidity and funding risks, the MNB may, subject to the principle of proportionality, require additional liquidity to be held in order to ensure adequate liquidity coverage.

For the purposes of determining specific liquidity requirements, pursuant to Section 181 of the Credit Institutions Act, the MNB must take into account:

- the business model of the credit institution,
- the arrangements, processes and mechanisms referred to in Section 108(5)(f) of the Credit Institutions Act, and their adequacy,
- the outcome of the supervisory review and evaluation, and
- systemic liquidity risks threatening Hungary

In respect of the level of additional liquidity, the MNB may prescribe:

- compliance with the minimum level of freely available liquid assets of adequate quantity and quality (composition),
- compliance with liquidity indicators above the regulatory limit,
- a level of balancing capacity that ensures a prescribed minimum survival period,
- the level of maximum cash outflow (MCO¹³⁸) for a specific period,
- a minimum liquid asset quantity best fitting the institution’s business model, aligned to the liquidity benchmark of the supervisory authority.

Since the business models and liquidity risk profiles of institutions differ from one another, the MNB should always apply the best benchmarks available, or it may revalue the benchmark used based on the characteristics of the business model.

IX.4.2.3 Key aspects of calculating Pillar 1 requirements

Risk management or reporting deficiencies, identified based on supervisory experience, that led to the underestimation of risks in several institutions. These topics will be highlighted in the following reviews. By publishing them (Annex 10, “Priority Areas of the ILAAP Review”), the Supervisory Authority helps the institutions to interpret legal requirements accurately. Institutions are expected to review their practices for these portfolios.

¹³⁷ The MNB believes that, as a general rule, 20 percent over-performance is necessary to qualify as ‘compliance at all times’ with the requirements. Deviations from the above are nevertheless possible; with the MFAR, for example, an accurately predictable numerator (mortgage bonds and refinancing loans) and a robust denominator (mortgage loans) result in a stable indicator, where a smaller buffer is also sufficient. If the buffer is below 20 percent, the MNB will prioritise the inspection of the aforementioned risk management processes.

¹³⁸ MCO = maximum cash outflow

IX.4.2.4 *Portfolios that are risky in terms of liquidity*

Although the institution is expected to produce its own risk list and manage the risks identified, the Supervisory Authority will, on the basis of its experience, compile a comprehensive inventory of the risks arising in multiple institutions. The list may vary depending on market trends, so the supervisor reviews this annually and publishes it in an appendix to the Manual (Appendix 11: Information on unstable funds that are prioritised in the context of the supervisory review process and on the related liquidity requirements). In order to disseminate good practices and ensure a level playing field, the Supervisory Authority will provide methodological assistance regarding the level of additional buffers an institution is expected to create for specific indicators. Institutions are expected to assess these and, where their own risk assessment indicates, to set buffers at a level higher than the buffers required by law or this Manual.

IX.4.2.5 *Calculation and compliance with Pillar 2 liquidity requirements*

The appendix on unstable funds indicates the indicator relative to which the buffer required for the management of specific risks represents an add-on, the methodology of nominal determination, and the form of compliance. There is a significant potential of volatility due to the nature of the liquidity risk. For example, the inflow of unstable funds increases the risk, which will subsequently decrease following the outflow of such funds. Therefore, it is not feasible for the Supervisory Authority to establish the additional requirements from time to time at specific amounts. Consequently, in the case of rapidly changing risks, the Supervisory Authority will only provide the methodology, and the institution will be obliged to adjust its reserves to the changing liquidity risks.

Depending on the nature of the risk, the determination may:

- concern a variety of indicators¹³⁹, including risks that are not captured;
- be quantified as a nominal or percentage value, or a prescribed higher level;
- relate to a pre-established and regularly reviewed time horizon, or based on methodology or varied on a monthly basis.

The Supervisory Authority monitors the fulfilment of requirements regarding additional own funds primarily through ILAAP reviews, both in terms of determination and actual compliance. The Supervisory Authority seeks to formulate additional requirements in a form verifiable through ongoing supervision.

In the current regular reporting¹⁴⁰, only additional requirements related to LCR regulation are reported in Table C_76.00.

Institutions are expected to reflect the additional requirements in their internal risk management systems. To facilitate supervisory communication, the way in which the additional requirements are taken into account is set out in Annex 11 (Information on unstable funds that are prioritised in the context of the supervisory review process and on the related liquidity requirements).

IX.5 Business model analysis

As part of the SREP, the MNB can evaluate the strategy and business model of supervised institutions in parallel with the ICAAP supervisory review process¹⁴¹. The purpose of the regular business model analysis is to assess business and strategic risks and to determine and judge the following:

- the viability of the institution's current business model on the basis of the institution's ability to generate an acceptable income over the next 12 months; and

¹³⁹ While most of the additional capital requirements determined under ICAAP concern equity and are additive, for the purposes of ILAAP this option is limited, e.g. it is not possible for LCR capital requirements to be combined with those for FFAR (DMM). In addition, a risk can be managed in several ways, e.g. through the assignment of a larger outflow in LCR, and a lower ASF multiplier in NSFR.

¹⁴⁰ Effective from June 2021.

¹⁴¹ The business model is the set of methods, tools, and structures through which the institution operates, generates profits and increases.

- the sustainability of the institution's strategy on the basis of the institution's ability to generate an acceptable income over a period of at least 3 years, in the light of an assessment of the institution's strategic plans and financial forecasts.

Conducting a business model analysis allows the MNB to refine its supervisory strategy and priorities, and to detect risks at an early stage and take the necessary steps. The results of the business model analysis are used by the MNB to evaluate all other elements of the SREP assessment and to support those evaluations. Based on the results of the business model analysis, in justified cases – if the viability of the business model of the institution or the sustainability of its strategy is not or not adequately supported – the MNB may deem it necessary to impose additional capital requirements and other requirements related to develop business model, manage business and strategic risks may also need to be defined.

In the whole process of business model analysis, the MNB primarily seeks answers to four essential questions:

1. How is the institution generating profits at the moment?
2. What are the main factors influencing the profit?
3. How is the institution planning to make a profit in the future?
4. How will the main factors affecting profitability change and what are the drivers of change?

The process of business model analysis consists of the following seven major steps.

(1) Business environment assessment. The business environment is a key factor for the implementation of the institutions' strategy. During the evaluation, the MNB focuses primarily on the economic environment, the regulatory environment, the competitive situation, and market trends affecting the operation of the institution.

The main focus for the MNB in this respect is the identification and analysis of key macroeconomic variables affecting operations currently or in the future, the competitive environment and its expected development in view of the activities of the members of the peer group, and market trends with potential impact on the performance and profitability of the institution (regulatory, technical, technological, social, demographic, etc. trends).

(2) Quantitative analysis of the business model. The MNB carries out an analysis of institutions' main financial and accounting statements, including an assessment of their financial performance relative to their announced and observed risk appetite.

In doing so, the MNB assesses, in particular, the institution's income statement, balance sheet, its structure, the concentrations shown therein, the regulatory capital, and the trends in their changes, the underlying trends, the risk appetite of the institution, the related limits and the appropriateness of limit management.

(3) Qualitative analysis of the business model. The MNB examines the factors affecting the effective functioning of institutions and the main external and internal dependencies, as well as the quality of the relationship with customers, business counterparties, suppliers, and areas where the institution has a competitive advantage over similar institutions.

(4) Evaluation of the strategy and financial plans. During the assessment of institutions' strategic plan and financial forecasts, the MNB reviews the assumptions used, and forms a comprehensive view about the feasibility and riskiness of the business model.

In particular, the MNB assesses especially the overall strategy of the institution, the main quantitative and qualitative corporate governance objectives, examines financial performance forecasts, identifies the success factors for the implementation of the strategic and financial plan, examines the realism and

consistency of the assumptions behind the institution's strategy and forecasts, and the institution's ability to implement on the basis of how the management has previously adapted to the strategy and forecasts, and how the complexity and aspirations of the developed strategy relate to the current business model of the institution.

(5) Creating a forward-looking capital plan: As a first step, the MNB creates a forecast of the revenues and costs of an institution using the databases and sets of detailed records about the institution. The forecast of the baseline scenario is produced in line with the expected changes in the macroeconomic and legislative environment and also takes into account the expected results of key management actions on both the cost and the revenue sides. In the second step of its calculation, the MNB produces the institution's capital plan in the light of its forecasted profitability; and then compares the capital plan to the level of, and expected changes in, the capital requirement. In this analysis the MNB always complements the outcomes of the quantitative model with the qualitative information obtained from analysing the bank's strategy; among other things, it analyses in detail the capital impacts of the dividends policy, IT investment and management actions (branch and labour rationalisation, NPL disposal etc.). It also looks at bank-specific factors that could not be identified by an analysis of historical time series. These include especially, but not exclusively, an assessment of the impact of portfolio purchases on capital and the impact of mergers and acquisitions on profit, as well as compliance with MREL.

(6) Establishment of the MNB's view. Based on the analysis of the business model implemented, on the evaluation of the forward-looking strategy and financial plans, and on the Central Bank's own expectations and forecasts, the MNB forms a view on the feasibility of the institution's future business model, the sustainability of its strategy, and its vulnerabilities (including in particular poor expected financial performance, reliance on an unrealistic strategy, excessive concentrations or volatility, excessive risk-taking, funding structure concerns, and/or significant external threats).

In assessing the viability of the business model, the MNB focuses primarily on the institution's ability to generate an acceptable income over the next 12 months, taking into account the factors mentioned above, and whether, in view of the current and the forecast capital requirement, the institution will be able to maintain the level of capital required for stable operations without raising additional capital externally. In particular, the MNB examines whether the business model generates a return above the cost of capital on the basis of a comparison of the return on equity and the cost of capital, whether the funding and funding structure of the institution are appropriate for the business model and strategy, and whether the institution's business model and strategy relies, in general or in terms of individual risks, on appropriate risk appetite in order to achieve acceptable returns.

In terms of assessing the sustainability of the strategy, the MNB primarily examines whether the institution is able to generate reasonable returns on a future period of at least 3 years, based on plans and forecasts, including the supervisory assessment of the business environment. In that context, the MNB assesses in particular the extent to which the institution's assumptions and financial performance forecasts may be considered realistic, and the MNB will form a view on the effects of the business environment on the institution's financial performance forecasts. In addition, the MNB assesses the risk level of the institution's strategy (complexity and objectives of the strategy relative to the current business model) and the consequent probability of success based on the institution's ability to implement it.

Based on the above assessment, the MNB develops a comprehensive opinion on the viability of the business model and the sustainability of the strategy.

(7) Determination of supervisory measures. Depending on the objective and focus of the investigation and the result of the business model analysis, the MNB determines, as required, the supervisory measures concerning the management of the risks identified.

X. List of documents

In the course of the supervisory review, institutions are required to present the ICAAP in place. The official ICAAP and ILAAP documentation submitted to the MNB must always include the presentation of implemented methods that have been approved by top management.

In order to enable an accurate assessment, the data in the submitted documentation must always reflect the latest information. Otherwise (i.e. if it has no access to updated figures and methodologies), the MNB will have no choice but to apply additional conservatism when forming an opinion on the capital and liquidity adequacy of the institution.

This chapter only provides suggestions regarding the chapters to be considered for inclusion in the submission. Both the format and the contents of the document are for the institution to decide on. However, when compiling the documentation, institutions must bear in mind that they will have to present and defend their capital requirement calculation methods and results, as well as the system in place to assure adequate liquidity. It is a supervisory expectation regarding the submitted document that it cites all arguments for defending the calculations of the institution.

XI. Summary

- Presentation of institution-specific and group-level risk strategy as a separate document (the documentation of the ICAAP and the ILAAP must sufficiently present the organisational, governance and supervisory functions of risk management along with the related internal audit mechanisms).
- Brief presentation of the major activities/business lines of the institution/group. In case of groups, it should be specified which group members are covered by the ICAAP and the ILAAP.
- Overview of the applied internal capital calculation method(s) and any changes thereof.
- Documentation of a use test. The institution must present the areas where it uses the results of the ICAAP. This presentation can impact substantially the supervisory judgment of the reliability of capital requirement calculations. The relation between ICAAP results and available capital.
- Evaluation of the compliance of the institution's risk management methods.
- Presentation of the institution's internal self-assessment (GAP analysis) and the resulting action plans, presentation of the results of annual ICAAP and ILAAP reviews.
- Brief assessment of the institution's material risks, presentation of changes since the previous assessment.
- Time of the capital and liquidity adequacy assessment exercise, specification of group members covered, name of persons conducting and approving the assessment.

XI.1 Presentation of actual and target capital position

Capital plan in detail: capital requirement-capital expenditure, internal/external resources, dividend policy.

XI.2 Detailed presentation of capital adequacy calculations

- documentation of methodologies established for identifying and managing risks (including other risks);
- detailed presentation of calculation methods and results, specification of confidence level and conditions for the calculation of economic capital requirements;
- date and time horizon of the calculation;
- a map of risks (including other risks), definition of risks;
- presentation of material risks that have been considered in the ICAAP, comparison to Pillar 1 calculation results where necessary, comparison to the institution's risk appetite (limit) concerning a specific risk, If Pillar 1 and Pillar 2 capital requirements are different, differences must be reconciled in a detailed, itemised manner;
- risk mitigants;
- presentation of methodology and assumptions (risk management approach);
- consideration of other risks in the internal capital allocation process;
- presentation of the findings and results of stress tests and scenario analyses;
- presentation of the aggregation procedure, the correlation and diversification effects considered including an explanation thereto;
- assessment of the compliance of the institution's risk management methods and processes (self-assessment: weaknesses, deficiencies, action plans).

As a requirement concerning the submitted documentation, the general methodology section (theory, models, etc.) and the specific numeric results (capital figures, model parameters etc.) must not be separated for such separation would cause difficulties in the assessment of quantitative results and the examination of capital adequacy. The document must present in detail the manner in which the capital requirement of a specific risk type was calculated. The MNB is only able to evaluate the relevant risk capital requirement in the light of the applied models. Without being fully aware of these models, the MNB has no choice but to have reservations regarding the presented numeric results. In case the institution covers a certain risk type by way of processes (and not capital), it is required to support this decision with convincing arguments (e.g. strategy and reputation risks may belong here).

XI.3 The integration of the ICAAP methodology into processes

- demonstration and assessment of the level of integration of the ICAAP into decision-making processes,
- outcome of the ICAAP review, main findings,
- planned and current changes to the ICAAP.

The MNB reviews the ICAAP in the context of risk cycles, in accordance with and under the framework of its audit plan. Therefore, underlying documentation should only be submitted at the request of the MNB, unless the ICAAP mechanisms have been subject to material changes. If so, the MNB must be informed of the major changes.

XI.4 Description of the Internal Liquidity Adequacy Assessment Process

For the evaluation of the ILAAP, institutions must at least submit the following documents:

- current liquidity strategy highlighting the changes compared to the previous liquidity strategies;

- the liquidity plan of the year preceding the review, backtested, and the current liquidity plan and current liquidity crisis plan (LCP);
- liquidity risk reports (quarterly and monthly reports for the past 12-month period, weekly and daily reports for the month under review);
- liquidity stress tests (assumptions, results);
- related effective internal liquidity regulations and regulations on internal funds transfer pricing;
- values and limit values of the early warning indicators during the past one-year period, description of responses to any actual warning;
- models, assumptions, segmentations and time series applied in quantifying deposit outflows;
- internal audit report relating to the liquidity risk;
- full list of limits indicating the changes made during the year preceding the review, and the data of the limit utilisation measurements in accordance with their frequency for the past one year preceding the review date, in an Excel table;
- explanation of the calculation of the Liquidity Coverage Ratio (LCR) and the Net Stable Funding Ratio (NSFR) pertaining to the reference date of the audit;
- list of group financing transactions.

XII. Annexes

Annex 1: Supervisory responses to the revealed deficiencies at small institutions

Annex 4: Information on risky portfolios that are prioritised in the context of the supervisory review process and on the related additional own funds required (available separately on the MNB website)

Annex 5: Data request for the review of risky portfolios (available separately on the MNB website)

Annex 6: Internal model to be applied for calculating foreign exchange rate risk (available separately on the MNB's website)

Annex 7: SREP Review Sheet for credit institutions (available separately on the MNB website)

Annex 10: Priority Areas of the ILAAP Review (available separately on the MNB website)

Annex 11: Information on unstable funds that are prioritised in the context of the supervisory review process and on the related liquidity requirements (available separately on the MNB website)

Annex 12: Request for data to check for unstable funds (available separately on the MNB website)

Annex 13: List of operational risk KRI's and scenarios

Annex 14: Example calculations for green corporate and municipal preferential capital requirement

Annex 1: Supervisory responses to the revealed deficiencies at small institutions

Revealed deficiency, problem	Supervisory measure	Problem category	Primary source
Operation under conditions with above average risks, the negative impacts of macroeconomic cycles	Request for the diversification of the activity	II.	Data supply, MNB investigation
High geographic concentration risk	Closer attention to risk management	III.	Questionnaire, investigation, s
The institution's strategy is not well-founded	Request for changing the strategy	II.	MNB invest supplies
The owners' dividend policy does not provide for the necessary internal capital increase	Call the owner's attention to the potential problems	II.	Data supply, q
Deterioration of trust (reputation risk)	Closer supervisory monitoring of the activity	I.	MNB investig information, q
Lack or weakness of ownership control	Request for stronger owner's control	III.	Data sup investigation
Deficiencies in the capacities or expertise of executives	Request for the elimination of deficiencies, order to conduct training, further training	I.	Investigations other organisat prudential disc
Problems related to the qualification and professional experience of executives out of the scope of the MNB	Request for professional further training	III.	Questionnaire, investigations
Non-compliance with earlier supervisory resolutions	Obligation to comply with supervisory resolutions, penalty	I.	MNB questionnaire
Non-compliance with MNB recommendations and methodology manuals	Reminder of compliance with recommendations and manuals	II.	MNB investiga
Disregarding other MNB notifications (e.g. management letters, CEO circulars)	Closer monitoring of MNB notifications	II.	MNB questionnaire
The MNB or any other external investigation reveals management, risk management or internal control problems	Obligation to rectify risk management and control deficiencies	I.	Investigation d MNB and othe
Significant deficiencies in the market risk management and control systems	Obligation to rectify risk management and control deficiencies	I.	MNB invest supply
The services and products provided by the institution are non-marketable and do not adjust to market demands	Request for the modification of the product and service range and the business model	III.	Investigation d MNB and othe data supply
Performance of activities not typical for small institutions	Closer supervisory monitoring of the activity	III.	Questionnaire, investigation, c

New types of activities, markets	Closer supervisory monitoring of new activities and markets	III.	Data supply, investigation, questionnaire
Falling market share/growth rate below the sector average	Request for the modification of the business model and business policy	III.	MNB questionnaire, HFSA analyses
The institution's client structure is questionable, it is a highly concentrated sector due to products or debtor age.	Request for the modification of the client structure	II.	Investigation of MNB and other data supply
The MNB or any other external investigation reveals an unauthorised activity	Obligation to dispense with unauthorised activities	II.	Investigation of MNB and other data supply
The institution employs unacceptable tools in its acquisition, marketing and disclosure policies.	Request for changing acquisition, marketing and disclosure policies.	II.	Investigation of MNB and other data supply
Asset quality is in the lowest 10–20% range compared to similar credit institutions	Request for the reduction of credit risks	III.	Data supply
Asset quality is in the bottom 10% compared to similar credit institutions	Request for the reduction of credit risks	II.	Data supply
Substantial credit losses in the past three years exceeding 5% of the equity.	Investigating the cases of credit losses	II.	MNB investigation, data supply, questionnaire
The rate of suspended interests is at least 30% higher than the sector average.	Investigating the cases of credit losses	III.	Data supply
Significant deficiencies in the credit risk management and control systems	Obligation to rectify risk management and control deficiencies	I.	MNB investigation received from other organisations
Clients representing higher credit risk than average based on their ratings and industry risks	Order for more detailed reports and stricter risk management procedures	III.	Questionnaire, investigation
Introduction of new loan products, including especially unusual and new products in the Hungarian market.	Monitoring of new products	III.	Questionnaire, investigation
The credit institution operates with ratios close to the statutory prudential limits (with less than 10% deviations)	Closer monitoring of ratios, prudential limits	III.	Data supply
High country risk	Closer supervisory monitoring of the activity	Additional own funds requirements imposed following a specific methodology	Data supply

Substantial losses in the last three years arising from market risks	Investigating the causes of market risk losses	II.	Questionnaire
Products with exceptional conditions	Call for a review of conditions	III.	MNB questionnaire
Interest rate sensitivity analysis indicates high risk	Request for the improvement of interest rate risk management techniques	Additional own funds requirements imposed following a specific methodology	MNB investment supply
Frequent liquidity problems, no access to additional capital, GAP analysis indicates high maturity mismatch.	Request for developing the liquidity risk management techniques	II.	Questionnaire, MNB analysis
Substantial losses in the last three years arising from operational risks	Investigation of the source of losses arising from operational risks	II.	Questionnaire
Outsourcing of significant activities, insufficient attention is paid to the entities performing outsourced activities.	Request for closer attention to the outsourced activity	III.	Data supply, questionnaire
Documentation and administrative problems (not only operational risk related problems)	Request for the elimination of documentation and administrative deficiencies	II.	MNB investment complaints, data
IT deficiencies	Request for the elimination of IT deficiencies	II.	On-site investigations, complaints
The ICAAP value is higher than under Pillar 1	Additional own funds requirements imposed in accordance with the ICAAP value and the result of the MNB's risk assessment	I.	Data supply, questionnaire
Decline in own funds compared to the end of the previous year in excess of 10%.	Obligation for the formulation of a capital plan	II.	Data supply

A list of the relevant key risk indicators recommended by the MNB for consideration

- Number of unfilled positions/lead times
- Staff turnover rate
- Number/average of days on sickness leave
- Number/total value of external fraud cases prevented/occurred
- Number/ratio of money laundering alerts
- Number of internal fraud cases
- Number of complaints received
- Number/total value of lawsuits
- Number/total value of fines paid
- IT systems availability
- Number/ratio of outdated IT systems
- Number of notifications to HelpDesk
- Number of BCP incidents
- Number of data protection incidents
- Number of failures to meet deadlines (external and/or internal)
- Number/proportion of complaints answered past the deadline
- Workload indicators (by area)
- Number/proportion of faulty transactions
- Number/proportion of incomplete credit folders
- Number/proportion of unenforceable collaterals
- Lead times of retail/corporate loans
- Number/proportion of expired audit points
- Number/proportion of unreviewed regulations

A list of the scenarios recommended by the MNB for consideration

- Epidemics
- Key staff leaving
- High fines imposed by authorities
- Improper product/model/business practice
- Action for damages (customer/partner/employee)
- Lending fraud
- Fraud committed with transaction products
- Unauthorised treasury activity
- IT security incident (hacker attack/virus attack/phishing)
- Money laundering and terrorist financing
- Outage of key IT system(s) or public utilities
- Improper IT development and/or project
- Natural disasters
- War and terror attack
- High-value banking transaction executed by incorrectly
- Failure to observe deadlines and/or documentation requirements
- Non-compliant performance by suppliers

Appendix 1. Determination of the capital requirement for interest rate risk in the banking book in the MNB benchmark model

The capital requirement for interest rate risk in the banking book is obtained by summing up the average value and standard deviation of the capital requirements determined, using the same methodology, periodically at the end of each month of the year preceding the reference date of the calculation.

$$TSz_{eff} = TSz_{average} + TSz_{standard\ deviation} \quad (1)$$

$$TSz_{average} = \sum_{j=0}^{n-1} \frac{TSz_{t-j}}{n} \quad (2)$$

$$TSz_{standard\ deviation} = \sqrt{\sum_{j=0}^{n-1} \frac{(TSz_{t-j} - TSz_{average})^2}{n}} \quad (3)$$

where: TSz(eff) = effective capital requirement,

TSz(average) = average capital requirement at time 't',

TSz(standard deviation) = standard deviation of capital requirements at time 't',

TSz_t = capital requirement at time 't', at the end of the respective period (month),

n = 12, the number of periods (months).

The purpose of taking standard deviation into account in determining the capital requirement is to ensure a preference for a capital requirement that is stable over time and to distinguish between capital requirements of the same average but with different degrees of standard deviation, in favour of the capital requirement with a lower degree of standard deviation.

The interest rate sensitivity defined at the end of a given period arises from the interest rate risk profile of the banking book – most notably from the repricing and duration gaps – and is determined jointly considering two key indicators, i.e. the sensitivity of income and economic value of equity, as a weighted arithmetic mean, where in addition to the traditionally used net interest income the measurement of income sensitivity includes other factors as well (see later).

$$TSz_t = w * \Delta netINC_t + (1 - w) * \Delta EVE_t \quad (4)$$

where: TSz(t) = capital requirement at time 't', at the end of the period (month),

w = weight of income sensitivity,

$\Delta netINC_t$ = total *net* income sensitivity at time 't',

ΔEVE_t = total sensitivity of economic value of equity at time 't'.

The total *net* income sensitivity ($\Delta netINC$) included in the formula (4) used for the calculation of the capital requirement at the end of the period is calculated from the total income sensitivity (ΔINC) in such a way that the total income sensitivity is reduced by the part of the net interest income that is likely to contribute to the capital increase, i.e. it can be interpreted as a potential capital increment estimated from net interest income.

$$\Delta netINC_t = \max(\Delta INC_t - net\ NII_t; 0) \quad (5)$$

The total economic value of equity and income sensitivity is the sum of the absolute values of the sensitivities calculated separately by currencies.

$$\Delta EVE_t = \sum_{curr=1}^n |\Delta EVE_{curr,t}| \quad (6a)$$

$$\Delta INC_t = \sum_{curr=1}^n |\Delta INC_{curr,t}| \quad (6b)$$

where 'n' denotes the number of currencies.

The change in the income and the economic value of equity for each currency¹⁴² is the worst value (the negative amount with the highest absolute value) calculated according to different scenarios for that given currency, up to zero.

$$\Delta EVE_{curr,t} = \min(\Delta EVE_{c1,t}; \Delta EVE_{c2,t}; \dots; \Delta EVE_{cn,t}; 0) \quad (7a)$$

$$\Delta INC_{curr,t} = \min(\Delta INC_{c1,t}; \Delta INC_{c2,t}; \dots; \Delta INC_{cn,t}; 0) \quad (7b)$$

where: $\Delta EVE_{cn,t}$ = sensitivity of economic value of equity for a given 'c' currency measured in a given 'n' scenario, at time 't',

$\Delta INC_{cn,t}$ = income sensitivity of a given 'c' currency measured in a given 'n' scenario, at time 't'.

The income sensitivity for the respective currency under the given scenario, calculated at time 't' ($\Delta INC_{cn,t}$) comprises two elements: in addition to the net interest income, it also includes the change in the value of the banking book positions measured at fair value (securities, interest rate derivatives¹⁴³, receivables and any other positions measured at fair value potentially taken into consideration) with the proviso the hedged and hedging transactions included in the hedge accounting are not to be taken into consideration in these positions. In the case of ΔINC , the result for a given scenario thus reflects the combined effect (sum) of the NII and the FV component, the latter of which is calculated for transactions not included in hedge accounting. In the calculation of FV sensitivities, for each instrument (bond, IRS, loan, other), only cash flows beyond one calendar year after the calculation are to be taken into account.

$$\Delta INC_{cn,t} = \Delta NII_{cn,t} + \Delta FV_{cn,t} \quad (8)$$

$$\Delta FV_{cn,t} = \Delta Bond_{cn,t} + \Delta IRS_{cn,t} + \Delta Rec_{cn,t} + \Delta Other_{cn,t} \quad (9)$$

where: $\Delta NII_{cn,t}$ = net interest income sensitivity of a given 'c' currency measured in a given 'n' scenario, at time 't'

$\Delta FV_{cn,t}$ = fair value sensitivity of a given 'c' currency measured in a given 'n' scenario, net of the items included in hedge accounting, at time 't'

$\Delta Bond_{cn,t}$ = fair value sensitivity of securities in currency 'c' measured in scenario 'n', net of the items included in hedge accounting, at time 't'

$\Delta IRS_{cn,t}$ = fair value sensitivity of the interest rate derivatives in currency 'c' measured in a given 'n' scenario (also including the CIRS and FRA instruments), net of the items included in hedge accounting, at time 't'

$\Delta Rec_{cn,t}$ = fair value sensitivity of receivables in currency 'c' measured in scenario 'n', net of the items included in hedge accounting, at time 't'

¹⁴² The scenarios used and the methods applied to determine them are set out in Appendix 2.

¹⁴³ IRS, CIRS, FRA transactions

$\Delta\text{Other}_{cn,t}$ = fair value sensitivity of all other instruments not mentioned above and measured at fair value in currency 'c' measured in a given scenario 'n', net of the items included in hedge accounting, at time 't'

The valuation change of positions measured at fair value (ΔFV - fair value sensitivity) is obtained as the sum of the present value changes relative to the baseline scenario, occurring as a result of various interest rate shocks. In the calculation of FV sensitivity, cash flows from transactions that occur within one calendar year of the calculation date shall not be taken into account.

The net interest income (netNII) included in the calculation of the net income sensitivity (see formula 5) is calculated as the difference of the interest income (line code: 1) and interest expenditures (line code: 2) reported in the FINREP income statement (or, in the absence of that, in the income statement submitted among the individual supervisory reports)¹⁴⁴ from one year of data preceding the calculation as the arithmetic mean of the annualised quarterly data (obtained by projecting the year-to-date cumulative income to the full year) reduced by 2.32 times the dispersion measure calculated from the same data, where the dispersion is obtained as the average calculated from the absolute value of the difference between the one-year moving averages and the actual observed quarterly data. The amount of potential capital increment (net NII) is 25% of the net interest income thus estimated, 0 in the case of a negative result.

$$\text{net NII}_t = \text{Max}((\text{NII}_{\text{avg},t} - \alpha * \delta\text{NII}_t) * 0.25, 0) \quad (10)$$

$$\text{NII}_{\text{avg},t} = \sum_{j=0}^{n-1} \frac{\text{NII}_{t-j}}{n} \quad (11)$$

$$\delta\text{NII}_t = \sum_{j=0}^{n-1} \frac{|\text{NII}_{t-j} - \text{NII}_{\text{avg},t-j}|}{n} \quad (12)$$

where: NII = net interest income reported in FINREP (or in the absence of it in the individual supervisory) data supply

$\alpha = 2.32$, the multiplier of normal distribution belonging to a confidence level of 99%

$n = 4$

Parameter 'w', specifying the weight of net income sensitivity, used in the calculation of the period-end capital requirement (formula 4) is derived from the income and economic value of equity sensitivity indicators themselves. The conceptual background of the calculation of the weight is the assumption that it is primarily the risk measured in the short run (within 1 year) that should be covered by capital as long as the degree of the risk measured in the longer run is less than the short-term risk. Accordingly, the weight of the indicator measuring short-term risks (ΔnetINC) is 100% until the value of the long-term indicator (ΔEVE) exceeds it. If the economic value of equity sensitivity exceeds the income sensitivity, the weight to be applied is determined by the extent of the two sensitivity indicators compared to each other, subject to the limitation that weight 'w' shall not be less than 20%.¹⁴⁵

¹⁴⁴ Data supplies of ID code F_02.00 and SF02. For the calculation of end-of-month capital requirements, the latest available end-of-quarter interest income and interest expense data may be used in an unchanged amount for three months.

¹⁴⁵ A floor of 20% is applied to weight 'w', thus when the income sensitivity is zero, the capital requirement will be 80% of the economic value of equity sensitivity.

$$w = \begin{cases} 1 & , \text{if } \Delta netINC / \Delta EVE \geq 1 \\ \text{Max} \left(\frac{\Delta netINC / \Delta EVE}{1 + (\Delta netINC / \Delta EVE)}; 0.2 \right) & , \text{if } \Delta netINC / \Delta EVE < 1 \end{cases} \quad (13)$$

The aggregated dEVE and dINC result for the HUF, EUR and USD currencies can be reduced by the percentage value of the risk mitigating effect resulting from the correlation between the movements of the yield curves in the three currencies. The higher absolute value of the end-of-period capital requirement quantified on the basis of the sensitivity indicators obtained by taking diversification into account (dEVE_{divers.} and dINC_{divers.}) – and with other parameters, such as netNII, or the dEVE and dINC results obtained for other currencies remaining unchanged – (TSz_{t divers.}) and 85% of the end-of-period capital requirement without diversification effect (TSz_{t without divers.}) shall be considered as the end-of-period capital requirement to be used in formulae (2) and (3):

$$TSz_t = \text{max}(TSz_{t \text{ divers.}}; 0.85 * TSz_{t \text{ without divers.}}) \quad (14)$$

Appendix 2. Interest rate scenarios used to determine the capital requirement for interest rate risk in the MNB benchmark model

The intensities of interest rate shock used in the benchmark model interest rate scenarios are consistent with the shock rates as revised by the BCBS in 2024¹⁴⁶, instead of the rates in the previous Basel and EBA recommendations, and follow the methodology described therein for determining shocks for those currencies (see HUF) where the BCBS document does not quantify the shock rate. On this basis, the shock rates applicable to the most relevant currencies for domestic institutions are as follows.

Table 1: Intensities of the standard interest rate shock for certain relevant currencies

Currency	Parallel	Short	Long
HUF	4.00%	5.00%	3.00%
EUR	2.25%	3.50%	2.00%
USD	2.00%	3.00%	2.25%

The MNB also uses the values published by the BCBS as the standard interest rate shock scenario for other currencies not included in the above table.

The potential increase in the capital requirement resulting from the increase in the extent of interest rate shocks is temporarily¹⁴⁷ not taken into account by the MNB in the TSCR, to allow institutions an adjustment period, and applies the increase in the capital requirement resulting from the increase in shock rates in the P2G amount. To quantify the magnitude of the impact of a change in the interest rate shock, instead of a full recalculation using the new shock rates, institutions may choose to apply a simplified procedure. Accordingly, the sensitivity indicators calculated for each currency in each scenario (NII, PV and EVE) are multiplied by the coefficient in the table below to obtain the sensitivity calculated with the new interest rate shock.

Table2: Multipliers to be used for the simplified calculation of new interest rate shocks

Currency	Multiplier
HUF	1.333
EUR	1.125
GBP	1.100
CHF	1.750

In the benchmark model, the MNB calculates a zero coupon spot yield curve consisting of continuous interest rates (log yields) for each spot yield curve consisting of the interest rates of the instruments with the lowest observed payment frequency¹⁴⁸ on the reference date, which is necessary to perform the interest rate risk calculations, and uses it in the baseline interest rate scenario to estimate the EVE and FV values for cash flow discounting and to estimate the forward rates calculated as the nominal interest rate for the NII, EVE and FV values for interest payment forecasting. The shock rates corresponding to the different stress scenarios are applied to the yield curves used in the baseline interest rate scenario, and stressed spot zero-coupon yield curves, calculated taking into account market interest rate floors (see

¹⁴⁶ Basel Committee on Banking Supervision: Recalibration of shocks in the interest rate risk in the banking book standard./ 2024/07.

¹⁴⁷ The transition period is expected to last until the conclusion of the 2025 ICAAP reviews, meaning that the full impact of the increased interest rate shock values will be reflected in the TSCR in the 2026 ICAAP reviews.

¹⁴⁸ If available for a given currency, an OIS yield curve is used, otherwise for example a yield curve consisting of FRA/futures and swap transactions with a one-month interest payment frequency is used.

below), are used to calculate the forward rates (calculated as nominal rates) needed to determine interest cash flows.

In calculating the EVE value for variable rate transactions, the MNB estimates the total cash flows of principal and interest until maturity in both the baseline and stress scenarios, and also takes into account complex interest rate fixing conventions (i.e. where the interest rate on the transaction does not simply follow the reference rate, but a multiplier is applied to the underlying interest rate or index, or its historical values are averaged, or the interest rate of the transaction may follow, with a time lag, the previous value of the reference rate or index instead of the current one). The MNB also considers demand deposits whose interest rate is linked to a reference rate as variable rate transactions.

In the benchmark interest rate risk calculations (dNII, dEVE and dFV calculations), the MNB applies a so-called transaction interest rate floor of zero percent to changes in *transaction* interest rates for demand or current account deposit or fixed-term deposit contracts with natural persons (see retail, household), for client loans and for securities, assuming a constant spread, i.e. the downward movement of transaction (product) interest rates is limited. Furthermore, for the purposes of interest rate risk calculations the MNB also takes into consideration the contractual interest rate floors. For the deposits of legal entities (e.g. corporates, institutions) and for transactions other than deposits and securities in other product areas, the potential extent of downward movements in transaction interest rates is determined by the thresholds applied to market interest rates (the so-called market interest rate floor).

In the case of market interest rate changes, the MNB will apply the interest rate floor in the international guidelines (market interest rate floor) both for the HUF and other currencies. This means that the degree of interest rate decrease can be such that the lowest level of the yield on the spot zero coupon yield curve, calculated as shown above, consisting of continuous interest rates, may be -1.5% at the point of the overnight maturity, and 0% at the points of the 50-year or longer maturities, while the lowest permitted level at intermediate points is obtained by linear interpolation. If the interest rate belonging to a specific point of the yield curve, observed on the reference date of the calculations, is lower than the relevant interest rate floor, the observed lower interest rate shall be used as interest rate floor in respect of this yield curve point (also in the stress scenarios).

(Note that the extent of downward interest rate shocks depends on the current level of the yield curve points, therefore, they need to be updated regularly.)

Appendix 3 Expectations with regard to the modelling of sight deposits for institutions and the MNB's own banking book interest rate risk benchmark model

As part of its interest rate risk benchmark model, the MNB produces estimates in order to determine the behaviour of products with undefined interest rate risk characteristics. The model for sight deposits, which fall into the above category of products, is described below along with the requirements concerning the development objectives for the sight deposit models used by the banks.

Since sight deposit holdings dominate on the liability side within Banks' balance sheets and therefore significantly impact on the measurement results of interest rate risk, the MNB expects the Banks to have in place their own models that capture the actual risk behaviour of these products appropriately. An appropriate model must not consider the entire portfolio as immediately due and cannot allocate it to the shortest repricing category. If possible, the model is expected to contain the components described in this appendix, either as standalone models or as parts of a more complex model.

A. Segmentation

The MNB expects banks to have estimates for all currencies with significant holdings within their sight deposit models but at least for the currencies *HUF* and *EUR*.

In addition to such breakdown by currency, the MNB also considers it necessary to differentiate the customer segments. Banks are expected to treat separately each customer segment with a materially different interest rate risk behaviour; as a minimum requirement, they should perform separate estimates for *retail* and *corporate* customers. The MNB also expects institutions to distinguish at least the transactional and non-transactional accounts for retail customers (see Section C.1).

B. The data used

The MNB expects the banks to develop and operate their sight deposit models by relying on all the material information available to them regarding the parameters of sight deposits and to make every effort to ensure that the data they use offer validated, controlled and reliable information. The data used should include at least sight deposit holdings and interest rate time series, which should incorporate data for at least *10 years* in at least a monthly breakdown.

C. The parts of the model

The purpose of applying the sight deposit model – as a part of the interest rate risk model - is to estimate the income sensitivity and economic value of equity sensitivity of deposit holdings, for which the MNB will take into consideration the results of several sub-models, as follows:

Sub-models

- 1) *Core deposit estimate*
- 2) *Holdings estimate*
- 3) *Interest rate estimate*
- 4) *Amortisation, cash flow estimate*
- 5) *Market scenarios*

C.1. Core deposit estimate

Core deposits are the part of the sight deposit holdings that are available to the bank consistently, regardless of the interest rate environment and have low interest rate flexibility, i.e. the changes of their interest rates do not follow market rate changes or only to a small degree.

The definition of core holdings is the first step in sight deposit modelling; these holdings serve as the basis for the subsequent estimates.

The holdings and interest rate estimates and cash flow forecasts described below apply to the core holdings.

- The core component is defined based on the simultaneous fulfilment of two different conditions, which should be estimated separately. Within the total volume, the part that is likely to remain in the Bank's balance sheet under the prevailing interest rate level for a longer time is classified as the stable part (i.e. stable in time). This can be estimated mainly by analysing historical volume data (e.g. by determining the maximum outflow over a specific period). The applied historical time series is expected to cover at least 10 years.
- The core component within the stable component is the part which is not repriced even in a highly volatile interest rate environment or the likelihood of repricing is low (i.e. its interest elasticity is close to zero). The part above this is the non-core component regardless of stability), which is considered to be an interest-sensitive product rapidly responding to changes in the market interest rate and it should be allocated to the shortest repricing category (1 month).
- Deposits placed by financial counterparties and high-amount individual deposits shall not form part of the core stock; these shall be eliminated for the purpose of estimation and allocated to the non-core stock in all cases.

Accordingly, determining the core holdings involves taking into consideration the uncertainties originating from, firstly, the behaviour of customers and, secondly, the product pricing practices of banks, in an environment of changing interest rates. There are various types of estimation methods, depending on the data available: e.g. the analysis of historic holdings data, the processing of individual account data, the use of time series analysis processes (e.g. ARIMA).

- As regards the sight deposit portfolio – in line with the 2016 Basel guidelines and the revised EBA guideline – at least the following segmentation should be used:
 - retail transactional (non-interest bearing accounts or accounts used for transactional purposes),
 - retail non-transactional,
 - corporate.

The following caps shall be applicable to these:

Segment	Maximum core deposits ratio	Maximum average remaining maturity
Retail / transactional	90%	5 years
Retail / non-transactional	70%	4.5 years
Corporate	50%	4 years

C.2. Holdings estimate

When estimating the income sensitivity, the MNB expects the applied model to assume constant balance sheet stock and structure, i.e. the substitution of maturing stock with products identical with the maturing ones and with positions of identical risk attributes. Taking

into consideration the dynamic changes of sight deposit holdings observed in recent years, the assumption of unchanged balance sheet may distort the interest rate risk estimates, so that we are relaxing the strict assumption of an unchanged balance sheet to a certain extent in the case of sight deposits. When estimating income sensitivity, we assume the entire deposit holdings that incorporate term deposits to be unchanged instead of assuming the sight deposit holdings to be unchanged, and within the deposit portfolio possible changes in the proportion of term and sight deposits to total deposits should be taken into consideration. There are different methods available to forecast the changes of the proportion of sight deposit holdings and their changes over the estimate horizon (typically time series analysis, regression, machine learning processes). The applied method should have the capacity for reliably predicting the proportion of sight deposit holdings under the various interest rate scenarios used in the interest rate risk model, with an acceptably low estimation error level.

C.3. Interest rate estimate

When estimating the interest rates of sight deposits, the objective is to forecast the evolution of the interest rates of these products in various market scenarios. Unlike in holdings estimation, the interest rates estimated in this model will be relevant not only for the estimation of income sensitivity but also in economic value of equity sensitivity calculations, because the interest rates predicted here are the ones used in determining interest cash flows.

There are different methods available to forecast the changes in the interest rates of sight deposit holdings (typically time series analysis, regression, replicating portfolio, machine learning processes). The applied method should have the capacity for reliably predicting the sight deposit interest rates under the various interest rate scenarios used in the interest rate risk model, with an acceptably low estimation error level.

C.4. Amortisation, cash flow estimate

When estimating the economic value of capital, the so-called 'run-off' approach is used in the case of sight deposits too: the amortisation of the holdings currently in the balance sheet is estimated and a forecast of the capital and interest cash flows originating from the amortisation schedule is created. The sensitivity of the present value of the cash flow forecast in this way is the contribution of sight deposits to the total economic value of equity sensitivity. Given the differences between interest rate cash flows quantified in the different interest rate scenarios, the individual scenarios will result in different cash flows, even if the capital cash flow does not change. Forecasting cash flows requires a knowledge of the maturities of the deposits and the amortisation schedule of the capital amount; an estimate of the future changes in product interest rates is also needed.

The deposit interest rates are estimated in a separate sub-model (see section above). In most cases, the maturity and the amortisation (capital cash flow) estimate is produced using the replicating portfolio approach. Upon determining the replicating portfolio, the MNB uses the 1-, 3-, 6- and 12-month and 3-, 5- and 10-year yield curve points in the model, and expects the banks' models to include at least two yield points within one year and two yield points over one year. It is a mandatory condition in all cases that the average maturity of the resultant portfolio in the respective segment shall not exceed the maximum average maturity specified in point C.1. The replicating approach allocates optimally the core part of the sight deposit holding to the selected tenors, whereas the non-core deposits are placed in the 1 month category, which stands for maturity within a short period of time. The target variable to be optimised is the so-called Sharpe ratio, i.e. the weights of the investments represented by the various points on the yield curve are proposed to be set by finding the maximum of the

indicator determined as the margin between the interest rates of the replicating portfolio and the deposit divided by the standard deviation of this margin.

Capital amortisation is determined assuming the constant run-off, in equal monthly amounts, of the parts invested in instruments represented by the various points of the yield curve, e.g. a partial sum invested for 3 months is amortised in three months, an amount invested for 6 months is amortised in 6 months in equal monthly amounts. The total amortisation schedule is calculated as the total of these constantly amortising subtotals.

C.5. Market scenarios

The market shock scenarios used in modelling sight deposits are the same 6 Basel scenarios as appear in the EBA Guidelines and applied by the MNB (see Appendix 2). The forecasted future interest rates used in the various sub-models equal the forward yields calculated using the current yield curve. In line with the methodology described in Appendix 2, forward yields should be calculated on the basis of the six spot yield curves determined by the six immediate interest rate shocks and the shocked future interest rates should be quantified based on them.

By using forward yields, shocked future interest is determined essentially by the shock of the current yield curve and the shape of the yield curve. Although this procedure does not necessarily provide a reliable forecast of future - shocked - interest, it serves the objective of the interest rate risk model. This is due to the fact that, through INC and EVE sensitivity measurement, the model is aimed only at measuring the differences between the various interest rate scenarios and the presentation of potential changes, and not a precise determination of the value of income or economic value of equity.

Appendix 4 Methodology used by the MNB to calculate the diversification effect that can be taken into account for the interest rate risk in the banking book

The diversification effect is calculated under the assumption that the monthly changes in the zero coupon interest rates for each currency follow a multivariate normal distribution, which can be described by a covariance matrix. For the determination of the covariance matrix, the correlation matrix is obtained from historical time series, while the standard deviation of the monthly changes in the zero coupon rates is adjusted to the standard interest rate shock measures defined by the EBA guidelines and RTSs. Standard deviations are defined by the following formula:

$$\sigma_{c,i} = \frac{S_{c,i}}{\alpha}$$

, where " σ " is the standard deviation, " s " is the standard interest shock measure, α is 99th percentile of the standard normal distribution (~ 2.326), while the index " c " denotes the currency, the index " i " denotes the 3-month, 5-year and 20-year yield curve points for the standard deviation, and the "short", "parallel" and "long" shocks for the interest rate shock measures, respectively.¹⁴⁹

To determine the correlation matrix, we use a 15-year time series (from 30.09.2008 to 31.08.2023), which contains the 3-month, 5-year and 20-year zero coupon yield curve points at the end of each month, calculated from the observed yield curves for each currency as continuous interest rates, and their monthly differences, which are used as the basis for the calculation.

The correlation coefficients are multiplied by the corresponding standard deviations to obtain the covariances, and from the covariance matrix a Cholesky lower matrix is determined, which can be used to perform Monte Carlo simulation of the multivariate normal distribution.

The interest rate shock measures required to calculate the diversification effect are calculated by linear interpolation along the yield curve from simulated zero coupon interest rate differentials for the highlighted maturities (3 months, 5 years, 20 years).

For the dEVE simulation, the cash flows reported in the 9R1 data supply are aggregated by currency and bucket and discounted according to the baseline interest rate scenario (thus obtaining the maturity structure of the net open interest rate position's present value per currency denomination). The resulting sums are multiplied by the shocks calculated according to formula ($e^{-r_{c,j}T_{c,j}} - 1$), where " $r_{c,j}$ " for currency " c " is the interest rate shock interpolated to the midpoint of the " j " bucket, taking into account the market interest rate floor, and " $T_{c,j}$ " for currency " c " is the maturity expressed in years at the midpoint of the " j " bucket. The resulting EVE sensitivities per buckets are summed up by currency. 10,000 Monte Carlo simulations are run on the dEVE values calculated for each currency.

In the dNII calculation, the amount of capital cash flows due within one calendar year reported in the 9R1 data supply shall be multiplied by the remaining maturity in years from the next repricing to the end of the one-year time horizon, and the interest rate shock adjusted by the transaction interest rate floor or, in its absence, the market interest rate floor, if necessary. The interest rate shock can therefore be calculated according to the following formula:

$$s_k^{floor} = \max(s_k, \min(0, f_k - r_k))$$

¹⁴⁹ That is, the standard deviation of the 3-month zero coupon interest rate differentials is based on the "short", the 5-year on the "parallel", and the 20-year on the "long" interest rate shock measure.

, where " s_k " is the shock size for the k^{th} cash flow without interest rate floor correction, " f_k " is the transaction interest rate floor for the k^{th} cash flow, or the market interest rate floor in its absence, and " r_k " is the average interest rate for the k^{th} cash flow. " s_k " can be determined from the currency and repricing period of the k^{th} cash flow from the zero coupon interest rate differentials simulated for the highlighted maturities (3 months, 5 years, 20 years) using linear interpolation. The estimated NII sensitivities per cash flow are summed up by currency, and 10,000 Monte Carlo simulations are run on the dNII values calculated per currency.

The calculation of dFV is performed in a similar way to the dEVE calculation, except that only cash flows beyond the calendar year following the reference date of the calculation of transactions valued at fair value and not included in hedge accounting are included, and the calculation is performed in parallel with the dNII calculation, based on the interest rate shocks (zero coupon interest rate differentials) simulated by the Monte Carlo method used for it. The source of the required cash flows can be the gap table produced by the institutions on the basis of the 9R1 data supply template or the cash flow projected on the basis of the 9R4 data supply. FV sensitivities per buckets are summed up per currency, and then 10,000 Monte Carlo simulations are run on the dFV values calculated per currency in parallel with the dNII calculation.

The dNII and dFV results obtained in the simulation are summed up to obtain the INC sensitivities per currency and per realisation:

$$dINC_{c,l} = dNII_{c,l} + dFV_{c,l}$$

, where the index "c" denotes the currency and the index "l" is the sequential number of the interest rate shock vector (realisation) generated by the Monte Carlo simulation¹⁵⁰.

From the simulation results obtained, the percentage value of the diversification coefficient for dEVE and dINC is determined:

$$D\%_{dEVE} = \frac{dEVE_{divers.} - dEVE_{without\ divers.}}{dEVE_{without\ divers.}}$$

$$D\%_{dINC} = \frac{dINC_{divers.} - dINC_{without\ divers.}}{dINC_{without\ divers.}}$$

, where " $dEVE_{divers.}$ " and " $dINC_{divers.}$ " are the estimated portfolio-level EVE and INC sensitivities, respectively, when the diversification effect is taken into account, while " $dEVE_{without\ divers.}$ " and " $dINC_{without\ divers.}$ " are the estimated portfolio-level EVE and INC sensitivities, respectively, when the diversification effect is not taken into account. The value of " $dEVE_{without\ divers.}$ " and " $dINC_{without\ divers.}$ " is determined as the sum of the 99th percentiles of the realisations per currency obtained in the Monte Carlo simulation, and the value of " $dEVE_{divers.}$ " and " $dINC_{divers.}$ " is determined as the 99th percentile of the portfolio-level dEVE and dINC results obtained by summing up the individual realisations. The diversification coefficients for dEVE and dINC (" $D\%_{dEVE}$ " and " $D\%_{dINC}$ ") are projected to the aggregate dEVE and dINC values without diversification, respectively, for HUF, EUR and USD currencies, according to the benchmark methodology, based on the 6 standard interest rate scenarios.

The diversification effect calculator for EVE and INC sensitivity corresponding to the methodology used by the MNB is presented in Annex 15 of the manual.

¹⁵⁰ the value of "l" is thus an integer between 1 and 10,000.