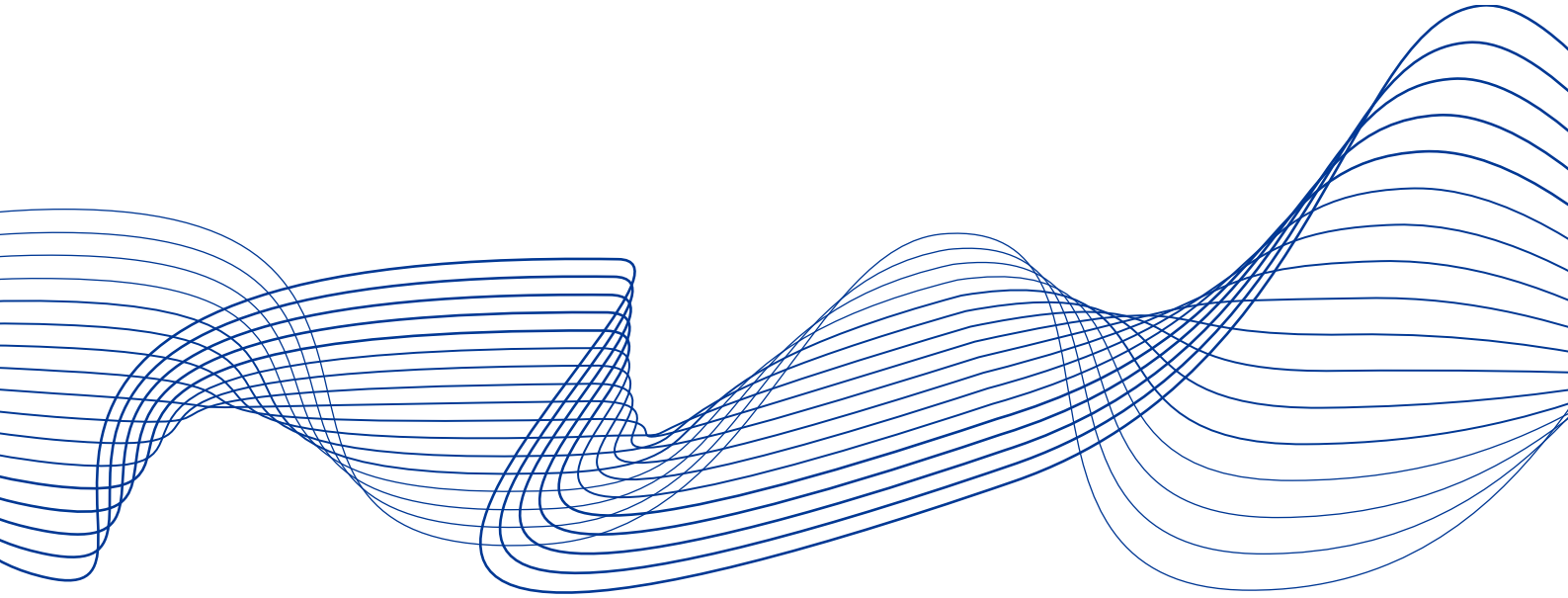
Final report on the use of structural macroprudential instruments in the EU

December 2017

by
the IWG Expert Group on the Use of Structural Macroprudential Instruments in the EU



ESRB
European Systemic Risk Board
European System of Financial Supervision

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Executive Summary

The Instruments Working Group (IWG) Expert group on the use of structural macroprudential instruments in the EU (EGSB) was set up to provide a cross-country comparison of the application of these buffers, to identify best practices and finally to make recommendations in this regard. This final report of the EGSB provides a stocktake on the use of structural buffers – i.e. the buffer for global systemically important institutions (G-SIIs), the buffer for other systemically important institutions (O-SIIs) and the systemic risk buffer (SRB) – in the European Union (EU) over the last three years and contains the full set of analyses conducted by the EGSB. Based on these analyses, it proposes amendments to the ESRB Handbook on Operationalising Macro-prudential Policy in the Banking Sector (ESRB Handbook) and makes a number of policy proposals regarding the legal framework of the buffers.

In line with the Capital Requirements Directive (CRD IV) and European Banking Authority (EBA) guidelines, national authorities have identified about 200 O-SIIs. Together, these institutions hold three-quarters of EU banking assets, which corresponds to almost twice EU gross domestic product (GDP). The heterogeneity of the national banking systems in the EU in terms of their size and structure is reflected in differences in the numbers of O-SIIs identified, as well as in their absolute and relative sizes.

In the absence of harmonised guidance, EU Member States apply various methods as well as supervisory judgement for calibrating additional capital requirements for O-SIIs. In all countries that apply the O-SII buffer, the size of the buffer is related to the degree of systemic relevance of the identified O-SIIs. However, this relationship differs substantially across countries. Generally, additional disclosure on methods used, beyond the legal requirement, is rare. The majority of countries use a bucketing approach, but the numbers of buckets and the methods for their classification differ. In all calibration approaches examined by the EGSB, the discretionary choice of parameters and assumptions affects the final calibration of the buffers significantly. This results from differences in national banking systems, but it is important to ensure that it does not lead to an uneven playing field across the EU.

A higher degree of harmonisation, preferably by means of a European Systemic Risk Board (ESRB) recommendation, would ensure that O-SIIs similar in their systemic importance were subject to comparable buffer rates across Member States. As a first step in this respect, the EGSB proposes some best practices to be included in the ESRB Handbook to foster harmonisation of the O-SII buffer setting. At the same time, all calibration approaches have their pros and cons, so no approach was identified as superior in this report. Therefore, some flexibility should be left to national supervisors to take into account specificities of national banking sectors. National flexibility, however, calls for adequate disclosure decisions and underlying calibration methods. The setting of buffer rates should be evaluated ex ante and ex post.

The caps on the buffer rates for O-SIIs and O-SII subsidiaries serve as a safeguard for the Single Market and Single Rulebook and limit potential ring-fencing activities across countries, but they prevent a number of Member States from fully addressing the O-SII risks by means of this dedicated instrument. O-SII caps have been introduced in the CRD IV package to act as a safeguard for the Single Market and the Single Rulebook. Recent empirical research reviewed by the EGSB, while not suggesting the need for a significant overall increase in capital requirements for the banking system in its entirety, argues for substantially higher capital

requirements for systemically important financial institutions. The Basel framework for domestic systemically important banks (D-SIBs) requires buffers to be commensurate with the systemic risks they pose, and it does not provide for any caps. The fact that the highest buffer for global systemically important banks (G-SIBs) is currently set at 3.5% may indicate what is seen as adequate at the international level. However, this may be of limited relevance for the European framework, in that the reference framework for G-SIIs is the international financial system and economy, while for the O-SII buffer the domestic financial system and economy are the relevant references. The cap on subsidiaries is perceived as distortionary to the setting of O-SII buffers in a number of host countries but beneficial in limiting potential ring-fencing activities. However, there is very little evidence that measures taken by host authorities could be disproportionate or unjustified.

The SRB is applied by roughly one-third of Member States to target long-term risks of a non-cyclical nature. As the SRB is also applied for the mitigation of risks stemming from structural features of the financial system or the wider economy, Member States apply it to target specific exposures as well as specific groups of financial institutions. The variety of metrics and calibration methods in use for the SRB mirrors the variety of risks addressed.

Owing to the flexible character of the SRB, a common understanding of the categories of long-term non-cyclical risk that the SRB can be used for would help to ensure that it was applied coherently. A structured process for the application of the SRB would start with a proper risk assessment that would comprise all relevant risk signals and risk factors and also incorporate expert judgement. In this report, the EGSB proposes a taxonomy of risks that can be addressed via the SRB and associated common and transparent risk assessment frameworks. The taxonomy has three risk categories: (1) risks stemming from the propagation and amplification of shocks within the financial system; (2) risks stemming from structural characteristics of the banking sector; and (3) structural risks to the banking sector stemming from the real economy. The proposed taxonomy is supplemented by metrics for the identification of these risks and is neither mandatory nor exhaustive.

Given the broad area of SRB application, the availability of a whole suite of methods and models that could also be used for ex ante and ex post evaluation would be useful for its calibration. The selection of a model always depends on the particular risk that is targeted. One fairly straightforward approach to calibration is a bucketing approach based on a scoring system, as used for the O-SII. Alternative approaches include macro stress tests or dynamic stochastic general equilibrium (DSGE) models. In terms of methodology, ex ante assessment of the wider impact of the buffer and the ex post evaluation of the effectiveness should be considered in the calibration process. As with the O-SII, the process of activation, calibration and evaluation of the SRB should be subject to public disclosure and explanation so as to enhance the effectiveness of an activated buffer. Notification and approval procedures above certain thresholds guarantee that adverse effects on the Single Market and Single Rulebook are avoided.

Although experience in evaluating the effectiveness and efficiency of activated structural buffers is limited, the interactions between the structural buffers within the current legal framework are complex and may influence their use. The rules on the scope of application, on consolidation, on additivity and on O-SII caps create a complex incentive structure, which in turn seems to influence the choice, scope and calibration of instruments. A prominent example is the use of the SRB instead or on top of the O-SII buffer for risks related to the systemic importance of credit institutions when other instruments including the O-SII buffer are assessed as not sufficient to address this systemic risk. At any rate, cooperation among the various authorities concerned with the application of structural buffers is required and should ideally be formalised.

On the practical side of O-SII and SRB application, and owing to their interaction, the EGSB has identified some limitations to the current legal framework and proposes amendments to deal with them. First, the currently blurred delineation of objectives of the O-SII buffer and the SRB should be resolved by clarifying their respective scopes: the O-SII buffer should continue to be used to address systemic risks stemming from individual institutions, while the SRB should tackle system-wide non-cyclical systemic risks. However, such delineation is only possible if the O-SII buffer cap and cap for subsidiaries are raised so that the O-SII buffer can sufficiently cover the risks posed by O-SIIs. As a corollary of the sharper delineation of the O-SII and SRB instruments laid out in this report, structural buffers should be additive in so far as they target different risks. While in a highly concentrated banking sector system-wide structural risks can actually originate from a few institutions, the application of an SRB should not, in principle, be motivated by risks that pertain to the balance sheet of one single institution. Second, the current "residual" nature of the SRB should be changed by removing the mandatory sequencing for its activation ("pecking order"), thus upgrading the SRB to the status of a dedicated instrument to address system-wide non-cyclical risks not already covered via Pillar 1 capital requirements. Policymakers could consider whether there is a need for a residual macroprudential capital buffer tool – in addition to the possibility of making use of Article 458 of the Capital Requirements Regulation (CRR) – to address residual systemic risks, and which is subject to a pecking order. However, there seems to be little need for such a residual instrument at the moment. Third, the SRB framework should be clarified to allow for a risk-sensitive calibration of the buffer. This would require the possibility of using the SRB to target specific subsets of exposures, such as sectoral exposures, and of allowing for multiple SRB applications so as to be able to address distinct risk sources, if needed. Clarifying the SRB framework in this way would lead to its greater effectiveness and acceptance, and also enable effective reciprocation of foreign SRBs. Fourth, the SRB should be available in all Member States to facilitate reciprocity and ensure a level playing field. Finally, the process of notification requires simplification, as it is unnecessarily complicated and burdensome, inducing authorities to choose other instruments that, although less suitable for the risk identified, are easier to activate.

Overall, the proposals are aimed at improving the effectiveness of structural buffers in addressing systemic risks in a timely and adequate manner, while existing rules and procedures would continue to safeguard the integrity of the Single Market. While some of the proposed changes should lead to increased flexibility and greater effectiveness with respect to the identified risk, the existing rules and procedures (notification requirements and approvals of buffer rates above certain thresholds) would continue to safeguard the integrity of the Single Market. Importantly, the removal of the pecking order and the possibility of a sectoral capital requirement would need to be balanced by increased transparency on the risk identification and assessment process through communication and enhanced disclosure. To avoid unjustified accumulation of buffers, the cumulative effect of all SRBs should be subject to the approval process.

Looking at the overall macroeconomic impact of structural buffers from a financial stability perspective, it makes sense to compare the cost of higher capital requirements for banks on the one hand with the benefit of fewer and less severe financial crises on the other. The empirical literature on overall capital requirements, with analyses using diverse types of models – namely semi-structural and structural vector autoregressive (VAR), factor-augmented vector autoregressive (FAVAR) and (early-warning) global vector autoregressive ((EW)-GVAR) models, vector error-correction models (VECMs) and DSGE models – finds that the costs are generated by the direct impact on lending interest rates that banks charge to households and firms. These rates are expected to increase, limiting credit growth and leading to adverse effects on economic growth. The

long-term benefits involve a reduction in the probability and severity of systemic banking crises, contributing to greater financial stability and a reduction in output volatility. The main finding of the empirical literature is that even though in the short term there are transitional economic costs to higher capital, there are long-term benefits due to lower output volatility, which can lead to more stable and durable growth. However, conclusions on the optimal level of capital vary significantly from one study to the next. In order to balance short-term costs and long-term benefits, higher capital requirements could be introduced gradually to take into account the cyclical and structural characteristics of the financial system. Specific literature on structural buffers and its interactions is scarce and very limited.

Based on current experience with structural buffers and on economic analysis, the following proposals regarding the application of structural instruments should be considered as possible enhancements to the ESRB Handbook.

Proposal	Details of the proposal
Guidance for O-SII buffer calibration	The buffer size should reflect the risk posed by each systemically important institution (SII). The calibration of the buffer should provide incentives for not increasing a bank's systemic importance. The calibration of buffer levels should only depend on aspects directly related to the systemic importance of the O-SII. The G-SII buffer rate applied to an institution should not act as an upper bound on the potential O-SII buffer that could be applied to that institution. Whenever the calibration method requires the choice of a reference institution, the use of an external reference point is advised. The calibration of the O-SII buffers gains robustness to the extent possible if several approaches are used simultaneously. A more detailed disclosure of calibration methods would be helpful since the calibration of the O-SII buffer requires the designated authority to make a significant number of discretionary choices. The greater scope for national discretion (e.g. compared with the G-SII buffer) should be maintained to allow the accommodation of the different structural characteristics of individual countries. The assessment of the effectiveness of the O-SII buffer should be related to the main economic objectives underlying the introduction of such a policy instrument.
A common understanding of the categories of long-term non-cyclical risks that the SRB can address would be be useful to ensure its coherent application	The application of the SRB should be based on a structured process, including a clear conceptual implementation framework for the identification, analysis and assessment of system-wide non-cyclical systemic risks. Such an implementation framework would include a broad – but non-exhaustive and non-mandatory – taxonomy of risks addressable by the SRB. The proposed framework for SRB implementation should include multiple calibration methods that can also be used for both ex ante and ex post evaluation.
Cooperation among authorities	Requirements for cooperation among authorities involved in the implementation of structural buffers should be in place to ensure the compatibility of objectives, to limit potential conflicts of interest and to enable a complete risk assessment.
Potential use of the leverage ratio to complement structural buffers	A macroprudential leverage ratio requirement can provide a useful complement to structural risk-weighted capital buffers. Until a minimum leverage ratio requirement is introduced, the existing guidance in the Addendum to the ESRB Handbook could be used to enhance the stability of national financial systems.

Furthermore, it is believed that the current design of the structural buffers limits their effective use. The proposals outlined below are aimed at improving the effectiveness of structural buffers in addressing systemic risks in a timely and adequate manner while balancing this flexibility with rules and procedures (e.g. notification requirements, approvals above certain thresholds, pecking order for residual instruments) necessary to safeguard the integrity of the Single Market and Single Rulebook. The legal proposals are interlinked and need to be considered as a package of mutually reinforcing measures.

Proposal	Details of the proposal
Upgrading the SRB to the status of a dedicated instrument	For a wide range of structural risks, the SRB is the most suitable and the only available capital tool. As such, it should have the same "non-residual" nature as the countercyclical capital buffer (CCyB) and the G-SII/O-SII buffers. As a negative side effect, the current pecking order has the potential to induce authorities to use other instruments instead of the SRB, even in cases where the SRB is the most suitable tool and should thus be removed. The removal of the pecking order should align the SRB as a dedicated instrument to address system-wide non-cyclical risks not already covered via Pillar 1 capital requirements.
Delineation of the SRB and O-SII buffer	The O-SII buffer should continue to be used to address non-cyclical systemic risks stemming from individual institutions, while the SRB should tackle system-wide non-cyclical systemic risks. The use of the SRB to target SII risks should therefore be discouraged. The prerequisite for this delineation is that the O-SII buffer sufficiently covers the risks posed by O-SIIs. As a corollary of the sharper delineation of the O-SII buffer and the SRB, structural buffers should be additive in so far as they target different systemic risks. While in a highly concentrated banking sector system-wide structural risks can actually originate from a few institutions, the introduction of an SRB should not, in principle, be motivated by risks pertaining to the balance sheet of one single institution.
Allowing the SRB to target specific systemic risks	Targeting specific systemic risks would reduce potential for regulatory arbitrage, facilitate reciprocation and lead to greater effectiveness and acceptance of the SRB. Targeting specific systemic risks would also reduce the need to individually calibrate the SRB rate for each institution. Specific risk targeting requires the possibility of a sectoral application of the instrument (based on a limited list of sectors). It also requires the possibility of multiple SRB applications to allow authorities to address distinct specific risk sources and to enable effective reciprocation of foreign SRBs. The cumulative impact of all SRBs should be subject to the approval of the European Commission above a certain threshold to safeguard the Single Market and the Single Rulebook.
Simplification and clarification of the processes	Simplification and clarification of the notification and approval procedure Transparency through communication and enhanced disclosure If Pillar 2 measures remained in the macroprudential toolkit after the ongoing review of the CRD IV package, mandatory cooperation between macroprudential and competent authorities should be introduced for Pillar 2.

Further limitations of the current legal framework for structural buffers have been observed, and policy judgement would be necessary to a greater extent in forming policy proposals in these areas. Therefore this report discusses the potential advantages and drawbacks of the current legal framework or potential options for amendments. The ESRB Opinion to the European Commission proposes specific changes to the regulatory framework for structural macroprudential buffers based on discussion and judgement of the ESRB policymaking bodies as a way forward. The proposals cover the following areas:

- **level of the O-SII buffer cap;**
- **additional O-SII buffer cap for subsidiaries;**
- **formal guidance for O-SII buffer calibration;**
- **clear delineation between the O-SII and SRB policy objectives, discouraging the application of the SRB to risks to be covered by the SII framework.**

1 Introduction

A comprehensive macroprudential framework including structural buffers has been set up as a response to the global financial crisis. The crisis revealed significant gaps in financial system oversight, in particular the lack of authorities with the mandate and appropriate tools to address systemic risks. Identification of vulnerabilities and risks did not prove sufficient to incentivise public and private stakeholders to take mitigating actions. Following the crisis, these gaps were filled by the establishment of a macroprudential policy framework comprising risk assessment and a set of specific instruments enabling macroprudential authorities to address different types of systemic risks. These developments have been led by the Financial Stability Board (FSB) and by the Basel Committee on Banking Supervision (BCBS) with the Basel III framework.

The establishment of the ESRB in 2011 and the entry into force of CRD IV and the CRR[1] (the CRD IV package) on 1 January 2014 were major milestones in the implementation of the macroprudential framework in the EU. The ESRB is responsible for the macroprudential oversight of the EU financial system in order to contribute to the prevention and mitigation of systemic risk. It has contributed to the development of macroprudential policy in the EU, notably by issuing recommendations on the macroprudential mandate of national authorities (ESRB/2011/3)[2] and on intermediated objectives and instruments of macroprudential policy (ESRB/2013/1)[3]. The entry into force of the CRD IV package on 1 January 2014 provided Member States with a harmonised set of instruments to address both cyclical and structural systemic risks at national level. The structural instruments include buffers for G-SIIs and O-SIIs, along with the SRB.

Buffers for SIIs are aimed at mitigating moral hazard in institutions that are deemed too big to fail. In a first step, G-SIIs are identified by the FSB in accordance with the BCBS framework, and their treatment in EU law is consistent with the BCBS framework. In a second step, the formal identification of G-SIIs follows a similar procedure to that for the identification of O-SIIs. O-SIIs are identified by an authority designated by each Member State, which can be the national competent authority (NCA)[4] or the national designated authority (NDA)[5], using a flexible approach based on EBA Guidelines (EBA/GL/2014/10)[6]. These guidelines are aimed at ensuring comparability across the EU and striking an appropriate balance between the specificities of national banking systems and the objective of ensuring a level playing field in Europe. The EBA Guidelines do not provide a calibration method for the O-SII buffers. EU law differs from the BCBS framework for D-SIBs by providing for caps on the O-SII buffers. Based on its macroprudential powers to top up

1 "CRD" refers to Directive 2013/36/EU of the European Parliament and of the Council of 26 June 2013 on access to the activity of credit institutions and the prudential supervision of credit institutions and investment firms, while "CRR" refers to Regulation (EU) No 575/2013 of the European Parliament and of the Council of 26 June 2013 on prudential requirements for credit institutions and investment firms and amending Regulation (EU) No 648/2012.

2 Recommendation of the ESRB of 22 December 2011 on the macro-prudential mandate of national authorities (ESRB/2011/3) (OJ C 41, 14.2.2012, p. 1).

3 Recommendation of the ESRB of 4 April 2013 on intermediate objectives and instruments of macro-prudential policy (ESRB/2013/1) (OJ C 170, 15.6.2013, p. 1).

4 The NCA is the authority responsible for microprudential supervision in Member States.

5 The NDA is the authority responsible for setting the CCyB in Member States.

6 EBA Guidelines on the criteria to determine the conditions of application of Article 131(3) of Directive 2013/36/EU (CRD IV) in relation to the assessment of other systemically important institutions (O-SIIs).

macroprudential decisions of national authorities (Article 5 of the SSM Regulation[7]), the European Central Bank (ECB) has developed a framework for setting O-SII capital buffer floors.

The SRB is a flexible tool to address long-term non-cyclical systemic risks of a structural nature not covered by other instruments. The SRB is specific to the EU framework but its transposition into national law is not mandatory. It can be used to address residual risks that cannot be addressed by other dedicated instruments. It can be applied to exposures (all exposures, all domestic exposures or all exposures located in another country) or to specific institutions (subsets of institutions or individual institutions). While the designated national authority is free to set the buffer level, the SRB is subject to notification and approval requirements once the buffer rate exceeds certain thresholds. This mechanism ensures that the SRB is applied appropriately, ensuring the protection of the Single Market and the Single Rulebook. If the SRB is applied to all exposures, only the higher of the G-SII buffer, the O-SII buffer or the SRB applies.

The ESRB Handbook and companion Flagship Report provide initial guidance on the use of structural buffers. With the new EU prudential rules providing a common macroprudential policy framework for the EU banking sector, the use of macroprudential instruments in the EU was expected to increase. However, much of the analytical approach had yet to be developed. The ESRB contributed to this development by publishing its Handbook and Flagship Report in March 2014. The aim was to assist macroprudential authorities in the EU to operationalise the new instruments for the banking sector.

Given the growing experience in the application of structural buffers, the EGSB was set up in October 2016 to provide a cross-country comparison on their use and to recommend best practices in their application. Since the publication of the ESRB Handbook and Flagship Report, practical experience with structural buffers has been growing. All Member States have implemented frameworks for identifying O-SIIs and setting buffer rates. Several Member States have also activated the SRB for different systemic risks. The EGSB was additionally mandated to investigate whether the experience from the use of these instruments calls for changes to the above-mentioned Flagship Report and ESRB Handbook.

Based on the stocktake of the application of structural buffers and assessment of their macroeconomic impact, the EGSB has put forward proposals for enhancing the ESRB Handbook and for the requisite legislative changes. EU Member States are required to notify their macroprudential policy decisions to the ESRB. Based on these notifications, the ESRB has published an annual Review of Macroprudential Policy in the EU since 2015. The EGSB has gone a step further and conducted a stocktake of the application of both the G-SII/O-SII buffers and the SRB investigating the methods and practices used in the activation and calibration of structural buffers and in measuring their effectiveness. The EGSB has also analysed the available academic literature regarding structural buffers.

The report is organised as follows: Section 2 contains the results of the survey conducted by the group; Section 3 analyses the available academic literature on the macroeconomic impact of structural buffers; Section 4 describes the application of the O-SII buffers, and Section 5 the application of the SRB; and finally Section 6 describes interaction elements of the structural buffers.

[7] Council Regulation (EU) No 1024/2013 of 15 October 2013 conferring specific tasks on the European Central Bank concerning policies relating to the prudential supervision of credit institutions (OJ L 287, 29.10.2013, p. 63).

2 Findings of the stocktake

The following stocktake provides a comparison of the use of macroprudential structural buffer requirements across countries since their implementation. The stocktake is primarily based on Member States' notifications to the ECB and ESRB and on existing reports on the application of structural buffers. It is complemented by analyses conducted by the EGSB.[8]

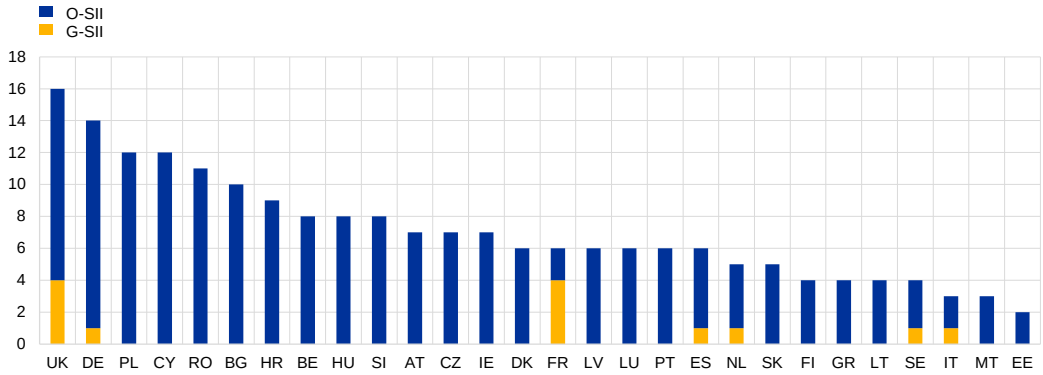
2.1 Stocktake of the application of the O-SII buffer in the EU

2.1.1 Overview of national implementation

In 2016, 199 O-SIIs were identified across the EU.[9] This list includes 13 European G-SIIs which are simultaneously identified as O-SIIs (see Chart 1). There are noticeable differences across EU Member States in terms of the numbers of designated institutions, partly reflecting the sizes of the national banking systems. Within the Single Supervisory Mechanism (SSM) area, 116 O-SIIs were identified, of which eight institutions are also G-SIIs. Member States have to identify O-SIIs and G-SIIs on a yearly basis. However, the list of identified institutions is fairly stable for the two available years of implementation.[10]

Chart 1

Number of O-SIIs and G-SIIs by country at year-end 2016



Source: ESRB.

Notes: Where an institution has been identified both as a G-SII and an O-SII, the institution has been allocated to the G-SII category. Cyprus has identified six investment firms as O-SIIs; they are included in the chart. Data refer to end-2016.

8 To be comprehensive, this stocktake will also refer to G-SII buffers, but will focus primarily on the application of O-SII buffers and the SRB. Therefore, the methodology for the identification of G-SIIs and the G-SII buffer calibration are not covered by this stocktake, as the methodology is harmonised by EU legislation.

9 Including six investment firms in Cyprus.

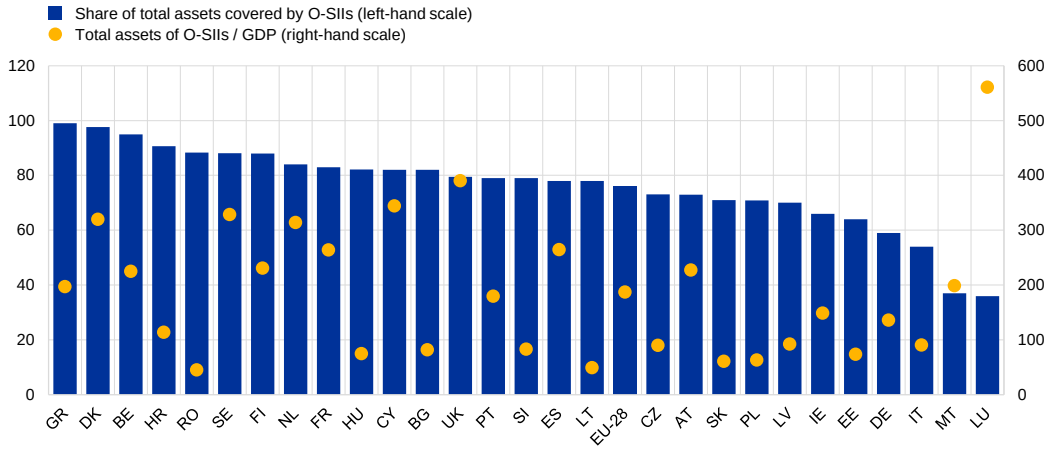
10 Cf. Table 7 of ESRB (2017).

O-SIIs represent an important segment of the national banking sectors. As the largest banks in individual jurisdictions have been designated as O-SIIs, they typically account for a significant share of national banking systems (see Chart 2). Together, they hold three-quarters of EU banking assets, almost twice EU GDP. However, there are significant differences across Member States due to the heterogeneity of national banking systems. In the majority of EU countries, O-SIIs account for more than 70% of all banking assets. In Greece, Denmark and Belgium, it is actually more than 90%. The share of O-SIIs in some central and eastern European (CEE) countries and in Ireland is somewhat smaller. In less concentrated banking systems, the share of O-SIIs is significantly lower. Whereas in large countries such as Germany and Italy the O-SII share of total banking assets is between 50% and 60%, only one-third of banking assets in Malta and Luxembourg are held by O-SIIs. Depending on financial deepening and/or the importance of the financial sector for the economy in general, measured in terms of the ratio of total assets of O-SIIs to GDP (see Chart 2), the importance of O-SIIs for the real economy differs more widely. While the ratios for several CEE countries are low at between 45% and 114%, major financial centres have much higher ratios (United Kingdom 390% and Luxembourg 550%).

Chart 2

O-SIIs' assets by country

(% of total banking assets and GDP)



Sources: ECB Statistical Data Warehouse and Eurostat. Data refer to end-2016.

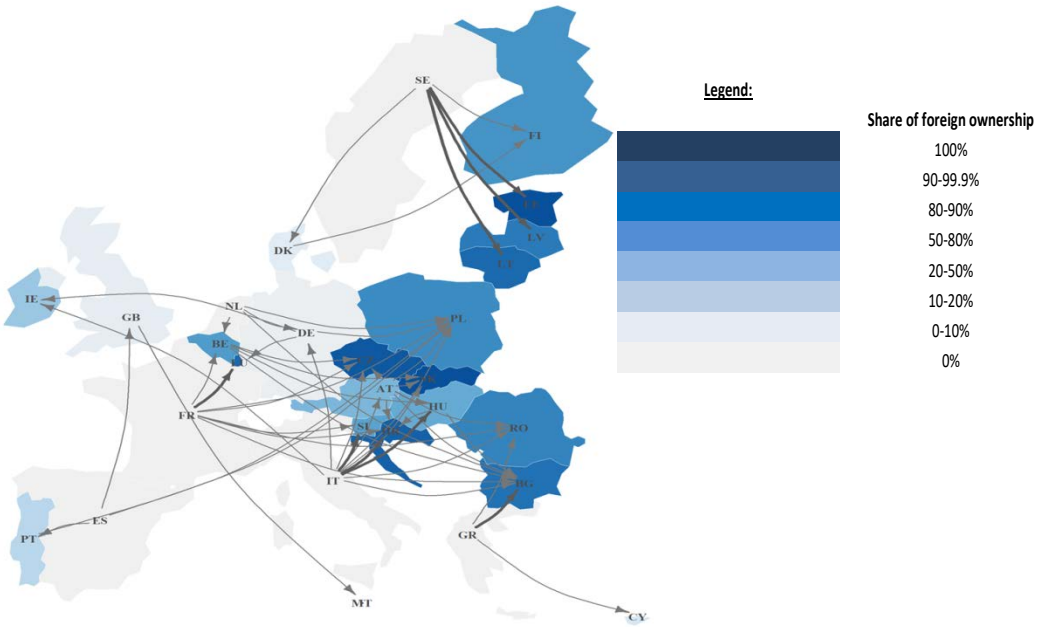
Several EU Member States have exposures to structural systemic risks stemming from cross-border banking and foreign ownership structures. Foreign ownership is a particular feature in central, eastern and south-eastern European (CESEE) countries and in Luxembourg, while larger countries usually have low levels of foreign ownership of banks (e.g. Germany, Spain, France, Italy and the Netherlands). Banking groups that are systemically important in one EU Member State often also have systemically important subsidiaries in other EU Member States (Chart 3).[11] Erste (Austria), Raiffeisen (Austria), Société Générale (France), UniCredit (Italy) and Intesa Sanpaolo (Italy) are examples of institutions with a particularly strong cross-border presence

[11] See Annex 3 of ESRB (2017).

through many SIIs. Such banks are therefore especially relevant in assessing cross-border contagion risk. In addition, there are regional differences regarding foreign ownership structures between euro area (EA) and non-EA banking systems. While banks from EA countries often have subsidiaries in non-EA countries (e.g. high market share of Italian and Austrian subsidiaries in Croatia and Hungary), this is less the case for non-EA countries, with the exception of Sweden, which is well represented in neighbouring Nordic EA countries (e.g. Denmark, Estonia, Latvia, Lithuania and Finland).

Chart 3

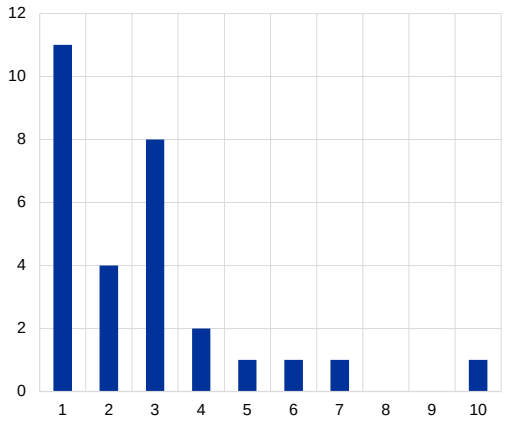
Share of O-SIIs with a foreign parent and cross-border ownership link



Sources: ESRB and SNL Financial (ownership and total assets).
Notes: The arrows between countries indicate the links between the home countries of SIIs and the host countries of the SIIs that they control. The thickness of each arrow is proportional to the number of such links.

Chart 4

Distribution of O-SII subsidiaries with an EU O-SII parent



Source: ESRB.
Notes: The horizontal axis displays the number of O-SII subsidiaries. The vertical axis displays the number of O-SII groups with the respective number of O-SII subsidiaries.

A significant number of O-SIIs are subsidiaries from banking groups located in other Member States. In 2016 there were 29 banking groups based in 15 Member States with 79 O-SII subsidiaries in 23 Member States. The most common model is that of a single O-SII subsidiary in another Member State (11 banking groups). There are six groups with more than three O-SII subsidiaries (see Chart 4). Owing to the subsidiary cap for the O-SII buffer, the level of the O-SII buffer of the parent institution limits the possibility for the host country to calibrate an adequate O-SII buffer for the O-SII subsidiary. For 17 Member States, the possible O-SII buffer for some subsidiaries is restricted by this cap. CESEE countries in particular face a situation where they host subsidiaries from up to seven other Member States which are considered systemically important for the host country.

Chart 5 provides an overview of the variation of the O-SII buffer requirement of parent groups and the number of O-SIIs with foreign parents for each country. This gives an indication of the varying buffer requirements that apply to the subsidiaries in a host country and hence also the constraints for the host country to impose buffer requirements that are consistent throughout its banking system with regard to buffer size and the systemic importance of each institution.

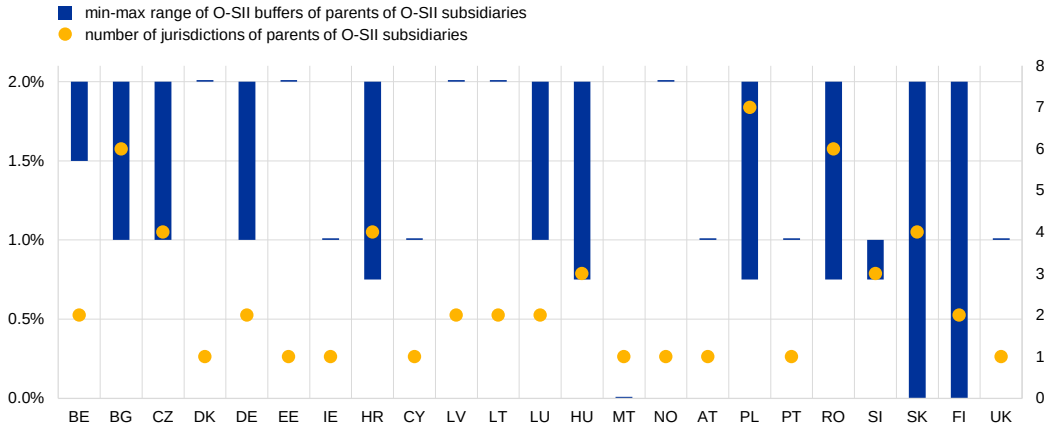
The O-SIIs seem to be well capitalised. Their capitalisation on average is well above required supervisory CET1 capital levels in most Member States (see Chart 6). Even with a fully phased-in capital conservation buffer (CCoB) and a maximum O-SII buffer of 2%[12] only a very limited number of banks would have to increase their CET1 capital to fulfil regulatory requirements – assuming that all other things remain equal. In combination with a sufficiently long phase-in period, additional capital requirements corresponding to the systemic footprint of the individual institution seem to be absorbable without negative consequences for the respective institutions.

[12] The green line in Chart 6 indicates the required fully phased-in CET1 capital requirements of banks including the capital conservation buffer (Article 129 of the CRD IV) but excluding Pillar 2 capital requirements, which are not publicly available. The phase-in of the capital conservation buffer started in 2016. In 2019 banks will have to hold the full amount of 2.5% of a bank's total exposures.

Chart 5

O-SII buffers of parent institutions of O-SII subsidiaries

(percentages, numbers)

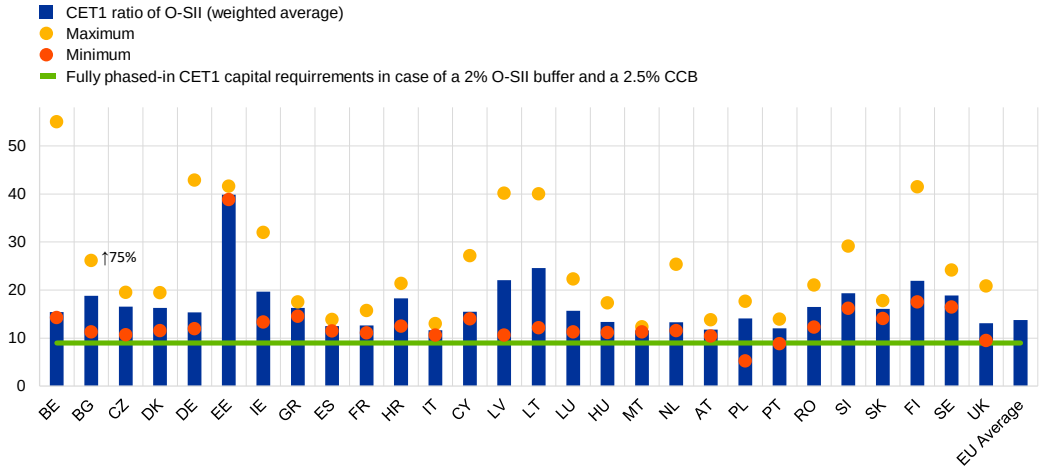


Source: ESRB
Note: O-SII buffer range is displayed on the left-hand axis and number of jurisdictions on the right-hand axis.

Chart 6

Capitalisation of O-SIIs in the EU in 2015

(percentages)



Sources: ESRB and SNL Financial.
Notes: The O-SIIs included are those identified as of January 2017 and considered retroactively. Owing to limited data availability, only 180 banks out of the 199 O-SIIs are included in the dataset. The six Cyprus investment firms identified as O-SIIs are not included in the figure. Not all countries use the O-SII buffer: some use the SRB instead (e.g. the Czech Republic, Denmark and, from 2019, the United Kingdom).

2.1.2 Activation and calibration

Most EU Member States follow the EBA Guidelines for the identification of O-SIIs. According to the notifications on the O-SII buffers, most EU Member States comply with the legal provisions of Article 131 of the CRD IV and the supplementary requirements laid down in the EBA Guidelines.[13] Half of the Member States identify O-SIIs only on the basis of the mandatory EBA indicators. The other countries use additional indicators and/or rely on supervisory judgement as shown in Annex 1. Some Member States use the option to adjust the threshold for the identification of O-SIIs in the given range of the EBA Guidelines, which is 275-425 basis points (b.p.). This is probably with the intention of decreasing the number of O-SIIs in countries with concentrated banking markets (e.g. Czech Republic, Slovakia) and increasing the number of O-SIIs in more diversified banking markets (e.g. Germany, Austria).

EU Members States use two general types of approach for calibrating the O-SII buffer, although there are noticeable differences due to national specificities. The first type of approach consists of methods that directly map the systemic importance scores of the institutions to a buffer level, whereas the second group does not rely on such a mapping. The majority of countries use a bucketing approach with different numbers of buckets, but they derive the classification of buckets by different methods, such as cluster analysis (Germany, Greece, Italy and Hungary) or proportional calibration (Luxembourg), and often complement their analyses with supervisory judgement (e.g. historical losses as additional indicators (Belgium, Ireland, Lithuania) or peer comparison (Belgium, Estonia, Ireland, Hungary, Slovakia and Finland). See Annex 1 for an overview. The method most frequently used from the second group of approaches for calibrating the O-SII capital buffer is the (equal) expected impact approach (Estonia, Ireland, Croatia, Latvia, Lithuania and Hungary). These approaches are explained in detail in Section 4 and an overview of them can be found in Annex 2. Chart 7 provides an overview of the relationship between the O-SII scores of institutions and their O-SII buffer rates across countries at the final stage of implementation.

Owing to the discretionary leeway of the O-SII framework, the range of O-SII buffer rates varies widely. One group of countries applies relatively low buffer levels, motivated by different aspects. For consistency reasons, the G-SII buffer of banks in these countries is used as an upper benchmark for the O-SII buffers (e.g. Spain, Italy).[14] This also limits the O-SII buffer levels for other O-SIIs in those countries. Other countries (e.g. Ireland, Italy, Poland, Portugal) leave room for an empty bucket similarly to the G-SII methodology to create a disincentive for further growth in systemic importance. Microprudential and/or conjunctural aspects also play a role in the determination of the buffer level (or the phase-in arrangements). Several Member States (e.g. Greece, Spain, Italy, Portugal) set their buffer levels with the intention of avoiding adverse effects on credit supply and the economic recovery and of limiting possible disruptions to the financial system or the real economy. In addition, Pillar 2 capital requirements – although being microprudential in nature – may also currently be applied to cover systemic risks posed by systemic institutions. Moreover, the introduction of the recovery and resolution framework of the Bank Recovery and

[13] Only Malta and Denmark apply a national methodology to take into account the specificities of their national banking sectors. The Maltese authorities confirm that the use of the EBA methodology would have given the same results in terms of O-SIIs identified. The designation of O-SIIs in Denmark is conducted according to three criteria and threshold values determined in a political agreement in 2013 passed by the Danish Parliament. The three criteria are listed as optional indicators in the EBA guidelines (See EBA, 2014).

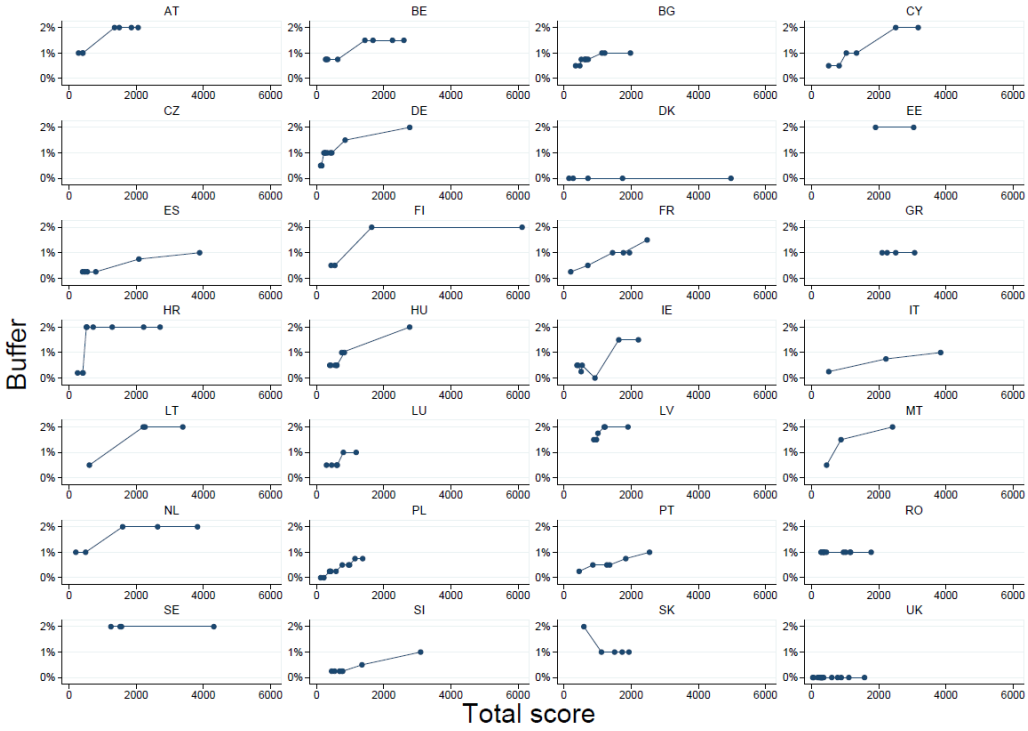
[14] Spain: Santander G-SII buffer of 1%; Italy: UniCredit G-SII buffer of 1%.

Resolution Directive (BRRD)[15] and the Single Resolution Mechanism (SRM) is considered by some Member States (e.g. Spain, Portugal) to address to some extent similar risks to those addressed by the buffers for SIIs. Resulting discrepancies at the lower end of the calibrated O-SII buffers have been reduced since the implementation of the ECB floor methodology (based on a bucketing approach), which established a floor for O-SII buffer rate decisions of EA countries.[16]

Chart 7

Relationship between O-SII score and O-SII buffer rate at the final stage of implementation

(percentages, basis points)



Source: ESRB
Note: The Czech Republic, Denmark and the United Kingdom apply the SRB instead of the O-SII buffer.

At the opposite end, several countries which apply relatively high buffer rates deem the O-SII cap inappropriate to cover risks posed by the O-SIIs and go beyond it by relying on other tools. This appears to be predominantly the case for subsidiaries identified as O-SIIs in host countries where the subsidiary cap can also restrict the O-SII buffer rates for those countries. As a consequence, several host countries combine the O-SII buffer with an additional SRB requirement (e.g. Estonia, Hungary, Slovakia) (see Section 2.2, Annex 5 and Annex 6 for more details). A notable example is Sweden, which imposes a total additional capital buffer of 5% on its SIIs (3% SRB, 2% systemic risk in Pillar 2 capital requirement).

15 Directive 2014/59/EU of the European Parliament and of the Council of 15 May 2014 establishing a framework for the recovery and resolution of credit institutions and investment firms and amending Council Directive 82/891/EEC, and Directives 2001/24/EC, 2002/47/EC, 2004/25/EC, 2005/56/EC, 2007/36/EC, 2011/35/EU, 2012/30/EU and 2013/36/EU, and Regulations (EU) No 1093/2010 and (EU) No 648/2012.

16 See: ECB (2017c).

2.1.3 Disclosure and notification

All Member States comply with the provisions concerning disclosure and notification of O-SIIs in the EBA Guidelines, but the extent and detail of the disclosure and notification varies from one Member State to the next. According to the EBA Guidelines[17], Member States have to publish at least an outline of the O-SII identification methodology and the methodology for setting the buffer rate, as well as explaining the use of any optional indicators. Changes to the threshold of 350 basis points need to be justified by relevant national specificities. By 1 December each year, Member States have to publish the (overall) scores of the institutions identified as O-SIIs in Step 1 as well as buffer rates applied. For institutions identified by supervisory judgement (Step 2) Member States have to briefly explain the choice of optional indicator(s) on which the decision is based and why these indicators are relevant in the Member State and for the respective institution. In practice, a uniform notification template has been designed for use by all relevant institutions.[18]

Additional information provided on a voluntary basis and which exceeds the EBA provisions is rare and not comparable. These data mostly refer to the cross-border impact of a measure, the interaction with other measures or the background information on the national banking sectors and the state of the economy. However, owing to the freedom of Member States to provide supplementary information, the information cannot be detected or easily compared, partly because sources of publication differ (e.g. financial stability report, separate policy documents (Portugal and United Kingdom, for instance) or law (Denmark)). Details of the calibration method used are scarce in most cases.

2.2 Stocktake of the application of the SRB in the EU

2.2.1 Overview of national implementation

Most Member States have transposed the SRB into the national legislation. Transposing the SRB into national law is not mandatory, although Ireland and Italy are the only countries not to have done so.[19] Nine countries have used the SRB as of 2016; these are mostly small and medium-sized countries (Belgium, Czech Republic, Denmark, Estonia, Hungary, Netherlands, Austria, Romania[20] and Sweden). In addition, Hungary and Slovakia have announced that they are applying it as of 2017, while the United Kingdom plans to apply it from 2019 onwards (see Annex 4 and Annex 5 for details).

Given its flexibility and unclear policy purpose, the scope and objective of the SRB overlaps with those of the O-SII buffer and differs substantially from one Member State to the next. Member States can apply the SRB to exposures and/or to institutions. In each case the national

17 Title IV of EBA/GL/2014/10.

18 The European Commission, ESRB, EBA, and competent and designated authorities of the Member States concerned including the ECB, see **Systemically important institutions**.

19 Finland transposed the SRB into its legislation in December 2017.

20 Romania activated the SRB in 2016 but suspended it shortly after its introduction and deactivated it in 2017.

authority can choose to impose the SRB on all exposures or institutions or to a subset of these, chosen for instance by geographical origin. At the final stage of implementation, the majority of Member States target all exposures (Czech Republic, Denmark, Croatia, Netherlands, Austria, Romania, Sweden, United Kingdom), often because of the dominance and concentration of the banking sector. Four Member States target domestic exposures only (Bulgaria, Estonia, Hungary and Slovakia). With respect to targeted institutions, three Member States target all institutions (Bulgaria, Estonia and Croatia), while other countries cover only selected banks – mostly a subset of O-SIIs.

Most Member States apply the SRB in order to address risks stemming from SIIs or from unforeseen shocks. Eight Member States impose the SRB on O-SIIs (Czech Republic, Denmark, Croatia, Netherlands, Austria, Sweden, Slovakia and United Kingdom). In addition, four Member States (Bulgaria, Estonia, Austria and Romania) target risks stemming from unforeseen external shocks such as deterioration in the quality of foreign exposures, an exchange rate shock, a foreign demand shock or contagion risks stemming from the foreign ownership of a bank. Two Member States target sectoral risks in the real-estate sector (Croatia and Hungary).[21] It is worth highlighting that two Member States use the SRB to target different objectives simultaneously (Croatia and Austria).

Countries targeting exposures emphasise the importance of the banking sector for the entire economy. High concentration of the financial sector could add risks for the proper functioning of the markets and might endanger financial stability. Specifically, in small or medium-sized and open economies (Bulgaria, Estonia, Croatia, Hungary, Romania) the SRB is used to increase the resilience of the banking sector to unexpected economic shocks or to specific risks, such as common or correlated exposures in certain sectors (mostly real estate).

Member States that target specific institutions, in contrast, use the SRB to deal with risks emanating from individual banks or groups of banks. Owing to misaligned incentives, the distress or failure of the respective institutions might have the potential to lead to disruptions in the financial sectors of these countries (Czech Republic, Denmark, Croatia, Netherlands, Austria, Sweden, Slovakia and United Kingdom). These countries therefore take into account not only the size of SIIs relative to their national economy, but also the characteristics of their local markets, e.g. concentration of banking assets into a few, interconnected sectors, lack of diversification of business models, undercapitalisation versus European peers, and potential difficulties in recapitalising failing institutions due to their complex ownership structures. In this respect, they often see the O-SII buffer cap of 2% as a constraint that prevents adequate coverage of the risks identified, and so they use the SRB instead or on top of the O-SII buffer.

Some Member States use the SRB to address a multitude of systemic risks simultaneously. Currently, this is the case with Croatia and Austria, which use the SRB to contain both risks of SIIs and, at the same time, risks of certain exposures (e.g. foreign exposures, real estate). In terms of methods used, the institutions concerned are subject to a single SRB requirement which covers all risk sources together. Differences in the level of the SRB only occur with respect to individual institutions' different degrees of risk. Such a uniform application of one SRB for different risks may

[21] Croatia: illiquid real estate market; Hungary: national commercial real estate sector.

be warranted in countries where the application of multiple SRBs to the same exposure is legally unclear or not legally possible, e.g. owing to the design of the national transposition of the SRB, but also owing to ambiguities in CRD IV itself.[22]

2.2.2 Activation and calibration

Substantial differences exist regarding the applied metrics and thresholds for the identification, calibration and activation of the SRB (see Annex 5). These differences can be attributed to the flexibility of the SRB to address a broad set of systemic risks, to national specificities requiring a different set of metrics and to the absence of guidance on best practices for measuring specific risks.

Three broad risk categories have been used to identify risks stemming from unexpected shocks. First, general macroeconomic indicators have been used (such as GDP growth and growth volatility, trade balances, capital inflows, unemployment and inflation rates). Second, the importance (size) of the banking sector for the financial system and the financing of the real economy (and, potentially, the concentration of the banking sector) also commonly play a role. A third category of indicators concerns the soundness of the financial environment in general or of a specific sector (e.g. real estate). Examples are private sector indebtedness, the level of non-performing loans (NPL), household financial assets, the number of transactions in the real-estate market, and the stock of project loans. Indicators are sometimes custom-built, reflecting the specific situation of each Member State.

The indicators used by Member States to identify risks arising from SIIs are similar to those used in the EBA Guidelines on O-SIIs. However, indicators reflecting national specificities are used as well, such as covered deposits, exposure in the national banking network (Austria) or total assets exceeding 50% of national GDP (Netherlands).

Methods to calibrate the SRB differ in Member States and lead to varying buffer levels of between 1% and 3%. Information about calibration details is scarce. Several Member States differentiate SRB levels according to the level of risk that emanates from the banks. While some countries provide for a uniform buffer level (e.g. Bulgaria, Estonia, Netherlands, Romania, Slovakia and Sweden), other Member States use several levels based on different indicators which are sometimes equivalent to the O-SII buffer calibration methods used. Another approach chosen is to set the SRB on the basis of the impact that the deleveraging of institutions of a certain size would have on the economy relative to benchmark institutions. Some countries consider qualitative factors, e.g. whether an institution is categorised as a “significant institution” in the context of the SSM, or the use a single indicator (e.g. market share) in the calibration of the SRB. In the case of Estonia, the calibration of the combined O-SII buffer and SRB requirements is also supported by a stress test.

[22] However, as noted in the unofficial opinion of the European Commission in Question ID 2017_3229 of the EBA Single Rulebook Q&A, which refers to reciprocation, since the SRB is an exposure-targeting (and not a risk-targeting) measure, there cannot be two SRBs simultaneously applied to the same set of exposures in reciprocation.

All countries impose buffer levels that do not exceed 3%. This decision might be influenced by the more elaborate and complex notification and approval requirements if the buffer exceeds 3% (see Section 5.6.4). However, information on the considerations regarding the buffer levels is rather scarce. In some countries (Bulgaria, Estonia) the buffer was chosen such that the capital requirement levels preceding the introduction of CRD IV and the CRR were maintained. Some countries that target systemically important institutions explicitly stated that they use the SRB to substitute for or to top up the O-SII buffer, as the latter is considered too low to cover identified risks adequately (e.g. Czech Republic, Denmark, Netherlands, Sweden).

2.2.3 Disclosure and notification

All EU Member States comply with the legal disclosure provisions which require a publication of the setting of the SRB on a website. The announcement has to include as a minimum information about the buffer rate and the institutions concerned, a justification of the measure (as long as the financial stability of the country is not jeopardised), the activation date, and the names of the countries concerned by the measure. For notifying the European Commission, the ESRB, ECB and EBA, the Member States have published all the relevant information using the notification template. Countries that supplied additional analyses to the ESRB also published those analyses on their websites.[23] Overall, there is little additional information on the application and especially the calibration of the SRB. It should be highlighted that none of the Member States chose to engage in the more restrictive notification process for buffer requirements above 3% (see Section 5.6.4).

2.2.4 Reciprocation

Estonia is the only Member State having requested voluntary reciprocity for the application of its SRB in accordance with the ESRB recommendation on the assessment of cross-border effects of and voluntary reciprocity for macroprudential policy measures (ESRB/2015/2).[24] In cases where the SRB is targeted at systemic institutions, there is no need to request reciprocity as the buffer is applied on an institution-specific basis. The request by Estonia was motivated by the aim of ensuring the effectiveness of the national measure and of maintaining a level playing field by preventing regulatory arbitrage. As shown in Annex 7, several countries have agreed to reciprocate the measure, yet many countries' credit institutions do not have material exposures to the Estonian economy. This suggests that some of the countries acknowledge reciprocity as a matter of principle rather than assessing the materiality of the exposures as a defining factor for the reciprocation of the measure. More than half of the countries did not reciprocate or did not respond at all. One reason could be the low materiality of exposures to the

[23] This assessment is limited to the publication of information in English on the websites of the relevant authorities.

[24] Recommendation of the European Systemic Risk Board of 15 December 2015 on the assessment of cross-border effects of and voluntary reciprocity for macroprudential policy measures (ESRB/2015/2) (OJ C 97, 12.3.2016, p. 9).

Estonian economy, along with legal uncertainty concerning the admissibility of a multiple application of the SRB to the same exposures.[25]

2.3 Evaluation of the effectiveness and efficiency of activated buffers

Experience of evaluating the effectiveness and efficiency of activated structural buffers is rather limited. For instance, research on the contagion effects based on German banking data concludes that if the buffers are capped at 2.5% (as with the CCoB) they are not large enough to prevent other systemically important financial institutions from failing in the event that one of the O-SIIs fails.[26] The regulatory Tier 1 capital losses are reduced significantly only if the buffers exceed 2.5%. Based on the results of a macro stress test for Germany,[27] the O-SII capital buffer will, on a weighted average, absorb 30% of the decline in the CET1 capital ratio taking into consideration the phased-in O-SII levels until 2018.[28] Therefore, the unexpected capital losses arising from a macroeconomic shock can be partly absorbed by the calibrated O-SII buffer rate, thereby effectively strengthening the resilience of the institutions concerned. However, the current O-SII buffer levels may not be sufficient to address all the risks resulting from O-SIIs. According to this analysis the cap of the O-SII buffer is not adequate to address the risk resulting from O-SIIs. One country simulated the effect of the introduction of the O-SII buffer (regulatory capital higher by 1%) on its economy and found that there would be an increase in the marginal cost of lending, which banks pass on in the loan interest rate. The increase in the loan interest rate would depress national consumption and investment, causing a decline in GDP of approximately 0.3% at the lowest point. Overall, notifications from most of the Member States show that the identified O-SIIs are already sufficiently well capitalised and should have no major effect on internal market or lending in respective countries.

The majority of Member States provide a qualitative evaluation of the impact of the measure in their notifications and do not expect a significant negative impact. In many cases no negative impact or only a small negative impact is expected. This is because the measure will not lead to an actual need for the build-up of capital or because the capital requirement of the measure will be small enough not to cause serious stress for the institutions concerned. Cross-border effects are also not expected, as several Member States claim that the cross-country links of the concerned banks are negligible. It is not clear whether further quantitative analyses were conducted to estimate ex ante the possible cross-border effects or the impact on the Internal Market. No regulatory arbitrage was identified and the measures are believed to be proportionate, effective and efficient, as they are designed to address the underlying systemic risk.

Cyclical aspects are nonetheless taken into consideration in structural policy decisions to avoid negative effects. While cyclical factors should not be reflected in the calibration of the level of the O-SII buffer requirement, many countries adjust the timing of its implementation on the basis

[25] For details see ESRB (2017), Special feature B: The ESRB's reciprocity framework – its first year of implementation.

[26] See Fink et al. (2014).

[27] IMF (2016).

[28] The O-SII buffers in Germany will be fully loaded in 2019.

of the current economic situation.[29] Some countries decided to set O-SII buffers at a low level in the first years and to raise them in the future to avoid frontloading (see Annex 3). Moreover, countries such as Greece and Cyprus, which experienced a noticeable contraction in GDP for several years in a row, decided to postpone the beginning of the O-SII buffer implementation. Other countries (e.g. Estonia, Lithuania, Slovakia, Finland and Sweden) opted for a quick and early introduction of the O-SII buffer and required fully loaded implementation from the start, taking into account the steady growth of their economies, high profitability and solid capitalisation of the banking sector (see Section 2.1.2). The same applies to the phasing-in of the SRB (see Annex 4), where countries with well-capitalised banks required a timely and fully loaded application of the buffer. Phasing-in arrangements vary considerably owing to the prevailing and desired solvency situation of the banks concerned and conditions in the financial sector.

2.4 Interactions between structural buffers

2.4.1 Current practice regarding the interactions of structural buffers

Interactions between the structural buffers are common in Member States. The majority of EU Member States use several structural buffers, with only the highest buffer being applicable (Article 131(14) of the CRD IV) to prevent a combination of structural buffers (O-SII, G-SII, SRB) from leading to an excessive accumulation of capital requirements. In some countries (Spain, France, Italy, Germany during phase-in), the G-SII buffer becomes applicable when it is higher than the O-SII buffer for all its institutions and no SRB applies. In other countries (Netherlands, Sweden), all three buffers are implemented, but the SRB set at 3% overrides the other buffers. In the United Kingdom, currently only the G-SII buffer applies. In 2019, the higher of the G-SII buffer or the SRB will become applicable after the implementation of the SRB in 2019. However, some countries (e.g. Bulgaria, Estonia, Hungary and Slovakia) apply the SRB only on a domestic basis, with the consequence that the G-SII/O-SII buffer and the SRB are cumulative (Article 131(15) of the CRD IV). The reciprocation of the SRB in Estonia also leads to interactions in several countries.[30] Further interactions result from legal provisions such as caps on the O-SII buffer, including those applying to subsidiaries of foreign O-SIIs, from the difference in the scope of application of individual buffer requirements and from the availability of the legal instruments (see Annex 6).

29 ECB (2016).

30 According to Article 134 of the CRD IV, Member States may apply an SRB rate for the exposures of their domestically authorised institutions which are located in the Member State that sets the buffer rate. In addition, in December 2015 the ESRB adopted a framework for the assessment of voluntary reciprocity for macroprudential policy measures in the EU: see ESRB/2015/2, on the basis of which the ESRB currently recommends two measures for reciprocation. One measure relates to the application of the SRB in Estonia. See also ESRB (2017).

2.4.1.1 Issues related to the scope of application and the level of consolidation of different buffer requirements

There is an interaction between the G-SII, O-SII and SRB buffers where a cross-border banking group has been identified as a G-SII or O-SII at the consolidated level by the home authority, and its subsidiaries have also been identified as O-SIIs in one or more host jurisdiction. In this case, the bank is subject to structural buffers that address systemic risks at different levels of consolidation. The aim is to ensure the availability of adequate capital resources both at the group level and at the subsidiary level to contain all the risks stemming from the banking group. Unless the buffer at the consolidated level is calibrated taking into account the systemic risks stemming from its subsidiaries, this may potentially lead to reduced flexibility of available capital and hence difficulties in ensuring that there is sufficient capital available within the consolidated group, and that it is distributed appropriately across it in order to address systemic risk in both the home and the host country. For details see Section 4.2.3.

Another interaction concerns the different scopes of application of the O-SII buffer and the SRB. An O-SII buffer can be applied to all exposures of a parent institution, while the SRB can be used to target domestic exposures, in which case the buffer requirements become additive (e.g. Bulgaria, Estonia, Hungary and Slovakia). While the limitation of the SRB's scope of application to domestic exposures might be motivated by higher, more conservative capital levels, it also entails the risk that activities may be shifted to areas where the SRB does not apply, e.g. other sectors of the economy or foreign exposures.

2.4.1.2 Issues related to the O-SII buffer cap

One commonly observed interaction between the G-SII/O-SII-buffer and the SRB is the effective circumvention of the 2% O-SII cap by applying the SRB at up to 3% for the institutions concerned. This occurs as several EU Member States (Czech Republic, Denmark, Croatia, Netherlands, Sweden, and Slovakia) consider the level of the O-SII buffer as inadequate to fully cover O-SII risks. For details see Section 4.2.1.

Several EU Member States – predominantly CESEE countries – are constrained by the O-SII buffer cap for subsidiaries of foreign banks and may instead use the SRB. Since the O-SII buffer for a subsidiary of a parent bank from another EU country is capped at the higher of either 1% or the G-SII/O-SII buffer level of the parent institution, the host country's authorities may not have the power to set a capital buffer that is adequate to cover the risk a specific bank poses for the national economy. This can also hold in cases where the O-SII buffer is slowly phased in for the parent institution. Finally, it may in theory also lead to the situation where two comparable banks in the same country are faced with different capital requirements owing to differences in the origin of their ownership. Hence, a local bank could face a higher capital surcharge than the domestic subsidiary of a foreign O-SII, which in turn jeopardises the level playing field principle. These problems are especially pronounced in smaller CESEE countries, where the banking sectors are dominated by subsidiaries of foreign banks. To circumvent the cap on subsidiaries of foreign G-SIIs/O-SIIs, some EU Member States apply the SRB. For details see Section 4.2.2.

2.4.1.3 Issues related to the reciprocation of an SRB

The reciprocation of an exposure-based SRB by another EU Member State may interact with that Member State's SRB requirement concerning the additivity of buffer requirements. As can be observed in the case of the Estonian request for reciprocation, only some Member States (in principle) require their institutions to hold the Estonian SRB in addition to the home country SRB (Denmark, Netherlands, and Slovakia). These countries argue that the two SRBs address different risks and therefore cannot be offset against each other. Countries that have set their own SRBs and do not reciprocate,[31] however, argue that their national SRB already incorporates the risks that the SRB of Estonia is set for, hence the buffer requirements should not be cumulative (e.g. Czech Republic, Sweden). According to the answer given by the European Commission to a question asked in the Single Rulebook Q&A published by the EBA[32], the SRB is an exposure-based instrument and not a risk-based instrument and as such only one SRB can apply to a specific exposure at a time. As such, in the event of reciprocation of a measure, only the higher SRB applicable to a specific exposure may apply.

A cumulative application of the SRB due to reciprocation could lead to a situation where an institution has to hold more than 3% additional capital from different SRBs. This would in principle require the reciprocating authority to follow stricter notification requirements. In this case the authority in question would have to wait for an opinion from the European Commission before reciprocating the foreign measure or applying its own SRB.

"Branchification", i.e. the practice of turning subsidiaries into branches, undermines the powers of host country authorities to impose an O-SII buffer or SRB.[33] Legally, the host country's authorities cannot impose an O-SII buffer or SRB on branches of EU parents located in another Member State. As a result, the only way for a host authority to ensure the proper capitalisation of the banks active in its jurisdiction is by applying an SRB and simultaneously requiring reciprocity. However, the host country authorities are dependent on the decision of the home country authorities to reciprocate the measure.[34]

2.4.2 Combined structural buffer requirements

There is currently no clear relationship between the importance of the banking system and the weighted combined buffer level imposed on the banking system (see Chart 8).[35] Theoretically one would assume that banks in countries with a highly important banking system might be exposed to higher systemic risks and therefore would impose a higher combined buffer level to increase the resilience of the banks. In practice, however, no significant relationship can be

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31 Until 2019, the Prudential Regulation Authority (PRA) in the United Kingdom does not have the legal powers to reciprocate the Estonian measure with an SRB or equivalent measure.

32 Question ID 2017_3229 of the EBA Single Rulebook Q&A.

33 E.g. the transformation of overseas subsidiaries of Nordea into branches.

34 See also "Resolving Cross-Border Banks: Lessons from the Nordic and European Banking Crises", keynote speech at the Conference on Cross-Border Banking and Regulatory Reforms by Stefan Ingves, Chairman of the Basel Committee and Governor of Sveriges Riksbank, Mauritius, 2 February, 2017.

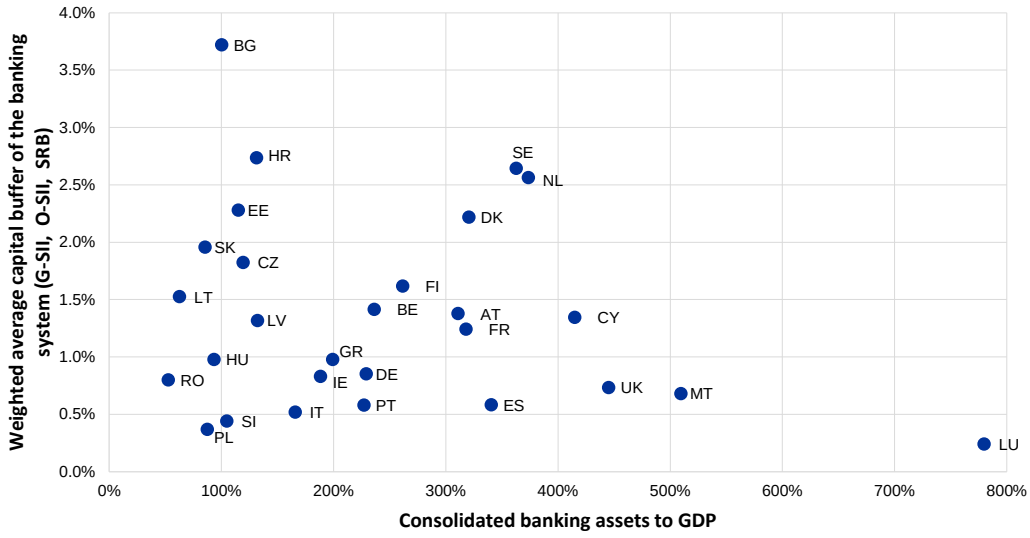
35 The buffers are weighted with the consolidated banking assets in the respective country.

identified. The aggregate buffer requirements may depend on a variety of factors (as also discussed in the sections above) and only to a lesser extent on the importance of the banking sector. However, it can be seen that several CESEE countries (e.g. Bulgaria, Estonia and Croatia), despite having rather small banking systems, impose much higher buffer requirements on their banking sectors than some countries with very large banking sectors (e.g. Spain, Cyprus, Luxembourg, Malta and United Kingdom).

Chart 8

Combined buffer requirements in relation to consolidated banking assets to GDP

(percentages)



Sources: SNL Financial, Eurostat, CBD2 of ECB, notifications received by the ESRB.
Notes: The six Cyprus investment firms identified as O-SIIs are not included in the chart. The values for the weighted average capital buffers include the effectively applicable, fully phased-in G-SII/ O-SII buffers and SRB according to the notifications to the ESRB. The SRB for the United Kingdom is not included as its level has not been announced yet. The CCyB and CCoB are not included in the calculation. Owing to data restrictions, possible additional capital requirements for branches are not included. Therefore, the actual applicable buffer requirement for Member States with a large market share of branches is higher than depicted, as the branch assets are included in the consolidated banking assets. The ratio of consolidated banking assets to GDP in Luxembourg is 1,600%; the number has been adjusted for presentation reasons.

3 Macroeconomic impact of structural buffers

The appraisal (both ex ante and ex post) of the impact of structural capital buffers is a challenging issue for policymakers. Such an appraisal should be closely linked to the objectives of regulation. However, unlike in the case of cyclical instruments, in the case of structural buffers this objective is not easily quantifiable and testable. Also, the way that such instruments are implemented in the EU makes the empirical assessment even harder – the O-SII buffers have been implemented at almost the same time and in a similar size across the EU (in many cases their implementation is not yet complete owing to phasing-in arrangements). Taking into account these limitations, some useful insights can also be gathered from the broader literature on capital requirements.

In addition, even though structural and cyclical buffers are intended to deal with separate aspects of systemic risk, in reality they coexist and implicitly interact. However, an assessment of their joint effect is even harder to make. As a starting point, it requires a thorough understanding of the impact on macroeconomic variables of individual instruments (system-wide capital requirements in Section 3.1, CCyBs in Section 3.2 and structural buffers in Section 3.3). Then, interactions between structural and cyclical buffers have to be examined from multiple angles (Section 3.4). Further conclusions on the interactions can possibly be drawn on the basis of methods that are used to examine the interactions of monetary and fiscal policies (as even though the two problems are not perfectly comparable, they share a number of common issues). The motivation behind this study was the concern that a quick phase-in of G-SII/O-SII buffers in an economic recovery, when the CCyB is set to 0%, might send out conflicting messages to the banking sector and have negative side effects on credit. Expectation management and the timing (or phase-in) of the activation of both buffers in the cycle is crucial for good policy management and the alignment of joint effects.

Recognising that implicit interactions between buffers exist highlights the need to define the current macroprudential framework more clearly in terms of objectives for each capital buffer. At the same time, in order to effectively design strategic interactions between them, potential measurement problems need to be acknowledged. Using instruments with different scopes from potentially different authorities might prove to be inefficient in the medium and long term. Clarity is also necessary in terms of capital buffer measurement for forecasting and release.

3.1 Measuring the impact of capital requirements

In the aftermath of the financial downturn of 2007-2009, the question of the appropriate level of capital that banks should hold has arisen among policymakers. Despite ongoing improvement in financial integration internationally, the financial sector fragilities, stemming mostly from large financial institutions and cross-border interconnections that contributed to the economic crisis, have underlined the importance of more resilient banking sectors. A key lesson of the crisis was that banking sectors were, in several cases, undercapitalised. The empirical literature on the impact and effects of increased capital requirements has grown substantially since the onset of the crisis.

There seems to be a consensus in academic literature that there is a trade-off in policymaking between short-term costs and the long-term benefits of higher capital requirements, which can be captured through the ex ante evaluation. There are various

models which incorporate the effects of increased capital requirements on economic growth. Most modelling frameworks tackle the first-round effects of higher capital ratios on lending spreads and credit growth with subsequent estimations of the impact on economic growth. While results can vary depending on the type of modelling techniques involved – whether semi-structural and structural VAR, FAVAR, (EW)-GVAR models, VECMs or DSGE models – the main finding is that even though in the short term there are transitional economic costs to higher capital, there are long-term benefits from lower volatility output and more stable and durable growth. The short-term costs are generated by the direct impact on lending spreads, which are expected to limit growth in credit to households and firms, generating subsequent negative effects on economic growth. Nevertheless, the long-term benefits involve a reduction in the probability of systemic banking crises, in turn supporting economic stability and a reduction in output volatility. The increase in capital requirements and liquidity standards can prove to have positive indirect effects on overall economic growth by reducing the probability of banking crises and by lowering overall output volatility. At the same time, capital constraints on banks may lead to higher funding costs for them and might result in a potential restriction in credit conditions for both households and companies, which might negatively affect GDP growth in the short run. Chart A in the Annex 8 provides an overview of the long-term expected annual net economic benefits, as estimated by the **Long-Term Economic Impact** group (BCBS, 2010a).[36]

However, quantifying the effects on the economy is not straightforward and inevitably requires some judgement on how banks will respond to changes in capital requirements. Such challenges have been acknowledged, and assessments have been performed with a wide range of results and various methodologies. The literature can be divided into two broad categories depending on technical approaches[37]. The first category is based on multivariate time-series empirical modelling approaches: VAR, structural vector autoregressive (SVAR), FAVAR or GVAR models, VECMs, or even dynamic panel frameworks. The second category is based on pure structural approaches consisting of the use of DSGE models which explicitly describe financial sector behaviour. All models take into account both explicit and implicit assumptions about bank balance sheet behaviour and estimate the impact on real economic activity. However, it should be noted that all analyses on such impacts should be treated cautiously, given the relatively high degree of uncertainty in their empirical conclusions or the hypotheses upon which the models are built.

Intermediate and long-term benefits and transitional costs have been inferred in two assessments performed by the LEI group (BCBS, 2010) and the Macroeconomic Assessment Group (MAG, 2010a, b), using a variety of models. The long-term economic impact assessment performed by the LEI group evaluated the economic benefits and costs of stronger capital and liquidity regulation in terms of its impact on output. The study targets net benefits, measured in terms

[36] However, studies based on the Modligiani-Miller theorem (e.g. Admati et al., 2011) show that such costs reflect only short-term adjustments during the transition period as banks can meet higher requirements by some combination of increasing retained earnings and deleveraging. Admati (2016) points out the other benefits of capital (such as reducing the externalities associated with asset fire-sales by distressed banks) and claims that that reduced lending should not always be considered a cost, as there are some types of risky lending that are not valuable. Also, private and social costs of capital need to be distinguished: Vickers (2016b) shows that while equity is costly for banks (because there are tax preferences for debt), it is not a social cost. Thus, higher bank equity has huge social benefits, not only reducing the probability of a crisis but also reducing its impact once it occurs.

[37] Considering the complexity of the studies, the literature can be categorised in various ways. For the purposes of the present report, a categorisation based on technical approaches is deemed appropiate.

of the long-term change in annual GDP from its pre-reform path, with the trend growth rate unchanged. Under the assumption that banks have completed the transition to new levels of capital and liquidity, the paper's message for a broad range of capital ratios (8%-16%) is that the net benefits of increased requirements remain positive, the expected positive gain being associated with a reduction in the frequency and severity of banking crises. Furthermore, the conclusions underline that the Tier 1 capital for which the net benefits are at a maximum is between 14% and 15% of risk-weighted assets (RWA), assuming that crises have a moderate permanent effect.[38] Using an average representative bank from 13 developed countries, under fairly conservative assumptions the LEI group study finds that a 1 percentage point (p.p.) increase in the level of capital ratios leads to an increase of 9-19 basis points (b.p.) in lending rates. Irrespective of the expected positive long-term effects, the MAG (2010a) quantifies the transitional costs associated with shifting to stronger capital regulations. Within the MAG's interim report, the combined results of 89 models[39] indicate that a 1 p.p. increase in capital ratios leads to negative and transitory deviations of GDP from its baseline of 0.1% to 0.26% and may generate an estimated increase of 15-17 b.p. in lending spreads. The findings of the final report of the MAG (2010b) are similar, this report focusing explicitly on the transitional costs of stronger capital requirements. Under the assumption that credit institutions act so as to adjust the global common equity to a level meeting the agreed minimum and the CCoB requirement within eight years, the study estimates that weighted median GDP is projected to fall by 15-26 b.p. below the forecasted baseline before recovering.

Several papers assess the impact of higher capital requirements in terms of transitional costs via a well-defined transmission mechanism by using multivariate time-series models, without assessing overall net benefits associated with a new steady state. Under the assumption that the return on equity (ROE) and cost of debt remain unchanged, King (2010) estimates that a 1 p.p. increase in the capital ratio can be recovered by increasing lending spreads by 15 b.p. These estimates constitute an upper limit on the size of the effect, as the author also emphasises that ROE and cost of debt should, according to economic theory, decrease with bank leverage and risk. The analysis is performed on data from 13 countries from the Bankscope database. Using the OECD's new global model, Cournède and Slovik (2011) estimate a medium-term negative impact of 4-6 b.p. on annual GDP growth with full 2019 Basel III implementation, with a larger impact in the EA than in the United States or Japan. The assessment is performed after estimating the increase in banks' lending rate spreads at around 14-64 b.p. on meeting Basel III requirements. Again, to be conservative, funding costs are assumed to be constant, and impact estimates represent upper limits. Analysing the combined impact of stricter capital requirements and other reforms, Elliott et al. (2012) estimate that lending rate spreads would increase by 8 b.p. in Japan, 18 b.p. in Europe and 28 b.p. in the United States. As funding costs are assumed to decrease in response to the deleveraging, impact estimates are in a lower range than in the above-mentioned studies, even though a combined impact of reforms is considered. Oxford Economics (2013) assesses that a 1 p.p. increase in the CET1 capital ratio would raise lending rates by 15 b.p. in the case of banks from the United States. By employing SVAR methodologies, Bridges et al. (2014) and Noss and Toffano (2014) estimate that a 1 p.p. increase in capital requirements leads to a 3.5 p.p. reduction and a 4.5 p.p. reduction in lending volume respectively. Gross et al. (2016) develop a mixed-cross-section

[38] Figures from the initial study have been updated. See Fender and Lewrick (2016) and Brooke et al. (2015).

[39] Standard semi-structural and DSGE models used for policy analysis and forecasting.

GVAR model to examine whether shocks to bank leverage due to higher capital requirements can propagate to the real economy. They run estimates under the model both with individual bank balance sheet variables and with banking sector aggregates. They find that under a shock of rising equity and expanding credit (i.e. a corresponding increase in the volume of loans, under the assumption of constant debt), real GDP increases by 0.1% to 2%. Behn et al. (2016) develop an EW-GVAR model to evaluate the macroeconomic impact of capital-based macroprudential policy measures. Using data from 14 countries, they find that under a scenario of increased capital requirements, there is an increase in GDP of 0-1 p.p. Gerba and Mencia (2017) perform an analysis on Spain's economy and find that a 1 p.p. increase in capital leads to a drop in bank credit to firms by 1.1 p.p. and in bank credit to households by 1.4 p.p. as a result of imposing sign restrictions[40] for four quarters. Reducing the sign restriction to one quarter, they find that a 1 p.p. increase in capital requirements leads to a decrease in bank credit to firms and households of 1 p.p. and 0.8 p.p. respectively. The four-quarter sign restriction leads to a decrease of 0.3 p.p. in GDP (short-term deviation), while the one-quarter sign restriction generates a 0.2 p.p. decrease in GDP. The authors allow firms to obtain credit via stock market funding, so there is substitution away from bank credit, concentrated on large firms. The imposition of sign restrictions in line with economic intuition and with previous findings from the literature permits the authors to isolate the behaviour of variables in a context of many interactions, in which disentangling effects might prove to be difficult.

In all modelling approaches, the increase in capital requirements is treated as an exogenous shock to a system, and the response of the system can be estimated subsequently according to the modelling framework. The shock in turn generates either an increase in interest rates and/or output volatility directly. The shock is usually applied to the level of capital ratio. Multiple variations of this ratio, such as total capital/assets or total common equity/RWA, may be taken into account, or the analyst may also choose to change either the level of capital or assets accordingly. The implementation of the shock depends on the modelling framework: structural VAR-type models and variations typically assume a 1 p.p. increase (or an increase of several percentage points, depending on the model) in the level of capital ratio, with the objective of obtaining estimates of the effects on GDP. Upon the initial shock, different paths for output growth can be simulated depending on the pre-specified path or final target level for the capital/RWA ratio or total capital amount/assets individually. DSGE models on the other hand assume a certain structure of the economy which can be either estimated or simulated according to certain hypotheses. These hypotheses may involve the use of bank capital or financial frictions directly in modelling behaviour. Consequently, such frameworks provide optimum capital ratios according to the level of GDP growth they obtain in the estimations/simulations of the model.

Within the second category, full-scale DSGE models are used to assess the impact of higher capital requirements on the real economy. The welfare measure depends on the modelling framework and can be either given by (changes in) real GDP growth or by the net (long-term) benefits of a reduction in the probability of a systemic banking crisis multiplied by the net present cost of future crisis minus the reduction in output due to higher lending spreads. For instance, Mendicino et al. (2017) and Clerc et al. (2015) define the welfare measure as the steady-state

[40] "Sign restriction" refers to a local identification scheme of variables. This involves the use of a modelling technique in which some variables are restricted to move only in a certain direction (either to increase or to decrease) in response to a shock in a different variable from within the developed model.

change in the level of consumption (Chart 9). Studies which employ modelling frameworks, such as Clerc et al. (2015), usually perform a series of simulations in terms of the level of capital ratio in order to determine its optimal level such that net benefits are maximised. Both the LEI group and the MAG studies make use of a variety of DSGE modelling frameworks (including with and without bank capital) in assessing the impact of higher capital requirements on the level of output and lending spreads. The former study finds that for a 1 p.p. increase in capital requirements, there is an approximately 0.25-0.85 negative percentage deviation from steady-state output with net positive benefits throughout, while the latter reports a median GDP transitional decrease of 0.01% to 0.4% from its baseline forecast. In their contribution to the MAG conclusions, Roger and Vlček (2011) develop a DSGE model with banks and financial frictions in credit markets, estimated using data from the both the United States and the EA. The model is used to evaluate the macroeconomic costs of an increase of 2 p.p. in the required capital ratio. They find that long-term output declines at 0.1% per annum both for the EA and the United States.

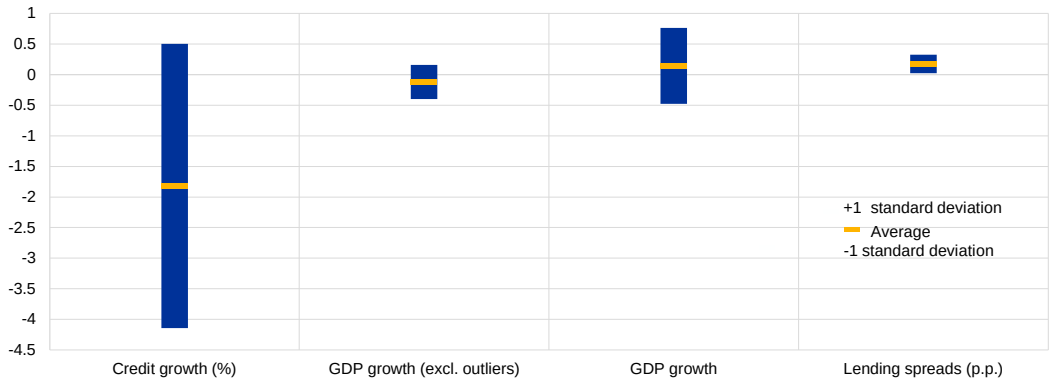
Mendicino et al. (2016) provide a quantitative assessment of increases in total and sectoral capital requirements in a stochastic environment in a calibrated and extended version of the original 3D model applied to the EA. The EA results highlight that starting from the calibrated level, a moderate increase in capital requirements is successful in reducing bank default probability and is optimal. However, once bank default probability is close to zero, larger increases in capital requirements reduce the supply of credit and strongly penalise the borrowers. Assuming equal weights for borrowers and savers in the social welfare function, the authors find optimal capital ratios for the EA as a whole of about 11.5% for corporate loans and 8% for mortgage loans. Mendicino et al. (2017), building on Clerc et al. (2015) and Mendicino et al. (2016), applied the 3D model to all SSM countries as part of the activities of the task force for operationalising macroprudential research (OMR TF). Starting from a calibration that matches historical data (2001-2014), higher capital ratios (both in terms of total capital requirements and risk weights) deliver substantial long-term net benefits to all countries, especially in terms of a reduction in the probability of bank failure (-0.23 p.p. to -1.36 p.p.), potential increases in economic activity (-0.01% to 0.16%) and a reduction in economic volatility. The optimal changes in risk-weighted asset capital requirements increases range between 0.83 p.p. and 4.51 p.p. across EA countries. Given that increases in requirements also carry short-term costs (GDP declines on impact by -0.34% to -0.07%), it would be advisable to have a gradual implementation across SSM countries.

Following the two-step procedure of the MAG, Dorich and Zhang (2010) estimate for the Canadian banking sector that a 1 p.p. increase in the capital ratio implemented over four years generates transitional costs in terms of a decline in GDP of 0.26 p.p. eight years after implementation. Brooke et al. (2015) depart from the LEI group study and perform a similar analysis for UK banks, taking into account changes to the regulatory environment in response to the global financial crisis. Unlike the conclusions of the LEI group study, the authors find that the appropriate level of capital is situated at around 10% to 14% of RWA if the banking system experiences a non-elevated risk environment and higher standards providing for additional loss-absorbing capacity are in place. Fender and Lewrick (2016) assess the macroeconomic impacts of the core Basel III reforms, including the leverage ratio surcharge for G-SIBs. They estimate the additional capital required to be held by banks, taking into account at the same time the potential impact of present reforms regarding the enhancement of G-SIIs' total loss-absorbing capacity. Based on historical data of 111 major banks (including G-SIIs) from 1994 to 2012, a 1.5 p.p. increase in risk-weighted Common

Equity Tier 1 capital leads to expected net benefits of 1.36% of the level of output per year, assuming costs of crises of 100% (of GDP in net present value terms). Most of the studies discussed in this section are summarised in tables A to C in Annex 8 and illustrated in Chart 9.

Chart 9

Overview of impact of a capital requirements increase on financial and macroeconomic indicators



Source: ESRB

Notes: Statistics have been calculated for the studies cited in the current section. In the majority of cases, the shock is standardised to a 1 p.p. increase in the capital adequacy level.

In conclusion, there are various models which incorporate the effects of increased capital requirements on economic growth. Most modelling frameworks tackle the first-round effects of higher capital ratios on lending spreads and credit growth, with a subsequent estimate of the impact on economic growth. While results can vary depending on the type of modelling techniques involved – whether semi-structural and structural VAR, FAVAR, (EW)-GVAR models, VECMs or DSGE models – the main finding is that even though in the short term there are transitional economic costs to higher capital, there are long-term benefits from lower output volatility and more stable and durable growth.

3.2 Determining the impact of the CCyB

The global financial crisis was preceded by strong credit growth, and its negative impact was exacerbated by the procyclical behaviour of the banking sector. Indeed, it is well established in the literature that periods of excess aggregate credit growth signal an overheating in the economy that might be associated with a systemic banking crisis[41].

Learning from one of the main lessons of the global financial crisis, the Basel III package introduced the CCyB as a macroprudential tool to strengthen the resilience of the banking system via time-varying capital requirements. Capital buffers are intended to be built up in periods when system-wide risks from excessive credit growth are increasing and to be released in times of crisis when the flow of credit to the real economy can be disrupted. As reported in the

41 E.g. Schularick and Taylor (2012), Lopez-Salido et al. (2016), Benh et al. (2016).

previous section, increased capital requirements are expected to reduce economic growth in the short term, limiting the procyclicality of the banking system. However, smoothing the credit cycle is just a welcome side effect of the CCyB, the main goal of which is to increase the banking sector's resilience by building cushions against banks' total risk exposures (BCBS 2010).

The concept of CCyBs is judged favourably in the literature, although net benefit analyses are scientifically challenging. In particular, it is found that macroprudential policies used with the main purpose of curbing the cycle are effective in reducing credit growth, even in the short term, and in dampening output volatility.[42] There is a trade-off between the output losses and the increased resilience of the banking sector: while the former can be easily quantified, the latter requires greater efforts. Moreover, even though the reduction of excessive credit is considered a secondary benefit of the CCyB, a sudden large drop in credit might be undesirable.

Despite some variability across various models, the literature agrees that the macroeconomic effect of increasing the CCyB by 1 p.p. is quantitatively small. Moreover, the magnitude of the impact is mitigated by a higher initial total capital requirement and a slower implementation period that allows banks to build up capital in a gradual manner by retaining earnings and to invest the additional funds in new assets (see Table D in Annex 8 for a summary).

3.3 Determining the impact of structural buffers

There is limited availability of ex ante analysis regarding the impact of structural capital buffers. The buffers for SIIs are part of the mandatory regulatory framework, so authorities are required to introduce them regardless of their expected impact. Also, the room for discretion in setting their levels is often very restricted (e.g. the calibration of the G-SII buffer is strictly defined in CRD IV, and the existing provisions effectively cap the O-SII buffer size).[43] While there is some evidence regarding the impact of SII buffers, there is less research relating to the impact of the SRB.

SII buffers are intended to internalise negative externalities[44] resulting from undercapitalised large banks, e.g. by linking the buffer size to the aim of the buffer.[45] Conclusions from studies on the impact of overall capital requirements may not always be directly applicable in the context of structural buffers.[46] The impact of the SII buffers can be derived indirectly from some of the methodologies that can be used to calibrate the buffer. Among the different methods available, some directly link the buffer size to the general aim of the SII buffer. For example, the equal expected impact (EEI) approach assumes that if the economic impact of the failure of systemically important banks is x times greater than the impact of the failure of non-systemic banks, then the probability of

42 E.g. Angelini et al. (2015), Gambacorta and Murcia (2017), Noss and Tofano (2016), Repullo and Suarez (2013).

43 For more discussion on caps, see Section 4.

44 There are different ways to measure the systemic risk of individual banks. For example, Acharya and Steffen (2013) use the systemic expected shortfall (SES), defined as the amount by which an individual bank is undercapitalised in a systemic event. They therefore link bank-specific capital levels to the contributions to systemic risk.

45 It is important to note that the SII buffers are not intended primarily to decrease the size of the banks (as there might be benefits of having large institutions, e.g. economies of scale), but to increase their resilience. There is also a vast amount of literature on concentration in the banking sector and its linkage to financial stability (see e.g. Beck et al., 2006).

46 On the other hand, SIIs usually account for a large share of domestic banking sectors, so the impact of the buffers should not be very different from the impact of the increase in general capital requirements. Brooke et al. (2015) use the framework designed for the analysis of the optimal capital requirements to inform decisions on the SRB buffer for ring-fenced banks.

such a failure should be x times smaller (see Section 4 for a more extensive description of this approach). Following this principle, Passmore and von Hafften (2017) suggest that current G-SIB buffers are not enough to reduce the probability of a crisis, given the recent experiences.

Alternatively, the impact of capital requirements for SIIs on selected macro-financial variables can be analysed. Structural econometric models (such as FAVARs) are commonly used methods. The (short-term) impact on macro-financial variables is negative, but in the medium term total credit to the non-financial sector increases as a result of more resilient banks. According to Budnik et al (2017), a 1 standard deviation increase in Tier 1 capital requirements for systemically important banks above that for the entire banking system (accommodated by adjustments of assets) leads to a one-year cumulative reduction in residential real-estate prices (of between 0% and 0.6%), in credit to non-financial corporations NFCs (of between 0% and 1.8%), and in credit to households (of between 0% and 4.5%).[47] The cumulative effects after two years are even more pronounced for these variables, pointing to the fact that the banks respond to the shock only with a lag by accommodating their assets.[48] The effects on GDP are more difficult to interpret, with the output of some countries expanding and that of others contracting one or two years after the shock. In addition, an interesting pattern that the authors also find in the sample is that systemically important banks lead the market in adjusting their capital and assets upwards: the smaller players also follow this pattern, possibly in order to restore their competitiveness in the funding market. Hence, there might be some peer pressure across the entire financial sector for banks to adjust their capital and assets even if they are not systemically important. This may be one important reason why we see such large statistically significant impacts on macro-financial variables as long as two years after the initial shock. By contrast, in the medium term (or five years after the shock) the benefits from more resilient systemically important banks become clearer, since the amount of credit to households and non-financial firms increases in most cases by up to 0.8%.

3.4 Interaction and joint effects of structural and cyclical buffers

Macroprudential policy benefits from several instruments which can be implemented in order to ensure the sustainable functioning of the financial system. As was discussed in previous sections, cyclical and structural buffers have different objectives and tackle different risks from a policy point of view. Therefore, in the proper conduct of macroprudential policy, the instruments should not interact explicitly (i.e. policymakers should independently assess the implementation and effects of each buffer in relation to its specific objectives). However, even though there is a clear distinction between structural and cyclical buffers, implicitly the instruments might interact because they are ultimately targeting risks stemming from the financial sector through capital requirements.

47 See Table E in Annex 8 for a more detailed overview of the impact. The ranges represent the variations in coefficients between countries. For reasons of compliance with the report by the task force for operationalising macroprudential research, we cannot report country-specific results.

48 Two years after the shock, credit to non-financial corporations falls by 0% to 2.65% and credit to households by 0% to 4.5%. For residential real estate, some prices rise after two years (by 0.8%) and some fall (by 0.8%). The ranges in values represent the median effects across all the countries examined (Spain, France, Italy, Portugal, and Lithuania).

Although there is consensus that buffers should not interact explicitly ex ante, there may be implicit interactions among the buffers owing to the dynamic structure and interlinkages between the economy and the financial system. Departing from each buffer's scope, their interaction can be viewed from multiple perspectives and it can have mutually reinforcing or counteracting (i.e. cancelling) effects. Therefore, in qualitatively capturing interactions, both the institution-dimension and the time-dimension character of the instruments need to be taken into account. In addition, the cross-border dimension could also be considered, being one of the central issues pertaining to the ESRB's scope. In looking at financial and business cycle behaviour, the cyclical and structural buffers should be treated as implicit strategic complements during expansionary phases. While interaction between the buffers is not explicit, it should be possible to assess their implicit interaction by observing the final effects they have in the economy and the way in which they respond to the economic cycle.

3.4.1 CCyB and O-SII buffer interaction during the phase-in period

Expectation management and the timing (or phase-in) of the activation of the two buffers in the cycle is crucial for good policy management and the alignment of joint effects. During the phase-in period of the O-SII buffer, conjectural considerations, among other things, have to be taken into account for the definition of the buffers' implementation paths. In particular, there is a probability that a quick phase-in of the O-SII buffer during the final stages of a recession might have unwarranted effects that are comparable to a premature increase in the CCyB. Under certain circumstances, this might result in prolonged credit stagnation. However, not least for this reason, the O-SII framework provides for discretionary leeway to calibrate buffer levels. Accordingly, several EU Member States (e.g. Greece, Spain, Italy, Portugal) have applied relatively conservative O-SII buffer levels with the intention of avoiding adverse effects on credit supply and the economic recovery and of limiting possible disruptions to the financial system or the real economy (see Section 2.1.2).

3.4.2 The CCyB and O-SII buffer – results from an extension of the 3D model

It is well known in the literature that policies generate spill-over effects (negative or positive) on other policies such that the aggregate impact of two policies is different from the sum of their individual effects. Moreover, policies interact (explicitly or implicitly), and thus their impact on the joint effectiveness needs separate investigation. A natural way to examine this is in a structural (DSGE) model where the channels are clearly defined and the impact of policies can be determined and transparently quantified. To this end, the 3D model developed by Mendicino et al. (2016) and Clerc et al. (2015) is used by Aguilar et al. (2017) to examine the joint impacts of optimal capital buffers.[49] The model is calibrated for the period 2000-2015 and nests two types of capital buffers: one that is cycle-independent and system-wide, and another that varies with the cycle in a countercyclical manner, but is also system-wide. In relation to structural buffers such as the O-SII buffer, in this model it is assumed that the banking system only consists of systemically important banks such that system-wide fixed

[49] Mendicino et al. (2017) also perform a welfare analysis of joint impacts between the two buffers as part of the research by the task force for operationalising macroprudential research, but use a different method to measure welfare. Here we wish to use a global welfare approach and report only the results from that paper. For results from the task force for operationalising macroprudential research, see the reference above.

buffers are the same as buffers for SIIs.[50] However, considering that in most EU countries SIIs represent 80-90% of the total banking sector measured in assets or credit (see Section 4 for data), this does not seem to be a very restrictive or unrealistic assumption, in particular since we are interested in the structural (qualitative) effects of the two policies jointly, rather than a precise quantitative measure.

There are evident benefits to applying both policies in this model given their mutual influence, albeit the relative role of optimal structural buffers is higher. The combined welfare gains from the two policies are indeed diferent from the sum of the two as a result of the influence that one policy exerts over the other and their respective spill-over effects. Aguilar et al. (2017) run an exhaustive sequence of policy experiments using model-derived welfare functions. They also run a calibrated model on the EA, Germany, Spain, France and Italy (see Chart C in Annex 8 for the EA, Germany and Spain). They find that the (additional) benefit from using an optimal CCyB is significantly higher when optimal capital buffers are already used.[51] The total minimum loss going from the calibrated to the optimal capital requirement scenario is large (between 6% and 12% smaller). At the same time, they find that the weights of the arguments in the optimal CCyB rule increase across the board.[52] Note that the optimal CCyB policy rule reacts to household credit-to-GDP and firm credit-to-GDP. Thus, there seems to be some overlap and reinforcement between the structural buffer and the CCyB. A higher structural buffer will prompt a stronger reaction of the CCyB to financial cycles. However, if the structural buffer is already at (or close to) optimal level such that economic costs stemming from distressed systemically important banks are minimised, the cyclical risks are also partially mitigated. In that case, the marginal benefit of an optimal CCyB is positive, but limited.[53]

However, four factors hinder a conclusive interpretation of these results. First, the assumptions on the composition of the banking sector used in the studies might not be realistic, and thus composition differences need to be taken into account. Second, the regulatory framework surrounding (total) capital requirements is not equal to that of the O-SII buffers. Third, the negative systemic spill-over effects from a defaulting SII cannot be quantified in this model. Fourth and last, the optimal criterion in rule-making is not easily definable for some countries and systems. Because of these limitations, we have attempted to complement these findings in previous sections with other qualitative and institutional approaches in order to understand better the interaction dynamics and raise additional issues related to their joint effects.

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50 We need to make this assumption because the model does not allow for heterogeneous banks. In order to explicitly include SII buffers, it would be necessary to discriminate between banks and only apply the structural buffer to a subset of those. However, at this point this is not possible in this DSGE model or in others that we have looked at and that we have codes available for.

51 The optimal capital level is calculated as the capital level that maximises an objective function. It is derived using a first and second-order approximation of consumers' welfare using the model's first principles. The optimal CCyB, on the other hand, is found using a second-order approximation of consumers' welfare where the objective is to minimise that loss function (with only volatilities of the arguments included) for a given CCyB rule. The authors tried a number of alternative rules, including reactions to different variables, and the best-performing CCyB rule was the one that responded to household credit and firm credit separately. They also derived the optimal weights on each argument in the rule given the minimum loss function. Hence the optimal capital buffer and CCyB are derived differently.

52 The optimal coefficients on credit and housing investment in the CCyB reaction function vary from country to country. In addition, a calibrated capital requirement is used in some countries, while an optimal capital requirement is used in others. For the EA, under the calibrated capital requirement for the 2000-2015 period the optimal coefficients are 0.25 for total credit and 0.35 for house prices. Under the optimal capital requirement, the weights become 0.4 and 0.9. See Chart C in Annex 8 for further details.

53 New results from the yet unpublished research by Aguilar et al. (2017) from January 2018 suggest that mutual reinforcement between the structural-and cyclical buffers results in significantly lower losses (or higher welfare) compared to the losses generated by any of the buffer individually, or combined.

3.4.3 CCyB and SRB

The interactions between the SRB and CCyB should take into account specific sectoral risks and are most likely to complement each other. The SRB is an independent instrument, and should not be used as a top-up to the O-SII buffer. In terms of strategic interactions, the buffers (SRB and CCyB) will most probably complement each other, since, contrary to the CCyB, the SRB is used to mitigate long-term risk of a non-cyclical nature. A sectoral CCyB might effectively address sectoral risk of a cyclical nature, and conversely if the SRB is used to mitigate risks stemming from a specific exposure category growing in size, and released when the exposure is reduced, the SRB can take the role of a sectoral CCyB.

The situation of strategic complements might change if growth in credit spans multiple sectors and this occurs in particular on the syndicated credit side. If the policymaker deems credit growth to be systemic, then both the CCyB and the SRB should respond, as two types of risk are building up in the economy. Should the growth of syndicated credit be considered non-systemic, the SRB would not respond, and the policies/buffers would act as substitutes. Considering the large chain of actors and products involved in loan syndication, as well as the fact that the excess of credit is usually concentrated in several key institutions which are all strongly interconnected, in the event of an abrupt reversal, strong cross-sector contagion effects might materialise in the financial system. Because of these many links which are formed within syndicated loans, the SRB might be better positioned to address more complex links stemming from many interconnections due to syndicated credit, while the CCyB has a broader scope by being linked to the aggregate provisioning of loans towards the real economy.

Regarding the release of the SRB and the CCyB, they need not occur at the same position in the cycle. On one hand, the CCyB is to be released promptly when the cyclical risk materialises, i.e. when a financial crisis occurs and the economy enters the downward phase of the financial cycle. On the other hand, deactivating or lowering the SRB should occur when the underlying structural risk has fallen, which might not necessarily occur during or immediately after a financial crisis. Considering for instance the 2007-2008 financial crisis and performing a backward-induction exercise: interconnections and contagion risks were particularly high during the upswing, so an SRB could have been introduced to increase resilience against contagion externalities. At the same time, the build-up of cyclical risk could have led the national authority to introduce a CCyB, if such instruments had been available at the time. In terms of release, the CCyB would have been the implicit leader, with immediate release after the crisis burst. However, contagion risks and interconnections did not diminish in 2008 (at least not immediately), suggesting that the authority should have waited a bit longer before eventually deactivating or reducing the SRB.

In determining implicit interactions, the position over the financial cycle needs to be taken into account, while institutional or regulatory restrictions also need to be considered. In terms of timing, calibration and policy implementation, neither buffer is leader or follower, as it depends on macroeconomic conditions, and their interaction induces changes in expectations. However, considering the position of the financial cycle, the CCyB should be the implicit leader and lead the cycle.

3.5 Conclusions

All methods have their limitations, and assessments should explicitly state the limitations, simplifications and assumptions taken to appropriately set expectations on what evaluations are able to accomplish. Moreover, while some of the costs of reforms for market participants may be measurable as GDP losses in the short term, measuring the overall social benefits (i.e. in terms of crises avoided or tempered) is far more difficult, given the possible trade-offs involved in policy objectives, the existing incomplete financial intermediation theory, and data gaps. Also, the effects of implemented reforms can only be fully ascertained over a longer period of time that includes a full financial cycle, including stressed as well as normal market conditions.

The models discussed represent educated attempts to "learn the future from the very limited past". For instance, the general equilibrium model in Aguilar et al. (2017) is calibrated using data on the 2001-2014 period, while the FAVAR model used by the task force for operationalising macroprudential research is estimated over the 2003-2015 period, and the EW-GVAR (Behn et al., 2015) over 1995-2014. A natural question to ask then is to what extent this information is useful going forward. Researchers cannot do much about this problem since, in order to form a view on the relationship between bank balance sheets and the economy, it is necessary to look at how these comoved over a reasonably long period of time. Yet we should keep in mind that (a) these periods were radically different, (b) neither might actually be informative on how the economy will evolve over the next decade, and (c) we now have a greater number of macroprudential tools that interact with each other. In addition, it should be noted that all analyses reported should be treated cautiously, given the relatively considerable degree of uncertainty in their empirical conclusions or the hypotheses upon which the models are built.

With this caveat in mind, the findings can be translated into useful recommendations. Since the costs of transitioning to higher capital might be substantial, higher capital requirements should be introduced very gradually, taking into account the cyclical and structural characteristics of the financial system. Moreover, supervisors should encourage banks to increase capital ratios by raising equity rather than shrinking assets. Distinguishing capital requirements between risks and types of buffers highlights that the joint impact of macroprudential tools differs from the sum of the effects of the individual measures. This implies that the overall level of both measures should be taken into account when setting each of them. At the same time, the complexity in measuring the increasing bank resilience might signal over-regulation and the risk of activities migrating to less regulated financial intermediaries.

With regard to strategic interactions among buffers, while they should usually be seen as complements, they might become substitutes in specific circumstances and hence produce mutually counteracting effects. However, the interaction analysis should be regarded from a dynamic perspective as it includes not only the interaction among the buffers themselves, but also their interactions across different financial and economic cycles. The timing and intensity of the underlying cycle is therefore important in determining the total combined impact of the buffers. Nonetheless, literature on these interactions is still scarce, and further analytical work is required in the near future to better enhance the tools of macroprudential policymakers.

4 Application of O-SII buffers[54]

Summary of proposals

Based on current experience and economic analysis, the following proposals relating to guiding principles for the application of the O-SII buffer could be considered.

- **The buffer size should reflect the risk posed by each SII.** Thus, if a financial institution is identified as a systemically important bank, this means that there exists a systemic risk which should be addressed with a buffer. Therefore, all other things being equal, setting O-SII buffers at zero should be avoided. However, there might be some specific and exceptional circumstances in which the domestic systemic footprint of the bank is already captured by other measures that could justify a 0% buffer.[55] The final assessment should always be made by the authorities on a case-by-case basis and be properly explained to the public.

- **The calibration of the buffer should provide incentives for not increasing a bank's systemic importance.** A rise in the systemic importance of a bank should be reflected in a higher buffer rate (although the relationship does not have to be linear). If there are large differences in systemic importance among banks, the application of a flat buffer rate is not warranted. If the bucketing approach is used to set the buffer rate, the last bucket should ideally be left empty in order to incentivise institutions not to increase their systemic importance. However, owing to the existence of O-SII caps, this leeway currently might not be available in every Member State.

- **The calibration of buffer levels should only depend on aspects directly related to the systemic importance of the O-SII.** A clear-cut scope of application for the O-SII buffer helps to avoid overlaps between instruments, increases the effectiveness of the instrument and makes evaluation of the measure possible. In order to effectively address the risk of misaligned incentives, no other (e.g. microprudential) aspects should be considered. In particular, the time dimension of systemic risk should not be taken into account, meaning that the buffer rate should not be dependent on the financial cycle, as other macroprudential instruments are available in CRD IV to deal with cyclical risk.

- **The G-SII buffer rate applied to an institution should not act as an upper bound on the potential O-SII buffer that could be applied to that institution.** The O-SII framework is best understood as taking the complementary perspective to the G-SII regime by focusing on the impact that the distress or failure of banks (including international banks) will have on the domestic economy. As institutions may be more significant to their domestic economy than the global economy, the O-SII buffer rate applied to that institution may be higher than the G-SII buffer rate.

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54 For a detailed description of the O-SII buffer, please refer to Chapter 4 of the ESRB Handbook.

55 E.g. bank subsidiaries with globally integrated business models that are themselves parts of wider international banking groups, for which the systemic risks are already properly mitigated with the G-SII buffer and whose domestic activities do not pose significant systemic risk at a non-global level. Other specific cases can be banks that are in the running-down process and banks with large non-bank subsidiaries, where a 0% buffer could be justified in the light of other prevailing policies to mitigate the risks.

- **Whenever the calibration method requires the choice of a reference institution, the use of an external reference point[56] is recommended.** Such an approach can help to ensure that not only relative changes to the benchmark but also a general increase in the systemic importance scores of all O-SIIs in a country are reflected in higher capital buffer levels.

- **The calibration of the O-SII buffers gains robustness to the extent possible if several approaches are used simultaneously.** A number of different calibration methods can be used to set the buffer size. Each has both strengths and weaknesses, all rely heavily on different assumptions, and no methodology is theoretically dominant over others. The choice of approach used should depend inter alia on economic reasoning, the specific features of the banking sectors in each EU Member State (e.g. number of O-SIIs, level of concentration), and data availability (e.g. loss history). Different methods might lead to (slightly) different results. A cross-check with several other methods can therefore finally guide the decision about the final calibration of buffer levels. Furthermore, to improve transparency and understanding, the process that leads to the decision should be made public (e.g. via disclosure measures).

- **A more detailed disclosure of calibration methods would be helpful since the calibration of the O-SII buffer requires the designated authority to make a significant number of discretionary choices.** The public communication would benefit from thorough description of the methodology used, including the justification for the choice of a particular method (possibly together with an explanation of why other methods were considered inappropriate in this particular case). The precise scope of desired disclosures relating to calibration depends on the method chosen to set the O-SII buffer.

- **The greater scope for national discretion (e.g. as compared with the G-SII buffer) should be maintained to allow the accommodation of the different structural characteristics of individual countries.** The calibration of the buffer can change according to the specificities of each Member State's economy and banking sector. For instance, small open economies in which the banking sector is highly concentrated in a few large banking institutions may require higher buffer rates than other countries. Therefore, a balance ought to be found between a sufficient level of harmonisation and the ability to effectively target domestic risks.

- **The assessment of the effectiveness of the O-SII buffer should be related to the main economic objectives underlying the introduction of such a policy instrument.** In an ideal scenario, authorities should be able to document (including quantitatively) the impact of the buffer on the probability of distress or funding advantages and related increased risk-taking incentives under the implicit state guarantee. The evaluation should encompass both of the above regulatory objectives, while their relative importance should be decided on a case-by-case basis as the costs stemming from the distress of an institution and the costs induced by funding cost advantages, excessive risk-taking and distorted market competition are expected to vary by institution. Also, the long-term impact on the economy should be investigated whenever possible, including the potential circumvention of the buffer. In addition, the international spill-over effects and regulatory practices should also be assessed, e.g. by means of international peer comparisons and following recommendation ESRB/2015/2. Nonetheless it

[56] "External reference point" means that the reference bank is a hypothetical institution with a systemic importance score equal to the threshold for the identification of O-SIIs; an alternative to this is using the actual score of a selected bank (e.g. a bank with the lowest systemic importance). It does not mean that a national authority should base its calibration on the practices of other national authorities, for example by using a bank in another Member State as a reference point.

is recognised that valid quantification of the potential impact on these accounts may be limited to a significant extent by the insufficient empirical experience accumulated so far and the continuous evolution in financial and regulatory conditions. It is also worth noting that evidence of the O-SII buffer's effectiveness manifests itself only in distressed periods, which occur rarely.

It is acknowledged that there are certain elements of the current legislative framework (i.e. the 2% cap and the cap on subsidiaries) that affect the final calibration of the buffer and are perceived by some Member States as an obstacle to effectively dealing with the level of systemic risk in their countries. However, any changes in this area need to be based on policy judgement, should take into account all arguments and should carefully balance pros with cons.

4.1 Size of the O-SII buffer

The O-SII buffer is aimed at limiting the systemic impact of misaligned incentives with a view to reducing moral hazard. The misaligned incentives stem from the negative externalities that institutions perceived as being too important to fail can present to the whole financial system, along with the associated (implicit) government guarantees and moral hazard problems.[57] The higher capital surcharge (O-SII buffer) is meant to increase the loss-absorbing capacity of such banks by reducing the likelihood and the potential systemic impact of a stress event related to banks' systemic footprint.

Owing to the possibility of exerting supervisory judgement and the lack of detailed guidance regarding the calibration of O-SII buffers, large differences in approaches to setting the buffer rate exist between EU Member States. To avoid unequal treatment of O-SIIs across the EU, it needs to be ensured that banks identical in their systemic importance are not only subject to similar capital requirements across Member States ("level playing field" principle) but also that their capital requirements are commensurate with the systemic risks they pose.[58] A higher degree of harmonisation, however, has to be balanced with some flexibility that should remain with national supervisors, as the O-SII buffer was designed to deal with systemic risk in domestic or regional banking sectors.

4.1.1 Calibration

Two general types of approach for calibrating the O-SII buffer can be identified on the basis of experiences so far. The first group consists of methods with direct mapping between buffer levels and systemic importance scores (most often, the scores are obtained using the EBA guideline methodology,[59] although other approaches have also been taken by some Member States). This group includes the proportional approaches, the bucketing approach or the cluster

[57] See EBA/GL/2014/10.

[58] A special case for the harmonisation of the O-SII buffer is the approach taken by ECB Banking Supervision. Pursuant to the SSM Regulation, the ECB has the legal power to "top up" macroprudential measures taken by Member States by applying more stringent requirements for capital buffers than already applied by national authorities. With the aim of fostering consistency towards requirements for O-SIIs in SSM member states, the ECB has developed a framework to provide a common base to O-SII buffers applied at the national level (see ECB 2017c). The intention is to address potential inaction bias and contribute to a level playing field, leaving space for fine-tuning calibration on the basis of national specificities and expert judgment. Therefore, the methodology only provides for harmonisation at the lower end of the buffer calibration, e.g. it requires a non-zero O-SII buffer. A phase-in period of three years is envisaged following the G-SII process.

[59] See EBA/GL/2014/10. The use of EBA scores for the calibration process, though not mandatory, would contribute to further harmonisation of O-SII buffer calibration practices in the EU.

analysis. A second group consists of methods without direct mapping between buffer levels and systemic importance scores (or without using them at all) referring to a more theoretical framework – for example the EEI approach or the estimation of funding advantages. Illustrative examples of all methodologies described can be found in Annex 9.

4.1.1.1 Methods with direct mapping between buffer levels and systemic importance scores

Proportional calibration

Under the fully proportional calibration approach, O-SII buffer levels are set by defining a linear function of the systemic importance score of each O-SII, while under the adjusted proportional calibration approach, O-SII buffers are adjusted to (higher) round figures by supervisory judgement. Thus, the two main parameters of the methodology are the slope of the linear function linking O-SII buffer levels to O-SII scores and the intercept (point of intersection with the axis). Their setting depends inter alia on the choice of reference institution. In BCBS (2011), the reference institution is defined as "(…) a bank whose failure does not pose negative externalities on the system that the supervisor cannot accept". A range of options is possible in this area. The reference institution could for example be the O-SII with the lowest or highest systemic importance score, but such a choice would directly link the buffers of the other O-SIIs to the score of the chosen reference bank, and hence would deliver relative differences in systemic importance, rather than exhibiting the importance of the individual bank only. Thus an "external reference point", such as the threshold for the identification of O-SIIs (e.g. 350 b.p. for countries using the EBA methodology) should be preferred. Illustrative examples of the use of the proportional approaches (fully and adjusted by supervisory judgement) can be found in Annex 9.

While the proportional methodology is easy to understand and communicate, it has some disadvantages. First, in the case of the fully proportional method, it implies setting continuous buffer levels, which are difficult to apply in practice. Second, particularly in the fully proportional case, the buffer rate changes in response to all, even small, changes in the systemic importance score of an O-SII, even though the systemic importance of this bank de facto remain the same. This introduces undesirable volatility and uncertainty in setting the buffer rates, and also makes communication of the buffer framework to the public more challenging (although variability can be marginally reduced through supervisory judgement or by the application of a rounding convention). Third, from an economic perspective, it remains to be resolved whether the relationship between the capital surcharge and the systemic importance score should be linear or allow for some degree of convexity. Finally, full proportionality may require the authorities to be able to assign buffer levels without limits (i.e. without being constrained by any cap) in order to ensure that the linear mapping between the systemic importance score and the buffer rates is preserved at both ends (low and high scores). Otherwise, the mapping might be non-linear (if, for example, the linear function provides a buffer level higher than the O-SII cap), leaving room for discretionary decisions.

The bucketing approach

The bucketing approach groups O-SIIs into different groups or "buckets" which are characterised by a similar level of systemic importance. This method is the most commonly used approach in practice as it is intuitive, it is easy to apply and communicate, and at the same time it overcomes some of the problems of full proportionality, e.g. it avoids continuous buffer levels and is therefore more stable over time. However, the number of buckets, their size and the corresponding buffer rates need to be set in a discretionary way by the national authorities.

The adequate number and size of the buckets can be set in various ways. A simple approach is to design buckets that are equally sized in terms of the systemic importance scores (similarly to the G-SII approach), yet the size of the bucket has to be set discretionarily. Alternatively, a cluster analysis can be used – a statistical technique which groups the institutions in such a way that banks in the same group (cluster) are more similar to each other regarding their systemic importance than those in other clusters. Various algorithms exist to this end – some examples used in practice (see Annex 9) are agglomerative hierarchical approaches (e.g. Ward algorithm) or centroid-based clustering approaches (e.g. k-means).[60] However, cluster analysis has some disadvantages. First, it is a purely statistical approach without any theoretical or economic backing, and there may be concerns on the economic meaningfulness of the results. Second, the results crucially depend on the specific clustering methodology chosen (methodology instability), and might not always converge with meaningful groupings of institutions.[61] Third, cluster analysis requires a sufficiently large group of banks to be available for the analysis and is therefore less or not at all applicable for countries that have identified only a small number of O-SIIs or jurisdictions with very small banking systems. Also, the consistency of the clustering based on a single variable may depend on the underlying sample scores and may not be robust (see Alessandri et al. 2015). Fourth, for banks with systemic importance scores close to the selected threshold, marginal changes in their scores can alter their status of being an O-SII or not, even if their ranking position is unchanged. Finally, the results of the clustering procedure may not be fully comparable across countries, which may hinder a level playing field, transparency and market discipline.

An adequate number and/or size of buckets in a country can also be derived by supervisory judgement.[62] As the motivation for O-SII buffers is to reduce negative externalities, and as such externalities increase with rising systemic importance of institutions, assigned capital buffers should rise with the systemic importance of an O-SII. From this it also follows that O-SIIs with widely differing scores need to be allocated to different buckets. The bucket thresholds can be calibrated from the total systemic importance score or from the category scores to link the buffer to the specific aspects of the bank's systemic relevance. To provide stability over time, the number of buckets should not be too high, as otherwise banks might switch between buckets frequently. Stability can also be enhanced if the thresholds of the buckets are calculated by using averages of O-SII scores over a number or years (e.g. three-year average) – instead of only the figures for the

60 For the robustness of the results, a combination of clustering approaches could be used (as with the ECB floor methodology, for instance).

61 For instance, clustering by means of the "median linkage method" may not always converge to a solution within the sample. The results of other methodologies based on iterations, such as the "k-means" method, often depend on the chosen starting iteration values and could yield different results even within the same sample. In addition, different types of standardisations (e.g. Z-scores, robust Z-scores, unit normalisation, etc.) can provide different results (transformation instability).

62 The starting point can be, for example, the number of buckets derived on the basis of clustering methodologies.

current year (although this could mean that recent increases in systemic importance are not adequately reflected in the O-SII buffer) – or by using a rounding convention.

The allocation of buffer levels to each bucket is also highly dependent on supervisory judgement and should be guided by best practice. Formally, this allocation is restricted only by the requirement not to create disproportionate adverse effects on the financial systems of other Member States (thus creating an obstacle to the functioning of the Internal Market and existing caps). Currently, most EU Member States use equal steps of 0.25% or 0.5%, depending on the chosen number of buckets. In general, the buffer level for the last systemic institution should be greater than 0% in order to properly account for the systemic risks the identified bank poses. The same incentives result from leaving the highest bucket empty (similarly to G-SII bucketing). However, as long as the O-SII buffer is capped at 2% (or 1% in case of subsidiaries), an empty bucket limits the available range of buffer levels further. This can impede the capability of the buffer to adequately account for risks posed by O-SIIs (for more discussion on the caps, see Section 4.2).

4.1.1.2 Methods without direct mapping between buffer levels and systemic importance scores (or without use of systemic importance scores)

The EEI approach

The main idea behind the EEI approach is that the expected impact on the economy of the failure of a SII and a non-systemically important institution should be the same. The expected systemic impact concept is comparable to the expected loss concept, but is applied on a wider macro-financial scale where the probability of distress plays a similar role to the probability of default (PD) and the measurement of individual systemic importance has a similar function to loss given default (LGD) estimates. The O-SII buffer lowers the systemic impact by reducing the PD of an O-SII. Thus, if the systemic impact of the failure of an O-SII is X times greater than that of a non-SII, the capital ratio of an O-SII needs to be increased to make it X times less likely to fail than the non-SII.[63] Mathematically, this corresponds to the following EEI equation:

$$P(OSII)C(OSII) = P(NonOSII^R)C(NonOSII^R) \quad (1)$$

where $P(OSII)$ and $P(NonOSII^R)$ are the probability of failure or near-failure of an O-SII and a reference (R) non-SII, respectively; and $C(OSII)$ and $C(NonOSII^R)$ are the economic/social costs underlying a situation of distress of a O-SII and a non-SII, respectively.

Three key elements of this methodology affect the final calibration of the buffer. These three parameters include (i) the estimation of the systemic LGD of both O-SII and reference non-O-SII, (ii) the estimation of the PD of each bank, and (iii) the choice of the reference non-O-SII. Each of these parameters can be set by authorities in a discretionary way, as for each one options are available and there is no economic theory to back such decisions.

[63] Even if an O-SII has a lower probability of failure than a reference non-SII, the equation of expected systemic impact recommends the application of a non-zero O-SII buffer whenever the ratio between the systemic impact of the O-SII and the non-SII is greater than the reciprocal ratio of their probability of failure. A non-zero buffer rate is necessary because the lower probability of failure of an O-SII is more than compensated for by the high level of systemic importance.

Estimation of systemic LGD

The future cost of crises is not known to authorities. It can be proxied by looking at historical failures, but the availability of empirical research related to the distress of individual banks or O-SIIs is very limited. Thus, the systemic LGD of an O-SII is usually approximated with the systemic importance scores (see e.g. BCBS, 2011). While this approach is easy to implement (and often the only possibility), it ignores the potential fixed costs of bank failures[64] and the non-linear relationship between the scores and the systemic impact, which would suggest that a non-linear transformation of the scores which maps the systemic impact better approximates the actual systemic impact of an O-SII's failure (although at this point grasping non-linear relationships is mostly theoretical).

Estimation of PD

The proper determination of the PD of a (reference) non-O-SII is a crucial element of the EEI method. The most popular approach is to use a historical distribution of the return on risk-weighted assets (RORWA), defined as the ratio of net income to RWA. Losses represented by RORWA feed directly into common equity via negative net income, and data are usually available for a comprehensive set of institutions (including non-publicly traded). Nonetheless, such an approach has some drawbacks. First, a limited number of extreme loss episodes may result in seriously biased estimates, and the results are highly dependent on the time span and institutional coverage of the sample. Ideally the estimates of the buffer should ideally be based on the sample of banks that are similar in their business models and for which long and consistent RORWA time series are available. Second, historical loss analyses are sensitive to a number of uncertainties, including the interpretation of historical loss data given the extent of regulatory reform since the crisis, survivorship biases in the historical data, the point of non-viability for institutions in the future and the impact of past public sector interventions. If market data are available, these problems could be mitigated to some extent by using the Merton model and conditional PD estimates. However, the Merton model is based on an even greater number of assumptions. In addition, the PD estimates reflect the idiosyncratic PD of an institution, rather than the probability of systemic distress. In fact, a bank can be in distress without triggering a proper default (actual bank defaults are rare), and this distress can give rise to significant systemic risk materialising and to negative spill-overs onto other institutions.

Choice of reference institution

There are a number of alternatives for choosing an institution to represent the non-systemically important bank. The most natural reference point for countries using a scoring methodology to identify O-SIIs (e.g. following the EBA Guidelines) is the systemic importance threshold (see the discussion in Section 4.1.1.1). However, other approaches are also possible. One is an approach where the actual score of the institution falls just under the O-SII identification threshold, while another is the use of a "virtual" institution. In the latter approach, such an institution can be defined for example by considering the average systemic importance score of the banking sector and

[64] See The Clearing House (2016). Fixed costs of bank failures may include fire-sales of banks' assets by investors in banks with similar portfolios to the failed bank, leading to a contagious impact that, to a large extent, is unrelated to the systemic score of the failed bank. Assuming that there are fixed costs of failure, as these increase, the relative importance of the systemic score decreases and the systemic costs of failure of an SII and the reference bank become more similar.

possibly multiplying it by a factor q>1 (see e.g. Skorepa and Seidler, 2013). The "q" factor is set by the regulator at its discretion. The lower this factor is, the higher the O-SII buffer the regulator wishes to set (or, in other words, the stricter the regulator is).

A review of experiences shows that countries have taken different approaches with respect to the key parameters of the EEI methodology. The EU experiences are summarised in Table 1. Outside the EU, the EEI methodology has been used for example by the US authorities to inform the decision on the G-SIB capital buffer (see Federal Reserve System, 2015).[65]

Table 1
EU experiences with the EEI methodology

	BE	CZ	HR	HU	IE	LT	LV
Main method?		Yes		No		Yes	Yes
Use of the expert opinion			Yes	Yes	Yes, used heavily owing to variation of business models		No
Sample	2007-2015	From 2002		Q1 2004-Q2 2015		Q4 2002-Q2 2015	2004-2015
Reference bank	Robustness check with multiple approaches	2*[sector average]		O-SII identification threshold (350 b.p.)			O-SII identification threshold (425 b.p.)
Bankruptcy probability	2.5% of RWA	2.5% of RWA		2.5% of RWA		2.5% of RWA (cumulative over four quarters)	
Expected impact	Modified EBA scores	Modified BCBS D-SIB indicators	EBA O-SII scores	Modified EBA O-SII scores	EBA O-SII scores, EBA importance subscore, avg. market share in Irish loans and deposits	EBA O-SII scores	Modified EBA O-SII scores
Loss definition	After-tax profits	After-tax profits		After-tax profits (moving sum of four quarters)		Moving sum of net profit over four quarters	

Source: ESRB.
Note: Empty cells denote lack of information available to the expert group.

The main advantage of the EEI methodology is that it is linked directly to the economic rationale of the O-SII buffer. It relaxes the assumption of a linear relationship between the systemic importance score and the buffer rate. Similarly to the fully proportional method, it generates a continuum of buffer rates over values of systemic impact and does not allow for existing caps to be accommodated (although, if the EEI methodology is implemented, authorities may group the buffer rates into buckets or round to discrete steps; they may do this as a prudent means of avoiding estimation errors, for the sake of predictability and simplicity, and in order to

[65] To calculate the impact component of the calculation, the US approach employs two methods: BCBS systemic importance scores (similar to the EBA scores) and a measure of a firm's reliance on short-term wholesale funding. Four different methods are considered to choose the reference bank. Finally, four-quarter rolling RORWA and the threshold determined on the basis of cluster analysis are used.

provide the right incentives). In addition, this approach assumes that policymakers are risk-neutral (because it is based on the premise that reducing the expected impact of the O-SIIs is consistent with the objective of reducing negative externalities). If the regulators were risk-averse, the expected impact approach would underestimate the higher loss absorbency required. Finally, the approach focuses solely on the expected benefits of higher capital and does not incorporate any costs associated with higher capital requirements for SIIs.

Funding advantages

Following the BCBS guidance for setting the buffer for G-SIBs, the calibration of the O-SII buffer could be based on the estimated funding advantages of systemically important banks. "Too-big-to-fail" institutions benefit from implicit government guarantees which are associated with substantial funding cost advantages. Thus, the O-SII buffer could be imposed to offset the reduction in funding costs that systemically important banks enjoy. However, robust estimations of such advantages are very hard to obtain (see e.g. Kroszner (2016) for a review of the literature on the existence and extent of funding cost differentials between banks, or IMF (2014) and Schich and Aydin (2014) for some estimates related to G-SIBs). In addition, the concept of funding advantages might be more suitable for large G-SIBs and not very well suited to O-SIIs, which are usually much smaller. Important empirical approaches to estimating the funding advantages (e.g. bond spread differential and ratings-based approach, contingent claims analysis approach, difference-in-differences approach) depend heavily on market data (e.g. bank bonds and credit default swaps) and/or credit ratings.[66] For this reason, the BCBS recommends the use of funding advantages only as a cross-check for other calibration methods. While no EU Member State has applied such an approach, even as a cross-check, it was used in Australia as one of the methods to calibrate the level of higher loss absorbency requirement for D-SIBs (see APRA, 2013).

Network analysis

Network analysis can be used to analyse the implications of financial linkages of systemically important banks for the emergence of systemic risks. One example is the banking system loss (BSLoss) analysis. This is a model-based analysis of potential system losses caused by the default of a single bank, for example, which can be used to determine the amount by which the regulatory Tier 1 capital of the banking system is reduced as a result of the default of an O-SII and its contagion effects within the banking network. This deduction may be interpreted as the contribution to risk costs resulting from interconnectedness between banks. In addition, the first-round effect (write-downs on defaulted exposures) and knock-on effects resulting from contagion effects in the interbank market are also taken into account (see Fink et al., 2014). Analyses of the relative contribution of the failure of an O-SII to the systemic credit risk (e.g. the risk of high failures of correlated credit portfolios of banks – see e.g. Tente, von Westernhagen and Slopek (2017), which consider the creditworthiness of borrowers and correlations between them) can also inform the supervisory decision about the calibration of capital buffers. Network analysis is used to examine certain risk categories such as institutions' contributions to systemic risk resulting from interconnectedness or systemic credit risk in more detail. In this respect it can be used as tool to identify additional institutions as systemically important, but also to add information relevant for the buffer calibration.

[66] E.g. Ueda and Weder di Mauro (2012) estimate the value of the structural subsidy by using expectations of government support embedded in Fitch credit ratings as a difference between the overall rating and unsupported rating.

Peer comparison

Some authorities set the O-SII buffer rate also taking into account a peer review of buffer rates set by other authorities for similar institutions and in similar Member States. Peer comparison can lead to a higher degree of harmonisation, enhance the level playing field and help avoid competitive disadvantages across O-SIIs in the EU. However, it is not a feasible option for those jurisdictions where peers are not clearly identifiable. In addition, peer comparison requires that relevant authorities use other approaches first to be able to compare buffer levels. The benefits of this method are therefore not as great as those of other methods.

4.1.2 Communication

Communication on the use of the O-SII buffer is an important and integral part of the communication strategy of the overall macroprudential framework at both European and national level. The main purpose of a communication strategy is to inform the public and targeted institutions about the identified risks to financial stability and the application of macroprudential measures. However, as it can also affect market participants' expectations, it can even be seen as a separate policy tool (see ESRB, 2014a, Chapter 10).

With respect to the activation of the O-SII buffer, communication must necessarily include a description of the systemic risk identified, how the measure is expected to mitigate it, and the key operational features of the measure (including the timing for application). Most of these issues are part of the information reporting template of the ESRB, the ECB and EBA. However, especially with respect to the expected mitigation of the systemic risks, more detailed information at Member State level should be encouraged. This also includes the disclosure of the analyses done to assess the impact of the measure.

More detailed disclosure of calibration methods would facilitate a full understanding of how the systemic risk stemming from the existence of O-SIIs is mitigated with the buffer. As the evidence in this section shows, a range of methods are available to calibrate the buffer. In addition, each method relies on numerous discretionary assumptions. Public communication would therefore benefit from a thorough description of the methodology used, including the justification for the choice of a particular method and the assumptions made therein.

As more harmonised guidance for the disclosure of additional information can prove helpful to improve the transparency and comparability of the buffer requirements, country-specific aspects need to be safeguarded. In cases where EU Member States use a different set of indicators (besides the possibility of the EBA Guidelines to incorporate optional indicators) in order to account for the specific national situation, a publication of individual scores only according to Step 1 of the EBA methodology (i.e. the use of mandatory indicators) could be misleading. One example is Latvia, where the systemic importance scores of the O-SIIs are calculated by employing an adjusted EBA guideline methodology.

The precise scope of desired disclosures relating to calibration depends on the method chosen to set the O-SII buffer. For authorities using calibration methods with direct mapping between systemic importance scores and buffer levels (fully proportional and bucketing approaches), the emphasis should be put on providing reasoning for choosing the number and width of the buckets or a reference institution (in case of the fully proportional approach). The disclosures related

to the EEI approach should in particular include the justifications for the choice of the reference institution, the choice of the definition of default, the proxy of the systemic impact used and the assumed definition of loss. Apart from the ESRB reporting template, full details of the methodology could possibly be disclosed in a separate, publicly available document (e.g. financial stability report).

4.2 Design of the O-SII buffer[67]

To some extent, the actual calibration and existing differences in targeting O-SII risks among EU Member States are down to the specific design features currently in place in CRD IV. This applies especially to the 2% cap on the O-SII buffer (Article 131(5) of the CRD IV), the cap for subsidiaries (Article 131(8) of the CRD IV), and the consolidation rules. Due to these design features, in some cases setting the O-SII buffer rate that is suggested by the calibration methodology and is considered appropriate by national supervisors may not be possible.[68] This creates incentives to use other instruments instead. At the same time, caps can be seen as helpful in protecting the single European market. The European Commission (2016) states (in relation both to the 2% cap and to the cap for subsidiaries) that "these provisions in the current framework are intended to protect the functioning of the Internal Market also by limiting deviations from the harmonised level of minimum capital requirements, and to prevent the unwarranted accumulation of capital buffers that could have unintended consequences in terms of the supply of credit to the economy".[69] However, in its framework for D-SIBs, the BCBS does not envisage a cap for the D-SIB buffer, stating that, as a principle, the higher loss absorbency requirement imposed on a bank should be commensurate with its degree of systemic importance (although it is important to stress that the current EU macroprudential framework is considered to be in compliance with the Basel rules).[70]

4.2.1 2% cap

Given experiences to date, it may be questioned whether O-SII buffers complying with the 2% limit are sufficient to adequately absorb potential losses posed by O-SII failures. As shown in Section 2.2.1, some Member States effectively circumvent the 2% cap by applying the SRB to target risks related to the O-SII buffer. Raising the cap should decrease the incentive of authorities to use the SRB to target this risk, facilitating a clear delineation between the O-SII buffer and the SRB. A potential risk of raising the cap is that national regulators may find themselves under pressure to increase O-SII buffer rates up to the new cap. However, there is no evidence of a "race to the top" within the current flexibility afforded by the EU framework.

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67 This section combines different arguments related to the design of the O-SII buffer with the aim of supporting the ongoing discussion on the EU macroprudential framework with an economic analysis. At the same time, no explicit recommendations are made in this respect.

68 This is particularly important for non-SSM countries.

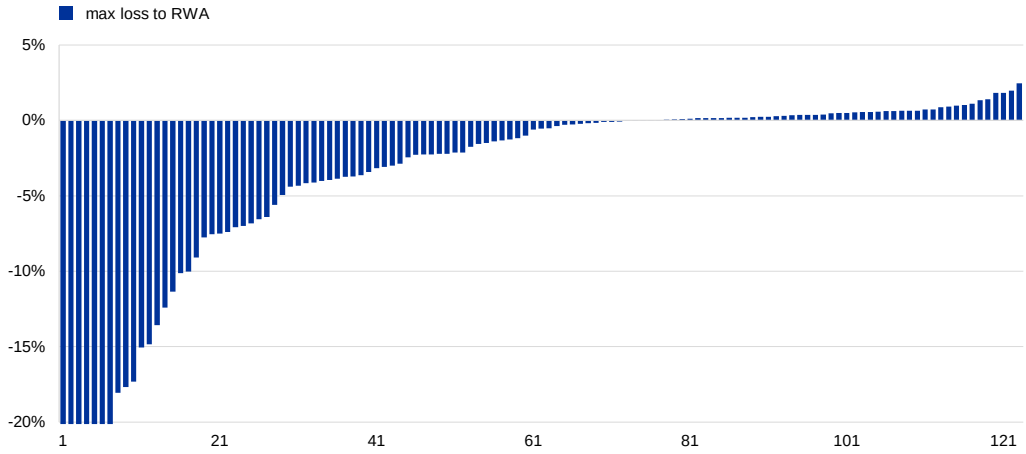
69 In an earlier document (EC 2015), the European Commission notes that "paradoxically, O-SII buffer rules could also have a capital reducing effect compared to a counterfactual in which procedures would be less burdensome (…) [and] it can be argued that the cap on the O-SII buffer could become binding for the national competent and/or designated authorities and could even prevent them from fully addressing financial stability risks in some circumstances".

70 Outside the EU, two countries have set D-SIB buckets above 2%. The United States has the highest bucket, at 4.5% (this refers to the Federal Reserve System capital surcharge for G-SIBs, where the Federal Reserve System introduced a second method for calibrating the surcharges with buckets from 1% to 5.5% with a 0.5 p.p. increase for every 100 b.p. of score above 1,130. The current highest active bucket is set at 4.5%. See Federal Register, Vol 80, No 57 of 14 August 2015.

Evidence from bank losses in the last financial crisis is inconclusive. Of 116 EU banks with more than €30 billion of assets, 17 experienced losses in excess of 9% of RWA (4.5% minimum requirement plus 2.5% CCoB and 2% O-SII buffer) (see Chart 10). Arguably, this could be taken as evidence that some institutions would benefit from maintaining O-SII buffers above 2%. However, the existence of other regulations that were introduced into EU legislation after the crisis makes extrapolations from historic losses more difficult. In particular the resolution framework and the minimum requirements for own funds and eligible liabilities (MREL) increase resolvability and rectify incentives. Thus, these complementary reforms might have reduced the need for higher O-SII buffers. However, they are the responsibility of different authorities (designated authority versus resolution authority) and are not calibrated in a complementary way.[71]

Chart 10

Bank losses as share of RWA (2008-2012)



Source: ECB, based on SNL financials
Notes: The sample includes 116 banks from the EU28 whose total assets exceeded €30 billion in any year during the period 2008-12. The figure represents the aggregated losses in consecutive years for a bank (or, where there were no losses, the least profitable year) in relation to the bank's RWA at the beginning of the period when losses started occurring.

There is no clear justification for the 2% cap in the empirically backed estimates of optimal capital requirements. The extensive but still not fully conclusive literature to date has tried to tackle the estimate of the interval of optimal capital requirements. Although these cost-benefit-type estimates do not explicitly deal with O-SIIs, they still may provide some indication as to whether raising (or eliminating) the cap could provide room for a better approximation of the optimal capital requirements, at least in the case of O-SIIs. The analysis carried out by Dagher et al. (2016) gives estimates on the marginal benefits of higher loss-absorbing capacity. With capitalisation between 15% and 23% of RWA (the authors interpret this as loss-absorbing capacity of a type similar to the total loss-absorbing capacity (TLAC)) the probability of realising the losses in case of a banking crisis could be reduced to a tolerable level in their opinion.[72] Above that level, the marginal benefit

[71] See Commission Delegated Regulation (EU) 2016/1450 of 23 May 2016 supplementing Directive 2014/59/EU of the European Parliament and of the Council with regard to regulatory technical standards specifying that the criteria relating to the methodology for setting the minimum requirement for own funds and eligible liabilities (OJ L 237, 3.9.2016, p. 1). Article 1(2)(c) and Article 2(8) of the Regulation specify that MREL shall include the combined buffer requirement and thus the O-SII buffer level. From this perspective, it is not a substitute for the O-SII buffer. Furthermore, there is no direct link between the identification of an O-SII and its resolution treatment, as each is done separately by a different authority.

[72] The latter is approximated by one approach aggregating the approximate capital loss and recapitalisation needed to restore viability.

derived from further increasing the level of capital seems to considerably diminish. Based on the BCBS (2016) review of optimal capital requirements the optimal Tier 1 requirement ranges from 8% to 20% of RWA. Brooke et al. (2015) estimate the optimum Tier 1 capital ratio to be in the range of 10% to 14% of RWA. In contrast with previous studies, they make estimates assuming that the resolution requirements are in place and take account of the whole timespan of the last crisis experience. Vickers (2016b) draws attention to the assumptions on the conditional probability of failure and the assumed beneficial effects of a working resolution regime, without which the estimate could be 10 p.p. higher.

While empirical studies on the optimal level of capital requirements for the whole banking system give no clear signals regarding the need to increase the cap, other studies argue explicitly for substantially higher capital requirements for systemically important banks only. The Federal Reserve Bank of Minneapolis (2016), for example, argues that a CET1 level of 23.5% of RWA for systemically important banks (and a corresponding leverage ratio of 15%) can "reduce the change of public bailouts relative to the current regulations from 67% to 39%" with relatively low cost to GDP. Passmore and von Hafften (2017) argue that current surcharges of G-SIBs should be between 225 b.p. and 535 b.p. higher than current surcharges to be able to ensure survival of G-SIBs in financial crises. Based on these studies, a cap of 2% for O-SIIs does not seem to be sufficient to secure the resilience of SIIs. Meanwhile, stress test calculations in Germany suggest that the unexpected capital losses arising from a macroeconomic shock can only partly be absorbed by the calibrated O-SII buffer rate. The cap on the O-SII buffer therefore seems to be inadequate to address the risks resulting from O-SIIs in this particular case. The ESRB (2016) points out that some analyses based on an EEI approach also suggest that buffer rates for systemically important banks might need to be higher than 2% (see also Box 1).

However, the reliance on the studies related to the optimal level of the capital to justify the removal of O-SII cap might be questioned for two reasons. First, the studies refer to the overall risks (not only the ones specific to O-SII) which can be addressed through other capital requirements (e.g. CCyB, SRB or Pillar 2 measures). Second, this analysis might be criticised for not taking into account other regulatory measures that were taken after the crisis to enhance the stability of financial system, such as MREL (see also the discussion related to MREL later in this section).

It could be argued that the different reference points determining the systemic importance of O-SIIs and G-SIIs support the cap. If the expected systemic impact arising from the failure of a G-SII is appropriately mitigated by the 3.5% G-SII buffer rate as a maximum, then arguably the systemic risks stemming from the presence of an O-SII in a domestic economy could also be appropriately mitigated by a considerably lower (e.g. 2%) O-SII buffer rate as a maximum because of its presumably lower expected systemic impact.

Box 1

Potential impact of lifting the 2% cap

As the review of calibration methods in Section 4.1 shows, two methods allow for "unconstrained" estimates of the O-SII buffer, which means that they can potentially produce estimates higher than 2%: the fully proportional approach and the EEI approach. The two methods can be applied to European O-SIIs to identify the potential, simulated impact of raising the cap.

Under the fully proportional approach it is assumed that the systemic importance score equal to 350 b.p. with the buffer of 0.25% is a reference point. As a result, the banks that are potentially affected by the 2% cap are those institutions for which the systemic importance score exceeds eight times the reference score (2,800 b.p.).

The EEI approach is applied using the following assumptions (see Section 4.1.1.1 and Annex 9 for more details): the reference bank is a hypothetical institution with 350 b.p., and a loss to RWA greater than 2.5% is taken as a default point.

Loss distribution is taken from the Bankscope database, using yearly losses to RWA of banks from all advanced economies. This approach is similar to the one taken by Brooke et al. (2016), who use data from the Bankscope database to assess the optimal level of capital requirements for UK banks. Since the precision of EEI estimates is unknown (this method relies on a number of assumptions – see the description of the EEI method in Section 4.1.1.2 for more details), only banks for which the suggested buffer exceeds 4% (i.e. twice the existing cap) are considered as potentially affected.

The results of the simulation are based on strong assumptions. They can only be considered as approximate and are merely aimed at illustrating the scale of the potential impact. In particular, they should not be treated as indicating that the actual buffers imposed on selected banks are not adequate – the final decision to set the correct buffer rate remains in each case the sole responsibility of the authority, which can take into account all the dimensions of individual systemic risks.

As Table A shows, the number of potentially affected O-SIIs varies between 10 and 67, with a higher number of banks being affected as a result of applying the EEI methodology. Had the cap been lifted, the median O-SII buffers for these banks would have been between 2.34% and 6.84%.

Table A

Results of the simulated lifting of the 2% cap

Method/scenario	Number of affected O-SIIs	Median new buffer (%)	Median actual buffer (%)
Fully proportional	10	2.34	2
EEI	67	6.74	1.5

Source: ESRB.
Notes: EEI scenarios refer to the loss distributions described above. Median new buffer shows the median of the buffer rates produced by the method indicated in each row.

Table B

Impact on firms by size and importance

		Number of affected O-SIIs	Median actual buffer (%)	Median new buffer (%)	Max new buffer
EEI					
By size	Small	8	1.6	5.5	7.7
	Medium	36	1.6	7.0	10.8
	Large	23	1.4	7.7	13.4
By systemic importance	Medium	23	1.2	4.8	5.6
	High	44	1.5	8.2	13.4
Fully proportional					
By size	Medium	5	1.6	2.3	2.4
	Large	5	1.6	2.7	3.1
By systemic importance	High	10	1.6	2.5	3.1

Source: ESRB.
Notes: EEI scenarios refer to the loss distributions described above. Median new buffer shows the median of the buffer rates produced by the method indicated in each row.

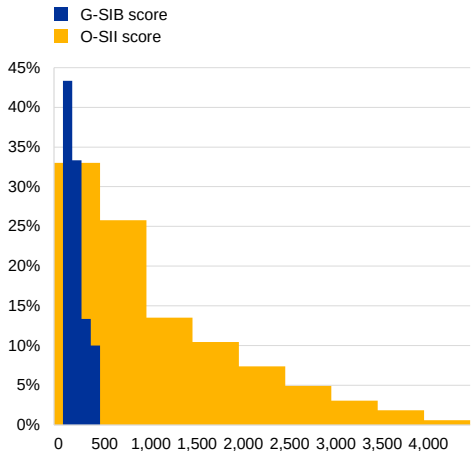
However, the EEI analysis only looks at historical losses and does not take into account various post-crisis measures (other than those related to systemically important banks) that have been introduced into the regulatory framework with the aim of increasing the resilience of banks and thus possibly lowering the probability of a crisis (which in turn should lower the buffer estimates) – see the description of the EEI method in Section 4.1.1.2 for further discussions related to the caveats of the EEI methodology and the discussion relating to the resolution framework later in this section. Table B show that under both the proportional approach and the EEI approach, larger banks would be required to have higher capital buffers.

However, the comparison between the O-SII and the G-SII framework may also give indications for the inadequacy of the 2% O-SII cap. O-SIIs can be expected to be much more important for domestic economies than G-SIIs for the global financial system, so their contribution to the systemic risk from a domestic perspective is likely to be higher. The identification of G-SIIs is based on a global reference framework in which the systemic impact and G-SII buffer of a global institution are proportional to its share in global markets and financial activities. In the framework of reference of a domestic economy, the same institution or a systemically less important domestic institution may have a business model implying a significantly larger share in the domestic financial market and in critical financial activities, especially in the case of a high degree of concentration. While the global reference system is adequate to capture the international impact (e.g. global financial contagion effects) of the failure of a G-SII, it could play down the importance for a national economy of the same institution or some of its subsidiaries. To some extent this can be illustrated with the comparison of the distribution of systemic importance scores (see Chart 11). The same result holds if only the size score is taken into account (which alleviates the problem of

comparability of total scores[73]) – see Chart 12. Thus, if the highest buffer of 3.5%[74] for G-SIBs is considered appropriate to mitigate the impact of an individual bank on the world's economy, then capping the O-SII buffer at 2% may not seem justified. This is also supported by the current design of the interaction between the two buffers in CRD IV, as Article 131(14) states that where a group, on a consolidated basis, is subject to a G-SII buffer and an O-SII buffer, the higher buffer shall apply in each case. Thus, the O-SII buffer rate is envisioned to be potentially higher compared with the G-SII buffer rate, if the latter is lower than 2%.

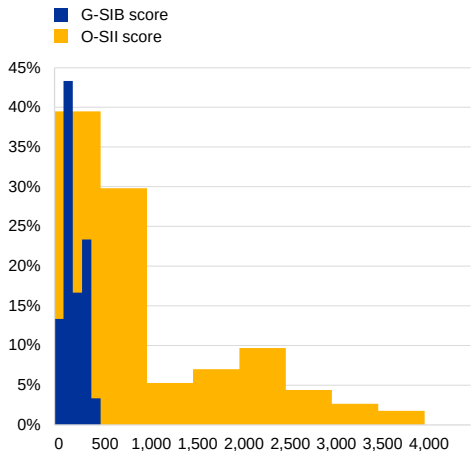
The possible negative side effects of lifting the O-SII cap need to be considered. A lifting of the cap gives more leeway to adequately consider systemic stability risks that may arise from O-SIIs. However, this advantage needs to be weighed against possible negative consequences that higher capital requirements might have on bank lending, profitability, economic growth and ultimately financial stability itself. Higher capital requirements, if they only apply to some banks, can also affect the level playing field and fair competition among banks. In addition, raising the O-SII cap too high could also constitute an obstacle to cross-border bank acquisitions and hinder smooth European financial integration (see ECB 2017b). Thus, all the arguments need to be carefully balanced when making any decisions in this area.

Chart 11
Comparison of O-SII and G-SII total scores
(distribution of total scores)



Sources: Loudis and Allahrakha (2016) and ESRB calculations.
Note: O-SII scores refer to 2016 data, G-SIB scores to 2015 data.

Chart 12
Comparison of O-SII and G-SII size scores
(distribution of size scores)



Sources: Loudis and Allahrakha (2016) and ESRB calculations.
Note: O-SII scores refer to 2016 data, G-SIB scores to 2015 data.

[73] Total scores for O-SIIs and G-SIIs are obtained using different indicators which may affect their comparability. In both methodologies, size is measured by total assets.

[74] The last G-SII bucket of 3.5% has been empty since the beginning of the identification of G-SIBs by the FSB in 2011. Thus, the highest bucket used is the 2.5% bucket.

4.2.2 Cap for subsidiaries[75]

The existing cap for subsidiaries (Article 131(8) of the CRD IV) is strongly related to the geographical pattern of cross-border banking linkages among European banks. Some EU banks have substantial cross-border intra-EU exposures, and there are also strong ownership linkages among European O-SIIs (see Chart 3 in Section 2). A number of non-EA countries have their banking systems dominated by foreign-owned banks, mostly headquartered in the EA. Often, both the parent group and one of its subsidiaries are identified as systemically important banks in the countries where they are incorporated.

Arguments in favour of the cap

One of the main reasons for imposing an additional cap on subsidiaries is to avoid distortions to the Single Market. These distortions could arise if banking groups are subject to very different capital requirements at the consolidated level and at the subsidiary level. Thus for instance the cap limits the inefficient allocation of capital and keeps in check any damage to competition. A complete removal of the cap on subsidiaries might trigger unwanted competition between EU home and host supervisors regarding the allocation of capital for existing cross-border banking groups and could inhibit the development of pan-European banking groups.

Removal of the cap could potentially have an adverse impact on the resilience of parent institutions. A higher O-SII buffer for subsidiaries (as compared with their parent) creates an incentive for parent institutions (or holding companies) to raise debt externally in order to invest in the equity capital of their subsidiaries, thereby enabling their subsidiaries to meet their higher O-SII buffers. This process, known as “double leverage”, can weaken the resilience of parent institutions or holding companies, which rely in part on dividend income from their subsidiaries to service their external debt, and can lead to undue pressure on subsidiaries to upstream dividends (see Box 2). However, this is still an issue in any case for non-EU subsidiaries, as the additional cap does not apply to them (although obviously non-EU subsidiaries are not affected by the EU O-SII framework).

Box 2

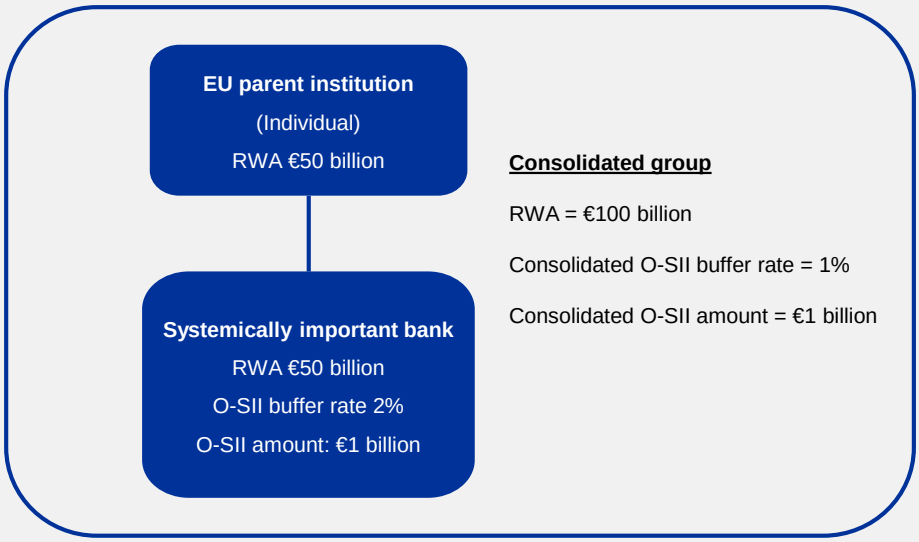
Removal of the cap on subsidiaries and impacts at the consolidated level – an example

An EU parent institution has RWA of €50 billion on an individual basis. It also has a subsidiary with RWA of €50 billion. The EU parent institution is required by the home authority to meet a 1% O-SII buffer on a consolidated basis. The subsidiary is required by the host authority to meet an O-SII buffer of 2% (in this example, we assume no intragroup transactions, meaning that the consolidated RWA are the sum of the parent and the subsidiary and equal to €100 billion).

[75] See Annex 10 for simulations related to this cap.

Chart A

O-SII with systemically important subsidiary



In this scenario, the consolidated O-SII buffer and overall systemic risk of the group have been set much lower by the home jurisdiction than the O-SII buffer and domestic systemic importance of the subsidiary by the host jurisdiction. Other things being equal, all of the systemic buffer capital required on a consolidated basis (€1 billion) would be located (ring-fenced) within the subsidiary. This would mean that none of the capital held for systemic purposes would be available to absorb losses arising from the EU parent individual bank.

To address these challenges, the home authority should have flexibility to adjust the O-SII buffer at consolidated level to take account of the higher systemic risk posed by the subsidiary. In the example above, the EU parent institution accounts for 50% of the assets of the consolidated group. In the event of distress, it should be able to absorb half of the 1% buffer at consolidated level (i.e. €500 million). To ensure this is possible, the home authority could decide (with no obligation) to increase the O-SII buffer at consolidated level so that the subsidiary can meet its €1 billion buffer amount without depriving the individual EU parent institution of its proportionate share of the consolidated O-SII buffer. This would involve increasing the consolidated O-SII buffer amount to €1.5 billion, with a consolidated O-SII buffer of 1.5% instead of the initially assessed level of 1% prior to the decision taken by the host authority. This would ensure that there was enough capital at group level to take into account the systemic importance of the subsidiary, as well as ensuring that other parts of the group had access to their proportionate share of consolidated resources. Fruitful and constructive dialogue between home and host authorities would facilitate effective implementation of this approach.

From the perspective of home countries, the cap for subsidiaries prevents ring-fencing of capital within the subsidiaries and allows for more effective use of capital within the group. Box 3 explains the concept of ring-fencing in more detail. In the context of the O-SII buffer, ring-fencing is related to the accounting principles of calculating capital requirements at

the consolidated level (see e.g. McPhilemy and Vaughan, 2016 or Ramirez, 2017). Setting an excessive O-SII buffer at the subsidiary level affects capital allocation within a group (see the example in Box 2). Cerutti and Schmieder (2014) put the simulated impact of ring-fencing on parent banks' Tier 1 capital ratio at an estimated 0.9% to 2.4% (compared with a baseline scenario where all capital buffers in excess of regulatory minima could be transferred). On this basis they conclude that ring-fencing can be an important risk for banking groups' solvency and erode their ability to diversify strategies under stress. These estimates are based on the publicly available data from the 2011 EBA stress tests. The cap on subsidiaries limits the discrepancy between the subsidiary and group O-SII buffer – including, however, when higher buffers at the subsidiary are justified.

Box 3

The notion of ring-fencing

There is no universally accepted definition of ring-fencing. Most often, ring-fencing refers to structural reforms of the banking sector, such as measures to separate risky trading activities from other parts of banking groups, which aim to insulate retail operations from possible losses. Examples of structural reforms include the so-called Volcker Rule in the United States, aimed at limiting too-big-to-fail risks. In the United Kingdom, ring-fencing was one of the main policy proposals made by the Independent Commission on Banking and will be legally binding for the biggest UK banks from 2019 (see HM Treasury, 2017). Mandatory separation of proprietary trading was foreseen in the draft regulation on the structural reform of the banking system (see European Council, 2015).

The term “ring-fencing” is also used in the context of restrictions related to the cross-border operations of multinational banking groups. Song (2004) equates ring-fencing with isolating the bank from other companies in the group. D'Hulster and Otker-Robe (2015) define ring-fencing as “geographical separation of part of a cross-border banking group from its parent, or other affiliates, on a permanent or temporary basis” referring to the “territorial bias”.

In particular, the restrictions can relate to the cross-border transfer of capital and/or liquidity within one group and can be the effect of supervisory actions. Most often, ring-fencing is an effect of the actions taken in host countries, but examples of ring-fencing by home authorities can also be found. In such a context, ring-fencing can be understood as “partially or fully limiting cross-border banking groups’ ability to re-allocate funds from subsidiaries with excess capital and/or liquidity to those in need of capital and/or liquidity” (Cerutti and Schmieder 2014). Cerutti et al. (2010) identify three different types of ring-fencing:

1. partial ring-fencing, where only excess profits can be freely allocated within the group but not capital buffers;
2. near-complete ring-fencing, where only one-way flow of funds from the parent to a subsidiary is allowed;
3. full ring-fencing, where any intragroup transactions are not allowed.

However, the above definitions do not take into account the motivations of authorities in imposing such restrictions and treat nearly any actions taken by host supervisors as ring-fencing, irrespective of their motivation. In particular, it is useful to distinguish between:

- prudential requirements and buffers imposed by host authorities on subsidiaries (or sub-groups) of international banking groups in accordance with internationally agreed (Basel) standards;
- measures arising from jurisdiction-specific approaches to regulation and supervision that extend the amount of capital and liquidity that internationally active banks need to hold locally.

Prudential requirements and buffers are mandated by the BCBS framework, which requires its rules to be applied "at every tier within a banking group…on a fully consolidated basis". The application of requirements and buffers to institutions (regardless of whether they are subsidiaries of international banking groups) is also required under the CRD IV package. Nevertheless, these requirements are not fully harmonised and leave large flexibility to national authorities in the details of their application.

Using the discretion to apply internationally agreed standards in a slightly different way than they are applied in other jurisdictions or using jurisdiction-specific measures may be motivated by a variety of factors. D'Hulster and Otker-Robe (2015) link ring-fencing to policy considerations (the existence and effectiveness of global resolution frameworks, firm-specific information asymmetries related to the resolution, and the protection of supply of credit) as well as structural characteristics of cross-border banking (whether the source of stress is in home or host country, the business model of banking groups). Herring (2007) notices that the strongest incentives for ring-fencing arise when foreign-owned banks are systemically important in the host jurisdictions and at the same time are small relative to the parent group.

From the point of view of host authorities, ring-fencing can protect local macro-financial stability (which host authorities are mandated to do by law) by limiting risks of intragroup contagion (see Cerutti et al., 2010). In the EU, some actions of this type might be considered illegal to the extent that they go beyond maximum-harmonising EU legislation. The European Commission (2014) in this respect states that "such ring-fencing measures may be restrictions to the free movement of capital that are prohibited by the Treaty unless duly justified and proportionate". However, the European Commission (2014) acknowledges that it is difficult to clearly distinguish between legal and illegal actions. It points out that some actions can only be considered as illegal if they are not justified and proportionate. Thus, it divides measures into two groups: justified ("validly required by the situation of the individual institution targeted by the supervisory requirement") and unjustified ("excessively protecting national taxpayers"), linking the discussion on ring-fencing to the evaluation of the suitability of supervisory measures. However, the European Commission concludes that its review reveals "no relevant legal obstacles that would prevent institutions from entering into contracts that provide for the free movement of funds between them within a single liquidity sub-group". D'Hulster (2015) shows that ring-fencing activities are much more common outside the EU, which can be explained by the specific regulatory framework.

The same report by the European Commission acknowledges that while ring-fencing practices can be "logical from a purely national perspective" they may have "clear and significant negative effects from a wider European perspective". Consequences of ring-fencing include negative effects on credit supply and cross-border capital flows through higher capital and/or liquidity requirements

imposed by host supervisors on internationally active banks. Restrictions put in place in one country could also create an incentive for other countries to follow suit.

While there is a consensus that ring-fencing should be avoided, there is also lack of common methodology as to how ring-fencing could be measured in practice. High capital buffers per se do not constitute the evidence the authorities excessively hoard capital in their jurisdictions. The "justifiability" of actions lies at the heart of the notion. But what is justified and what is not remains very subjective. As a result, relevant authorities might sometimes have difficulty in finding common ground.

Finally, removing the existing cap could also hinder the objective of encouraging financial integration across Europe. Requesting excessive O-SII buffers on subsidiaries could encourage banking groups to transform subsidiaries into branches, which could be detrimental both for home and host countries (as less supervisory information is requested on branches than on subsidiaries). This practice of branchification implies that a larger proportion of a host banking system will be supervised by the home authority instead of the host authority. The recent reorganisation by Nordea to organise its operations through branches rather than using a subsidiary structure is an illustrative example of such a practice. Danske Bank has announced similar plans.[76]

Arguments against the cap

From the perspective of host authorities, the cap can lead to a distortion in the level playing field within a country or compromise financial stability. This is because the same buffer rate of above 1% cannot be applied to two banks of similar systemic importance belonging to different ownership structures if one of them is a domestic bank and the other a subsidiary of an EU parent institution. However, this is difficult to reconcile with the principle stated in the BCBS framework for D-SIBs, which stipulates that "banks in a jurisdiction should be subject to a consistent, coherent and non-discriminatory treatment regardless of the ownership" and means either that the risk is insufficiently addressed as the buffer level is too low for both banks (which impairs financial stability in host country) or that the level playing field principle is compromised. While it can be argued that banks belonging to large groups where liquidity and risks are centrally managed are less prone to systemic events than domestically owned banks that do not have access to support from a parent bank (which justifies a lower O-SII buffer), the experience from the recent crisis shows that foreign banks can act also as shock transmitters (see e.g. Cull et al., 2017 and the literature presented therein).[77] In addition, the cap also indirectly affects domestically owned banks, which may have a negative impact on financial stability in host countries.

[76] See **Danske Bank Annual report 2016**.

[77] In 2009 a special coordination body (the Vienna Initiative) was established comprising the representatives of the EU cross-border banking groups present in emerging European countries, home and host regulators, and international institutions such as the IMF, and aiming "to prevent a large-scale and uncoordinated withdrawal of cross-border banking groups from the region".

There is also no theoretical justification to link the importance of a bank in one market (e.g. the home market) to the buffer in another location. The scale of activities of EU cross-border banks in different locations may differ substantially. While it can be argued that the O-SII buffer at the consolidated level already partly covers the risk posed by subsidiaries (as it is based on the consolidated systemic importance indicators calculated at the highest level), and thus the O-SII buffer can be lower in the host countries, this argument neglects the fact that in this way only the relative importance of the subsidiary within the group (not the host economy)[78] is captured (in the EU, subsidiaries are usually small compared with their parent groups, but this does not mean that they cannot have dominant positions in their jurisdictions, and as a result, the removal of the cap would be likely to have a much smaller impact on the parent banks than on the subsidiaries – see Box 4). What is more, holding capital in other entities (i.e. parent banks) may not be effective in compensating for potential moral hazard connected to the implicit guarantees that systemically important banks may enjoy (which is the aim of the O-SII buffer).

There is no empirical evidence supporting the effectiveness of the cap in preventing ring-fencing. The existing research in this area, which is scarce, does not refer directly to the problem of O-SII buffer, and the results depend heavily on the initial discretionary assumptions (in particular, there is no common definition of ring-fencing – see Box 3). The assessment of whether the ring-fencing would actually increase after the removal of the cap would require an evaluation of the proper level of buffers in host countries. The discussion in this context seems to be based on the assumption that the O-SII buffers in host jurisdictions will be automatically and significantly raised, while in reality host country authorities also take into account the systemic importance of banks in their jurisdictions and may not always make use of this possibility. In addition, there is no reference to ring-fencing in the current design of other capital buffers in CRD IV – i.e. the SRB, CCyB and the CCoB – which makes the argument inconsistent.

Finally, from a purely operational point of view, the cap negatively affects the predictability and communication process in host countries. The O-SII buffer must be aligned with the decisions made in other countries, which may be taken at different times. This could lead to frequent resetting of the O-SII buffers simply to adapt them to actions in other countries (not because of changes in the systemic importance of a given institution). This can affect the credibility of policies at the host level and might be difficult for market participants to understand.

[78] In other words, the systemic importance of the parent group is the same whether it has a high systemic presence in one other Member State or whether it has a diversified portfolio spread across the whole EU without any systemic presence in any other EU Member State.

Box 4

Removal of the cap on subsidiaries – a simulation of the impact

To simulate the potential impact in the EU context, data on ownership linkages from the ESRB (2017, Annex 3), data from notifications and financial information from the SNL database are used.

In the first step, subsidiaries that are potentially affected by the cap are identified. It is assumed that these are the subsidiaries with a systemic importance score above 1,000. Next, it is assumed that the O-SII buffer for these banks is set at the maximum currently available level of 2%. The impact of lifting the cap is approximated only on the basis of differences in RWA between parents and subsidiaries; it does not take into account other potential changes that may interact with the removal of the cap on subsidiaries. Charts A and B show the results. For the results of other simulations using different assumptions, see Annex 10.

Chart A

Increase in capital requirements in response to the removal of the cap for subsidiaries

(% of RWA of home countries)

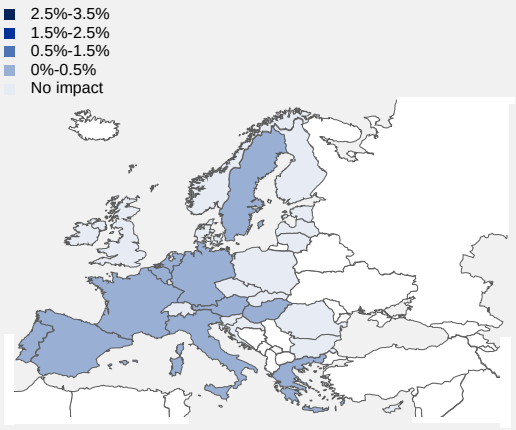
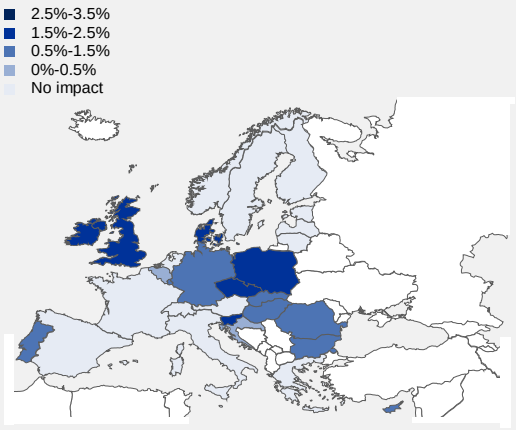


Chart B

Increase in capital requirements in response to the removal of the cap for subsidiaries

(% of RWA of host countries)



Sources: ESRB, SNL and ESRB calculation.
Notes: Calculations are based on RWA of individual banks as at the end of 2015, taken from the SNL database (in a few cases, data were collected from banks' individual financial statements). The Czech Republic, Denmark and the United Kingdom use the SRB instead of the O-SII buffer.

4.2.3 Levels of consolidation

The aim of the O-SII buffer is to contain all the risks stemming from a banking group, which includes ensuring the availability of adequate capital resources both at group level and at subsidiary level. Differences in the levels of consolidation have an impact on assessing an O-SII's systemic importance. Whereas the highest consolidation level of a banking group includes all

subsidiaries, sub-consolidation applies to a sub-group of entities within the wider consolidated group. The individual (solo) consolidation level only comprises the unconsolidated accounts of a legal entity licensed as an institution. Comparing overall systemic importance scores compiled at two or more distinct consolidation levels is difficult because the number and scope of institutions taken into account varies (considerably) from one distinct consolidation level to the next. For a given banking group, there are two opposite effects in play. On the one hand, there should be a decrease in the market share of the lower consolidation level of a banking group, as some of its activities are excluded. On the other hand, an increased overall contribution from all the domestic entities of a banking group might be observed when assessed at a lower consolidation level, as intragroup transactions (between them) would no longer offset one another. Subsequently, the resulting overall effect on the systemic importance score of a banking group when calculated as the sum of the scores of all its entities is rather uncertain.[79] If only the leading institution of a banking group rather than the highest consolidation level of a banking group were considered, then the overall score would be lower (unless this leading institution and its peers conducted a lot of intragroup transactions).

The legal framework for the application of the O-SII buffer with respect to consolidation is laid down in Article 131(5) of the CRD IV, but its interpretation is ambiguous. Article 131(5) can be read as meaning that it only allows different levels of consolidation as mutually exclusive possibilities depending on the consolidation level at which each entity has been identified within a given jurisdiction ("The competent authority or designated authority may require each O-SII, on a consolidated or sub-consolidated or individual basis, as applicable, to maintain an O-SII buffer … taking into account the criteria for the identification of the O-SII."). Another reading of Article 131(5) interprets the conjunction as inclusive, and accordingly some Member States, such as Bulgaria, Estonia, Croatia and Poland, have already implemented the O-SII buffer at (sub-)consolidated and individual levels. In contrast to this, Article 133(3) on the requirement to maintain an SRB explicitly allows the possibility of the simultaneous prescription of the SRB at multiple levels of consolidation.

There are merits in applying the buffer at the highest consolidation level in each country. Such an approach is in line with the BCBS principles regarding higher loss absorbency for D-SIBs.[80] The EBA Guidelines on the identification of O-SIIs explicitly require a first assessment at the highest level of consolidation for achieving the harmonisation objective across Europe but allow for a subsequent application of the methodology at other appropriate levels. Setting O-SII buffers at the highest level of consolidation available in each jurisdiction can allow for the internalisation of external effects and safeguarding of financial stability. This can ensure that enough capital is available in all parts of the group if needed. However, there are circumstances where supervisory authorities may choose not to apply the O-SII buffer at the highest level on consolidation, for example where the consolidated group is designated as a G-SII.

On the other hand, there might also be some merit in the simultaneous application of the buffer at more than one level of consolidation within a given jurisdiction. For a competent authority, this could ensure that enough capital is held not only in the group (or sub-group), but also

[79] It should be observed that intragroup transactions are not external exposures; this is why accounting rules require their elimination, and their inclusion in systemic scores measurement might lead to some double counting effects.

[80] See BCBS (2012), Principle 10.

in key institutions within its jurisdiction. Certain subsidiaries within a consolidated group may perform critical activities (e.g. household and small and medium-sized enterprise (SME) deposit-taking and lending). Applying an O-SII buffer at consolidated level only would not guarantee that the capital held to meet the buffer would be available to absorb losses from that particular subsidiary. Hence, competent authorities should have the option to apply the O-SII buffer within a given jurisdiction, including at levels beneath the highest consolidation level to ensure an appropriate distribution of capital to the part of the group on which their jurisdiction depends. The BCBS framework for D-SIBs draws attention to this problem by looking at ring-fencing issues and foresees the possibility for the home authority to also set solo capital requirements.[81] However, situations could exist in which non O-SII foreign subsidiaries of a banking group could be worse off if most of the consolidated capital is retained both in certain host countries through O-SII buffers of foreign O-SII subsidiaries and in the home country through a solo capital requirement set by the home supervisor.

In the context of cross-border banking, the possibility for the home authority to impose the O-SII buffer simultaneously at the highest and lower consolidation levels could mitigate the risk related to excessive ring-fencing behaviour of host supervisors. This possibility might be particularly important if the cap on subsidiaries is lifted.[82] At the same time, there might be reasons for the designated authority where a group is headquartered (home authority) to have the flexibility to take into consideration O-SII buffers set at lower levels of the group by host authorities when setting O-SII buffers at the consolidated level (see Box 2). However, this might trigger unwanted side effects. Indeed, the home authority might have to wait for all host authorities' decisions on O-SII buffers of the foreign subsidiaries of all its internationalised banking groups before it can finalise the setting of O-SII buffers at consolidated level for its jurisdiction (or it might have to reassess its own decisions once the host countries' decisions have been taken).

In some circumstances, there might be a rationale for setting higher buffer rates at lower levels of consolidation. Such an approach might be especially justified in the case of globally active banks that are at the same time identified as G-SIIs. According to CRD IV, the higher of the two buffers (O-SII and G-SII) applies in such cases. Thus, if the bank is subject to the 2% O-SII buffer and the 1% G-SII buffer, the global operations of the bank are subject to a higher buffer (2%) than intended solely by the G-SII buffer. Such a situation can be justified, as the country where the parent of an O-SII is hosted may well face costs in the event of bankruptcy that are substantially higher than the domestic costs, since losses of a foreign subsidiary might have to be borne by the parent. However, in some circumstances, this could result in a disproportionately high buffer for the group as a whole. Another case where setting a higher buffer rate at lower levels of consolidation could be justified is where some groups contain particular subsidiaries or sub-groups that are both (a) more important for the domestic economy than the rest of its group and (b) structurally separated from the rest of the group. In these circumstances, it would be reasonable for the competent authorities to hold the systemically important subsidiary (or the sub-group) to a higher standard of loss absorbency than the rest of the group. In this case, the amount of capital required on a consolidated basis should reflect the sum of the domestic systemic importance of the specific subsidiary (or the sub-group) and the systemic importance (domestic or global) posed by the other entities in the group.

81 See BCBS (2012), paragraph 38.

82 See Section 4.2.2 for more discussion on this issue.

4.3 Evaluation

The assessment of the effectiveness and proportionality of the O-SII buffer implementation is required by CRD IV and recommended in prudential principles of international and European fora. According to Article 131(7) of the CRD IV, before setting or resetting the O-SII buffer, the competent or designated authority has the legal obligation to justify why the O-SII buffer is considered likely to be effective and proportionate to mitigate the risk represented by O-SIIs. Relevant authorities should have a clear understanding of these two concepts.

First, the assessment of the effectiveness of a regulatory measure should demonstrate the extent and significance of its expected impact on the targeted risk and the reasons for these expectations regarding regulatory effects. The assessment could be interpreted as the evaluation of the expected benefits to the financial system and the economy balanced by the negative effects arising from its implementation compared with the implementation of alternative instruments. Such an analysis should be based on past empirical experiences with comparable regulatory measures, provided the forward-looking evaluation of economic circumstances and the nature of the regulatory change allow such a comparison to be drawn.[83]

Second, proportionality requires that regulatory measures impose obligations on individual institutions in proportion to their contribution to systemic risk. EBA (2015) identifies the following five dimensions of the principle of proportionality: (1) the cost-benefit analysis of the objectives of a regulation at a level proportionate to the "significance and complexity of the issue"; (2) the contribution of a regulatory change to the marginal benefits and costs of the regulatory regime as a whole; (3) complexity and the related burden of compliance, potential for regulatory arbitrage and opacity; (4) differentiation in regulations based on the particular circumstances of banks; and (5) materiality: waiver of requirements for institutions only marginally exposed to systemic risk.

Effectiveness and proportionality are discussed as inter-related subjects in multiple impact assessments. For example, BCBS (2012) states that a supervisory risk assessment proportionate to systemic importance is a prerequisite of efficient supervision. Meanwhile, EBA (2015) includes the cost-benefit analysis of effectiveness in the components of proportionality. Thus efficiency and proportionality enhance and intensify each other's effects.

In general, the Member States' notifications tend to reveal a qualitative approach in assessing the effectiveness and proportionality of structural measures, both on the benefit side and on the cost side. On the benefit side, in several cases national authorities have determined the objective of the O-SII buffer regulation to be the mitigation of two related market failures. First, it is intended to reduce the probability of the systemic impact materialising, i.e. the probability of negative externalities (losses) resulting from the failure or serious distress of an O-SII. Second, the pricing of an implicit state subsidy into funding costs of O-SIIs distorts competition and burdens the state budget if SIIs have to be bailed out at the expense of taxpayers. In addition, there is the recurring argument of increased harmonisation (and proportionality) between national and international capital requirements.

[83] E.g. de-Ramon et al. (2017) detect certain differences alongside the similarities in the balance sheet adjustment strategies and capital structure management of UK institutions facing changing capital requirements before and after the crisis.

Generally, approaches to corroborating assessments of the cost of a failure and the impact of an O-SII's distress rely on additional indicators, while a model-based analysis tends to be the exception. Several national authorities analyse supplemental indicators on individual or sectoral exposures in proportion to GDP, sectoral concentration or other types of aggregated measure (e.g. aggregate share in domestic private deposits and loans or in payment transactions or over-the-counter derivatives). To some extent the calibration may provide justification for the effectiveness of the O-SII buffer in reducing the probability of distress, e.g. if the EEI is used. If the calibration does not take account of the buffer's impact on the probability of distress, the assessment of effectiveness should discuss this. In Germany, the systemic effects of a default of an institution are also analysed (see e.g. Fink et al., 2014 on the BSLoss analysis).

Analyses of the effect of the introduction of O-SII capital buffers on the development of implicit funding cost subsidies are also scarce and need to be promoted. Several studies confirm that too-big-to-fail institutions benefit from implicit government guarantees.[84] The International Monetary Fund (IMF, 2014) discusses several approaches to estimating implicit funding subsidies (see also Siegert and Willison, 2015), but whether and to what extent the introduction of the O-SII capital buffer or credible resolution regimes has reduced implicit government guarantees given their size and importance is an ongoing subject of discussion, impeded by the limited access to market price and rating data for various national authorities. An evaluation of funding cost advantages should include a control for different degrees of risk-taking, because the beneficiaries of implicit subsidies may finance higher levels of risk-taking with similar costs to non-SIIs.[85]

The assessment of the cost side of introducing the O-SII buffer is also hampered by analytical challenges, as the existence of voluntarily held additional capital buffers can temporarily dilute the assessment results. Many Member States find that the cost effects of the regulatory measure seem to be quite small for the affected institutions, because many of them do not have to raise additional CET1 capital to fulfil the requirements. Instead, they only lock down own funds they had already accumulated (voluntarily held capital buffers). This effect may dilute a comprehensive assessment of the cost effects of O-SII buffers, at least in the short term. Academic literature indicates that even banks that hold excess capital above regulatory minima react to higher regulatory capital requirements and attempt to manage the buffers to mitigate expected market reactions (see e.g. Francis and Osborne, 2010).

One important aspect of the analysis of the cost effects of O-SII buffers is the economic consequences of phasing in the buffer. A forward-looking analysis of the adjustment strategies during the transitional period may be warranted. This could take account of changing access to capital markets, other changes in capital requirements in the near future, expected speed of recovery and potential balance sheet adjustments (e.g. deleveraging, or changes in leverage, in the voluntary buffer or in the market segments most affected by these adjustment needs).

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84 Krozner (2016) provides an insightful overview of approaches that have been applied to examining funding cost differentials between large and small banks.

85 For an empirical investigation of higher risk-taking incentives under public guarantees, see Gropp, Gruendl and Guettler (2010).

Analysis of the proportionality of implemented O-SII buffers can draw to a great extent on an assessment of calibration methods. The consistent application of calibration methods reviewed in this report in many cases provides buffer rates that are proportionate to the systemic importance and consequently to the systemic impact of the individual institution. Therefore, the proportional calibration method, the bucketing approach, and the EEI could be used to support the proportionality of the determined buffer rates. Occasionally the analysis distinguishes between institutions having similar systemic importance measurements but distinct sources of systemic importance and different corresponding external costs of imposing the O-SII buffer on them, e.g. institutions with a domestic focus are compared with foreign subsidiaries with a more international focus.

However, an impact assessment of the introduction of O-SII buffers goes beyond calibration. The notification template refers to an assessment of cross-border effects, of the likely impact on the Internal Market, and of leakages and regulatory arbitrage within the notifying Member State. Recommendation ESRB/2015/2 gives Member States guidance on how to proceed on this. Additionally, Chapter 11 of the ESRB Handbook elaborates on the analytical framework.

Theoretically, the introduction of capital instruments such as the SII buffers and the SRB can affect cross-border credit exposures and access to cross-border capital markets. In this regard, the assessment of the development of cross-border loans is of special importance with respect to the credit transmission channel. Possible effects on cross-border capital markets could be assessed by analysing cross-border bank equity exposures in relation to total home own funds.[86] National authorities should pay attention to the cross-border aspects of regulatory arbitrage. For example, in smaller national jurisdictions, where branches play an important role, activity may shift to branches not burdened by the O-SII buffer (i.e. through branchification), which would constitute an inward spill-over into the host country.

[86] Table 11.3 of the ESRB Handbook offers a more comprehensive list of transmission channels and respective indicators.

5 Application of the systemic risk buffer

Summary of proposals

Based on an economic analysis and current experience of the SRB, the following guidelines, covering the application of the SRB, should be considered for improvement of the ESRB Handbook.

- **The application of the SRB should follow a structured process, including a clear conceptual implementation framework, for the identification, analysis and assessment of system-wide non-cyclical systemic risks.**

- **The above implementation framework should include a broad – albeit non-exhaustive and non-mandatory – taxonomy of risks that the SRB can address.** This would help to identify the non-cyclical risks that the SRB could address and the indicators to be monitored in relation to the risks. It would also help to inform calibration. The suggested categories of risks that could be addressed via the SRB comprise those stemming from: (1) the propagation and amplification of shocks within the financial system; (2) structural characteristics of the banking sector; (3) the real economy with the potential to affect the banking sector.

- **The proposed framework for SRB implementation should include multiple calibration methods** that could also be used for both ex ante and ex post evaluation.

Furthermore, the current legal framework for the SRB has some limitations that could impede the effective application of the buffer. These limitations relate partly to the currently blurred delineation of the objectives of the O-SII buffer and those of the SRB, which could result in the risks covered by the two instruments overlapping. The proposals outlined below should lead, if implemented, to a sharper delineation of the O-SII buffer and the SRB, the improved flexibility of the SRB in addressing systemic risks in a timely and adequate manner, and greater efficiency in the choice of the tool most appropriate for an identified risk. At the same time, existing rules and procedures (notification and approval requirements of buffer rates above certain thresholds) should continue to safeguard the integrity of the Single Market. Greater transparency through enhanced disclosure should further balance out the improved flexibility offered by the proposed changes.

- **Clarification that the SRB is an instrument addressing system-wide non-cyclical systemic risks (not already covered via Pillar 1 capital requirements).** The current macroprudential framework could be enhanced by clarifying the respective scope of the O-SII buffer and the SRB: the O-SII buffer should continue to be used to address non-cyclical systemic risks stemming from individual institutions, while the SRB should tackle system-wide non-cyclical systemic risks. Although, in a highly concentrated banking sector, system-wide structural risks could originate from just a few institutions, when these risks call for the introduction of the SRB they should not, in principle, relate to the balance sheet of one single institution. However, this delineation is only possible if the O-SII buffer cap and the cap for subsidiaries are raised so that the O-SII buffer can adequately cover the risks posed by O-SIIs. As a corollary of the sharper delineation of the O-SII buffer and the SRB, structural buffers should be additive to the extent that they target different systemic risks.

- **Removal of the mandatory sequencing (pecking order) for the activation of the SRB.** The purpose of the current pecking order of instruments in the EU macroprudential framework is to ensure that each instrument is used to target the specific risk(s) it is designed for, resulting in the consistent application of macroprudential measures across the Single Market. On the basis of our analysis, however, the SRB is the most suitable instrument for a wide range of structural risks and is the only available macroprudential capital tool. As such, it should have the same "non-residual" nature as the CCyB and the G-SII/O-SII buffers. A negative side effect of the current pecking order could be to potentially encourage the authorities to use instruments other than the SRB, even in situations where the SRB is the most suitable tool. Overall, this may result in the less effective use of macroprudential buffers. Policymakers may wish to consider whether a residual macroprudential capital buffer tool is needed to address residual systemic risks, in addition to the option of using Article 458 of the CRR, and in the light of the current pecking order. There does, however, seem to be little need for such a residual instrument at the moment.

- **Clarification of the SRB framework to allow for a risk-sensitive calibration of the buffer. This means it should be possible to:**

  - **apply the SRB to specific subsets of exposures, such as sectoral exposures;**

  - **allow for multiple SRB applications that can address distinct risk sources, if needed, and facilitate the effective reciprocation of foreign SRBs.**

  Under the current legal framework, the targeting of subsets of exposures is restricted to the geographical origin of exposures. Countries that have applied the SRB to sectoral risks have calibrated the SRB based on a credit institution's total risk exposure amount. The disadvantage of this non-risk-sensitive implementation of a sectoral buffer is that it reduces transparency, requires regular recalibration to avoid regulatory arbitrage, and hinders effective reciprocation when a blunt non-risk-sensitive reciprocation must be used. This is why, when non-cyclical systemic risks derive from a specific subset of bank exposures, it could be more effective for an authority to use a SRB targeted at sectoral risks with, for example, a calibration based on the risk exposure amounts of targeted exposures. The authority would thereby ensure that the entities subject to the SRB are not only better capitalised, but are also incentivised to reduce their exposures to the identified risks. This would also minimise regulatory arbitrage. However, operationalising risk-sensitive SRBs could be challenging given communication difficulties regarding calculation bases and the need to ensure consistent and comparable exposure definitions across jurisdictions. With regard to a sectoral application of the SRB, this could be based on a limited number of subsets of exposures. Such usage would require multiple SRBs to be applied simultaneously if more than one source of structural risk were identified. Multiple applications would also make reciprocation of SRBs significantly simpler and more effective, and would reduce the risk of regulatory arbitrage, although authorities would need to check that there had been no double-counting of risks.[87]

- **Simplification and clarification of the notification and approval procedures, which would continue to safeguard the integrity of the Single Market.** Existing rules and procedures are a key element of the current legal framework and should be maintained as a balance to the

[87] Such multiple usage could be addressed by multiple SRBs contributing to an "overall" SRB, which would be the basis for thresholds and notifications, in much the same way that the CCyB currently works with foreign and domestic calibrations.

flexibility provided by the SRB, and in order to avoid any adverse impact on the Single Market. However, the current differences in the notification and approval requirements between Member States and third countries are an obstacle to the effective usage of the SRB, and increase complexity unnecessarily. These requirements should be streamlined and harmonised at a 5% threshold, regardless of geographical implementation, to allow for the adequate and consistent implementation of the SRB. Since the SRB is a buffer, the approval process should not be required when maintaining or lowering the SRB rate, since this increases uncertainty for both banks and authorities at the very moment they might need to utilise the capital buffer, and could even delay the timely cancellation of SRBs once an underlying systemic risk has subsided. To reduce the overall notification burden, the ESRB should become the central hub for all notifications associated with macroprudential measures within the EU.

- **Transparency through communication and enhanced disclosure.** Publication by the activating authority of its motivation and analysis could promote better understanding of policy decisions and ultimately lead to the smooth and efficient functioning of the framework which, in the longer run, would enhance its credibility and effectiveness. Importantly, communication and enhanced disclosure would improve the transparency of the risk identification and assessment process, balancing the greater flexibility resulting from the prior proposals.

5.1 General considerations

The SRB is a CET1 capital buffer whose use is aimed at preventing or mitigating long-term non-cyclical systemic risks. The SRB is defined in Article 128(5) of the CRD IV and its use is further specified in Article 133 of the CRD IV, while the ESRB Handbook previously provided guidance on its application. The SRB is designed to prevent or mitigate non-cyclical, systemic or macroprudential risks[88] and increase the resilience of the banking sector, in order to reduce the potential losses to taxpayers and society that could arise from financial crises. The SRB may be used to address situations where:

1. the entire financial sector is prone to specific risks; or

2. a specific part of the financial sector is vulnerable to large losses (due to large shocks or the potential for significant amplification of shocks in the system) that could severely impair the system´s ability to lend and/or provide other critical financial services to the real economy.

The SRB is a flexible tool, as currently defined in CRD IV. The SRB rate is (in theory) not capped[89], the buffer may apply to all institutions, or one or more subsets of those institutions, on an individual or a consolidated level, and different buffer rates can be applied to different subsets of financial institutions. The SRB can be applied to exposures located in the Member State that sets the buffer, as well as to exposures in third countries or other Member States. Last but not least, the SRB also has broad application in terms of potentially targeted risks.

[88] Systemic risk is defined in Article 3(10) of the CRD IV as “risk of disruption in the financial system with the potential to have serious negative consequences for the financial system and the real economy”.

[89] As discussed in Section 2, although in principle the relevant national authority is free to choose the buffer level adequate for a risk, in practice the notification and approval requirements for the SRB seem to constrain the level chosen. To date, possibly due to burdensome legal provisions, no Member State has applied a SRB exceeding 3%.

Nonetheless, certain conditions must be fulfilled when a SRB is implemented. A SRB could be applied when (i) the risks have not been sufficiently addressed by the use of other measures in CRD IV or in the CRR (with the exception of Articles 458 and 459 of the CRR), and (ii) they are not expected to abate naturally during the cycle. In addition, the implementation of a SRB in a given Member State should not have disproportional adverse effects on other Member States' financial systems or act as an obstacle to the functioning of the Internal Market (Article 133(10) a) of the CRD IV).

The SRB's policy purpose and breadth of application (both in terms of risks that could be addressed and optionality in respect of targeted exposures and application level) makes consistent application particularly challenging. Ideally, there should always be a clear separation of the applications for different tools in order to improve the predictability of the tools, the transparency of macroprudential policies, and analytical comparability. However, a perfect separation may not always be possible in practice due to the ever-changing nature of systemic risks and the limited flexibility, plus contingencies, in the design of the instruments. Additionally, no clear definition exists of what a long-term non-cyclical risk actually is.[90] Furthermore, there are also challenges with regard to the interaction of the SRB with other tools, reciprocation implications, and the different rules on accumulation when the buffer is used alongside other macroprudential buffers.

Designing a structured process serving as a guideline for SRB activation might offer a pragmatic approach to overcoming some of these challenges. Such a process would require a clear conceptual implementation framework for risk identification, analysis and assessment. This framework should consider various factors of both a qualitative and quantitative nature, in order to determine whether the SRB should be activated and, if so, to which subset of the financial system it should be applied. The factors could also support the calibration of the SRB and enhance the ex ante evaluation of the macroeconomic impact of the measure.

The rest of this part is structured as follows. Section 5.3 provides an overview of the structured process that could serve as a guide during the activation of the SRB. Section 5.4 describes a framework for risk identification and measurement, including a proposal for a taxonomy of risks that could be addressed by the SRB, and a set of metrics for measuring those risks. Section 5.5 describes different methods for the calibration, as well as the ex ante and ex post evaluation, of the SRB rate. Subsequent sections discuss other aspects with regard to the use of the SRB, notably practical issues relating to its application (Section 5.6), reciprocity and the accumulation of multiple SRBs (Section 5.7), and communication and disclosure (Section 5.6.7).

5.2 Process of activation[91]

The following structured process (Chart 13) may be used as a guideline for the activation of the SRB. The process consists of several stages: Step 1 – the definition of the risks that could potentially be addressed by the SRB; Step 2 – the selection of indicators for the regular monitoring of risks; and Step 3 – an assessment of the identified risk areas (see Section 5.4). These three

[90] The identification of such risks can be particularly challenging in cases of sectoral exposure (such as real estate, where it is not always easy to disentangle the structural and cyclical elements of a risk).

[91] The process described in this section is based on the current legal framework set out in Article 133 of the CRD IV, and therefore takes the residual nature of the SRB as a given (i.e. the fact that this instrument is subject to a pecking order).

steps constitute the regular monitoring of risks. Once a risk requiring action has been identified, the authority should consider whether it is possible to activate an instrument preceding the SRB in the pecking order (Step 4). If it is not, and the SRB is the most appropriate instrument, then the setting of the SRB rate, including the ex ante evaluation of the impact, will follow (Step 5, see Section 5.5). Step 3 should be taken into account when the SRB is calibrated. Step 6 consists of the application of the instrument and, finally, Step 7 consists of an ex post evaluation of the impact of the buffer in respect of the objectives the authority wanted to achieve prior to activation (see Section 5.5.4).

The process begins by defining the risk areas for the application of the SRB. Appropriate indicators are then selected and defined to measure the long-term non-cyclical systemic risks the buffer could address. The individual indicators, as well as any indices composed of these indicators, should be periodically updated and monitored. They should cover different drivers of long-term (at the time of activation) non-cyclical risks.

Systemic risks may be assessed using a variety of approaches. A scoring approach or more sophisticated models may be used. More details of appropriate metrics and the approaches that may be used in the identification of risks are provided in Sections 5.4 and 5.5.[92]

Before deciding whether to activate the SRB or increase the level of the buffer rate, the authorities should consider whether any other existing macroprudential measures in CRD IV or the CRR, excluding Articles 458 and 459 of the CRR, might sufficiently, or more effectively, address the identified macroprudential or systemic risk. When making this assessment, the authorities should take into account, inter alia, the way in which the SRB has been implemented in national legislation.

When setting the buffer rate, the authorities should utilise relevant quantitative indicators and models. In addition, the authorities should use qualitative information and expert judgement to support their decisions, given the changing and wide-ranging nature of systemic risks (see Section 5.5).

The authorities should evaluate the short-term and long-term costs and benefits of the action considered and share these insights in their published decision regarding the usage of the SRB.[93] This ex ante analysis could cover, inter alia, the expected impact of the action on the resilience of the banking sector, on banks´ behaviour, on the terms and availability of credit, and on the key macroeconomic variables. Possible interactions with other current and planned future policies should be taken into account.

As a part of this evaluation, authorities should assess the size of exposures relevant to SRB application that are either held by branches of foreign institutions or by domestic banks in other jurisdictions due to cross-border business. They should evaluate the need for ensuring reciprocation arrangements for these exposures. They should also take into account both systemic risk and level playing field arguments and, if necessary, contact the relevant authorities in other jurisdictions to coordinate and discuss any possible reciprocity-related issues prior to implementing the measure.

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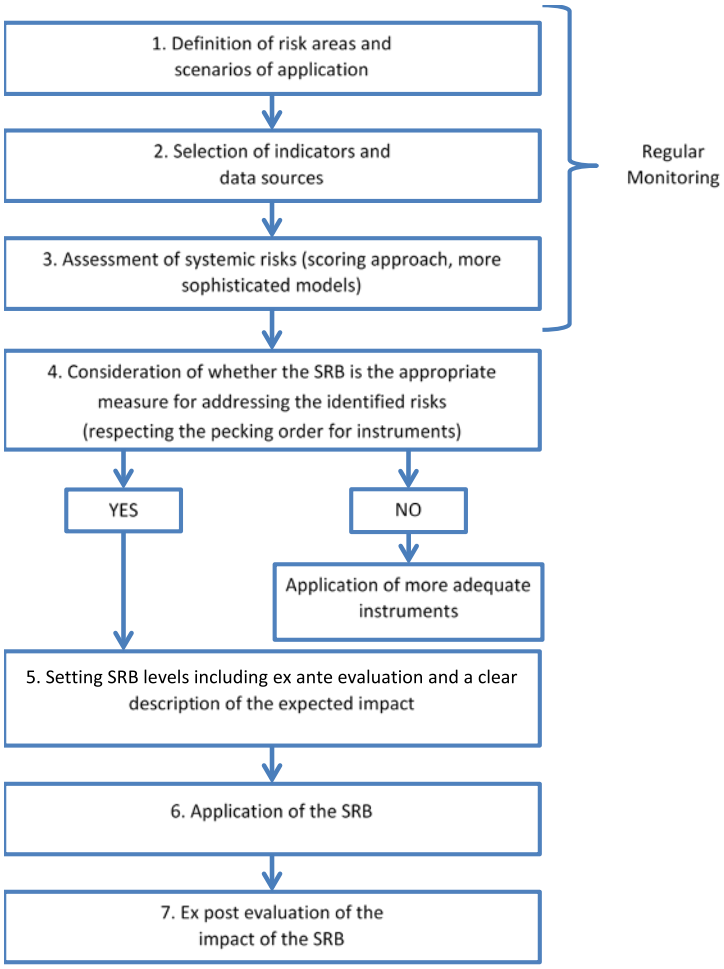
92 The methods for the identification of risks and for the calibration of the SRB may overlap.

93 Unless there is a reasonable risk that such publication could jeopardise the stability of the financial system.

Chart 13

Process for the application of the SRB



Source: ESRB, adapted from Deutsche Bundesbank.

In addition to setting the SRB rate, the authorities should also determine the appropriate scope for the measure, which should be either institution or exposure based. If the measure is only applied to a subset of credit institutions, the authorities should aim to ensure that the level playing field is not endangered and that the targeted structural systemic risks will not move to other institutions/sectors.

Based on an ex ante analysis of the SRB application, the authorities should assess whether it is necessary to phase in the full amount of a determined SRB. While the SRB is implemented to address longer-term structural systemic risks, the length and design of the phase-in period should be tailored to ensure that the application of the SRB does not result in any excessive negative short-term effects.

The authorities should plan communication of the SRB policy application in addition to the legally binding notification requirements. In particular, national authorities should plan communication with and the involvement of different EU-level bodies, as well as other relevant stakeholders, in the process of applying SRB decisions (see Section 5.8). The more complex the

nature of the measure envisaged is, the earlier the authorities should start to engage EU-level bodies, with issues of reciprocity included in the process. In the case of the SRB, the degree of the required involvement of EU bodies increases in line with the level proposed for the buffer rate (1-3%; 3-5%; >5%). The authorities should disclose their justifications for the chosen buffer rate (see Section 5.8). In the event of inaction, the authorities should also be able to justify that decision.

As a final step, the authorities should develop and have access to tools and methods that may be used to evaluate the actual costs and benefits of the SRB measures implemented. On the basis of that ex post analysis, the authorities should be prepared to take any corrective actions required (see Section 5.5.4).

5.3 Risk identification: a taxonomy of risks addressable by the SRB

The implementation of a structured process for the application of the SRB should make use of a conceptual framework for risk identification and measurement. A key element of this implementation framework is a taxonomy of the risks that may be addressed by the SRB. As pointed out in Section 5.2, the SRB can be used to target a large range of potential risks, provided that these are of a systemic and non-cyclical nature. The first step, in the absence of a more focused definition, is to try to create a taxonomy of such risks.

The taxonomy should be sufficiently broad to reflect the breadth of risks that could be addressed by the SRB, but should still include a list of specific risk drivers. This will better frame the risk to be targeted and will assist in identifying an appropriate set of indicators to be monitored. The flexible nature of the SRB implies that any taxonomy will be neither comprehensive nor binding.

The risk assessment underlying a decision to apply the SRB should be based on relevant risk signals. Specific structural risk indicators should be derived from the current structure and state of the particular economy and financial sector in question, as well as from a clearly recognisable build-up of structural risks. In addition to the proposed set of metrics, other non-cyclical risks may also need to be considered in the identified risk categories. These could be related to, for instance, financial innovations, the growing importance of linkages between the banking sector and the wider financial sector, or even the institutional characteristics of a particular Member State.

However, individual risk indicators should not be used as mechanical triggers in the activation and calibration of a SRB. All jurisdictions that have applied a SRB so far have used a combination of indicators which, considered together, pointed to a level of risk that appeared to imply that additional capital was necessary. It is therefore important to bear in mind that the risk assessment underlying a macroprudential decision is, typically, based on a combination of risk signals. National authorities should therefore retain a flexible approach when selecting the most relevant risk indicators, taking into account the combination of metrics that most accurately reflects national idiosyncrasies and circumstances.

Indicative thresholds, combined with expert judgement, could offer a balanced approach to the activation of a SRB. Thresholds could be derived for several metrics in order to provide guidance on the activation or deactivation of a SRB. There are significant differences between

Member States in their choices of metrics and indicative thresholds.[94] These quantitative measures should be informed and supplemented by expert judgement both to prevent indicative thresholds from limiting the flexibility of the SRB and to account for country idiosyncrasies. As described in the stocktaking exercise, this has been done by the authorities that have already applied a SRB. In principle, Early Warning Systems (EWS) could also be developed to guide the application of the SRB. However, since an EWS is meant to detect the build-up of risk over the financial cycle, its use is more straightforward in the identification of systemic crises driven by cyclical (as opposed to structural) risks. In addition, and maybe more importantly, taking into account national specificities in the development of an EWS is especially challenging.[95]

While relatively clear from a conceptual point of view, distinguishing between the cyclical and the structural dimensions of systemic risks is not always straightforward. For instance, some metrics are also monitored to detect the emergence of cyclical risks, or are likely to vary over the cycle (such as exposure concentration and asset commonality). In fact, one possible interpretation of structural risks is that they represent propagation mechanisms for cyclical risks once these have materialised. Similarly, in the identification of structural systemic risks and the application of the SRB, the emphasis should mainly be on cross-sectional (cross-bank and cross-country) comparisons. However, the time-series evolution of indicators for the same country could also be of interest since it would facilitate the assessment of potential risks over time.

Also, the extent to which a certain structural risk is already covered through Pillar 1 (i.e. microprudential) capital requirements and/or the SII buffers, interactions and potential overlaps should be carefully analysed to avoid any risk of double-counting. For instance, risks emanating from the systemic footprint of individual institutions, due to their size and importance to the financing of the economy, should be addressed using the SIIs buffers. Nonetheless, in its assessment of system-wide structural risks, the national macroprudential authority may conclude that the aggregate level of structural size-related risks is not sufficiently covered via the individual buffers of the designated O-SIIs. In that case a SRB could be activated to increase the resilience of the banking sector to adverse financial developments.

This section tries to provide a meaningful, albeit non-exhaustive and non-binding, classification of long-term (at the time of potential activation) non-cyclical risks. For each category of risk identified, a list of specific risk factors and the corresponding set of metrics used to measure them has been created (see also Annex 11). The proposal encompasses risks that are not expected to abate naturally over the cycle and that have the potential to impose serious negative consequences on the financial system and the domestic economy. Systemic risks of this kind may, for instance, relate to the structural characteristics of the domestic banking sector (e.g. its importance for the financing of the economy; a low degree of substitutability; the degree of concentration). The more an economy is bank-financed, the greater the potential damage to domestic financial intermediation that could result from a banking crisis. In addition, their high concentration in the financial sector illustrates the need to monitor risks for the proper functioning of the markets and for the provision of credit to the private non-financial sector (PNFS). In this case

[94] For instance, the following indicators and corresponding thresholds have been considered for risk identification: in the Netherlands, the SRB is activated for banks with a size of at least 50% of Dutch GDP; in the UK the SRB is activated for institutions that hold more than £25 billion in deposits and shares.

[95] Early warning approaches consist of defining critical thresholds for some indicators that may signal upcoming systemic crises. Because systemic crises are rare events, in order to obtain sufficient crisis observations EWS critical thresholds are defined using a panel of countries. This results in thresholds that are equal for all the countries of the panel under analysis.

the importance of banks in the financing of the economy is a specific risk factor of interest. This can be measured through assessments of total bank assets or total retail deposits as a proportion of GDP, as well as by the share of bank credit as a proportion of total credit to the PNFS.

The categorisation of risks seeks to provide a common and transparent framework for understanding structural risks that could be addressed by the SRB. However, it is necessarily non-exclusive and is not designed to be exhaustive nor mandatory. The proposed taxonomy is only one of many possible classifications. It is broad in that it tries to reflect the flexible nature of the SRB, and hence the potentially large spectrum of non-cyclical risks that the instrument can address. This is why, for instance, sectoral-specific risks are included as risk factors, even though it is unclear whether the current regulatory provisions permit a sectoral application of the SRB. Moreover, the list of metrics should not restrict national authorities' risk identification.

The proposed taxonomy comprises the following three broad and non-restrictive categories of risks that can be addressed by a SRB: (1) risks stemming from the propagation and amplification of shocks within the financial system; (2) risks stemming from the structural characteristics of the banking sector; and (3) structural risks to the banking sector stemming from the real economy. In the following sections these risk categories will also be linked, where possible, to the intermediate objectives of macroprudential policy as recommended by the ESRB[96].

Each of these three large risk categories has been further broken down into several risk subcategories in order to identify the specific risk factors that could be taken into account when deciding whether to apply the SRB, and that an authority would want to measure. To this end, a set of metrics is proposed for each risk factor that may be used for both risk identification and risk assessment (Annex 11). Indeed, the metrics are not expected to be exhaustive or binding on national authorities.

5.3.1 Risks stemming from the propagation and amplification of shocks within the financial system

Financial crises become systemic in nature through the propagation and amplification of an initial shock. Some of these contagion channels are established through direct linkages between financial agents or other financial intermediaries. Other amplification channels do not require significant linkages between financial institutions but can arise from common exposures or similar business models. In these cases, credit institutions cannot assess the risk of other credit institutions simultaneously encountering distress due to a negative credit event, given that they cannot observe the credit exposures of other banks. This could lead to a situation where the PD increases for several institutions, first due to the initial economic shock (which should be covered by microprudential capital requirements), and then due to the increased PD by many other credit institutions which have exposures to those institutions initially hit. These second-round effects could create a downward spiral of asset values which, in turn, could trigger bank defaults. An economic shock hitting several institutions at the same time could, therefore, lead to a too-many-to-fail situation. A similar logic applies to the assumption that banks with identical business models will be simultaneously distressed when a macro shock is applied, e.g. for institutions which run a high risk of interest rate shock due to a strong maturity mismatch. Besides such large exogenous shocks, the idiosyncratic shock from a bank distress or

[96] ESRB Recommendation on intermediate objectives and instruments of macroprudential policy (ESRB/2013/1).

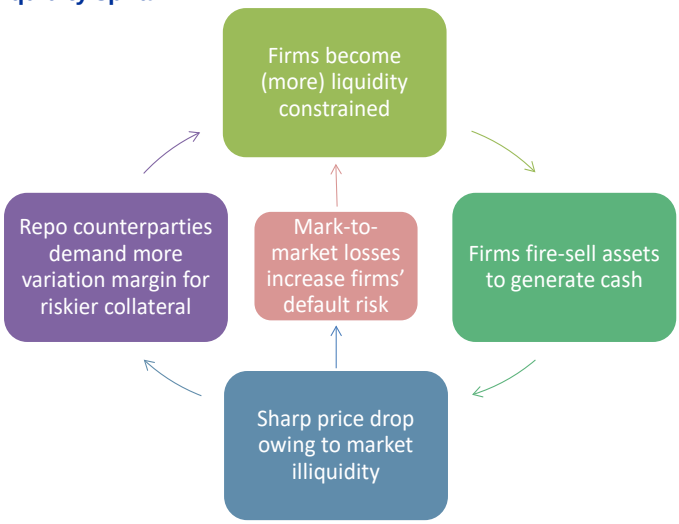
default could also trigger a systemic crisis due to linkages within the financial system. There is therefore a risk that a subset of institutions could be particularly exposed to certain asset classes, have common business models, be highly interconnected (within the domestic banking system and/or across borders) and have the potential, via contagion phenomena, to cause substantial damage to the real economy.

The metrics in this risk category seek to capture three particular amplification channels for shocks once these have materialised (see Table A in Annex 11). These are:

- **Exposure concentration and asset commonality.** While the large exposure of an individual institution to a given asset class represents a risk that has, in principle, already been captured under Pillar 1 own funds requirements, large common exposures by several financial institutions may lead to a concentration of risk that could be a factor in shock amplification. In practice, overlapping portfolios of financial assets can increase the likelihood of simultaneous distress and render the system more fragile as a whole . This may occur, for instance, if assets are marked to market. In that case, if a shock at one institution leads to a sell-off of assets, this could eventually result in a fire sale due to asset price depreciation. This cycle is shown in Chart 14. The metrics in this subcategory seek to capture the concentration, size and share of banks' financial asset holdings, including security holdings and off-balance sheet items. This will support the assessment of whether a possible concentration risk is a persistent feature of bank exposures. The measures of different assets should be put in context, e.g. by normalising these against GDP or bank capital adequacy and, to be most effective, should be broken down by counterparty country and sector. This would facilitate the identification of the foreign countries and foreign sectors from which domestic banks could receive larger shocks. Another commonality of exposures may be observed in countries where credit institutions hold a significant amount of loans or deposits in foreign currencies. All these metrics are also closely related to the metrics for "sectoral risks" and "economic openness" (cf. Section 5.4.3).

Chart 14

Illiquidity spiral



Source: Clerc et al. (2016): "Indirect contagion: the policy problem", ESRB Occasional Paper, adapted from Brunnermeier and Pedersen (2009).

- **Commonality in bank business models.** Risks may materialise if several banks display some common structural risks (e.g. in their funding structure) or from maturity mismatch or their sources of income. This could be of concern for institutions with a strong reliance on more volatile market funding as opposed to more stable secured deposits. Another possible channel for simultaneous distress could be if long-term invested assets have a return that is lower than funding costs, which could significantly increase due to an interest rate shock, even if the institution has a stable funding structure based on secured deposits. A lack of diversity with regard to sources of income in the banking sector, which may be due to herding behaviour, could also introduce stress into the system. Analysing the evolution of bank business model metrics over time could also be important, facilitating an assessment of how risks have changed over time.

- **Financial interconnections and contagion.** Although they permit better diversification of financial institutions, and contribute to the effective functioning of financial markets in calmer times, interconnections may also be channels that propagate tail risks, spreading financial weaknesses across institutions and across countries. Financial interconnections and contagion phenomena may, therefore, amplify shocks and weaken the financial system as a whole, with serious repercussions on economic activity.

Insofar as the SRB is used to address risks in this category, its implementation may be related to the third intermediate objective of macroprudential policy recommended by the ESRB (ESRB/2013/1), namely "to limit direct and indirect exposure concentrations". Moreover, if a SRB is introduced to cover risks stemming, for example, from commonalities in banks' funding structures and/or maturity mismatches, the corresponding intermediate policy objective (as per the ESRB Recommendation) would be to "mitigate and prevent excessive maturity mismatch and market illiquidity".

The metrics in this risk category seek to capture, e.g. by using model-based estimates of financial contagion, network risks (including those potentially not covered by G-SII and O-SII buffers).[97] Contagion risks go beyond institutions that are in themselves systemically relevant and cannot, therefore, be fully captured by the O-SII buffer. O-SII identification focuses on the relative importance of individual institutions, so the overall risk characteristics of the financial network (e.g. its overall density) may not be fully captured. SRB risk identification could rely on some modelling approaches excluded in the O-SII identification process. Centrality measures, for instance, could support the identification of those institutions which are particularly interconnected, and hence potentially more systemic in the network of exposures. This may be due to their high number of direct counterparties, or because they are

[97] Market-based indicators of contagion risks – such as the probability of a simultaneous default by two or more large and complex banking groups (Segoviano and Goodhart, 2009), or the Conditional Value at Risk (CoVaR) of Adrian and Brunnermeier (2008) – could also be used to identify risks stemming from financial interconnections. However, the EGSB has decided to exclude these metrics, given that they reflect time-varying risk perceptions and are not expected to be stable over the cycle, so as indicators they might be ill-suited to measuring long-term structural risks. Moreover, the activation of the SRB, possibly including a phase-in period, in response to heightened risk perception captured by these metrics, may not be timely and may, in fact, even be procyclical, given the potential knock-on effect on risk perceptions. Finally, these indicators can only be calculated for banks that are publicly listed on a stock index or that have sufficiently liquid CDS quotes. This would severely limit their availability to EU banks (Masciantonio, 2015).

connected to other highly "central" banks in the network.[98] However, it is important to note that, in principle, any structural risk pertaining to a specific institution's position in the financial network could be taken into account by the O-SII buffer, given the flexibility allowed by the EBA Guidelines.[99] Network analysis and network-based contagion models could facilitate risk identification by considering several channels of shock propagation – the estimated effects could be larger than those obtained by simply taking into account the volume of intra-financial sector assets and liabilities considered in the mandatory O-SII methodology. For instance, network-based models could take both direct and indirect contagion mechanisms into account. The former arise from institutions' bilateral exposures, potentially leading to "default cascades" if one bank defaults on its contractual obligations, while the latter may continue to occur even in the absence of direct contractual links, e.g. via overlapping portfolios of securities holdings, margin calls and asset fire sales.[100] Network analysis could also be used to identify the risks arising from a potential too-many-to-fail problem. Moreover, a recent and growing body of literature has emphasised how important the structure of financial linkages between banks is to systemic risk.[101] Chart 15 provides an example of a heatmap of contagion losses suffered by European (EU) banks following the default of another EU bank counterparty, based on a stylised interbank network.

In conclusion, it should be borne in mind that the definition of "relevant" networks in which the contagion mechanisms occur is critical to the use of these models for policy purposes. The network definition is obviously greatly constrained by data availability. Therefore, network centrality metrics and model-based estimates of contagion critically depend on access to good quality data on bilateral and common exposure data. Moreover, as is the case for all modelling frameworks, the results of the models depend on underlying modelling assumptions and should be interpreted with due caution.

98 Centrality is one of the concepts of network analysis that has attracted the attention of policymakers with regard to its potential application to financial networks. Existing indicators provide various angles from which a market player may be deemed prominent in a network of financial linkages, and also deliver information on the potential impact of an institution's failure on the rest of that network. For instance, Clerc, Gabrieli, Kern and El Omari (2014) identified the potential "super spreaders" of financial contagion in networks of bilateral exposures on single name credit default swaps (CDS) from 2008 to 2012, using network centrality.

99 Centrality measures and mode-based considerations may be taken into account as optional indicators, or in the expert judgments of designated authorities, in the identification of O-SIIs or the calibration of the O-SII buffer. For example, centrality-based measures are used in practice in O-SII identification by the Central Bank of Hungary, in line with EBA Guidelines.

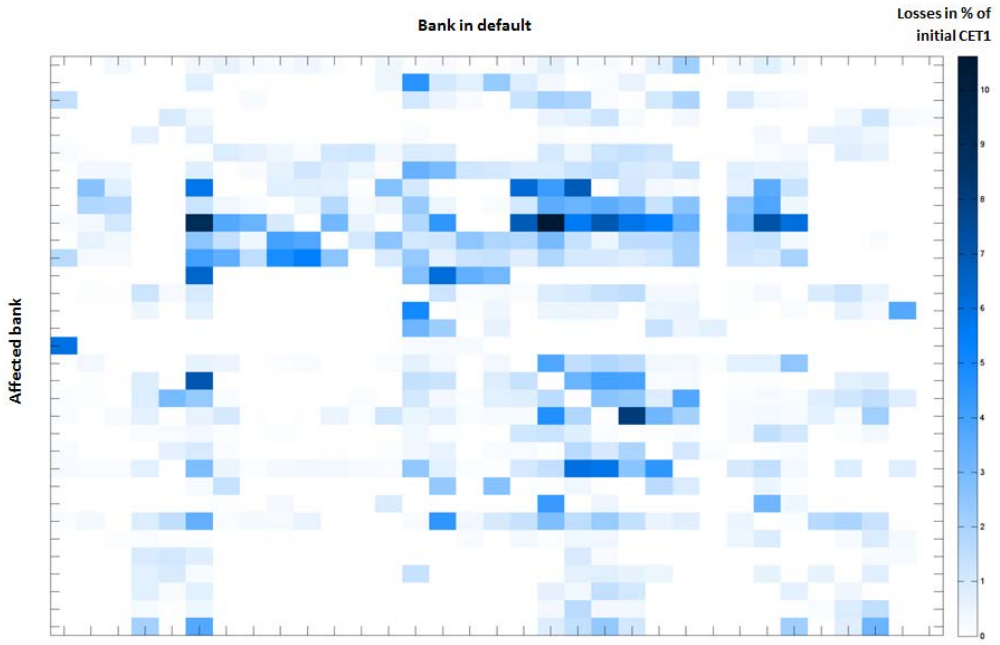
100 Recent examples of network-based models of contagion include, inter alia, Fink et al. (2016), Gabrieli, Salakhova and Vuillemey (2015), Idier and Piquard (2016), and Montagna and Kok (2016).

101 Using simulated interbank networks, Gai and Kapadia (2010) and Georg (2013) provide evidence of a common feature of financial (and generally more complex) systems known as the "robust-yet-fragile" property – these systems tend to be generally robust to the removal of a node (i.e. to the random failure of a financial market participant), yet fragile in respect of targeted attacks on their most interconnected nodes. Gabrieli, Salakhova and Vuillemey (2015) have illustrated this feature by constructing probabilistic networks of interbank exposures based on actual bank-to-bank data on unsecured loans traded between 73 European banking groups.

Chart 15

Model-based interbank contagion – contagion losses suffered by European banks after the default of another EU bank counterparty

(losses as a % of initial CET1 capital)



Source: Banque de France, based on an application of Gabrieli et al. (2015).
Notes: Simulated interbank exposure data based on aggregate balance sheet information. Each cell of the heatmap represents the share of capital of Bank A (row – affected bank) that would be lost following the default of bank B (column – bank in default). Interbank contagion is measured in terms of Bank A (common equity) capital losses following the default of Bank B (which makes it default on its credit obligations). The losses for each bank are computed as a percentage of its initial CET1 capital. They are the sum of credit losses following the initial default (solvency contagion) + losses due to banks' liquidity hoarding on short-term unsecured interbank loans (liquidity contagion). The initial bank default occurs in a "stressed" banking system, i.e. in a system experiencing relatively mild stock market losses. The scale of losses is indicated on the right-hand side of the chart. Darker columns indicate the banking sectors that are potentially the most dangerous for their EU counterparties – darker rows indicate the banking sectors that would be most affected following the default of an EU bank in the sample.

5.3.2 Risks stemming from structural characteristics of the banking sector

Certain structural characteristics of the banking system may not necessarily induce direct losses, but they could potentially become amplification channels in the event of a crisis. This warrants the introduction of measures aimed at reducing the overall impact of systemic events on the financial sector and, as a consequence, on the real economy. These structural aspects are related to market-specific developments and the institutional set-up of the domestic financial system. The most obvious risk resulting from the structure of the financial system relates to the concentration and size of the financial sector, as a diversified and less concentrated banking system is generally perceived to pose a smaller systemic risk.[102]

[102] However, even a banking sector not characterised by high concentration can still pose a systemic threat if the exposures of the institutions are not diversified (cf. Section 5.4.3).

In a banking sector that is highly concentrated relative to the financial system or the national economy the negative externalities and costs of financial crises could be more severe. Where the banking system dominates financial intermediation, has a large financial size compared with the domestic economy's performance or plays a dominant role in resource allocation through, or in addition to, capital markets, severe system-wide disruptions could represent a costly external burden on domestic and cross-border economic activity. Where a few relatively big banks dominate the market, risks of systemic importance may go beyond the individual contributions of the O-SIIs and, as such, cannot be sufficiently mitigated by the O-SII buffer alone. This might also apply to cases where national authorities do not consider the O-SII buffer sufficient to mitigate these risks. In these cases, although this is not ideal, some authorities have used the SRB to top up the capital requirements set by the O-SII buffer. A further source of risk is the ownership status of banks in the domestic financial system. The foreign ownership of a domestic bank subsidiary may, depending on the circumstances, either stabilise or destabilise the credit institution in question, as will be discussed further in the next paragraph.

The specific risk factors can be summarised as follows (see also Table B in Annex 11)

- **Concentration of the domestic banking sector, and its size and importance for the financing of the economy.** Risks included in this category can be measured using aggregate banking indicators such as the size of assets and retail deposits, as well as the share of bank credit supplied to the PNFS. Not included are the indicators used for the identification of O-SIIs (e.g. size indicators for individual institutions) as risks emanating from the systemic footprint of individual banks should be addressed using the O-SII buffer.[103] It is important to note that although structural risks in this category are partially covered by O-SIIs' capital requirements, the national authority may deem their aggregate level to be insufficiently addressed through the individual buffers of the designated O-SIIs. In those cases, imposing an additional surcharge on several domestic banks may be appropriate. Regarding concentration, market structure developments may be driven by deep banking sector restructuring processes, e.g. in the aftermath of a financial crisis. In that case increased concentration may be associated with a rationalisation process aiming at reducing costs and increasing system efficiency. The risk assessment should take such elements into account.

- **Foreign ownership.**[104] For banking systems in developed industrialised countries, no general conclusions can be drawn as to whether foreign banks contribute to systemic risk or not. It is, rather, the substitutability of banks which is at the heart of this risk factor. This dimension may, however, go beyond individual institutions and could, therefore, become more pronounced if the combination of certain factors – including the ownership structure of the banking sector – increases the risk of a strong balance sheet reduction and a consequent need for the substitution of banking activities. A potentially positive factor for financial stability related to foreign ownership may be that foreign banks are better able to cope with shocks in the host market if they are internationally active and can provide funds for recapitalisation within the banking group. However, whether or not they recapitalise their subsidiary institution in the host

[103] Actually, national authorities can use concentration-type risk measures as optional indicators to identify systemically important institutions. In these cases, the same concentration indicators should not be used to justify application of the SRB because the underlying risk would, arguably, have already been accounted for through the O-SII buffer.

[104] The Banking Union, when fully delivered, will clearly have a large impact on the size of this risk factor within the euro area.

country might depend on what incentives they have to remain active in that market in the long run. Recent research[105] has found that foreign banks are more likely to withdraw from a market during a crisis if their market share is low, but this is not the case if they play a significant role in the host country or if they are locally financed to a significant extent. In general, the scale of subsidiaries' deleveraging during a crisis could also depend on a parent bank's commitment to maintaining its exposure in the region and recapitalising its subsidiary.

Foreign banks could also end up transferring a shock from the home market to the host country if funds are removed from the subsidiary in the host country in order to recapitalise the parent company. This may result, inter alia, in the restriction of lending by the subsidiary institution, which could have a negative impact on the real economy of the host country if the supply shortfall is not covered by other institutions.[106] A study by the DNB shows that foreign banks in developed economies do not limit their lending during crises any more than domestic banks.[107] Lending by foreign banks is significantly less volatile if the loans are not cross-border transactions, but are instead provided by a local "bricks and mortar" bank subsidiary which, ultimately, has a stronger and longer-term commitment to the host country.[108] In line with this reasoning, metrics measuring the risk deriving from the foreign ownership of a bank should account for the significance and long-term strategic importance of the host country subsidiary and the host market to the parent institution.

- **Other potential structural risks.** These include risk originating from high system-wide and persistent levels of non-performing loans. These can weaken banks´ ability to lend as they reduce profitability across the market and increase funding costs for all banks. Lower credit supply can, in turn, result in the reduction of economic growth. This is especially the case for countries with a dominant banking sector, where capital market financing may not be an option. In such cases the SRB could be used to incentivise banks to reduce their stock of NPLs more quickly in order to free up bank capital and facilitate credit growth.

- **With regard to the link between the risks in this category and the intermediate objectives recommended by the ESRB, if the structural factor deemed to pose a systemic risk relates to banking sector leverage, the corresponding SRB implementation would aim to "mitigate and prevent excessive leverage" (first intermediate objective of ESRB/2013/1).** Arguably, except for excessive leverage and the strengthening of the resilience of financial infrastructures, the policy objectives recommended by the ESRB do not cover risks emanating from other structural features of, or developments in, the financial system. This may mean that the adequacy of the intermediate objectives established in Recommendation D in ESRB/2013/1 need to be revised.

105 Cf. Claessens and Van Horen (2013).

106 For example, foreign banks in Eastern Europe reduced their lending during the 2008/2009 crisis more than domestic banks. Cf. Ongena et al. (2013).

107 Cf. Claessens and Van Horen (2013)

108 Cf. García Herrero and Martínez Pería (2007).

5.3.3 Structural risks to the banking sector stemming from the real economy

As the recent financial crisis has shown, shocks originating from the real economy can impair the functioning of the financial sector. This has, in turn, the potential to create an economic downturn due to reductions in lending to the real economy. These risks may originate in specific economic sectors in distress, or they may derive from an aggregate demand shock which could come from a separate economic crisis in another country. This scenario is especially relevant for countries with small and open economies. Financial institutions should, in general, be prepared for such shocks since microprudential capital requirements ought to take scenarios of this type into account. However, as a shock may be amplified due to the structural characteristics of the banking sector (see Section 5.4.2) and its contagion channels (see Section 5.4.1) macroprudential policies may be required to absorb the entire effect of the shock on the real economy – including second-round effects. In particular, a SRB may have a role to play if the authorities deem the macro externalities of individual banks' behaviour to be, on aggregate, larger than an amount that can be covered by individual Pillar 1 capital requirements and the banks' O-SII buffers.

On the basis of this rationale the following specific risk factors (see also Table C in Annex 11) were identified:

- **Economic openness.** Economies which depend significantly on exports and imports are more vulnerable to global economic shocks – these can affect the non-financial sector and lead to potential losses for the entire financial system. Shocks of this kind can also be triggered via the level of a country's foreign exchange rate. Depending on the structure of an economy, a stronger domestic currency may harm the competitiveness, and therefore revenues, of exporting industries, while a weaker domestic currency may increase prices for imports, thus reducing consumption. The vulnerability of an economy to such a shock may be measured by considering indicators for trade openness and export and import concentration. In this context it is important to measure the ability of the financial system to withstand the aftermath of a shock. A broader perspective could also include the capacity of fiscal policy to cushion an aggregate demand shock and the ability of the central bank to absorb a foreign exchange shock.

- **Sectoral risks to the PNFS, households and the public sector**.[109] Concentration risk is an important element in the build-up phase of financial crises. Bank lending to specific sectors may therefore be regarded as one of the key measures used to assess structural fragility in the financial sector. Once concentrated exposures have been identified it is also important to measure the actual risk of these exposures by, for example, analysing the financial health of individual agents in the relevant sector and how disciplined they are with regard to payments. Note that risks emanating from the direct concentration of exposures have been included under Section 5.4.2. This additional risk category focuses on the interaction between concentrated bank exposures and other risky developments in the economy that could trigger

[109] Applicability to subsets of exposures is unclear under the current regulatory provisions. However, because the concentration of sectoral exposures could represent an important driver of structural risk for the domestic economy, the EGSB concluded that such exposures should be included in this section.

a financial crisis, acting as an amplification mechanism. One example could be the high and persistent build-up of household and/or non-financial corporation aggregate leverage – a SRB could then be activated to force banks to internalise the potential externality of aggregate deleveraging after a shock, with its associated reduction in consumption and real output. The SRB should, in fact, only be used in this case to the extent that the risk identified is deemed to have a non-cyclical dimension. If it does not, the CCyB could be more suitable.

5.4 Calibration, ex ante and ex post evaluation

This section provides details of the main tools and methodologies which could potentially be applied in the calibration process. It describes their main features, strengths and weaknesses, and tries to map the various analytical tools to the vulnerabilities identified in Section 5.4. Note that the analytical approaches are complementary to, and not substitutes for, expert judgement based on qualitative analyses.

5.4.1 Calibration methods

As highlighted by the stocktake (Section 2.2), there are significant differences between national authorities that have implemented a SRB, in respect of the metrics and tools applied for calibrating SRB levels. In general, information on calibration is rather scarce and the buffer levels chosen are not necessarily based on a quantitative estimation exercise. Once a system-wide structural risk has been identified, an assessment of institutions' exposure or contribution to the risk can be undertaken and could possibly – although not necessarily – lead to non-uniform buffer levels being applied across banks. In such an additional step, expert judgement would be likely to play a significant role, together with a qualitative assessment of the metrics most suitable for discriminating between different subsets of banks (see Section 2.2.2).

Indeed, the flexible nature of the SRB renders establishing a uniform methodology of calibration particularly challenging, assuming it is desirable in the first place. Identifying certain vulnerabilities within the macro-financial sector, based on a wide range of indicators, models and thresholds, warrants a thorough understanding of the transmission mechanisms and the amplification channels of shocks. The use of more than one model might prove especially useful in this respect, and might provide policymakers with a broader and more informed perspective on systemic risks to the national banking sector and domestic real economy.[110] The availability of several complementary analytical approaches could also be instrumental in taking national specificities into account.

If the SRB is applied to a set of financial institutions rather than to all banking exposures, one possible approach for the assessment of macroprudential risks and consequent SRB calibration is a standard scoring system with a related bucketing approach. Generally, the

[110] In 2016 the Committee on the Global Financial System (CGFS) published a report on "Experiences with the ex ante appraisal of macroprudential instruments" (CGFS, 2016) illustrating the diversity of methods used in operationalising and, in particular, calibrating macroprudential instruments. The report acknowledges that "there is no single preferred approach to ex ante appraisals".

approach involves the calculation of scores for various banks, which are then allocated to different buffer rate buckets. The scores can be based on the aggregation, via various weighting methodologies, of multiple indicators presented in the risk identification section and can naturally be extended if other vulnerabilities are identified.[111] Given that the risk addressed by a SRB is of a long-term nature at the time of activation, the scoring and bucketing method would not need to be updated regularly, i.e. in principle no frequent SRB recalibration should be necessary (contrary to the requirements of a cyclical instrument such as the CCyB).

In general, a scoring system and bucketing calibration methodology can be applied in cases where the macroprudential authority is targeting a set of key indicators, by combining these into a single score for each institution. This may apply, for instance, if the SRB has been activated to prevent or mitigate sectoral risks. The methodology would, in this case, require the calculation of a score for each economic sector, based on several indicators (e.g. size, total credit extended to the sector, riskiness as measured by the average PD of borrowing non-financials, NPLs and/or default rates by sector) and a relevant weighting system. In principle, indicators used to calibrate the SRB should not overlap with those used to determine other macroprudential buffers, in order to avoid any risk of double-counting. When an overlap exists with indicators used to determine microprudential capital requirements (such as, for example, PDs and sectoral default rates), the calibration should focus on the additional aggregate dimension of risk not already covered via individual capital requirements.

The main advantage of using a scoring system and related bucketing methodology is that its application is straightforward from an analytical point of view. It should also be relatively easy to convey to both policymakers and relevant stakeholders. The approach is simple from a quantitative point of view and does not require specialised profiles to be implemented (unlike a number of quantitative macroeconomic models that are reviewed below). Communication with policymakers is also likely to be straightforward, not least because the approach is already applied by the majority of authorities in the calibration of the O-SII buffer. In addition, as this method is the same as that used for calibrating the O-SII buffer, it might also facilitate an assessment of the extent to which a country's structural risks are already covered via O-SII buffers. A case in point is Denmark, where a progressive SRB has been assigned to O-SIIs, depending on their O-SII bucket allocation (1% to 3% divided into five subcategories).[112] The advantages and disadvantages of bucketing approaches are discussed in greater detail in Section 4.

It is not clear how applicable a scoring system is to other risk categories identified in Section 5.4; this is mainly because several structural risk indicators are computed at aggregate (system) level rather than at bank level, and in most cases the scoring method would only offer an assessment of relative rather than absolute risk intensity. The high level of discretion that a policymaker needs to apply – e.g. in choosing a selection of relevant indicators to be combined to obtain a single score and in choosing an appropriate weighting system – has

[111] The applicability of this approach is straightforward for risks stemming from banks' systemic footprint that are deemed to be insufficiently addressed through the application of an O-SII buffer. This is the case because the metrics used to evaluate these risks are computed at an individual-bank level. However, targeting O-SII risks through the application of a SRB is not ideal and should be avoided.

[112] In principle, risks related to O-SIIs should only be covered by the SRB in as much as the O-SII buffer is demonstrably insufficient.

both benefits and costs. On the one hand, discretion provides flexibility, which is critical to improving the way national specificities are taken into account. On the other hand, it implies that the implementing authority is required to make even more effort in terms of clarity of communication with all relevant stakeholders. Furthermore, since the scoring method only offers a relative risk assessment, it means that a reference point is required for the calibration of a SRB.

In addition, more sophisticated approaches can also be used for calibration, in order to benchmark and/or complement the assessment and calibration obtained using a scoring system. Broadly speaking, these include top-down stress testing frameworks (that ideally also allow for some form of network contagion and macro-financial feedback effects) at the less structural end of the spectrum, to general equilibrium macroeconomic models at the other, more structural (i.e. theoretically founded) end.

Top-down stress testing frameworks facilitate quantification of the impact of an adverse scenario on individual banks' balance sheets through the calculation of first-round losses and the consequent impact on capital ratios and RWA. For the calibration of the SRB, the stress scenarios should be designed based on the structural risk drivers and amplification channels that the macroprudential authority aims to mitigate via this buffer. These could include, for example, a shock on a particular asset class, currency or real economic sector to which the domestic banking system as a whole is deemed to be overly exposed, thus generating a level of aggregate risk that is larger than the level accounted for via microprudential requirements. Estimated losses under a stress scenario could form the basis for calibrating the size of the SRB.

Top-down stress tests featuring network models would be particularly useful for calibration – even more so if a policymaker is concerned over structural risks stemming from interconnections and contagion externalities that have not been appropriately internalised by financial institutions (and are not already covered via other macroprudential buffers). Network modules can be nested into the stress testing framework to measure the systemic amplification that could follow first-round capital losses after an adverse scenario (see the "Impact on the banking system" box in Chart 16). Expected contagion spill-overs stemming from interbank obligations and asset fire sales might be mitigated via an additional SRB requirement. Importantly, as long as losses due to contagion have not already been covered by other capital requirements, this approach avoids any double-counting of risks.

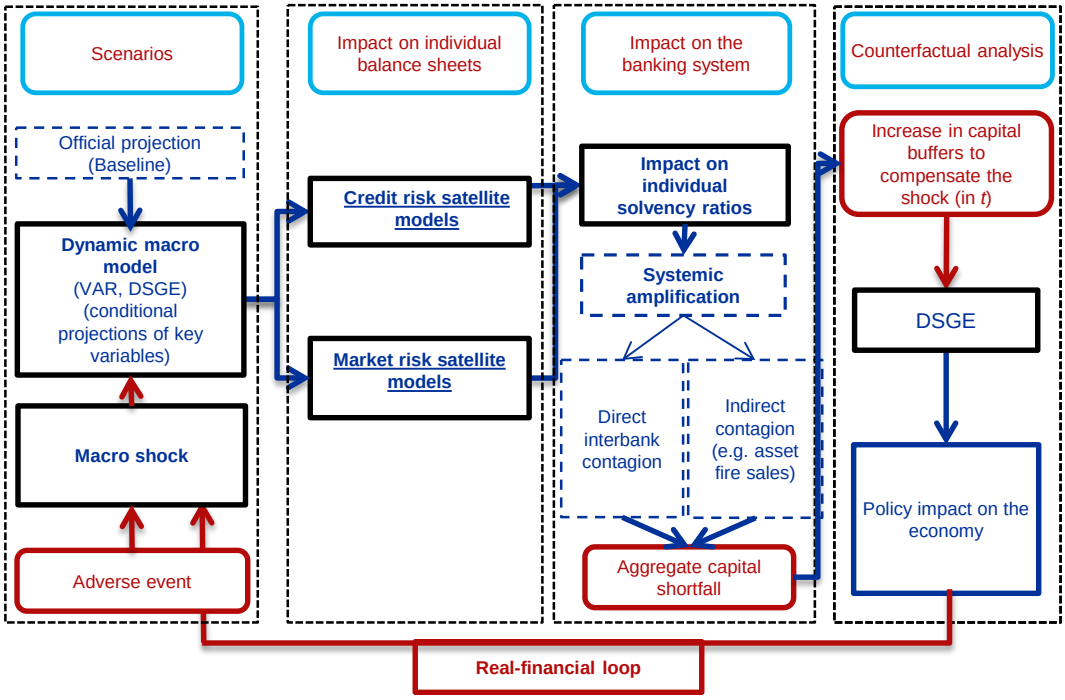
Scenario design is a key ingredient of a top-down stress test and should be informed by the macroprudential authority's systemic risk assessment. For instance, the stress event that adds to the baseline projections of macro-financial variables in a stress-testing exercise should clearly reflect the structural versus cyclical nature of the identified risks. The stress scenario used to calibrate a CCyB (i.e. if a policymaker is concerned over the build-up of cyclical systemic risks) is different from the scenario underlying the calibration of a SRB targeting excessive exposure concentration. If the same stress testing framework is used for both the CCyB and the SRB, then having distinct and non-overlapping stress scenarios is key to avoiding risk double-counting.

Ideally, top-down stress testing frameworks can be complemented by additional modelling blocks (such as general equilibrium macroeconomic models) to embed spill-overs from the banking sector to the real economy and then back again from the economy to the banks, i.e. to account for the real-financial "loop" (a schematic representation of a macro stress test set-up is

provided in Chart 16).[113] While the development of this type of framework is very recent and the details may differ, an ideal set-up for the calibration of macroprudential buffers should account for (some form of) both spill-overs within the banking sector through contagion effects and for macro feedback effects. Importantly, depending on the scope of the stress-testing exercise, an authority could decide to "switch on" (or not) the module that allows for network contagion. For instance, if an authority is concerned over the build-up of cyclical systemic risk in the economy and relies on macro stress testing for the calibration of the CCyB, the counterfactual analysis used to define the appropriate CCyB rate – given the assumed stress scenario – should not take systemic network amplification into account. The latter would instead be key in the calibration of a SRB aimed at increasing banks' resilience to contagion externalities.

Chart 16

Schematic representation of a macro stress testing framework for the calibration of macroprudential buffers



Source: Representation adapted from the "hybrid approach" for the calibration of the countercyclical buffer in Bennani et al. (2017), forthcoming.

One advantage of top-down stress testing frameworks is that their development and use could be fairly straightforward for national authorities. The development of frameworks of this type, both for supervision and for macroprudential purposes, has been significant in the aftermath of the global financial crisis, making them currently more accessible to NCAs and NDAs than they were a decade ago. Importantly, the global financial crisis has placed the potential role of

[113] Stress testing frameworks featuring the macro-financial loop are also called "macro or macroprudential stress tests". For an example see V. Constâncio, the ECB's Vice-President: "The role of stress testing in supervision and macroprudential policy", Keynote address at the London School of Economics, London 29 October 2015.

macroprudential policies in addressing financial stability risks at the top of both researchers' and policymakers' agendas. This means that a growing number of specialised profiles are, and will be, available to face the modelling challenges related, for instance, to the dynamic behavioural reaction of banks subject to financial stress and the non-linearity of financial crisis episodes (notably due to systemic amplification channels).

In terms of drawbacks, the development and use of a macro stress test set-up is burdensome, because of the need for specialised (quantitative) profiles, and in terms of computation and data capacity. Experts' input is also crucial beyond the development phase. Their judgement and their quantitative and qualitative expertise is critical for the most important phase of top-down stress tests, i.e. the design of the relevant scenarios – the baseline scenario (the current macroeconomic perspectives) and the adverse scenario (incorporating the relevant downside risk). Communication might also be particularly challenging. As emphasised above, all choices involving a certain degree of discretion need to be backed up by appropriate and effective arguments that are robust in the face of criticism.

As another approach to calibration policymakers could use DSGE models which allow for a structural (i.e. theoretically founded) calibration of the SRB. DSGEs describe the optimal decisions of representative economic agents facing limited resources and have been enriched in recent research to account for the role of bank intermediation and default in the economy. Capital requirements are explicitly characterised and play a role in the behaviour of banks (see, for instance, Clerc et al. (2015)). These models therefore provide a natural tool that can be used to assess the dynamic effect of a change in capital buffers on the real economy, as well as the effect of macroeconomic shocks on the banking sector as a whole.

The main strength of structural models is their theoretical underpinning, which also allows different linkages between the macroeconomy and the banking sector to be taken into account via expectations. DSGE models also take into consideration how agents (firms, households and banks) form expectations and the role of these expectations in agents' current decisions. This means, for instance, that the estimated macroeconomic impact of a certain policy intervention (e.g. the introduction of a macroprudential capital requirement such as a CCyB or a SRB) might be reduced if agents have internalised the policy, in contrast to a situation in which the buffer had been activated unexpectedly. Considerations of this type may help to guide phase-in decisions for structural as well as cyclical buffers.

One weakness of using DSGE models for calibration purposes is that they only allow assessment of the effects of an adverse shock on the entire banking sector and cannot, therefore, be used to assess the relative impact of a shock on individual banks. For this reason, they should be seen as complementary to top-down stress tests.

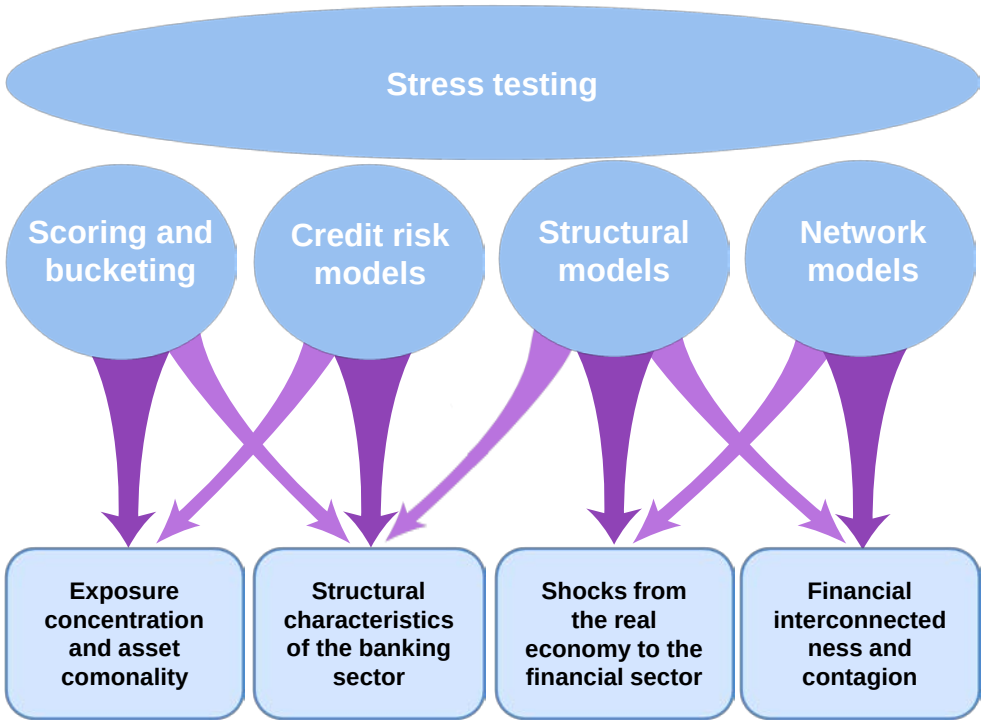
Finally, reduced-form time series models such as vector autoregressive models (or other extended versions such as factor-augmented vector autoregressive models) could also provide guidance for setting the level of the SRB. This is based on historical correlations derived from empirical evidence rather than on the theoretical transmission mechanisms embedded in general equilibrium models. In both cases, simulating the response of banking sector specific variables to macroeconomic shocks, under different scenarios, could play a significant role in the process of calibrating the SRB.

5.4.2 Mapping calibration methods to the identified risks

The relevance of different calibration methods may depend on the specific risks that a policymaker aims to address. While certain approaches are best suited to addressing certain categories of risks (see Chart 17), in some cases a hybrid approach, combining multiple methodologies, could provide the best guidance for calibrating a SRB. The following sections seek to map the various analytical approaches to different financial risks. As emphasised in the previous subsection, the use of one or more analytical tools, as well as qualitative input and expert judgement, should be considered complementary.

Chart 17

A mapping of quantitative calibration methods to structural risks



Source: ESRB.

For instance, when dealing with risks stemming from exposure concentration or asset commonality, calibration could rely on estimating potential conditional losses based on several adverse scenarios (e.g. shocks on the PDs of various asset classes) with different probabilities that these will materialise. In this case stress tests could be used to identify macroprudential capital shortfalls using standard credit risk modelling theory, thus providing guidance on setting a buffer level that would appropriately mitigate the estimated losses. The model could rely on the PD, loss given default (LGD) and exposure at default (EAD) estimates for each asset class. It would deliver loss estimates at individual bank level which could then be used to determine the appropriate level of the SRB. Indeed, since the riskiness of individual bank

exposures derived from credit risk models should already be covered via microprudential requirements, if such an approach is used for macroprudential calibration then the focus should be on the additional aggregate dimension of risk not already covered via individual bank capital.

When taking financial interconnectedness and contagion into account, models that can capture complex and dynamic relationships through network analysis, such as the BSLoss[114] or the simulation model of Idier and Piquard (2017), may be used to identify the level of capital needed to prevent possible contagion effects. Indeed, the network models used should account for the transmission channels considered to be most relevant for the domestic banking sector, including interbank equity or debt exposures, or asset fire sales for a particular asset class. Since the results will depend critically on the exact parametrisation of the model, a wide range of robustness checks should be performed to gauge the sensitivity of the results to model calibration. As Chart 17 shows, network models can be used on a standalone basis or nested into a broader stress testing framework.

If a policymaker is concerned over risks stemming from the structural characteristics of the banking sector and the potential negative impact on the real economy, **calibration should rely on a macro stress testing framework** featuring feedback loops between banks' balance sheets and macro-financial variables. One way to account for the "real-financial loop" is to complement stress test results with a counterfactual analysis of additional capital requirements based on a macro-financial model. As described in Chart 17, a stress-testing exercise would show individual capital shortfalls. The aggregation of these shortfalls quantifies the additional capital buffer required to protect the banking system against the adverse scenario. The prescribed capital calibration can then be input into a DSGE model to evaluate the consequences for the real economy of the pre-emptive introduction of the additional buffer. The main advantage of this approach resides in its capacity to account for certain structural vulnerabilities of the financial sector or the real economy and their interactions, amplification channels, and the aggregate impact of certain shocks. Moreover, simulating various scenarios could help to reveal different risk sources that might otherwise be overlooked in a less rigorous modelling framework and, as a consequence, might not be addressed adequately through the application of other macroprudential measures.

If the structural risk identified relates to other potentially structural risks, such as the excessive risk-taking or leverage of domestic banks potentially leading to a suboptimal level of capital in the long run, then a DSGE model could be used to characterise the optimal long-run equilibrium level of regulatory capital in the system. The latter could be taken as a calibration of the Pareto-optimal level of the SRB (see Box 5).

[114] Cf. Fink et al. (2016).

Box 5

A structural approach to the calibration of the SRB: an application to France[115]

The legally-defined goal of the SRB – to mitigate structural vulnerabilities in the banking sector – can translate into a theoretic social welfare-maximising objective of the policymaker within a DSGE model. The DSGE can be used to compute the net benefits of a change in the steady-state (i.e. non-cyclical) level of regulatory capital requirements. In particular, the estimated optimal steady-state level of capital, the level of the solvency ratio of banks beyond which it is no longer possible to produce Pareto improvements in welfare for both savers and borrowers, can be used as a reference for the calibration of a SRB.

If the current combined level of structural capital buffers (including the minimum capital requirement, the CCoB, G-SII/O-SII buffers and excess voluntary buffers in bank balance sheets) is lower than this estimated steady-state level, then a policymaker could unambiguously make the case for higher non-cyclical capital requirements. These additional non-cyclical requirements could be imposed via a SRB.

In the context of the DSGE model of Clerc et al. (2015) – the so-called 3D model used by the ECB Task Force on Operationalising Macroprudential Research[116] – the policymaker aims to maximise social welfare by addressing the following types of distortions: (i) banks' limited liability due to a sector-wide safety net provided by deposit insurance; (ii) banks' funding cost externalities due to the fact that the deposit premium depends on average (rather than individual) bank risk behaviour; and (iii) limited participation in equity markets, implying that equity as a form of funding is scarce and more expensive than debt.

In the model, bank defaults imply costly liquidations and cause welfare losses that agents fail to internalise because of the existence of safety net guarantees and the fact that depositors are not able to command bank-specific risk premia. Higher capital requirements reduce deadweight losses from defaults, which occur in equilibrium but, at the same time, increase reliance on expensive, scarce equity. Higher capital requirements reduce loan supply and tighten lending standards, although they can increase economic activity and enhance social welfare as they reduce the implicit government subsidy to banks and depositors deriving from limited liability and deposit insurance.

In this context, the optimal steady-state level of bank capital trades off (i) the cost related to the rise in borrowing costs that reduces the welfare of indebted households and (ii) the benefit of the reduction in the frequency of bank defaults and the associated resources lost in bankruptcy. The ability of permanently higher capital requirements to increase the welfare of both savers and borrowers is, however, limited as beyond a threshold level the benefits deriving from a

[115] This box draws heavily on Bennani et al. (2017).

[116] Mendicino et al. (2017), "Operationalization of the 3D Model – A quantitative assessment of macroprudential policies in Euro Area countries", Workstream 1 (DSGE Modelling) of the ECB Task Force on Operationalising Macroprudential Research.

lower incidence of bank defaults are outweighed by the costs imposed on borrowing households due to the higher cost of credit.

Bennani et al. (2017) estimate the 3D model on French data to compute this target (average) solvency ratio, which does not seem to suggest that the French banking sector is undercapitalised in the long run (see also the Task Force on Operationalising Macroprudential Research, 2017). The analysis suggests a target level of (average) non-cyclical total capital requirements for the six major French banks of 9.5% of their RWA. According to the model, this is the level below which an increase in capital increases everybody's welfare but above which more capital will produce welfare losses for borrowers. Given that the current average level of total (non-cyclical) capital requirements for the six major French banks – whose realised ratios stood at 17.9% as of end-December 2016 – is higher than the estimated 9.5%, the 3D model indicates a calibration of the SRB at a rate of 0%.

Assessing the impact of shocks stemming from the real economy on the financial sector requires a robust structural framework with strong theoretical foundations, along the lines of DSGE models which include explicit optimisation mechanisms. DSGE models can, in fact, be used for two purposes. On the one hand, they can be mobilised to design macro scenarios (e.g. an economic downturn) based on shocks that have a clear economic interpretation. On the other hand, they may be used to complement a stress-testing exercise through counterfactual analysis (as described above). In comparison with top-down stress tests, the models are able to measure the dynamic effect of a change in macroprudential buffers on the real economy, without having to rely on other external or satellite macro models. Their disadvantage is that they only allow assessment of the effects of an adverse shock on the entire banking sector and cannot, therefore, be used to evaluate the relative impact of a shock on individual (heterogeneous) banks.

Box 6

Calibration of a SRB for sectoral risks

Sectoral risks from the real economy represent a major source of risk. The calibration of a SRB so it can potentially be used to address systemic sectoral risks could, for example, be based on the work of the AWG Working Group on Sectoral Risk in 2015.[117] Such a SRB would account for risk stemming from the sectoral concentration of bank portfolios. The analysis is based on credit register data and the sectors are classified by NACE code.

The work of the AWG Working Group on Sectoral Risk included an analysis of the potential systemic risk implications of sectoral concentration. These concentrations of exposures could represent a channel transmitting risks from the retail and non-financial corporation sectors to the financial sector and vice versa. The investigation comprised an analysis of the systematic differences across economic activity sectors in credit risk levels and their dynamics in respect of business and credit cycles. It also contained an analysis of the credit risk stemming from the sectoral concentration of bank portfolios, i.e. from potentially insufficient diversification with regard to economic activity sectors.

[117] Cf. ESRB: "Banks' sectoral risks – Final Report", June 2015.

The assessment of the risk posed by a given sector is based on a multi-factor structural model. First, the foundations for the evaluation are built on descriptive statistics such as the exposure size of a bank to a sector, the concentration of bank portfolios and the share of the sector on an institution's balance sheet, or the PD of the sector. The multi-factor structural model then estimates commonly used measures of risk (VAR, Expected Shortfall) and the marginal contributions of individual sectors to these measures. Finally, a set of regressions is applied, aiming to highlight whether sectors are characterised by a stronger cyclicality, and the relationship between portfolio concentration, exposures and riskiness at bank level is analysed.

A SRB could be calibrated as a function of the estimated average PD of the relevant sector and the expected loss that this might generate. Based on these measures, losses can be estimated and input into network models so that second-round effects within the entire banking sector may also be taken into account. One approach for the final calibration could be to impose the SRB on an institution-specific basis, i.e. to set a higher SRB for those banks with a higher share of the capital shortfall of the entire banking system as a result of losses within the sector concerned. This could, however, lead to a situation where an institution which has a relatively lower exposure to a sector than other institutions is required to comply with a higher capital requirement due to higher vulnerability arising from second-round effects. Another approach could be to impose an exposure-based SRB for high-risk sectors, depending on the systemic loss they might generate, also taking into account default correlations between different non-financial sectors of the economy.

Note that expert judgement is a valuable complement to all analytical calibration tools. This is a direct consequence of the complex nature of systemic risk identification and measurement. The latter, for example, may need to be revised if new elements (such as a new legal provision) become available which could lead to a change in the level of risk identified, and hence in the macroprudential policy decision (see, for example, Box 7 on the SRB implementation in Romania and the events that led to a re-assessment of the need for a SRB). In particular, expert judgement plays a crucial role in the design of stress scenarios and in the definition of the macroprudential authority's objective function, whether this is social welfare-theoretic as in a DSGE model or ad hoc as in a stress-testing exercise (where the objective of the authority follows the principle that the aggregate or individual banks' capital ratio(s), at the end of the stress horizon, should not fall below a pre-defined threshold). This line of reasoning also holds for less developed financial systems or in cases where data are scarce. Consequently, the importance of qualitative aspects, which cannot be precisely quantified or evaluated but have the potential to significantly impact the macro-financial framework, should not be disregarded when deciding the appropriate level of the SRB.

Finally, it is important to emphasise that, regardless of the approach selected for calibration, results should be complemented by an assessment of the impact of banks' distress on the real economy of a specific Member State. The SRB should not be applied if such an impact is likely to be absent or limited. In general, a non-cyclical change in capital requirements should only be implemented if net benefits are expected from higher capital (see Section 5.5.3).

Box 7

SRB implementation in Romania

Following the identification of an external contagion risk in December 2015, the National Committee for Financial Stability recommended to the National Bank of Romania that it implement a SRB of 1%, based on all exposures. The SRB requirements were applied to credit institutions whose parent bank was registered in a country for which the credit rating of sovereign bonds issued by the central government was below investment grade. The instrument used for the assessment was the long-term sovereign debt ratings of the home countries of banks, as reported by the credit rating agencies recognised as ECAIs. The use of the sovereign rating was based on the following characteristics: (i) international recognition; (ii) transparency and availability; (iii) predictability; (iv) independence; (v) dynamic and synthetic character; and (vi) objectivity. Upon completion of the assessment, the buffer was applicable to 7 (seven) credit institutions in Romania. Given that two of the banks were systemically important, in accordance with the National Bank of Romania (Banca Naţională a României) assessment carried out in 2015, and an O-SII buffer was also applicable, the SRB was applied to 5 (five) credit institutions active in Romania, in line with CRD IV provisions on combined buffer requirements.

The contagion risk was assimilated to systemic risk generated by structural factors (the ownership of banks), which could have had negative consequences for the financial system and the real economy. The negative spill-overs could have been transmitted through both asset and liability channels, affecting the value of the assets and the capital of the banks concerned, including through the funding channel. The instrument used and the decision to implement a SRB at that time was decided on the basis of several considerations of both a quantitative nature (i.e. excessive reliance on external financing from parent banks reflected by the loans/deposits ratio and the share of foreign liabilities of total liabilities and capital; the lower quality of loan portfolios indicated by above-average levels of the non-performing loans ratio; the concentration in large portfolios of CHF loans vulnerable to FX risk; and a weaker ability to perform financial intermediation reflected by negative credit growth), and also a qualitative nature (i.e. expert judgement), including the impact of a potential deterioration of the sovereign rating which could have affected market perception and depositor confidence, therefore resulting in a higher cost of funding from retail deposits, with a direct impact on capital. A significant spread was seen for the period December 2013 to December 2015 between the average interest rates for the two groups of banks (i.e. non-investment grade countries versus investment grade countries) when comparing applicable volume-weighted interest rates on term deposits for both RON- and euro-denominated deposits. According to the calculations, the estimated additional annual costs were significant and had a mean centred on around 0.9% of total RWA, which justified the implemented level of the SRB in Romania.

The measure was implemented to further improve the resilience of the banking sector, thereby mitigating risks which could have arisen from the identified source. The National Bank of Romania envisaged two positive effects of implementing the SRB: (i) improving the resilience of credit institutions to exogenous shocks; and (ii) avoiding moral hazard and ensuring that the capital requirements for entities in the banking sector were calibrated to the specific risks in their balance sheets.

However, from February 2016 public discussions of certain domestic legislative changes regarding loan contracts had begun to attract significant attention. The developments regarding loan contracts were considered likely to lead to significant changes to the capital adequacy indicators of the Romanian banking system due to increased capital requirements. The application of the SRB was therefore suspended until the outcome of the legislative changes could be clarified. The suspension was based on quantitative arguments (an impact assessment and simulations of the regulatory changes) as well as expert judgement relating to the uncertainty surrounding the final outcome of the legislative proposals.

In December 2016 the implementation of the SRB was re-assessed. Following a significant reduction in regulatory risk after the impact of the proposed legislative changes had been watered down in the final versions of the laws, coupled with a fall in external contagion risk, the National Committee for Financial Stability recommended that the National Bank of Romania deactivate the SRB from 1st March 2017.

5.4.3 Ex ante evaluation of the SRB

The decision to implement a SRB – or a macroprudential policy more generally – should always be accompanied by an ex ante evaluation describing the policymaker's reasoning in imposing the measure and the expected impact on the financial sector and on the real economy. After the measure has been imposed, the ex post evaluation should aim to evaluate the actual impact of the measure and how this compares with the main objectives set by the authority and its initial assessment. Both these evaluation processes are closely linked to the assessments and decisions taken during the calibration stage, which are discussed in Section 5.5.1. In practice, many policymakers will keep the goals of the measure in mind during calibration, so these two stages should be thought of as complementary rather than separate.

A key challenge for the calibration of capital buffers in general relates to the difficulty in assessing the transmission of changes in macroprudential buffers to the real economy. The task is especially complicated in Europe because of the limited insights that may be gleaned from past experience. The study of transmission channels using standard econometric techniques requires a longer time series of data than that usually available.

The potential costs and benefits of introducing a SRB closely relate to the instrument's ability to limit the occurrence of future financial crises. In this context it is important to measure both the short-term or transition costs related to higher capital requirements (see, for example, the BCBS's Macroeconomic Assessment Group[118]) as well as the long-term gains due to the absence of systemic events (see, for example, the BCBS's Long-Term Economic Impact Group[119]). A permanent change in capital requirements should only be implemented if net benefits are expected from higher capital.

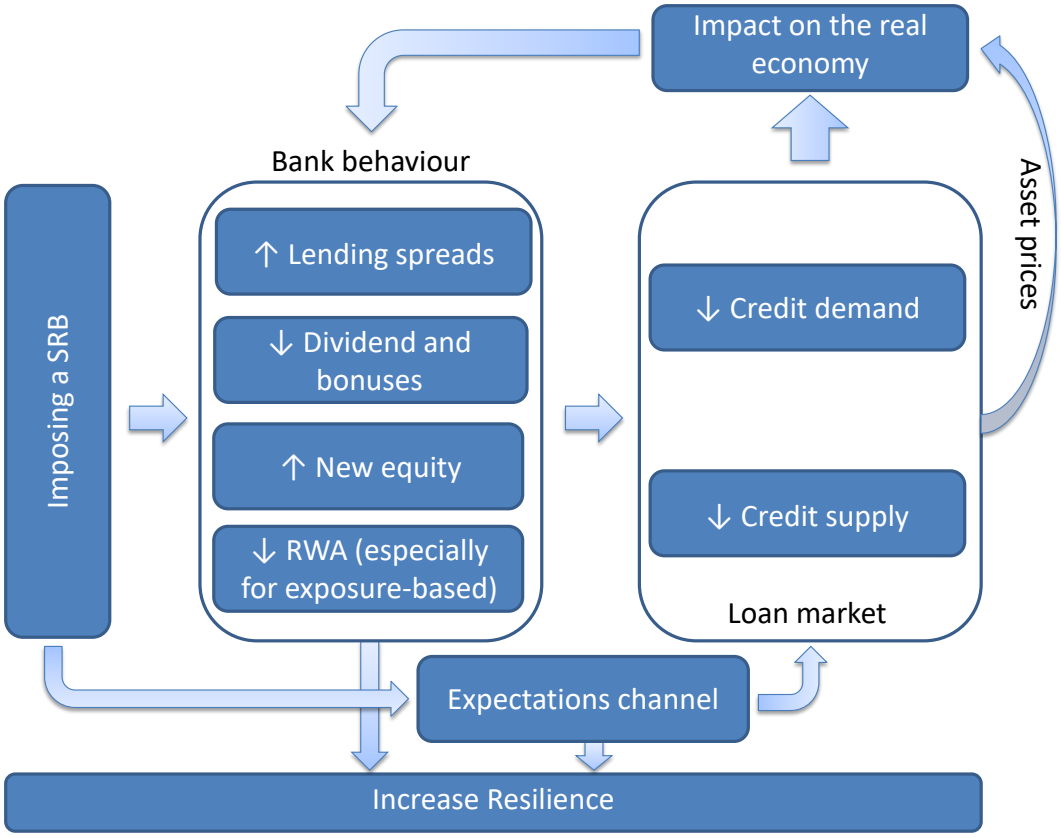
[118] MAG (2010a, b).

[119] BCBS (2010a).

The authorities should also monitor the main channels of propagation when imposing structural buffers, as part of the evaluation of the macroprudential policy transmission mechanism. The capital-based measures' effectiveness depends on the options that credit institutions choose when addressing a potential capital shortfall, with a significant impact on credit supply and demand (Chart 18). Other important spill-overs to the non-banking financial sector and asset prices should be analysed according to their impact on the credit cycle.

Chart 18

A flowchart of a SRB implementation transmission mechanism



Source: Adapted from the ESRB Handbook on Operationalising Macro-prudential Policy in the Banking Sector.

First, the main channel through which the SRB is expected to contribute to strengthening financial stability is by increasing the resilience of financial institutions in the long term, which will, in turn, reduce the likelihood of financial distress. In general, this holds true regardless of the specific type of capital buffer applied on top of the legal minimum capital requirements. Taking into account how difficult it is to disentangle the effects of structural and cyclical buffers, most of the studies aiming to evaluate the ex post effects of changes in capital requirements have focused on the benefits of raising additional capital independently of the specific buffer used to that effect.

Second, in the short term such additional capital requirements carry economic costs due to increased funding costs for banks, which will, in turn, encourage banks to increase lending spreads and/or reduce credit supply, with a potential negative impact on economic activity. Institutions may opt to deleverage rather than to increase capital, hence reducing output in the long term. At the same time, deleveraging might also occur in sectors where competition is greater and where substitutability will lead to a reduction in credit from some banks offset by increased lending from others.

Therefore, consolidating market sentiment through the expectations channel can play an important role in the effectiveness of the SRB. From a modelling perspective, DSGE models provide interesting results since they are able to account for the presence of expectations as well as measure welfare. Measuring the trade-off between a lower incidence of bank defaults and the short-term costs of raising equity could provide the basis for an ex ante evaluation of SRB implementation. Other possible approaches to quantifying the overall impact include macro stress testing and FAVAR models that simulate the scenario of higher capital requirements and measure their impact on bank lending, credit spreads and macroeconomic variables.

Stress tests provide a useful tool for quantifying the impact of a shock scenario on the resilience of the banking system, and the feedback loops to the real economy. They can be used as a benchmark for the resulting SRB levels. For this purpose, it must be ensured that stress tests are applied to the same shock scenario as that in the model used for the calibration of the SRB (e.g. a sectoral credit portfolio model). In contrast to sectoral credit portfolio models, stress tests do not always deliver a distribution of losses and may, instead, be based on an expected loss approach. Annex 12 provides an outline of a typical stress testing process.

5.4.4 Ex post evaluation of the SRB

The primary objective of the ex post evaluation is to compare the actual impact of an implemented SRB with the objectives defined in the calibration process and the ex ante evaluation results. This analysis complements the ex ante evaluation by taking into account the observed behaviour of financial institutions, in contrast to the theoretical assessment provided by the ex ante evaluation.

Considering (i) the wide area of long-term non-cyclical risks the SRB can be applied to and (ii) the degree of heterogeneity of the various vulnerabilities and risks addressed in countries that have implemented it, its ex post evaluation can be challenging. This is especially the case as a proper evaluation can only take place when sufficient time has passed since activation but macroprudential authorities have also released the buffer, having made the assessment that the risks it was designed to capture have been mitigated or considerably reduced in intensity. Given its flexible nature, an ex post assessment can be customised to address the main objectives of the structural measure, ranging from monitoring excessive concentration, through an ex post analysis of key indicators, to measuring the welfare costs of higher capital requirements and the ability of these to limit the occurrence of systemic events, in a structural framework.

There is currently almost no experience of ex post evaluation of the SRB as countries have only recently started implementing such measures and there is, therefore, limited empirical data on which a thorough quantitative assessment can be built. Moreover, even if sufficient data existed, the methodology used to evaluate effectiveness would be analogous to that proposed for the ex ante evaluation, since it is not easy to measure the long-term benefits of higher capital requirements in mitigating systemic crises. As such, at this time the ex post evaluation of the SRB can only be performed on the basis of modelling frameworks which incorporate ex ante expectations of its effectiveness in mitigating the identified risks, or on macro stress tests based on updated information which could include the limited effects of a recent SRB implementation. In this respect, looking at empirical data on market reactions after capital increases could provide some evidence of the role of expectations in consolidating resilience in the banking sector.

However, in order to avoid unwanted side effects and potential recalibrations following SRB application, the policy target must be clearly specified. In this context, an ex post evaluation should assess the extent to which the buffer has had the desired impact on the resilience of the banking sector and on credit dynamics. Relying solely on the empirical evidence provided by an ex post evaluation based on short-term effects could lead to an erroneous recalibration of the instrument. The quantitative ex post evaluation should therefore be combined with a qualitative assessment from the relevant authority.

Finally, the ex post evaluation should also closely monitor and assess any unintended consequences of applying the SRB, following the guidance provided by the ESRB Handbook. In this context, authorities should focus not only on deleveraging and the impact on lending but also on the reallocation of capital, shadow banking spill-overs and adjustments to internal ratings-based models.

5.5 Practical issues concerning the application of the SRB

5.5.1 Multiple and risk-sensitive applications of the SRB

It is currently unclear whether it is legally possible to implement or calibrate more than one SRB per jurisdiction – this may be subject to the national transposition of the SRB. Throughout Article 133 of the CRD IV, reference is made to both "a systemic risk buffer" as well as to "the systemic risk buffer". Paragraph 5 also discusses the implications of *"[…] that systemic risk buffer […]"* and paragraph 9 that *"[…] Different requirements may be introduced for different subsets of the sector"*, implying that it is possible for several SRB(s) (or put another way, multiple calibrations of the SRB) to be active simultaneously. However, only granularity on a geographical basis is specifically allowed in CRD IV. The article is, as such, unclear and does not explicitly confirm whether a jurisdiction can apply more than one SRB calibration simultaneously or not.

Under the current regime, in which different risks must be assessed and calculated based on all domestic exposures or on all exposures in third countries, an authority is restricted to calibrating a single SRB on the basis of the sum of all relevant risks. Let us imagine a where an authority has identified two distinct sources of structural systemic risk but has decided to

calibrate one single SRB to cover both. Although this takes into account the interactions of all the different risks addressed via the SRB, due to the accumulation of all these risks the resulting SRB would not be transparent and would therefore not be comprehensible, which could undermine acceptance of the instrument altogether. There are currently no jurisdictions which have applied multiple SRB calibrations. However, AT and HR have implemented a SRB calibrated on different components of structural risk but then applied at an equivalent "all exposures" level.

This kind of non-risk-sensitive approach might reduce transparency and neither promotes effective risk management nor effectively aligns incentives unless regularly recalibrated. If an entity subject to such a SRB halved its exposures which are the source of the risk specifically targeted by an element of the aggregate SRB, the SRB rate it would be required to maintain would not fall until the SRB required by the designated authority had been recalculated. However, if multiple SRBs were available, calibrated based on the risk exposure amounts of the targeted risks, then each SRB could specifically and effectively target an identified risk element, instead of having a blunt impact on all the exposures it is applied to.

From a practical point of view, being able to apply or calibrate multiple risk-sensitive SRBs would be extremely beneficial for financial stability across the EU, not least because reciprocation issues might arise were this not possible. There are situations where, in order to fully address a risk, multiple SRB calibrations may be required. However, as noted in the unofficial opinion of the Commission in EBA Q&A 2017_3229, referring to reciprocation, since the SRB is an exposure (not risk) targeting measure, two SRBs cannot be simultaneously applied to the same set of exposures. Let us imagine a situation in which Country A has applied a SRB of 2% to all the exposures of banks headquartered in its jurisdiction to cover the systemic risk of FX lending to unhedged borrowers and, subsequently, Country B has applied a SRB of 3% to all domestic exposures to cover the risk of high LTV loans and has asked foreign authorities to reciprocate this measure. As the two SRBs cover different risks, exposures in Country B should, in principle, be subject to both requirements. However, under current legal conditions, Country A cannot reciprocate even if it wishes to. As a consequence, Country A's banks' exposures located in Country B will be subject to a lower requirement than the domestic exposures of Country B's banks.

However, the operationalisation of multiple risk-sensitive SRBs would be challenging. Implementation challenges could relate, in particular, to the accumulation of – and communication difficulties regarding – distinct capital requirements with different calculation bases. In the case of requirements stemming from national decisions and the reciprocation of foreign measures, accumulation of distinct buffers could lead to the double-counting of risks.

Importantly, the rules and procedures set out in Article 133 of the CRD IV should continue to safeguard the integrity of the Single Market. A more general concern over the possibility of applying multiple distinct SRBs is that this could result in an overly flexible and widespread use of this instrument, potentially damaging the Single Rulebook. However, the requirements stipulated in Art 133(10-15) of the CRD IV should counter this risk. Furthermore, enhanced disclosure with regard to the risk identification and assessment underlying the policy decision could balance the greater flexibility that could derive from multiple risk-sensitive SRBs (see Section 5.6.7).

Box 8

Hypothetical example of SRB complexity under the current legal framework

Country A has identified two long-term non-cyclical systemic risks within its economy:

1. FX loans to unhedged borrowers;

2. potential losses stemming from overcapacities in the commercial real-estate sector (CRE).

The national authority has observed that, due to a supply glut, CRE vacancy rates are high and prices are falling. Once workout is complete losses are expected to be larger than the amount banks have accounted for. The authority's assessment is that these risks are not adequately covered by the CRD IV package. Since Pillar 2 instruments are not under its control and there are no other instruments that could be effective in mitigating the risk, it decides to apply a SRB. The national authority estimates that a 5% capital surcharge on the CRE risk exposure amount and a 10% capital surcharge on FX exposures to unhedged borrowers would be appropriate to mitigate the identified risks. It therefore decides to impose a SRB on domestic exposures (as the risk is cumulative to O-SII buffers). In terms of institutions' total risk exposure amount, the calibration leads to the following hypothetical results:

- Bank 1 – SRB rate 0.7% – the authority must impose no SRB, or a higher than required SRB of 1%;[120]

- Bank 2 – SRB rate 2% – no constraints for this application;

- Bank 3 – SRB rate 3.5% – an approval process should be initiated in accordance with Article 133(14) of the CRD IV;

- Bank 4 – SRB rate 5.5% – an approval process should be initiated in accordance with Article 133(15) of the CRD IV. The SRB can only be applied if the EU Commission adopts an implementing act giving permission to the national authority to apply the SRB at this level.

Let us imagine that Bank 3 decides to decrease its lending to SMEs and increase FX mortgage lending. This will lead to a decrease of its total risk exposure amount (due to lower risk weights on mortgages than on SME lending) and therefore to a lower amount required for SRB despite the increased exposure to the targeted systemic risk. The authority must recalibrate the SRB rate for Bank 3 to 5.5% and must seek the Commission's approval to impose this recalibrated SRB.

Country A requests reciprocation of a measure and Country B decides to reciprocate. The published SRB rates (1%, 2%, 3.5%, 4%) cannot be used for Country B's calibration of the SRB. Country B needs to know the underlying requirement based on the targeted exposure amount of FX loans as well as CRE loans to properly calibrate its SRB. It decides to set a SRB of 1% for Bank 5, which provides FX mortgages in Country A. However, the SRB must apply to all exposures in Country A, so the SRB will also be applicable to Bank 5's SME and infrastructure lending in Country A, resulting in a credit slowdown.

[120] The issue of the minimum 1% threshold for application of the SRB has not been further investigated in this report due to time constraints.

Country C cannot reciprocate the measure as it has not implemented the SRB, even though it has a branch in Country A, which is very active in FX lending. Country D decides not to reciprocate the measure as it already has a SRB in place, which only applies to domestic exposures and would therefore no longer be cumulative with the O-SII buffer, if the reciprocating measure is incorporated. Country E decides not to reciprocate, as it plans to introduce a SRB itself and fears that the cumulative impact might mean it will be subject to the Commission's approval if it reciprocates.

5.5.2 Application of the SRB to targeted exposures

The taxonomy of risks presented in Section 5.3 offers a broad discussion of the systemic risks which may potentially be addressed through the application of the SRB. Some of the identified risks may require additional flexibility in the current legal framework so they can be adequately targeted. In order to address the risks presented in the taxonomy, it might be necessary to apply the SRB to a broad set of exposures, such as, for example, total or domestic exposures, when addressing risks stemming from the global economy for the financial sector of a small and open economy. It may, however, also be necessary to apply the SRB to a specific and limited set of exposures, e.g. when addressing macroprudential sectoral risks or risks stemming from exposure concentration and asset commonality. Such exposures relate to a specific sector of economic activity (such as agriculture, manufacture, real estate, etc.), a specific counterparty category (such as households and non-financial corporations etc.), as well as subsets of exposures based on other characteristics.

The current regime, under which the SRB can either target all exposures or just distinguish between exposures on the basis of their geographical origin, restricts the potential effectiveness of the SRB. This could lead to a situation where macroprudential sectoral risks are identified in a specific exposure sector but the SRB is necessarily then applied bluntly to total or to domestic exposures. This SRB could increase the resilience of an institution to a shock but does not offer any incentive to reduce the risk (unless a regular recalibration of the SRB is undertaken, which would increase the burden on the activating authority despite the structural nature of the risk targeted). Still, some Member States have calibrated the SRB as a function of the targeted exposure amount (see, for example, HU for an example of a SRB application where the buffer rates decrease in proportion to the amount of the targeted risk exposure). However, even a proportional calibration between the targeted risk exposure and the SRB does not fully align incentives, as a shift into other exposures might not reduce the total additional capital requirement resulting from the SRB to an extent that would provide sufficient incentives to decrease the targeted risk exposure.

Using a SRB to target specific exposures in a more granular way would have clear incentive and risk-mitigation effects, although the operationalisation of such a usage could be challenging. Defining and specifying targeted usage would be extremely difficult, as it is with the SRB today. There would be difficulties relating to ensuring consistent and comparable exposure definitions across jurisdictions, as well as communicating the different SRB rates and the effective overall impact of multiple SRBs. This is especially complex since a SRB targeting a specific exposure would need to be calibrated and defined on the risk exposure amount (REA) of the specific targeted exposures to ensure there are effective incentives to reduce risk and avoid regulatory arbitrage. This would mean there would be two SRB rates to communicate: the specific SRB rate as a proportion of the targeted exposures REA, as well as the rate as a function of the overall national total banking system REA. In short, although a SRB targeting exposures would allow more effective risk targeting, the challenge to overcome would be how such a use can be clearly and effectively communicated alongside the broader use currently in place.

5.5.3 Definition of the thresholds for calibration

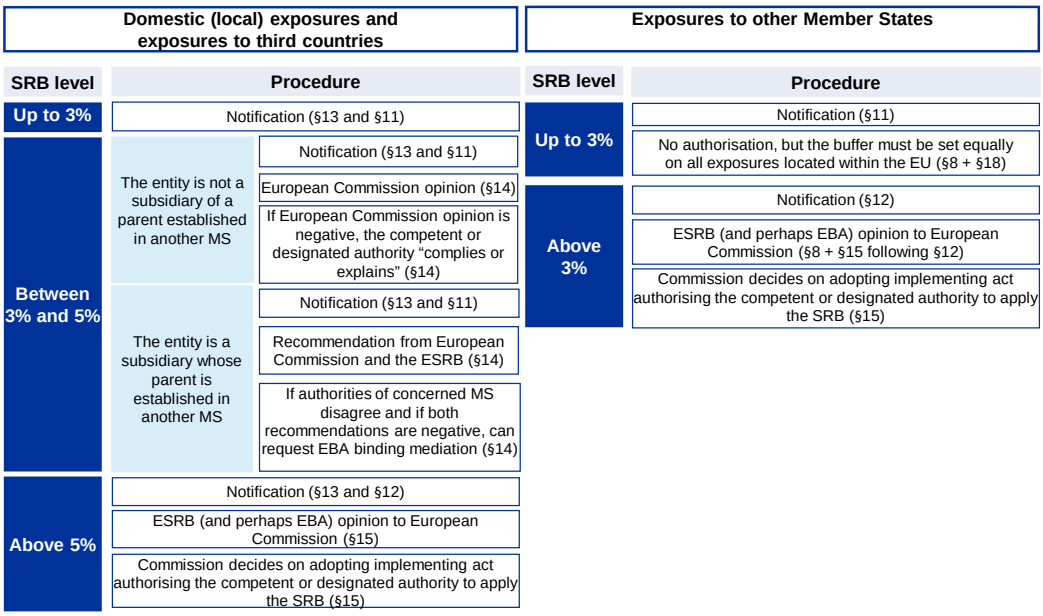
CRD IV is not clear on exactly what the threshold levels in Article 133 refer to. As noted in the stocktake, this has caused some confusion to date, with no jurisdiction applying a SRB at a level higher than 3% of the total REA of the banking system or of the geographical exposures of a Member State or the institutions it is applicable to (possibly also due to concerns over uncertainty regarding the application of these notification/approval requirements). EBA Q&A 2016_3037 has recently clarified this situation to some extent by explaining that the SRB rate is based on the total REA relating to a Member State as calculated in accordance with Article 92(3) of the CRR. Nonetheless, the Q&A does not explicitly define how the thresholds should be calculated.

5.5.4 Notification and activation process

Depending on the chosen consolidation level and the geographical location of exposures covered by the SRB, notifications should also be sent to other relevant authorities when this is deemed necessary. General notification requirements are laid down in Article 133(11)-(16) of the CRD IV (see Chart 19 for an overview). When the tasks of setting the SRB and the SII buffers are not allocated to the same authority, and given the interplay and overlap between the SII buffers, it is suggested that the authority responsible for setting a SRB should notify the other authority before setting or resetting a buffer rate.

Chart 19

Procedures of Article 133 of Directive 2013/36/EU (CRD IV)



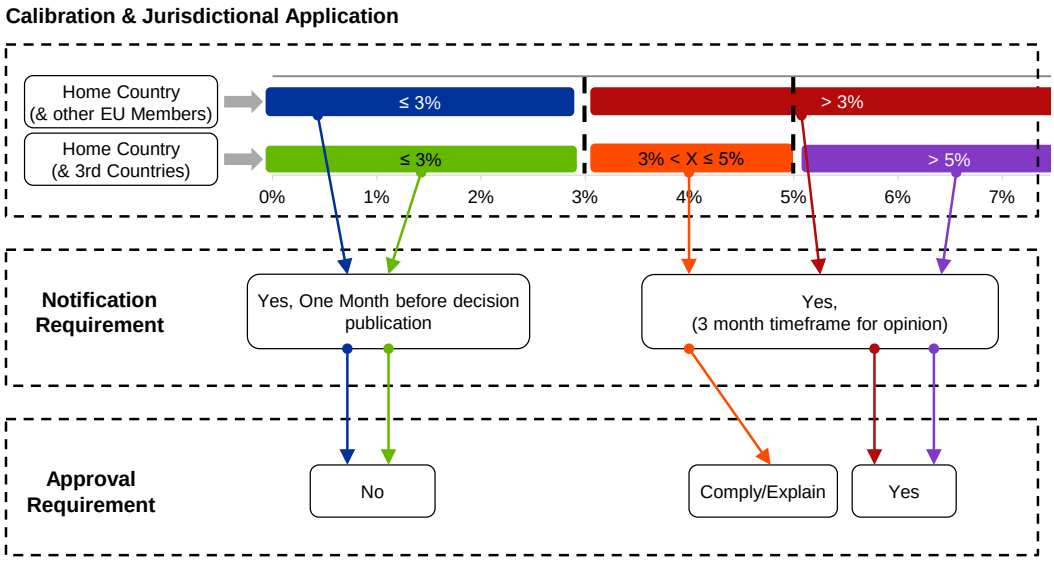
Source: ESRB.

The current notification procedure and approval requirements (See Chart 20) could represent a disincentive for authorities to set a SRB exceeding 3% since the measure could, potentially, be rejected. The notification threshold's calibration must be carefully considered in

order to balance, on the one hand, the need for appropriate national discretion to address risks adequately against, on the other hand, the potential for such measures to disrupt the Single Market and affect other jurisdictions.

Chart 20

SRB Application per Article 133 of the CRD IV



Source: ESRB.

5.5.5 Positioning of the SRB after other CRD IV/ CRR instruments

The current pecking order of instruments in the EU macroprudential framework requires the SRB to be used only when there is justification for why none of the existing measures in the CRD IV/CRR (excluding Articles 458 and 459 of the CRR) can adequately address the identified systemic risk. A clear separation of targeted risks and a well-defined allocation of instruments dedicated to addressing these risks is a key part of fully efficient and transparent prudential regulation. The pecking order aims to maintain a clear allocation of risk objectives and prudential tools by preventing the use of versatile instruments to target risks which would be better addressed using other, more standardised, measures.

However, this approach could introduce misleading incentives into the decision-making process, inducing authorities to use instruments other than the SRB, even in cases where the SRB is the most suitable tool. Prior to activating the SRB, macroprudential authorities must justify why other tools in the CRD IV/ CRR (excluding Articles 458 and 459 of the CRR) are not able to address the identified systemic risks, even if some of these instruments are clearly inadequate for addressing the risks. If the designated authority for the SRB disagrees with the competent authority then it (the designated authority) must consider instruments (e.g. Pillar 2 requirements) that are not even under its control. This could encourage inaction bias or create an incentive to choose an instrument which is comparatively more straightforward to implement but less effective in addressing the risk.

In order to avoid the introduction of misleading incentives in the selection of macroprudential instruments, and to ensure a timely and adequate response to systemic risks, the pecking order should be removed for SRB activation. For a wide range of structural risks, the SRB is the only available adequate macroprudential capital tool. As such it should have the same “non-residual” nature as the CCyB and the G-SII/O-SII buffers, i.e. it should be upgraded to the status of a fully fledged dedicated instrument covering non-cyclical risks which are not targeted by other Pillar 1 instruments. The purpose of the pecking order is to ensure that the dedicated instrument is used to target a specific systemic risk. While this results in the consistent application of macroprudential measures across the Single Market, the current set-up has the potential to incentivise authorities to use instruments other than the SRB beyond the scope of their targeted specific systemic risks, simply because they may find this easier, less burdensome, quicker and more predictable. National authorities should not be required to consider, or assess the effectiveness of, instruments which are focused primarily on other risks and are clearly not capable of addressing the vulnerability at hand. They should, instead, be encouraged to devote their efforts to the proper calibration of the SRB.

5.5.6 Phase-in approaches

The timescale for firms to meet the requirements of a given measure depends on the phase-in arrangements defined by the relevant authority when the measure is applied. These phase-in arrangements may vary between jurisdictions. In an extreme case, there could be a short-term risk of regulatory arbitrage in a situation where reciprocation has been requested and two or more reciprocating jurisdictions have taken very different approaches to the matter of when the measure becomes binding.

5.5.7 Communication and disclosure

Disclosure and communication are an important and integral part of the activation of macroprudential measures. Some disclosure requirements are already stipulated in the CRD IV package, under the provisions relating to notifications for each instrument. The measures notified to the ESRB and other EU authorities in recent years provide some guiding principles for disclosure and communication.

The ESRB Handbook already identifies some key objectives: (1) to announce policy action; (2) to enhance market discipline and manage expectations; and (3) to foster accountability. The second objective is linked with the broader objective of explaining the macroprudential strategy pursued by means of the policy action. This is particularly the case for highly flexible instruments, such as the SRB, that can be activated to address different risks. Proper disclosure enhances transparency, and can thus help national authorities carry out their mandates and foster better coordination at EU level.

Transparency is an important feature of the policy framework. Its main value lies in helping economic agents make informed decisions in a fast and efficient manner. This is even more the case in the context of macroprudential policy where policy decisions, even if institution-specific, are always taken from a system-wide perspective and could, therefore, have a significant impact on all

agents in the market. There are two dimensions of transparency that matter in this regard. First, information regarding the policy decision must be clear, understandable and widely communicated and disseminated. Second, the responsible authority should sufficiently reveal its analysis, actions and internal deliberations so that interested observers can see the logic behind each policy decision. When the two dimensions of transparency are satisfied, economic agents are able to anticipate policy decisions – i.e. the policy is predictable. This ensures the smooth and efficient functioning of the framework and guarantees, in the long run, its credibility and effectiveness. If publication could jeopardise the stability of the financial system, this information should not be included in the announcement.

To improve the transparency, and hence the predictability, of SRB decisions, the competent or designated authority should define and publish its strategy for the application of the SRB. The strategy should be a key element of the policy framework. All disclosure and notification requirements stipulated by law (see the next paragraph) should be read by the relevant stakeholders in the context of the strategy. The strategy should include SRB objectives, long-term non-cyclical systemic risks that can be addressed by the SRB, and principles guiding the authority's decisions. An important principle, for instance, relates to the fact that implementation is generally informed by the use of key indicators, possibly also by specific rules, and supplemented by expert judgement along with any other information at the authority's disposal. The strategy could also signal to the public whether the authority foresees the publication of the key indicators and modelling strategies used in setting the buffer rate, and/or what specific channels it plans to use to communicate implementation of the SRB. The latter may comprise press conferences, websites and the publication of risk reports for communication to the wider public, but could also include more specific and technical communication tailored to banks, e.g. through the organisation of a conference before the activation of the instrument. In general, the flexible nature of the SRB, its wide scope of application, and the absence of restrictions on the size of the SRB buffer rate call for particularly high transparency, provided disclosure is not liable to jeopardise financial stability.

Overall, the mandatory SRB disclosure framework is already quite detailed, although communication should encompass other aspects of the activation of the measure, and should also target different audiences. Indeed, disclosure for the SRB may be categorised into mandatory disclosure[121], (Article 133 of the CRD IV), and voluntary disclosure. This ensures the wide dissemination of information regarding the content of the measures well beyond the actors directly affected by the measures. Mandatory disclosure may be expected to show a high level of consistency across Member States. This consistency is also fostered by the common ESRB/ECB/EBA notification templates used when providing notification of the activation of macroprudential measures, although discrepancies between national authorities' choices regarding the level of detail provided, the promptness of releasing information, etc. are unavoidable. Nevertheless, community control is beneficial for a number of reasons: it fosters international accountability and cross-country coordination, and protects the Single Market. On the other hand, voluntary disclosure may more closely match the aims of national authorities when activating the SRB, with a greater focus on national specificities, and thus could be more heterogeneous.

[121] Mandatory disclosure contains notifications sent to national and EU authorities, as well as requirements to publish information on an appropriate website. For more information refer to Chapter 4, Section 5.2 of the ESRB Handbook.

Given the flexibility of the SRB, it is important for the information provided in the public disclosure to be further improved and communication to be enhanced. National authorities should make a special effort to explain the analysis behind the activation of the SRB, their goals, and how the tool will help achieve those goals. Although the SRB will impact banks through an additional capital buffer, its introduction could, potentially, be explained by entirely different analyses and could target different risks. Therefore, a clear explanation of the targeted risks and the SRB's expected impact and transmission channels is necessary, as this may help national authorities to shape economic agents' expectations, and could further help them to achieve stated policy objectives.

Voluntary disclosure fundamentally complements mandatory requirements. Indeed, by following a targeted approach aimed at reaching the general public, financial institutions, the press, and other stakeholder groups, the authorities can significantly influence the formation of expectations. In this sense, national authorities can make use of several communication methods, as detailed in the ESRB Handbook. In addition, it is important that enough time be allowed for economic agents to adapt their expectations, which is why timely communication – if possible well in advance of the activation of the instrument – is preferred. Eventually, offering guidance on the potential future path of the SRB rate in relation to the trend of the underlying risks could further improve the predictability and accountability of macroprudential policy. However, continuing limited experience of the SRB, and the interaction between different macroprudential instruments may significantly limit the scope for such forward guidance.

5.6 Reciprocity of the SRB

Reciprocity arrangements should ensure that all systemic risks are covered in all Member States and should, thereby, reduce the potential for regulatory arbitrage and prevent the double-counting of risks. Identified risks should be fully addressed in all Member States. Allowing different Member States to treat the same risk exposure differently provides scope for regulatory arbitrage and potential financial stability concerns. Reciprocity reduces these concerns and helps contain systemic risks. Reciprocation of measures should be based on the overriding objective of ensuring that identified risks are fully covered, regardless of the measure used for reciprocation. This means that Member States requesting the reciprocation of a measure should be clear in their communication regarding the identified risk, so that reciprocating Member States can effectively ensure that the risk is fully covered. These considerations are especially important since the tool's broad scope of use could be a challenge for accurate risk targeting. It is the responsibility of the reciprocating Member State to ensure (and demonstrate) that the risk is addressed as anticipated by the Member State requesting the reciprocation.

Automatic reciprocation of "domestic exposure"-based SRB measures, as is already the case for the CCyB (although there are some exceptions for the former on the basis of the principle of proportionality), could simplify and increase the efficiency of the framework. However, such a framework would only be possible if the above-mentioned changes to the SRB were implemented. Automatic reciprocity would ensure that systemic risks stemming from certain exposures were adequately addressed throughout the EU. The authorities in other Member States should have the right to issue a decision that exempts institutions in their jurisdiction from this reciprocity, in particular on the basis of the principle of proportionality.

5.7 Accumulation of SRBs

In general, measure accumulation should be dependent on the risks targeted by the measures. Measures targeting different risks should be added together while measures targeting the same risks should not, as long as the risks are fully addressed. This will ensure there is no double-counting of risks, which could produce negative incentive effects in the system. However, under the current framework this approach is not always applied. One particular example is the interaction between the O-SII and SRB buffers, detailed further in the O-SII-SRB interactions section.

Reciprocity requests for the SRB are currently voluntary; however, should stronger responses be desired in the future, use should be made of comply-or-explain requirements with sufficient transparency.[122] This would raise expectations that the home-host authorities would reciprocate the measure but would still retain their option, to effectively avoid any identified unintended negative impacts. Where authorities have opted not to reciprocate, or have reciprocated with a different measure/calibration, it is important that the reasons for this are clearly and publicly explained. This will serve to improve understanding of the measure's usage, and will justify the home authority's regulatory assessment and reduce the risk of unintended consequences stemming from the interactions of multiple measures.

There is little historical precedent to show how reciprocation requests should be handled in the EU. The ESRB has a key role to play in reciprocal requests, acting as a check on the initial request before it is sent to the other Member States, and monitoring the degree to which the reciprocation request has been implemented.

[122] i.e. mandatory reciprocity with home authority veto.

Box 9

Faroe Islands planned SRB application[123]

On 3 March 2017 the Systemic Risk Council in Denmark recommended that the Minister for Industry, Business and Financial Affairs set a general SRB rate of 1% for exposures in the Faroe Islands from 1 January 2018. The purpose of introducing a general systemic buffer was to make the banks more resilient to major fluctuations in the Faroese economy.

The Council assessed that the buffer rate should be further increased in the coming years. The Council will involve the Faroese authorities in the discussion of a suitable risk buffer rate level and the time horizon for phasing in the buffer rate until it reaches this level.

With a view to ensuring a level playing field for Faroese and foreign banks with exposures in the Faroe Islands, the Council advises the Minister to ask authorities in other relevant countries to reciprocate the SRB rate of 1% for all Faroese risk exposures. Authorities in other countries may exempt institutions with very small Faroese exposures from this requirement. To this end, the Council recommends an institution-specific limit of DKK 200 million, i.e. 1% of total lending, including lending from abroad, in the Faroe Islands.

The Faroese economy is a small, open economy with a concentrated business structure that is heavily dependent on fisheries and aquaculture. This makes the economy vulnerable to negative economic shocks, which may, via direct and indirect effects, entail losses in the banking sector and amplify real economic fluctuations. Historically, the Faroese economy has fluctuated strongly, with marked variations in the loan impairment charges Faroese banks. The Council's assessment is that the Faroese financial sector is vulnerable to the structural factors characterising the Faroese economy. The Council believes that activating the SRB for the Faroe Islands could address these vulnerabilities. The aim of the buffer is to prevent or mitigate structural systemic financial risks.

With regard to systemically important financial institutions (SIFIs) the general systemic buffer rate will be an add-on to the SIFI requirements, which are to be phased in by 2019. The Minister for Industry, Business and Financial Affairs is responsible for setting the SRB rate.

The Council's recommendation is in compliance with current legislation.

[123] As it is a third country, the 5% notification and activation threshold for the SRB would apply.

6 Interaction of macroprudential buffers and associated application issues

Summary of proposals

Based on current experience and economic analysis, the following proposals could be considered with regard to the macroprudential buffers:

- **Capital requirements relating to measures which target different structural systemic risks should be cumulative.** The current accumulation rule for structural buffers makes it difficult to target several structural risks simultaneously. In general, measures targeting different risks should be cumulative while measures targeting the same risks should not, as long as the risks are fully addressed. To prevent excessive accumulation of buffers, Commission approval should be required on the basis of the cumulative impact of all SRBs (Section 6.1).

- **A macroprudential leverage ratio requirement could usefully complement structural risk-weighted capital buffers.** This could increase the resilience of SIIs and help to internalise negative externalities deriving from excessive leverage and uncertainty in measuring risk. Until a minimum leverage ratio requirement is introduced the existing guidelines set out in the Addendum to the ESRB Handbook could be used to enhance the stability of national financial systems (Section 6.2).

- **Cooperation requirements should be in place between authorities involved in the application of structural buffers to ensure the compatibility of objectives, to limit potential conflicts of interest and to facilitate a complete risk assessment.** Adequate procedures should be in place that allow information – and, where needed, data – to be shared between authorities, including confidential information. A mandatory cooperation requirement between NCAs and NDAs should be incorporated into CRD IV whenever Pillar 2 measures are implemented for the purpose of system-wide stability (Section 6.3).

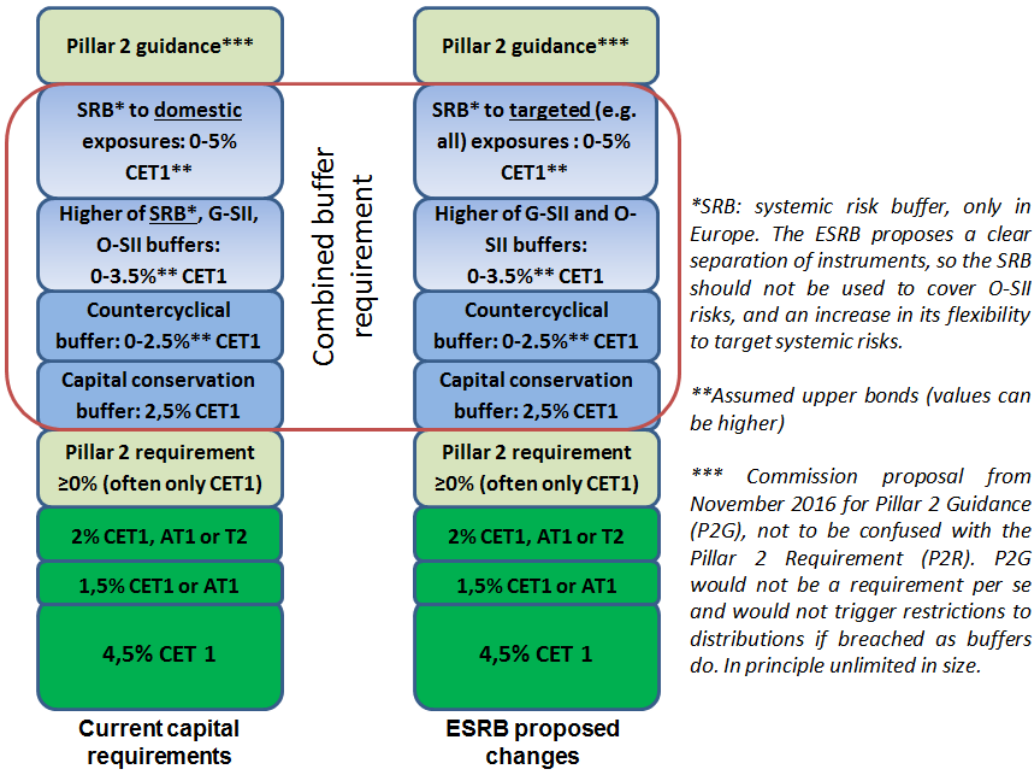
6.1 Simultaneous use of structural buffers – accumulation based on the risk coverage principle

The accumulation rule for structural buffers makes it difficult to target several structural risks simultaneously. If applied on a consolidated basis, only the higher of the G-SII buffer, the O-SII buffer and the SRB may currently be applied to an institution (Article 131(14) of the CRD IV). The only exception is when the SRB applies only to domestic exposures, in which case it is cumulative with the higher of the G-SII and O-SII buffers (Article 131(15) of the CRD IV). The aim of this limitation is to prevent a combination of structural buffers leading to an excessive accumulation of capital requirements. One way, therefore, to target multiple risks in the current framework is to impose the SRB on domestic exposures only. If not, all targeted risks must be incorporated into a single SRB, although this approach diminishes the transparency of macroprudential policy.

Capital requirements relating to measures which target different systemic risks should be cumulative. In general, measure accumulation should be dependent on the risks targeted by the measures. This is currently the case for Pillar 1 requirements, the CCoB, the CCyB and structural buffers which, by definition, target different risks and are cumulative in relation to each other. This principle should be extended to cover different sources of structural systemic risks. Measures targeting different structural risks should, therefore, be added together while those targeting the same risks should not, as long as the risks are fully addressed. This prevents the double-counting of risks which could lead to negative incentive effects in the system. One particular example of the accumulation principle is the current interaction of the O-SII buffers and the SRB. When the SRB is applied to domestic exposures only it is akin to an activity-based measure (in a crude way) – it differs from SII buffers and the buffers can be added together. However, when the SRB is applied on all exposures it may be viewed as an institution-based measure and the "higher-of" rule applies in order to avoid fragmentation, damage to the Single Rulebook and ring-fencing.

Chart 21

Current cumulative capital requirements for European banks and ESRB proposed changes



Source: ESRB.

If the SII buffers and the SRB are fully delineated with full risk coverage possible by each of them then, by definition, the two instruments target different risks and the SRB should always be applied in addition to the higher of the G-SII and O-SII buffers. It is currently

acceptable for the SRB to target the SII risks if these are not fully addressed by the capped O-SII buffer. It is therefore important that this potential interaction does not lead to the double-counting of capital requirements by imposing restrictions on the accumulation of the SII buffers and the SRB. However, this is no longer warranted when the two instruments have been fully delineated. The same principle should also apply to the multiple application of the SRB, where, in principle, each SRB decision targets a specific systemic risk and capital requirements should therefore be cumulative. The proposed accumulation rules, in combination with other capital requirements, are shown in Chart 21.

The accumulation principle should be taken into account in the calibration of structural buffers. This will improve the effectiveness of macroprudential policy, although it may have a significant impact on the level of regulatory capital that an individual bank might be required to hold in the future. However, as the research on the optimal level of capital requirements is inconclusive, authorities need to take all these aspects into consideration in the calibration of instruments. In order to prevent an inappropriate accumulation of capital requirements, the Commission's approval should be required if the cumulated SRBs exceed a given threshold.

6.2 A macroprudential leverage ratio buffer as a complement to risk-weighted structural buffers

The last financial crisis revealed that leverage had been an important driver of systemic risk with negative externalities for the financial system and the real economy. Although the average risk weights of banks declined in the build-up to the crisis[124], leverage was increasing in the long term, as shown by declining leverage ratios (Benink and Benston (2005)).[125] Lower RWA may partly have been due to portfolio shifts but were not always justified by lower inherent risk, as shown by the history of bank failures and, most recently, the global financial crisis. A leverage ratio requirement limits excessive on and off-balance sheet leverage by restricting a bank's total assets (including off-balance sheet assets) in relation to its equity. Furthermore, it safeguards against model risk and fundamental uncertainty[126], the latter being risk that is not measurable and cannot be calculated, as it defines a lower bound for permissible risk weights. This complementary safety net reduces (systemic) risk in a manner that risk-weighted requirements alone cannot.

A macroprudential leverage ratio requirement could usefully complement structural risk-weighted capital buffers. From a structural perspective, a macroprudential leverage ratio focuses on tackling systemic risks arising from leverage, banks' potentially misaligned incentives to reduce risk weights and too-big-to-fail issues surrounding SIIs, as well as other structural systemic risks

[124] Indeed, for a set of global banks, average risk weights fell from around 70% in 1993 to below 40% just before the crisis (ESRB Handbook Addendum 2015).

[125] The leverage ratio is, in simple terms, capital over total exposure.

[126] Fundamental uncertainty refers to the economic concept of Knightian uncertainty that is different from risk that is quantifiable if a probability is applied to it. For instance, uncertainty may be related to "unknown unknowns" as these are, by definition, not measurable (see Aikman et al. 2014).

such as the correlation of losses due to common exposures. Especially large and complex institutions are more likely to rely on internal ratings-based approaches when setting risk-weighted capital requirements and to maintain significant trading books with low measured risk. They are also more likely to be influenced by both model risk, especially regarding tail events, and uncertainty that cannot be captured by modelling. Data show that SIIs have, on average, lower CET1 capital and leverage ratios than other types of banks.[127] As risk-weighted capital buffers are inherently subject to model risk and uncertainty, a macroprudential leverage ratio add-on would be a useful complement that could increase the resilience of SIIs and help to internalise negative externalities deriving from excessive leverage and uncertainty in measuring risk. In the same vein, the leverage ratio add-on could also complement other risk-weighted buffers such as the SRB.

Several international fora have acknowledged the potential utility of a macroprudential leverage ratio as part of the overall macroprudential toolkit. The ESRB refers to it in its Recommendation on intermediate objectives and instruments of macroprudential policy[128], the EBA in its report on the leverage ratio (EBA 2016), the BCBS in its work on simplicity and comparability (BCBS, 2013c),[129] and the Governors and Heads of Supervision have discussed additional requirements for G-SIIs (BCBS, 2016). The ECB and the ESRB also highlight the advantages of a macroprudential leverage ratio in their respective responses to the European Commission's Consultation Document on the "Review of the EU Macro-prudential Policy Framework". Moreover, detailed guidance for macroprudential authorities in the EU in respect of the macroprudential leverage ratio is provided in the Addendum to the ESRB Handbook.

Several countries have introduced macroprudential leverage requirements against a backdrop of particularly highly leveraged banks running into trouble during the crisis. In the USA, the biggest deposit-taking bank holding companies are obliged to comply with a 6% leverage ratio, in Switzerland SIFIs are subject to a 4.5% ratio and G-SIBs to a 5% ratio, while in the Netherlands there is a supervisory expectation that the biggest banks will have a leverage ratio of at least 4%. In the United Kingdom, banks subject to risk-weighted macroprudential buffers will also have to comply with a complementary leverage ratio add-on set at 35% of risk-weighted buffers. Overall, recent economic studies have shown that not only would there be a solid macroeconomic net benefit of introducing a leverage ratio requirement of 3%, but that this net benefit would increase for higher requirements (Fender and Lewrick 2015).

A rules-based approach could lead to the simple and comprehensive introduction of a macroprudential leverage ratio add-on to ensure that the leverage ratio is acting as an effective complement to risk-weighted requirements. Not doing this would mean that the leverage ratio would become relatively less stringent than the risk-weighted framework for systemic institutions.

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127 See EBA (2017). According to this report, average ratios for G-SIIs and O-SIIs are lower than for Group 2 banks.

128 **Recommendation ESRB/2013/1 on intermediate objectives and instruments of macroprudential policy** (OJ EU 2013/C 170/1).

129 BCBS (2013): "Beyond the current proposals, other ideas to further strengthen the benefits of the leverage ratio within the regulatory framework could include: adjustments to the design and calibration of the leverage ratio, such as adopting a similar "buffer" structure for the leverage ratio as is the case for the risk-based capital requirements under Basel III; and/or the inclusion of stronger leverage ratio requirements for G-SIBs, so that the leverage ratio maintains its relative strength as a backstop for the most systemically important banks."

Once the minimum leverage ratio requirement envisaged by the CRD IV/CRR review has been introduced, ESRB should update its guidance, incorporating new insights from work involving net benefit analyses of a leverage ratio add-on linked to the risk-weighted (structural) buffers as part of the same overall framework. In the meantime, Member States should consider how the detailed guidance set out in the ESRB Handbook could be used to enhance the stability of national financial systems.

6.3 Cooperation requirements between macroprudential authorities

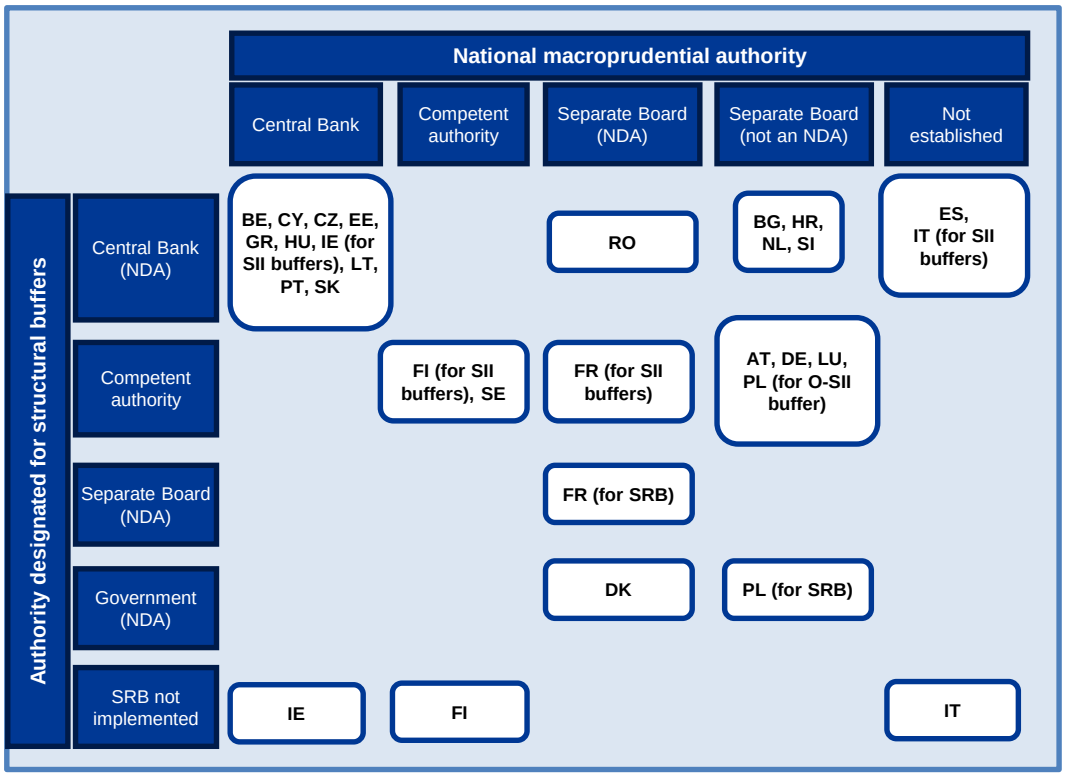
Cooperation requirements between the authorities involved in the implementation of structural buffers are needed to increase the effectiveness of the buffers. In addition to the interaction of the structural buffers described in Section 6.1, differences in the institutional set-up of EU Member States with regard to the authorities responsible for the application of macroprudential instruments also have an impact on the effectiveness of the buffers. As variations in the institutional macroprudential framework of Member States reflect national specificities, the ESRB provides guiding principles on the core elements of national macroprudential mandates, to promote consistency between national approaches and to help to overcome any national inaction bias.[130] In this respect, the ESRB recommends that Member States designate a national macroprudential authority (NMA) that not only identifies, monitors and assesses risks to financial stability, but also has control over the application of instruments used to perform its tasks. Institutionally, the NMA could be either a single institution or a board consisting of authorities with a material impact on financial stability. It does not necessarily have to be identical to the NDA which is – following the transposition of Article 136 of the CRD IV into national law – responsible for setting, inter alia, the CCyB. Chart 22 shows an overview of the NMA set-up and Annex 13 describes specific cases of implementation in Germany, France and Hungary. A current list of NMAs and NDAs is maintained and published by the ESRB[131].

[130] **Recommendation ESRB/2011/3 on the macro-prudential mandate of national authorities**.

[131] For the **current list**.

Chart 22

National macroprudential authorities



Source: ESRB.

Member States should designate the authority responsible for the application of structural buffers – this could be the NCA or the NDA.[132] EU Member States entrust structural buffers to four different kinds of authorities:

- **national central banks (as NDA).** Most EU Member States follow this set-up (BE, BG, CY, CZ, EE, GR, HR, HU, IE[133], LT, NL, PT, RO and SK). In many of these countries the central bank is also the national supervisor and acts as the banking supervisory authority (NCA).[134]
- **supervisory authorities** (NCAs in AT, DE, FR,[135] FI, LU[136], LV, MT, PL[137], SE and the UK). However, in some of these countries the central bank is closely involved in the

[132] See Article 131(1), Article 131(3), and Article 133(2) of the CRD IV.

[133] Only a O-SII buffer. A SRB was not implemented in IE.

[134] See Article 4(1) CRR.

[135] In France, the supervisory authority ACPR as NCA is responsible for the application of the G-SII and O-SII buffers, whereas a stability board decides on the application of a SRB.

[136] According to Article 59-2(10) of the Law of the Financial Sector, in Luxembourg the designated authority is the Commission de Surveillance du Secteur Financier (CSSF) which, when acting in such a capacity, takes decisions after consultation with the Banque Centrale du Luxembourg, in order to adopt a common position and, where applicable, after requesting the opinion of the Comité du Risque Systémique, or taking the latter's recommendations into account.

[137] In Poland, the responsibility for setting structural buffers is divided between the Financial Supervision Authority (KDW) for the O-SII buffer and the Ministry of Finance for the SRB.

macroprudential decision-making process, e.g. in the United Kingdom, the supervisory authority (PRA) forms part of the central bank.

- **the government (as NDA).** DK (Ministry of Business and Growth), PL (Ministry of Finance – only for the SRB).

- **financial stability boards (as NDA).** In France, the board is responsible for the application of the SRB while the supervisory authority (ACPR as NCA) is responsible for the implementation of the G-SII and O-SII buffers.

Within the SSM, the ECB has "top-up" power in respect of macroprudential decisions taken by national authorities for credit institutions within the Eurozone.[138] In this regard the ECB may, should it be deemed necessary, apply higher requirements for capital buffers to be held by credit institutions than those applied by the authorities of participating Member States. This relates to the ECB's specific tasks concerning policies for the prudential supervision of credit institutions, with the aim of contributing to the safety and soundness of credit institutions and the stability of the financial system within the Union and within each Member State.[139] With regard to the implementation of G-SII and O-SII buffers in the EU, a detailed coordination process has been created between NCAs/NDAs, the Supervisory Board (SB) and the ECB's Financial Stability Committee (FSC). Accordingly, any notification of a measure relating to significant supervised entities should be approved by the Governing Council following a proposal by the SB[140]. Hence, the coordination process thereby takes microprudential as well as macroprudential considerations into account.

The different institutional frameworks across the EU emphasise the importance of cooperation between the relevant authorities to ensure compatibility of objectives and to limit potential conflicts of interest. Cooperation requirements can help to reconcile the different policy objectives of NDAs and NCAs in order to facilitate a complete risk assessment (including system-wide risks). While NCAs focus predominantly on the safety and soundness of the supervised institutions ("idiosyncratic risks"), e.g. on the basis of loss experience and stress tests, the objective of macroprudential policy is "to safeguard the stability of the financial system including by strengthening the resilience of the financial system and decreasing the build-up of systemic risks" (ESRB 2011), meaning that macroprudential policy is more forward looking and preventive in nature. These are, however, two different sides of the same coin – the objective of all authorities involved is, at the end of the day, to prevent the collapse of the overall financial system.[141]

In general, cooperation requirements need to safeguard macroprudential and microprudential policy objectives simultaneously. As the financial crisis showed, ensuring the solvency of institutions and markets in isolation might not be sufficient to safeguard the stability of the whole financial system. The prevention and mitigation of systemic risk and the stability of the financial system could be viewed as a prerequisite for the stability of its individual components.

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138 See Article 5(2) SSM Regulation.

139 Article 1(1) of Council Regulation (EU) No 1024/2013 of 15 October 2013 conferring specific tasks on the European Central Bank concerning policies relating to the prudential supervision of credit institutions.

140 Article 13h(1) ECB Rules of Procedures.

141 See BdF (2014).

Therefore, in cases of conflict, macroprudential concerns also need to be considered (ESRB, 2014c). Cooperation requirements must ensure that all the information, expertise and control over well-defined instruments relevant to pursuing the macroprudential policy objectives are available at the NDA. Rivalry and turf issues between macro and micro objectives should be avoided if at all possible. If conflicts cannot be avoided they should be resolved following a clear procedure aimed at safeguarding financial stability, which is true for macroprudential policy in general. With regard to structural buffers, persistent rivalry between micro- and macroprudential authorities could lead to the inadequate capitalisation of SIIs at national level and a non-level playing field across countries.

Cooperation agreements need to consider the specific collaboration and management issues that depend on the national institutional set-up. Where the NDA and the NCA are combined in one authority (central bank or supervisory authority), cooperation agreements should define internal procedures for data and information sharing between different departments within this authority (e.g. between the banking supervision department and the financial stability department). If the NDA and the NCA are two different institutions more formal cooperation agreements will be required. These could consist, for instance, of detailed consultations with the NDA whenever the competent authority takes measures to address systemic risks. Where a board of authorities is entrusted with macroprudential powers, the cooperation agreements must be observed by several authorities. The board itself is likely to have a central role in cooperation processes and the exchange of information between the institutions that its members represent. Adequate procedures should be in place allowing information – and, where needed, data – to be shared by authorities, including information protected by professional secrecy.

More specifically, in the context of the identification of G-SIIs and O-SIIs and the setting of a SRB, cooperation requirements enhance the consistency and transparency of the underlying decision-making procedures. While the identification process is fairly prescriptive (based on the BCBS methodology for G-SIIs and the EBA Guidelines for O-SIIs), there could still be room for discretion. This is certainly true for institutions that are just above or under the identification threshold, as authorities may use their supervisory judgement. In respect of the calibration of the O-SII buffer, the decision leeway is even greater, since different methodologies can be applied that are based on a discretionary set of components and parameters (see Section 4). Further harmonisation regarding the calibration of O-SII buffers, as recommended in this report, may therefore be complemented by cooperation requirements to enhance the consistency and transparency of the decision-making procedures.

Additionally, cooperation requirements in relation to the use of structural buffers may contribute to the consistency of overall capital requirements. From a macroprudential point of view, an optimal level of capital requirements is a level that balances the costs linked to more expensive equity funding and the benefits of a lower rate of bank defaults.[142] Capital requirements should, therefore, also take into account general equilibrium effects resulting from individual bank behaviour, e.g. correlations and common exposures across financial institutions.[143] The optimal level of capital requirements, from a macroprudential point of view, can therefore deviate from the

[142] The ECB developed a model in this respect which also assesses the costs and benefits of changes to capital buffers (see ECB, 2017c.

[143] Brunnermeier et al. (2009).

optimal microprudential level of capital requirements. The objective of the latter is, as stated by the Basel Committee, to "improve the banking sector's ability to absorb shocks arising from financial and economic stress (…) reducing the risk of spill-over from the financial sector to the real economy".[144] Hence, microprudential capital requirements are calibrated bottom-up from an individual bank's perspective and with the aim of limiting the distress of an individual institution.[145] However, the failure of a G-SII or O-SII could, due to its systemic importance, entail higher contagion and spill-over risks (also cross-border), than other institutions. Similarly, concentrated exposures and similar business models may result in the amplification of losses following difficulties at one institution. This is why, in general, it is reasonable to expect that the optimal macroprudential level of capital requirements will be higher than the optimal microprudential level. Positive structural buffer requirements take this into account.

Specifically, cooperation requirements are needed to prevent the double-counting of risks and the neglect of certain risk areas. The overall level of capital for an individual institution is composed of the regulatory capital under Basel III (Pillar 1), Pillar 2 capital requirements (P2R) and the combined (macroprudential) buffer requirement as well as the Pillar 2 guidance (P2G)[146] (see Chart 21 in Section 6.3). A coordinated approach between NCAs and NDAs is needed to achieve an adequate level of capital without impairing the effectiveness of the relevant capital measures. As there is no risk overlap, structural buffers and P2G capital requirements cannot, in principle, be offset against each other.[147] The interaction between P2R and structural buffers might be trickier, for instance in cases where the NCA has implemented P2R from a system-wide stability perspective (e.g. using Article103 or Article 104(3)(d) of the CRD IV). In these cases, it cannot be excluded – if all risk has already been adequately and entirely covered in Pillar 1 or by the structural buffers – that the P2R of certain banks covers the same risk targeted by a structural buffer (e.g. a SRB applied to target common and correlated exposures), resulting in risk double-counting for those banks. Therefore, as a general principle, whenever the NCA implements P2R from a system-wide stability perspective, the designated authority should be systematically involved and consulted. To institutionalise this, cooperation with macroprudential authorities should be required under CRD IV in respect of Pillar 2 measures. In addition, cooperation requirements with NDAs could also be incorporated into the EBA Guidelines on the application of the Supervisory Review and Evaluation Process (EBA/GL/2014/13) whenever Pillar 2 measures are implemented from a system-wide stability perspective.

The implementation of cooperation requirements between (micro- and macroprudential) institutions should be enforced – this relates in particular to Pillar 2 instruments. Pillar 2 is predominantly designed to address idiosyncratic risks, although system-wide risks can also be

144 BCBS (2010b).

145 Borio (2003).

146 From 2016 onwards SSM banks are obliged to hold additional Pillar 2 capital (so-called Pillar 2 guidance – P2G) following the stress-test results determining their SREP capital. P2G, however, is not binding– it is a supervisory expectation for banks' capital above the level of binding capital requirements (minimum and additional) and on top of the combined (macroprudential) buffer. See ECB Annual Report on supervisory activities (2016).

147 In light of the elements taken into account when drawing up P2G – the depletion of capital under the adverse scenario of the stress test; the specific risk profile of the individual institution and its sensitivity to the stress scenarios; changes in the institution's risk profile since the stress test; and measures taken by the institution to mitigate risk sensitivities – there should not be an overlap of risk between P2G and the structural buffers. Instead, in certain cases a partial overlap with the countercyclical capital buffer seems possible, so close cooperation is needed between the Joint Supervisory Teams and the ECB as the NCA on the one side, and the NDA on the other.

targeted using these instruments.[148] Given the importance of this topic, guidance on cooperation requirements (beyond the requirements in Recommendation ESRB/2011/3 regarding the macroprudential mandate of national authorities) should, in any case, be expanded in the ESRB Handbook to discipline national authorities operating in different institutional set-ups.[149] Here it might be desirable to differentiate between macroprudential instruments (e.g. structural and cyclical buffers). As long as it is still legally possible to use Pillar 2 for macroprudential purposes[150], a mandatory cooperation requirement between NCAs and NDAs should be incorporated into CRD IV, whenever Pillar 2 measures are implemented from a system-wide stability perspective.

[148] While some members support the use of Pillar 2 in its application to system-wide risks, other members are of the view that Pillar 2 should not be applied from a system-wide stability perspective.

[149] Currently, the Handbook states (p. 22): "In order to arrive at a holistic view on how to address systemic risks, cooperation between relevant authorities is needed (see Chapter 9 for details)". However, so far Chapter 9 only refers to the use of indicators for overcoming an inaction bias.

[150] Cf. European Commission: "**EU Banking Reform: Strong banks to support growth and restore confidence**", 23 November 2016.

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Annex 1
Additional indicators used and supervisory judgement conducted for the identification of O-SIIs by Member States*

	Additional indicators	Reasoning	Implication
BE	Private sector deposits from depositors in Belgium	Significant market shares in the Belgian deposit market.	Axa Bank Europe SA and Argenta Banken Verzekeringsgroep NV/SA identified as O-SIIs.
	Private sector loans to recipients in Belgium	Significant market shares in the Belgian lending market.	Axa Bank Europe SA identified as O-SII.
DK	Total assets as a percentage of national GDP > 6.5%	Mandatory indicators are not used at all as three criteria and threshold values were determined by a political agreement in 2013 that was voted through the Danish Parliament. Only one of the three criteria must be met for the institution to be identified as a systemically important institution.	Two additional O-SIIs were identified which fall below the automatic threshold score of 350.
	Loans as a percentage of the total lending by the national sector > 5%		
	Deposits in per cent of the total deposits of the national sector > 5 per cent		
DE	Contingent liabilities	To include off-balance sheet risks.	LBBW, Helaba, BayernLB, NordLB, VW Financial Services, DekaBank, NRW.Bank, HSH Nordbank, Landwirtschaftliche Rentenbank and ING DiBa additionally identified as O-SIIs.
	Claims/liabilities to banks/insurance undertakings and other financing institutions	The distinction between banks and other financial intermediaries gives a more accurate picture of the various contagion channels within the financial system.	
	Receivables from/ liabilities to foreign banks and non-banks	A more differentiated picture of the institutions' cross-border activities.	
	Number of legally independent subsidiaries in Germany and abroad	To reflect the complexity of institutions' organisational structure.	
	Number of payment transactions processed	Whether an institution processes only a few, but larger transactions.	
	Number of indirect participants connected via Target2	Mapping of an institution's infrastructural function in the Target2 processes.	
EE	Supervisory judgement	The total scores for two banks are relatively high because they are among the few banks that have obtained funds by issuing debt securities. At the same time the amount issued is relatively small at 3% and 1% respectively of the total assets of the banks.	Bank of Estonia did not designate AS LHV Pank and Versobank AS as O-SIIs.
FR	Share of private national deposits, excluding regulated saving accounts centralised at Caisse des Depots et Consignations (CDC)	Significant market share in French deposit market.	La Banque Postale (LBP) identified as O-SII.
	Share of private national loans	Significant market share in French lending market.	
LV	Risk-weighted assets	These indicators take into account the specificities of the national financial sector.	No additional O-SIIs identified.
	Private sector deposits from Latvian residents		
	Private sector loans to Latvian residents		
	Credit risk stress test – additional provisions (% of total provisions needed in banking sector)		
LU	Supervisory judgement	Institution exhibits a high level of exposure to the domestic economy and the real-estate sector in Luxembourg. Its contribution to the Luxembourg deposit guarantee scheme is also of high importance.	Banque Internationale à Luxembourg identified as O-SII despite score below 350 b.p.
HU	Off-balance sheet items: market share-based indicator aggregating outstanding credit facilities, guarantees and other off-balance sheet items carrying credit risk	Proxy critical functions with high country specific importance and problematic substitutability for agents in the real economy.	No identification of additional O-SIIs, but change of individual institutions' overall final score which is used for the calibration of the O-SII buffer.
	Share in clearing and settlement systems: market share of retail customers' transactions in the clearing system (based on the volume and number of transactions)		
	Market share of outstanding assets under custody	Proxy critical functions of high country-specific importance and problematic substitutability for the financial system.	
	Unsecured interbank loans/deposit (centrality-based analysis)	To describe financial interconnectedness of credit institutions applying a network analysis approach high-lighting the most important interbank market segments.	
	Market transaction volumes or values: FX swap transactions between credit institutions (centrality-based analysis)		

	Additional indicators	Reasoning	Implication
MT(**)	Size ≥ 25% of GDP		Same O-SIIs identified as for EBA methodology.
	Covered Deposits ≥ 2.5 times the Depositor Compensation Scheme (DCS)		
NL	Total exposure at default	To include high amount of off-balance sheet activities.	Identification of SNS bank as O-SII.
	Type of customers	The provision of critical functions could (temporarily) be disturbed if a bank operating in a niche market fails.	
	Number of deposit accounts — retail	The impact of problems in banks with many retail clients would disrupt the access of many depositors to their funds.	
	Deposits guaranteed under deposit guarantee system	Direct contagion channel for other banks guaranteeing €100,000 per depositor.	
	Potential contagion through shareholders	Banks or government as shareholders.	
	Potential reputational contagion (new category: "behavioural effects")	Loss of trust in banks with comparable business models.	
	Potential contagion through entities in conglomerate (new category: "behavioural effects")	Contagion effects between entities within a conglomerate with the same brand name.	
	Degree of resolvability according to the institution's resolvability assessment (new category: "impediments to resolvability")	DNB assesses whether there are any impediments to the resolution of banks in an orderly manner.	
PL	Importance of an IPS of which the entity is a member (Article 113(7) of the CRR)		Two additional O-SIIs identified.
PT	Geographical breakdown of banks' activities (deposits and loans)		No additional O-SIIs identified.
RO	Volume of loans to non-financial companies and the degree of substitution of lending to non-financial companies	These indicators are used in the supervisory judgement as a second step of evaluation and are described in Annex 2 – Optional indicators in the EBA Guidelines.	No additional O-SIIs identified.
	Volume of deposits from households and non-financial companies		
	The activity of the credit institution in the interbank market and quantifying the contagion effects		
	Assessment of SIIs in the ReGIS payment system		
	Contagion risk from parent to subsidiary banks through the common lender channel		
SK	Total RWA	Risk exposures are a key indicator of the "risk-adjusted size" of banks. The retail sector is particularly important for Slovakian banks, which focus mainly on the national market.	No identification of additional O-SIIs, but change of overall final score of individual institutions.
	Retail loans		
	Retail deposits		
UK	Value of retail deposits	The Prudential Regulatory Authority (PRA) used firms' market share in the following indicators as the basis for its supervisory assessment. The PRA has designated all institutions whose supervisory assessment score exceeds 100 b.p. as O-SIIs. These indicators are relevant to the United Kingdom because they reflect the direct impact that the distress or failure of a systemic institution could have on the UK economy through the disruption or cessation of services, and also reflect other direct and indirect channels through which the distress or failure of institutions could pose a threat to the real economy, including through other intermediaries.	Santander UK, Plc Merrill Lynch International , Nomura Europe Holdings Plc, J.P. Morgan Capital Holdings Limited, Credit Suisse International, Standard Chartered Plc, Nationwide Building Society, Citigroup Global Markets Limited, Credit Suisse Investments (UK), UBS Limited were designated systemically important through supervisory assessment.
	Value of retail lending		
	Number of retail customers		
	Value of corporate deposits		
	Value of corporate lending		
	Intra-financial liabilities (deposits, repos, derivatives)		
	Intra-financial assets (loans, reverse repos, derivatives)		
	Daily average value of CHAPS transactions		
	Daily average value of BACS transactions		
	Daily average value of CREST transactions		
	Daily average value of LCH transactions		
	Custody assets		
	Trading assets		
	Market transaction volumes		

(*) The table is based on the O-SII notifications of Member States for the year 2016 and does not include methodological changes made since then (e.g. Luxembourg included two additional indicators in 2017 (centrality measure, assets under custody) to identify O-SIIs).
(**) MT applies a two-step national methodology. The additional indicators are considered in Step 2.

Annex 2
Calibration methods for O-SII buffers across Member States[151] [152]

	Calibration method	Information used for calibration	Number of buckets/ buffer range	Thresholds / buckets
BE	Bucketing, equal expected impact	Systemic importance scores Historical losses in the banking sector Stress test results Level playing field and single market considerations	2	Bucket 1: 1.5% Bucket 2: 0.75%
BG	Bucketing	Systemic importance scores Findings from the supervisory asset quality review and the stress test	3	Bucket 1: 1% Bucket 2: 0.75% Bucket 3: 0.5%
DE	Bucketing	Systemic importance scores Cluster analysis (Ward) Banking system loss (supervisory judgement)	4	Bucket 1: 2% Bucket 2: 1.5% Bucket 3: 1% Bucket 4: 0.5%
EE	Bucketing, linear proportionality equal expected impact	Systemic importance scores Peer review	2	≥ 1.200 (2%) linear (rounded 0.5%) 350 (0.5%)
IE	Expected impact	Systemic importance scores Historical losses (PD) Range of buffer rates Peer review	6	2.0% (empty) 1.5% 0.5% 0.5% 0.25% 0.0% (run-down institute)
GR	Bucketing	Systemic importance scores Cluster analysis	5	≥ 3500 (2%) 2000 – 3499 (1%) 1500 – 1999 (0.75%) 700 – 1499 (0.5%) 350 – 699 (0.25%)
ES	Bucketing	Systemic importance scores G-SII buffer (1%) as upper limit (indirect)	4	3650 – 5850 (1%) 2000 – 3650 (0.75%) 900 – 2000 (0.5%) empty 350 – 900 (0.25%)
FR	Bucketing	Systemic importance scores Expert judgement	5	0 – 500 (0.25%) 500 – 1 000 (0.5%) 1 000 – 2 000 (1%) 2 000 – 3 000 (1.5%) > 3 000 (2%)
HR	Equal expected impact Bucketing	RoRWA	2	Bucket 1: 2% Bucket 2: 0.2%
IT	Bucketing	Systemic importance scores Cluster analysis (k-means with 2, 3, 4 and 5 clusters)	6	≥ 4.000 (1.25%) empty 3.000 – 3.999 (1%) 2.000 – 2.999 (0.75%) 1.000 – 1.999 (0.5%) 350 – 999 (0.25%) 0 – 349 (0%)
CY	Bucketing (mapping table)	Systemic importance scores Level playing field	4	≥ 2.500 (2%) 2.500 – 1751 (1.5%) 1.750 – 1000 (1%) 1.000 – 350 (0.5%)
LV	Equal expected impact	Systemic importance (adjusted EBA methodology) RoRWA	3	2% / 1.75% / 1.5%
LT	Expected impact, expected losses (average)	RoRWA Historical losses	2	2% / 0.5%
LU	Bucketing (linear regression)	Linear regression Scaling Consistency G-SII / O-SII buffer	4	≥ 1.300 (2%) 1299 – 975 (1.5%) 974 – 650 (1%) 649 – 325 (0.5%)

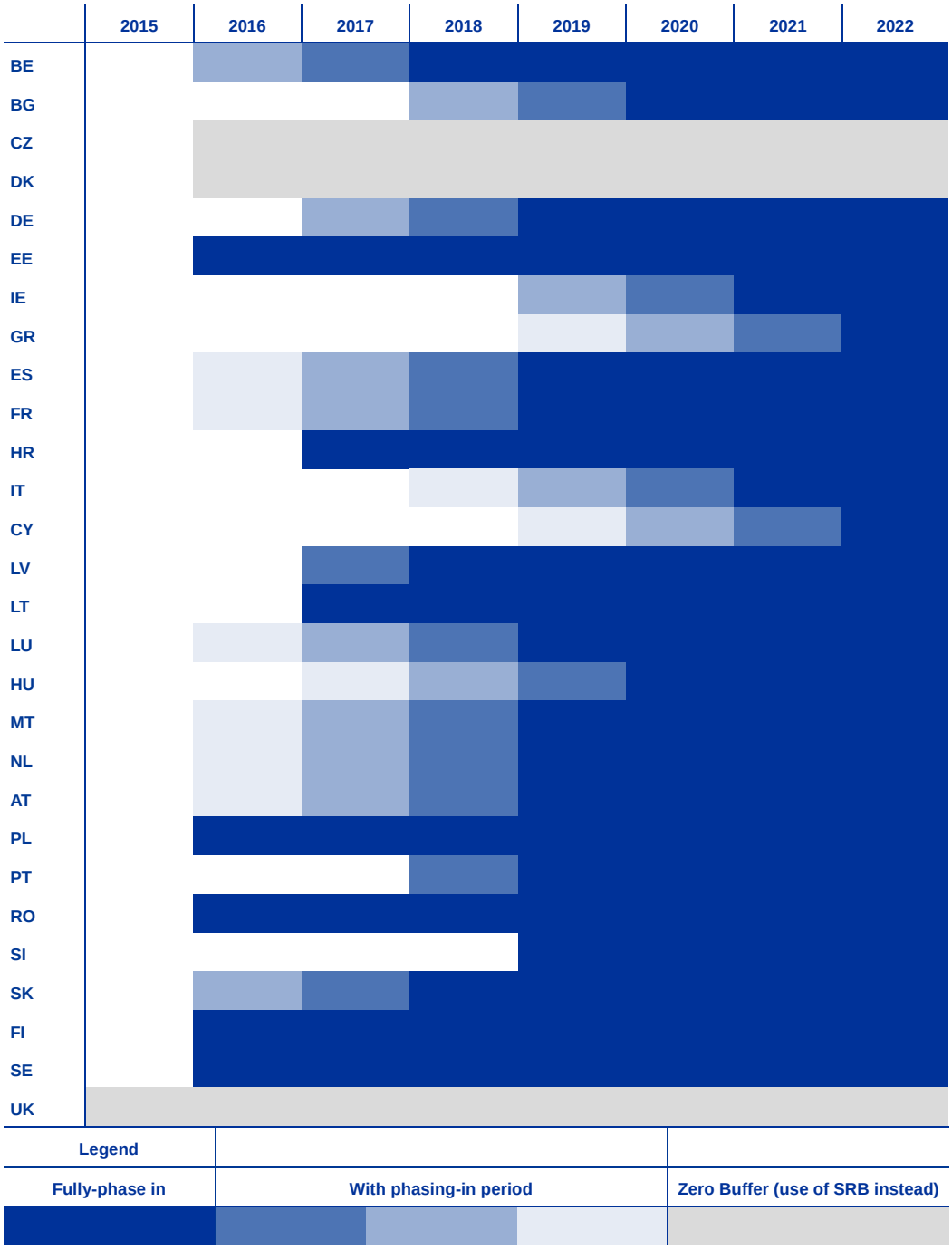
[151] The table is based on the O-SII notifications of Member States for the year 2016 and does not include methodological changes made since then.

[152] DK, CZ and UK identified O-SIIs, but did not calibrate an O-SII buffer for these institutions. Instead they apply a SRB which is further detailed in Section 2.2 and in Annex 1.

	Calibration method	Information used for calibration	Number of buckets/ buffer range	Thresholds
HU	Bucketing	Systemic importance scores Peer review Cluster analysis Equal expected impact Expert judgement		2% / 1% / 0.5%
MT	Bucketing	National methodology	4	2% / 1.5% / 1% / 0.5% (additional indicator)
NL	Bucketing	Systemic importance scores Top-up SRB	6	>1500 (3% SRB) 1000 – 1500 (2%) 350 – 1000 (1%) 0 – 45/45 – 150/150 – 350 (0%)
AT	Bucketing	Systemic importance scores	3	≥ 1.000 (2%) 637 – 999 (1.5%) 275 – 636 (1%)
PL	Bucketing	Systemic importance scores	6	≥ 1.750 (2%) 1.400 – 1.749 (1%) 1.050 – 1.399 (0.75%) 700 – 1.049 (0.5%) 350 – 699 (0.25%) 0 – 349 (0%)
PT	Bucketing	Systemic importance scores Cluster analysis	5	≥ 2800 (2%) (empty) 2100 – 2799 (1%) 1400 – 2099 (0.75%) 700 – 1399 (0.5%) 350 –699 (0.25%)
RO	Bucketing	Systemic importance scores Legal constraint for subsidiaries (1%) Level playing field for national banking sector		1%
SI	Bucketing	Systemic importance score Peer review State of the credit cycle	8	≥ 5250 (2%) 4550 – 5249 (1.75%) 3850 – 4549 (1.5%) 3150 – 3849 (1.25%) 2450 – 3149 (1%) 1750 – 2449 (0.75%) 1050 – 1749 (0.50%) 350 – 1049 (0.25%)
SK	Bucketing	Systemic importance scores Expert judgement Top-up SRB	2	2% 1% (top-up SRB (1% – 2%))
FI	Bucketing	Peer review	5	0.5% / 2%
SE	Supervisory Judgement	Systemic importance scores	-	2% for all O-SIIs

Source: ESRB.

Annex 3
Phasing-in of O-SII buffer requirement



Source: ESRB.

Annex 4
Activation of SRB

Source: ESRB.

Annex 5
Overview of the application of the SRB in the EU

Country	Risk addressed	Description of measure	Targeted exposures	Number of banks concerned	Level of consolidation	Buffer level	Indicators used	Expected impact	Request for reciprocity	Implementation/ phase-in
BG	Leverage of the banking system	Prevent reduction of capital requirements due to transposition of the CRD IV/ CRR. Bulgaria is constrained in its monetary policy due to its Currency Board Arrangement. In order to cushion downside risks from the CBA, the Bulgarian government believes it needs to run a fiscal surplus. As a consequence, there is little fiscal room for manoeuvre. Therefore, financial stability can only credibly be preserved by prudential capital requirements for the banking system. A 3% SRB on domestic exposures is thus applied to all banks as a top-up to regulatory capital requirements.	Domestic exposures	All banks	Highest possible level of consolidation	3%	Capital adequacy ratios before the introduction of the CRD IV package and potential impact on capital positions after the new rules are imposed, including detailed simulations showing expected impact Size, development and importance of the Bulgarian banking sector for the financial system of the country NPL ratio dynamics General macroeconomic indicators – GDP growth projections, trade balances/capital inflows, unemployment and inflation rates.	None: the measure will not increase actual capitalisation of banking sector.	No	31 December 2014, no phase-in
CZ	Systemically important institutions subject to misaligned incentives	The SRB is used to mitigate systemic risk arising from the potential destabilisation of banks contributing most to systemic risk in the economy. Destabilisation could negatively affect confidence in the banking sector, the financial system and the real economy.	All exposures	5	Highest possible level of consolidation	1-3%	The SRB is imposed on a bank if its SI (similar to EBA O-SII-methodology) score exceeds a certain threshold. The SI score is calculated using measures of size, interconnectedness, substitutability and complexity.	The SRB is expected to increase the loss-absorbing capacity of systemic credit institutions, thereby increasing the stability of the financial system and the real economy.	No	1 January 2017, no phase-in
DK	Systemically important institutions subject to misaligned incentives	The SRB is used to mitigate the risk of disruption to the Danish financial system should a Danish O-SII fail. The criteria used to identify an O-SII are set in a manner that takes into account the specific characteristics of the Danish banking sector, dominated by a few large institutions but also liable to be negatively affected by the failure of some medium-sized institutions.	All exposures	6	Highest possible level of consolidation	1-3%	Denmark imposes a SRB on all institutions identified as O-SIIs according to its own methodology. The criteria used for the identification of an O-SII are: size of the institution's balance sheet > 6.5% of GDP; lending of institution > 5% of total lending by Danish banks and mortgage credit institutions in Denmark; deposits of institution > 5% of total deposits by Danish banks and mortgage credit institutions in Denmark.	Low: the measure will not significantly increase capital needs of the banks concerned.	No	1 January 2016, phase-in until January 2019

Country	Risk addressed	Description of measure	Targeted exposures	Number of banks concerned	Level of consolidation	Buffer level	Indicators used	Expected impact	Request for reciprocity	Implementation/ phase-in
EE	Structural vulnerabilities of Estonian economy	The Estonian economy is primarily vulnerable because it is small and open. This allows problems caused by unforeseen negative shocks to emerge quickly and on a large scale. An unexpected worsening of the economic environment could lead to a rapid deterioration in the ability of companies and households to service their debts, meaning that banks would need to find additional capital at short notice to cover possible loan losses.	Domestic exposures	All banks	Individual and highest possible level of consolidation	1%	Size and openness of the economy Volatility of GDP growth Concentration of exports Share of investment in GDP Private sector indebtedness relative to income levels (GDP per capita) Household financial assets to GDP Importance of the banking sector to the financing of the real economy	None: current capitalisation of banking sector is above required capital level.	Yes: prevents regulatory arbitrage and ensures equal competitive conditions. De minimis rule: exposures to Estonia > EUR 200 million	1 August 2016 (originally 1 August 2014, 2% on all exposures), no phase-in
HR	Risk stemming from systemically important institutions subject to misaligned incentives Macroeconomic imbalances Sectoral risk (illiquid real-estate market) Concentration in the financial sector	The measure is aimed at increasing the resilience of banks to potential macroeconomic shocks, or to risks from the real-estate market or the structure of the banking system. It was also designed to introduce a buffer requirement of 3% for O-SIIs ahead of 2016. Even today, the SRB is the binding capital requirement as the O-SII-buffers are set at lower rates than the applicable SRBs.	All exposures	All banks	Individual and sub-consolidated	Market share of bank < 5% = 1.5% SRB Market share > 5% = 3% SRB	Indices of complexity (relative size and relative RWA shares of credit institutions; expert judgement) Relative macroeconomic imbalances assessed with European Commission's MIP Scoreboard data Number of transactions in the real-estate market Bank assets Hirschman-Herfindahl index.	None – low: the measure raises actual capital requirements only slightly in comparison with previous requirements. Few cross-border exposures.	No	19 May 2014, no phase-in
HU	Sectoral risk: risk of banks due to problem exposures from commercial real estate (CRE) sector	The amount and concentration of domestic problematic CRE exposures (including non-performing project loans and held-for-sale CREs) is currently high. The banks concerned should therefore either reduce their stock of problem exposures and/or increase their resilience to a negative shock.	The gross value of domestic CRE project loans and domestic on-balance sheet held-for-sale CRE Domestic CRE project loans should be taken into account if they are: a) loans overdue by more than 90 days; b) restructured project loans, except for loans restructured more than one year ago that have become performing loans since then; c) other project loans deemed non-performing by the credit institution.	All banks over the threshold (see buffer level)	Sub-consolidated	Minimum targeted exposures: HUF 5 billion; Targeted exposures /domestic Pillar 1 capital requirement: <30% -> 0% SRB; ≥30% -> 1% SRB; ≥60% -> 1.5% SRB; ≥90% -> 2% SRB. The SRB itself is determined by the multiplication of the institution-specific SRB and the domestic total RWA of the bank concerned.	Stock of total and domestic non-performing project loans and its ratio to total and domestic project loans Stock of total and domestic restructured project loans and its ratio to total and domestic project loans Stock of total and domestic problem CRE exposures and its ratio to total and domestic CRE exposures Total domestic problem CRE exposures over domestic Pillar I capital requirement (base of the calibration) Concentration of problem CRE exposures in the banking sector.	Low: the measure will not increase the capital needs of the banks concerned to a degree which would materially constrain their lending capacity.	No	1 July 2017 (originally 1 January 2017), no phase-in but early announcement of measure (18 November 2015)

Country	Risk addressed	Description of measure	Targeted exposures	Number of banks concerned	Level of consolidation	Buffer level	Indicators used	Expected impact	Request for reciprocity	Implementation/ phase-in
NL	Systemically important institutions subject to misaligned incentives	The SRB is used to mitigate the long-term non-cyclical systemic risk resulting from the large and concentrated banking sector in the Netherlands. In the Netherlands the banking sector's balance sheet represented 430% of GDP in mid-2013, larger than the European average of 300%.	All exposures	3	Highest possible level of consolidation	3%	Size to GDP: SRB of 3% for banks with on-balance and off-balance sheet items exceeding 50% of Dutch GDP.	Low: the measure will not significantly increase the capital needs of the concerned banks.	No	1 January 2016, phase-in until January 2019
AT	Risk stemming from systemically important institutions subject to misaligned incentives (systemic risk) Foreign exposure of Austrian banks (systemic cluster risk)	The Austrian banking sector is large in relation to the Austrian economy. It is: • highly exposed to emerging markets; • insufficiently prepared for the reduction/removal of the implicit government guarantee; • undercapitalised in relation to European peers. It has a very specific ownership structure (high share of non-stock companies) that makes recapitalisation difficult in times of crisis.	All exposures	12	Consolidated basis	1-2% for institutions directly supervised by ECB; 1% for institutions not directly supervised by ECB	Systemic risk: • secured deposits > 5% of total secured deposits in Austria; • total assets > 2%; • exposure/position in the Austrian banking network; • public ownership; public ownership > 50%; total assets > 0.5%. Systemic cluster risk: • CESEE exposure /bank's total assets > 30%; • bank-CESEE exposure/Austria-CESEE-exposure > 3%; • risk vis-à-vis CESEE (long-term structural risk of a country weighted by the ultimate risk of a bank in the respective country, cross-correlation of CDS-country-spreads) > 10%.	Low: according to the OeNB, the short and medium-term impact on GDP growth will be minimal. The OeNB assumes that banks will fully transfer the costs of holding additional CET1 to retail and corporate lending customers.	No	1 January 2016, phase-in only for ECB-supervised institutions
SK	Systemically important institutions subject to misaligned incentives	Slovakia's financial market is dominated by the banking sector. The banking sector is also relatively concentrated, with three banks holding more than 50% of total assets. Furthermore, while the negative impact of the previous recession on clients' debt servicing capacity was partly mitigated by decreasing interest rates, this mitigating factor is an externality and cannot, therefore, be controlled.	Domestic exposures	4	Highest possible level of consolidation	1-2%	EBA-O-SII-methodology.	None – low: the Bank Lending Survey suggests that banks do not see capital requirements as constraining lending.	No	1 January 2018, phase-in only for one bank: 'Tatra banka, a.s' must hold 0.5% as of 1 January 2017
SE	Systemically important institutions subject to misaligned incentives	If any of the four major Swedish banks were to default, this would currently be difficult to manage without major risks to the economy. A situation where one of the major banks risked defaulting could result in Swedish taxpayers being exposed to risks, and there could be a risk of disruptions in the functions performed by the major banks that are value-creating and thus crucial to society.	All exposures	4	Consolidated level	3%	Based on a number of indicators relating to the size of the four major Swedish groups in relation to the Swedish economy, as well as their interlinkages.	None: the measure was expected by Swedish O-SIIs and they have already complied with the capital requirements.	No	1 January 2015, no phase-in

Country	Risk addressed	Description of measure	Targeted exposures	Number of banks concerned	Level of consolidation	Buffer level	Indicators used	Expected impact	Request for reciprocity	Implementation/ phase-in
SE		Finansinspektionen currently considers an extra CET1 of 5% necessary for systemic risk reasons. This could be met partly by the systemic risk buffer and partly by an additional capital charge for systemic risk of 3% CET through Pillar 2, bringing the combined capital charge for systemic risk to 5%.								
UK (not yet applying the SRB)	Systemically important institutions subject to misaligned incentives	The SRB is used to mitigate the risk of disruption to the UK financial system should a domestically systemic important institution subject to ring-fencing or a building society become distressed or fail.	All exposures	To be determined	On sub-consolidated basis for ring-fenced bank On consolidated basis for building societies	0-3%	National systemically important institutions subject to the SRB are identified through their EEA deposit size (>GBP 25 billion). Institutions subject to the SRB are then ranked by total assets, according to pre-defined buckets. The threshold for a positive SRB is set at GBP 175 billion of total assets.	The SRB is expected to add around 0.5% of risk-weighted assets to the equity requirements of UK systemic banks.	To be determined	2019, precise date to be determined

Source: ESRB.

Annex 6
Overview of the interaction of structural capital buffers in the EU

	G-SII buffer	O-SII buffer	SRB	Interaction
BE	-	0.75% / 1.5%	-	Subsidiaries of parent O-SIIs (BNPP, ING), parent O-SII buffer 2% Full reciprocation EE SRB (1%) (no material exposure)
BG	-	0.5% / 0.75% / 1%	3% (domestic exposures)	8 out of 10 O-SIIs subsidiaries of parent G-SIIs/O-SIIs Sum of O-SII buffer and SRB applies
CZ	-	-	1-3%	2 subsidiaries of EU parents (UniCredit, Raiffeisenbank) De minimis reciprocity (EUR 200 million) of EE SRB (1%) (reciprocation covered by CZ SRB on five banks)
DK	-	-	1-3%	Identified O-SIIs have to apply SRB Subsidiary of parent G-SII (Nordea), 3% buffer (highest G-SII/O-SII buffer/SRB requirement) De minimis reciprocity (EUR 200 million) of EE SRB (1%) (in addition via Pillar 2 to own SRB)
DE	2% (DB)	0.5% /1% / 1.5% / 2%	-	Higher of G-SII /O-SII buffer applies (DB 2%) 2 subsidiaries of EU parents (UniCredit, ING): no restriction
EE	-	(0.5%)[153]- 2%	1% (domestic exposures)	2 subsidiaries, parent O-SII buffer 2% (SE) Sum of O-SII buffer and SRB applies
IE	-	0.0% / 0.25% / 0.5% / 1.5%	-	Subsidiaries of G-SII parents (UniCredit, RBS: 1% G-SII buffer)
GR	-	1%	-	
ES	1% (Santander)	0.25% / (0.5%) / 0.75% / 1%	-	Higher of G-SII / O-SII buffer applies (identical for Santander = 1%)
FR	2% (BNPP) 1% (GCA, GBPCE, SG)	0.25% / 0.5% / 1% / 1.5%	-	Higher of G-SII / O-SII buffer applies Full reciprocation of EE SRB (1%)
HR	-	0.2% / 2%	1.5% / 3% (all exposures)	Subsidiaries of G-SII and O-SII parents SRB applies as the highest buffer requirement
IT	1% (UniCredit)	0.25% / 0.75% / 1%	-	Higher of G-SII /O-SII buffer applies

[153] Buffer levels in brackets represent buckets which are currently empty, but which may be populated.

	G-SII buffer	O-SII buffer	SRB	Interaction
CY	-	0.5% / 1%/ 1.5% / 2%	-	2 subsidiaries of Greek parents
LV	-	1.5% / 1.75% / 2%	-	Subsidiaries of O-SIIs (SE) De minimis (EUR 1 million) reciprocation of EE SRB (1%)
LT	-	0.5% / 2%	-	Subsidiaries, parent-O-SII buffer 2% Full reciprocation of EE SRB (1%)
LU	-	0.5% / 1%	-	Subsidiaries of G-SIIs (DE, FR) and O-SIIs parents, SG Lux capped at 1% De minimis (EUR 200 million) reciprocation of EE SRB (1%)
HU	-	0.5% / 1% / 2%	1% / 1.5% /2% (domestic exposures)	Subsidiaries of G-SII and O-SII parents Sum of O-SII buffer and SRB applies
MT	-	0.5% / 1.5% / 2%	-	Subsidiary of G-SII (HSBC: 1.5%) De minimis (EUR 200 million) reciprocation of EE SRB (1%) (no material exposure)
NL	1% (ING)	1% / 2%	3%	Highest of G-SII /O-SII buffer and SRB applies De minimis (EUR 200 million) reciprocation of EE SRB (1%)
AT	-	1% / 1.5% / 2%	1-2% (all exposures)	SRB applies as the highest buffer requirement (due to phase-in arrangements) UniCredit Austria O-SII buffer of 2%, but as subsidiary of G-SII (IT) currently 1%
PL	-	0% / 0.25% / 0.5% / 0.75%	-	Subsidiaries of EU parents (AT, FR, NL)
PT	-	0.25% / 0.5% / 0.75% / 1%	-	Subsidiary of G-SII parent (Santander, 1%) De minimis (EUR 200 million) reciprocation of EE SRB (1%)
RO	-	1%	- (deactivated)	9 out of 11 O-SIIs subsidiaries of EU parents (O-SIIs, G-SIIs)
SI	-	0.25% / 0.5% / 1%	-	Five out of eight subsidiaries of parent G-SIIs/O-SIIs (FR, IT)
SK	-	1% / 2%	1% / 1.5% / 2% (domestic exposures)	Sum of O-SII buffer and SRB applies All O-SIIs are subsidiaries, O-SII buffer limited to 1% Full reciprocation EE SRB (1%) (no material exposure)
FI	-	0.5% / 2%	-	Subsidiaries of parent institutions (DK, SRB applies; Nordea: 2% O-SII buffer)
SE	1% (Nordea)	2%	3%	Highest of G-SII /O-SII buffer and SRB applies (+2% Pillar 2 requirement) De minimis (EUR 200 million) reciprocation of EE SRB (1%), but covered with own SRB (no additional reciprocating action)
UK	2% (HSBC), 1.5% (Barclays), 1% (RBS)	-	0 – 3% (2019)	G-SII buffer applies From 2019 onwards the higher of the G-SII buffer or the SRB will apply

Source: ESRB.
Note: The table is based on the notifications of Member States for 2016 and does not include changes made in 2017.

Annex 7
Reciprocation of the Estonian systemic risk buffer

Member State	Reciprocation	De minimis exemption Institution-specific threshold	No reciprocation	No notification
BE	●			
BG				●
CZ	●	€200 million		
DK	●	€200 million		
DE			●	
IE			●	
GR				●
ES			●	
FR	●			
HR				●
IT			●	
CY				●
LV	●	€1 million		
LT	●			
LU	●	€200 million		
HU			●	
MT	●	€200 million		
NL	●	€200 million		
AT			●	
PL			●	
PT	●	€200 million		
RO			●	
SI				●
SK	●			
FI			●	
SE	●	€200 million		
UK			●	
Total	12		10	5

Source: ESRB.

Annex 8
Summary of models and estimated impacts of capital-based macroprudential instruments

Table A

Overview of capital requirements, differentiated by modelling approach and effects

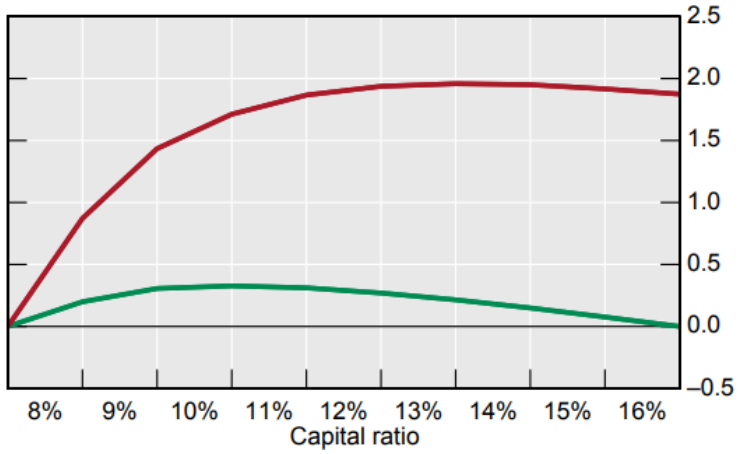
Modelling approach	Studies	Country/ period	Credit	Lending spreads	GDP (%) or GDP growth (p.p.)	
					Short term	Medium to long term
DSGE	LEI BCBS (2010a)	13 countries, 1993-2007		9 to 19 b.p.		-0.10 to -0.85%
	MAG (2010a,b)	15 countries	-1.11 to -1.89%	12 to19 b.p.	-0.19 p.p.	-0.10 to -0.22%
	Dorich and Zhang (2010)	Canada, 1980-2004		4 to 14 b.p.		-0.15 to -0.30 p.p.
	Slovik and Cournède (2011)	OECD countries, 2004-06		-15 to 0 b.p.		-0.10%
	Vlček and Roger (2011)	Euro Area, USA		15 to 20 b.p.		-0.10%
	Clerc et al. (2015)	Euro Area, USA				0.20 to 1.80 p.p.
	Fender and Lewrick (2016)	1994-2012 >100 banks from 14 advanced economies				0.50 to 2.00%
	Elliott et al. (2012)	USA, Europe, Japan		8 to 28 b.p.		
	Oxford Economics (2013)	USA		15 b.p.		
	Brooke et al. (2015)					-0.01 to -0.05%
	Mean		-1.5%	10.5 to 19.0 b.p.	-0.06 p.p.	-0.08 to 0.24%
	Standard deviation			4.3 to 5.0 b.p.	0.03%	0.40 to 0.95%
VAR, SVAR, FA/GVAR and other	LEI BCBS (2010a)	13 countries, 1993-2007		9 to 19 b.p.		-0.10 to -0.85%
	MAG (2010a, b)	15 countries	-1.11 to -1.89%	12 to19 b.p.	-0.19 pp	-0.1 to -0.22%
	King (2010)	13 countries,		15 to 90 b.p.		
	Slovik and Cournède (2011)	OECD countries, 2004-06		14 to 16 b.p.		
	Noss and Toffano (2014)	UK, 1986-2010		-4.5 p.p.	-0.08 p.p.	
	Bridges et al. (2014)	UK, 1990-2011		-3.5 p.p.		
	Gross et al. (2016)	28 EU economies	0 to 3%	0.00 to 0.02 p.p.		
	Behn et al. (2015)	14 advanced economies,1980-2016				0 to 1 p.p.
	Gerba and Mencia (2017)	Spain	-0.8 to -1.4 p.p.		-0.3 p.p.	-0.2 p.p.
	Mean		-0.73 to -0.57%	6 to 29 b.p.	-0.25%	-0.23 to 0.03%
	Standard deviation		1.01 to 2.15%	8.4 to 35.1 b.p.	0.1%	0.41 to 0.15%
Overall	**Mean**		0.93%	8.25 to 24.00 b.p.	-0.13%	-0.150 to 0.135%
	Standard deviation		1.01 to 2.15%	6.35 to 20.00 b.p.	0.07%	0.4 to 0.6%

Source: ESRB.

Notes: Statistical moments for each category of modelling approaches are computed by taking the mean and standard deviations of the minima/maxima values. The same approach is taken in calculating the overall mean and standard deviations effects.

Chart A

Long-run expected annual net economic benefits of increases in capital



Source: BIS LEI (2010)[154]: an assessment of the long-term economic impact of stronger capital and liquidity requirements. Notes: The capital ratio is defined as total capital over RWA. The origin corresponds to the pre-reform steady state, approximated by historical averages for total capital ratios (7%) and the average probability of banking crises. Net benefits (percentage impact on the level of output) are measured by the difference between expected benefits and expected costs. Expected benefits equal the reduction in the probability of crises multiplied by the corresponding output losses. The red and green lines refer to different estimates of net benefits, assuming that the effects of crises on output are permanent but moderate (which also corresponds to the median estimate across all comparable studies) or only transitory (green line).

[154] See Fender and Lewrick (2016) for updated estimates.

Table B

Overview of effects, differentiated by propagation channel

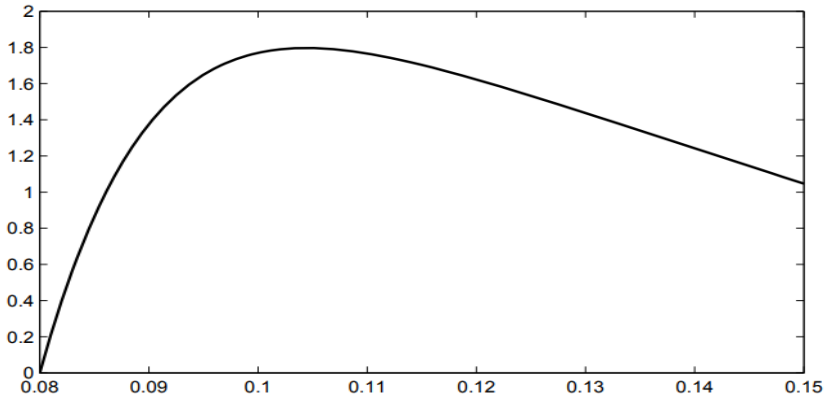
Study	Country/Period	Credit	Lending spread	GDP (%) or GDP growth (p.p.)
MAG (2010a,b)	15 countries	–1.11 to -1.89%	12 to 19 b.p.	-0.15 to -0.26%
LEI BCBS (2010a)	13 countries, 1993-2007	-	9 to19 b.p.	-0.1 to -0.85%
Dorich and Zhang (2010)	Canada, 1980-2004	-	4 to 14 b.p.	-0.15 to -0.3 p.p.
King (2010)	13 OECD countries, 1993-2007	-	15 to 90 b.p.	-
Slovik and Cournède (2011)	OECD countries, 2004-06	-	14 to 16 b.p.	-0.05 to -0.15 p.p.
Elliott et al. (2012)	USA, Europe, Japan	-	8 to 28 b.p.	-
Oxford Economics (2013)	USA	-	15 b.p.	-0.14%
Noss and Toffano (2014)	UK, 1986-2010	-4.5 p.p.	-	-0.08 p.p.
Bridges et al. (2014)	UK, 1990-2011	-3.5 p.p.	-	-
Behn et al. (2015)	14 advanced economies, 1980-2016	-	-	0 to 1 p.p
Fender and Lewrick (2016)	1994-2012, > 100 banks from 14 advanced economies	-	-	0.5 to 2.0%
Gross et al. (2016)	28 EU economies	0 to 3%	0 to 2 b.p.	0.1 to 2.0%
Gerba and Mencia (2017)	Spain	-0.8 to -1.4 p.p.		-0.2 to -0.3 p.p.
Mean		-1.82%	17.37 b.p.	-0.12* to 0.14
Standard deviation		2.32%	15.27 b.p.	0.28* to 0.62

Source: ESRB.
Notes: the table summarises several papers and their findings in terms of the impact of various shocks consisting of increases in capital requirements on lending rates (third column) and the impact on economic growth directly (last column), while also providing information on the targeted regions (countries) and the periods.
**) Excluding extreme positive values in order to avoid distortion.*

Chart B

Steady-state social welfare gains depending on the capital requirement (3D DSGE model)

(percentages)



Source: Clerc, L. et al. (2015), Capital regulation in a macroeconomic model with three layers of default, ECB Working Paper 1827.

Table C

Overview of effects, differentiated by modelling methodologies

VAR, SVAR, FAVAR, VECM, Other			DSGE	
Study	**Country/Period**	**Model**	**Study**	**Country/Period**
LEI BCBS (2010a)	13 countries, 1993-2007	13 models	LEI BCBS (2010a)	13 countries, 1993-2007
MAG (2010a,b)	15 countries	38, 53, 89, 97 models	MAG (2010a,b)	15 countries
King (2010)	13 countries, 1993-2007	Asset/liabilities structural model	Dorich and Zhang (2010)	Canada, 1980-2004
Slovik and Cournède (2011)	OECD countries, 2004-06	OECD New Global Model	Slovik and Cournède (2011)	OECD countries, 2004-06
Noss and Toffano (2014)	UK, 1986-2010	VAR	Vlček and Roger (2011)	Euro area, USA
Gross et. al (2016)	28 EU economies	Mixed-Cross-Section GVAR	Clerc et al. (2011)	Euro area, USA
Behn et al. (2015)	14 advanced economies, 1980-2016	Early Warning GVAR	Gerali et al. (2010)	Euro area, 1998-2009

Source: ESRB.
Note: The table provides an overview of models and separates the literature on structural modelling techniques from DSGE modelling.

Table D

Summary of impacts of 1% increases in CCyB

	Report of the Task Force on Operationalising Macroprudential Research (2017)			Gross et al. (2016)	Behn et al. (2016)
+1p.p. shock to the CCyB	3D (1) (version 1)	3D (1) (version 2)	FAVAR (2)	MCS-GVAR (3)	EW-GVAR (4)
Model	a DSGE model with a default of three sectors, households, NFCs and banks		a factor-augmented VAR which relates individual bank responses and macroeconomic dynamics to policy measures	a mixed-cross-section Global Vector Autoregression model with an equation system with a time-contemporaneous relationship	an Early Warning Global Vector Autoregression that assesses how the right-side variables of the logistic EW model respond to changes in banking sector capitalisation
Sample	12 EA countries, 2001-14		6 EA countries, 2003-15	42 EU banks or 28 EU countries, 1999-2014	14 EA countries, 1995-2014
Benefits	↓volatility of total credit	↓ cumulated GDP losses when the economy is subject to an adverse financial shock between Q4 and Q16	↓ credit losses in the first four quarters	↓banks' probability of defaults	↓ probability of being in a vulnerable state
		higher if the implementation is slow and the riskiness of bank assets is high			
Costs	↑volatility of bank default	↑cumulative GDP losses after the activation of the CCyB		GDP losses	GDP losses
	smaller if better capitalised banks	smaller if better capitalised banks		bigger if contraction deleveraging, smaller for expansionary deleveraging	bigger if contraction deleveraging, smaller for expansionary deleveraging
Net benefits	quantitatively small	-0.61 to +2.63 on GDP (probability of 50%. There are net benefits, although these are contained for most countries considered)	quantitatively small	-4% to 1% on GDP	benefits, albeit quantitatively small, if banks

Source: ESRB.

Table E

Summary of impacts of increases in capital buffers for systemically important banks

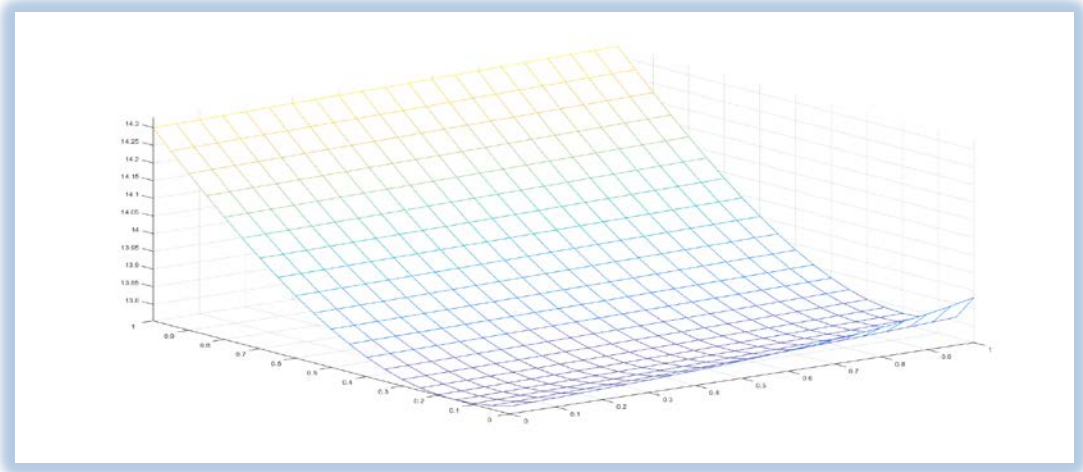
Variables	Cumulative impact after one year	Cumulative impact after two years	Cumulative impact after five years
Residential real-estate prices	0.0 to -0.6%	0.8 to -1.9%	-
Commercial real-estate prices	0	0	-
Credit to NFC	0.0 to -1.8%	0.0 to -2.6%	0.8 to -0.1%
Credit to households	0.0 to -3.2%	0.0 to -4.5%	0.7 to -1.0%
GDP	0.3 to -0.3%	0.2 to -0.4%	-

Source: Budnik et al. (2017).
Notes: The responses are cumulative after a one standard deviation increase in systemic (O-SII) buffers. The countries included in the study are Spain, France, Italy, Portugal and Lithuania and the intervals include all the median responses for the various countries except the extreme outlier.

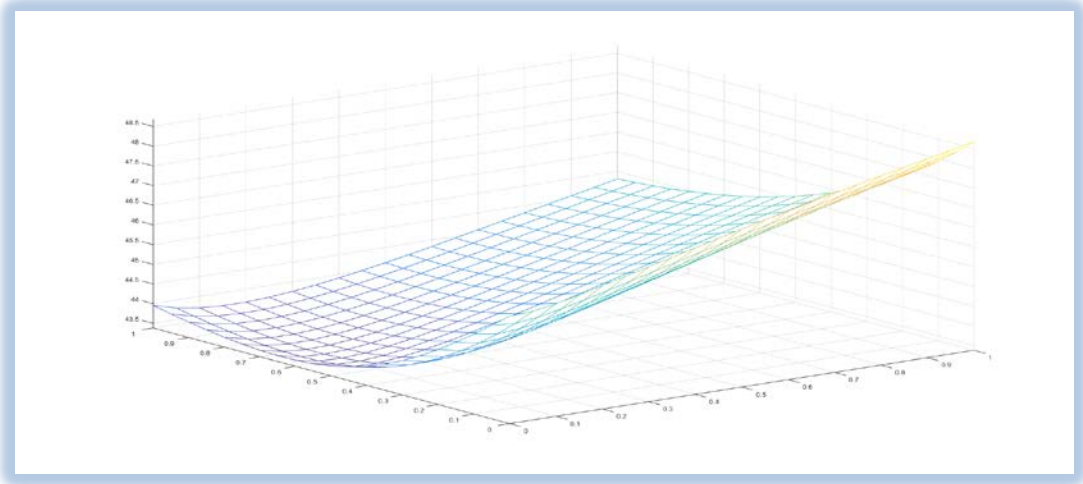
Chart C

3D impulse responses on the interactions between capital requirements and CCyB

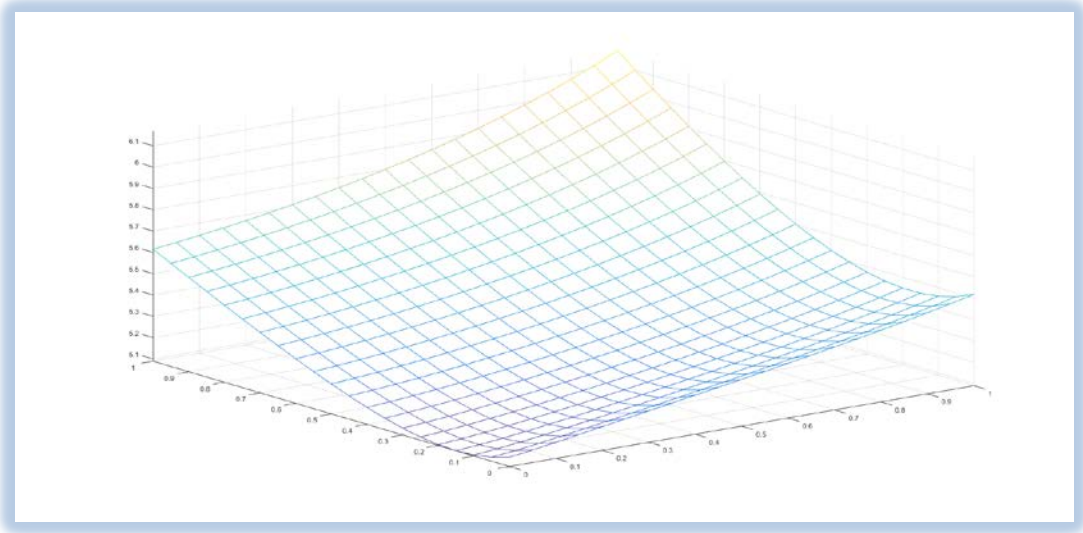
Euro Area's optimal CCyB rule under calibrated capital requirement



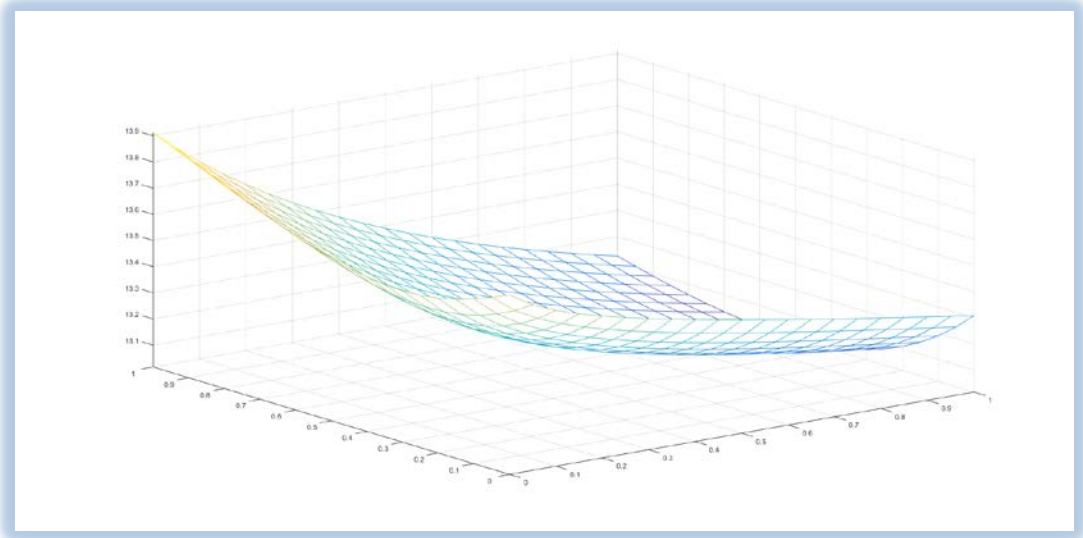
Spain's optimal CCyB rule under calibrated capital requirement



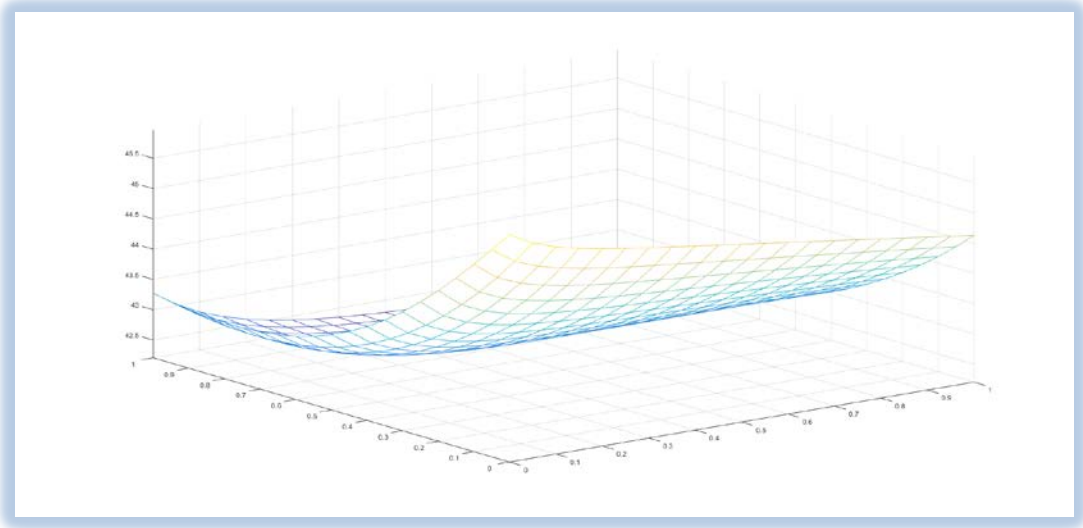
Germany's optimal CCyB rule under calibrated capital requirement



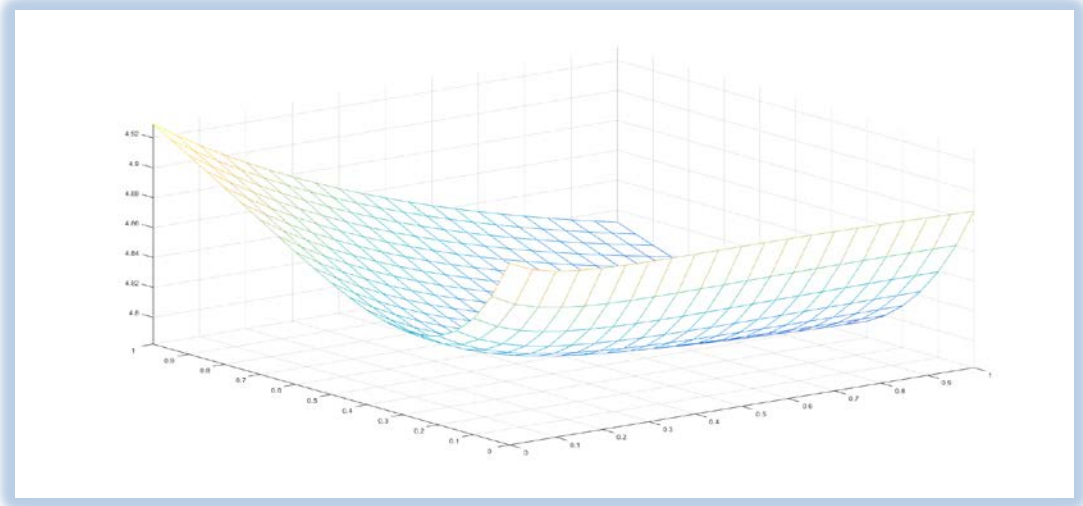
Euro Area's optimal CCyB rule under optimal capital requirement



Spain's optimal CCyB rule under optimal capital requirement



Germany's optimal CCyB rule under optimal capital requirement



Source: Aguilar et al. (2017)
Notes: The first graph for each country represent the optimal CCyB rule estimated under the calibrated capital requirement for the period 2000-15. The second graph, on the other hand, depict the optimal CCyB rule estimated under the optimal capital requirement scenario. The x-axis is the weight on household credit, the z-axis the weight on firm credit, and the y-axis is the total welfare estimated for a given combination of the two weights. The aim is to minimise welfare, and so where the loss is smallest also determines the optimal weights of the arguments in the CCyB rule.

Annex 9
Illustrative examples of O-SII buffer calibration

Proportional calibration – an illustrative example

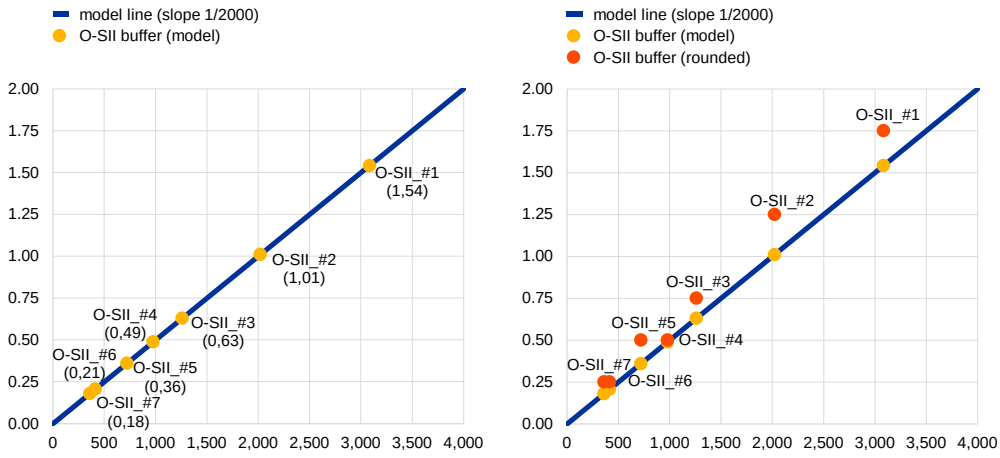
Assume that there is a banking sector with seven O-SIIs with systemic importance scores as follows:

Name	O-SII Score
O-SII_#1	3085
O-SII_#2	2021
O-SII_#3	1259
O-SII_#4	978
O-SII_#5	720
O-SII_#6	413
O-SII_#1	360

Chart A shows the results. As an example, it is assumed that a linear relationship is set as follows: a systemic importance score of 2000 b.p. implies an O-SII buffer of 1%, so an O-SII with a score of 360 would be assigned a buffer of 0.18% (360/2000 * 1% = 0.18%, corresponding to O-SII_#7 in the left panel of Chart A). This approach implies that a bank with twice as high a systemic score as another O-SII would be assigned twice as a high buffer rate (e.g. an O-SII with a score of 720 would be assigned a buffer of 0.36%, corresponding to O_SII_#5).

Chart A
Proportional calibration – an illustrative example

x-axis: O-II scores
y-axis: O-SII buffer (CET1 %)



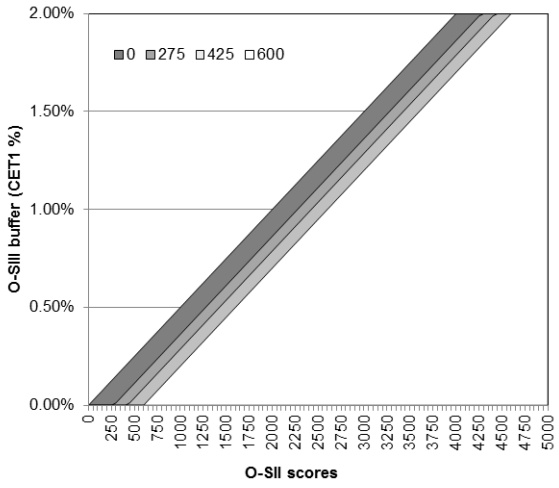
In the case of the proportional approach adjusted by supervisory judgement (see Chart A, right panel), the buffer level is rounded to the closest multiplier of 0.25%, in order to ensure the

assignment of a round buffer level and to give a more stable calibration. In this case, it may be advisable to avoid rounding to lower buffer levels as this tends to reduce the benefit of the buffer and might also be legally disputable.

The final calibration of the buffer depends greatly on the choice of reference point. The most natural choice is the threshold for the identification of the systemically important bank (e.g. 350 b.p. for countries using EBA criteria). If different minimum scores for a positive buffer are considered (i.e. the point of intersection with the x-axis), different values for the calibration are possible. Even if the proportionality coefficient is taken as given, the calibrated buffers vary considerably (on average by 0.20%) for the example data – see Chart B.

Chart B

Proportional approach – variation in O-SII buffer due to choice of reference point



Note: Lines are identified based on the minimum score with an implied positive buffer. The three possible values of the threshold for identification were taken as a reference point (i.e. 275, 350 and 425 b.p.).

Bucketing approach – an illustrative example

The bucketing approach consists of the following steps. First, a number of buckets is set (ranges of systemic importance scores in basis points). Next, a buffer level is associated with each bucket so that when the systemic importance scores increase, the associated buffer levels also increase. After that, each O-SII is allocated to a bucket on the basis of its systemic importance score, and a buffer level is thereby set.

In this example, eight buffers are set, increasing in steps of 0.25% from 0.25% for Bucket 1 up to 2% for Bucket 8. Note that, in this example, the buckets are not of equal size (although the supervisor could have made this choice) and the last bucket has been left empty (this could also have been designed differently).

Definition of buckets: lower and upper limits of each range for a given buffer level				Allocation of designated O-SIIs to buckets according to their systemic importance scores			
Bucket No	Min score	Max score	Buffer rate	Name	O-SII score	Bucket No	Buffer rate
1	0	400	0.25%	O-SII_#1	3085	7	1.75%
2	400	800	0.5%	O-SII_#2	2021	5	1.25%
3	800	1200	0.75%	O-SII_#3	1259	4	1%
4	1200	1800	1%	O-SII_#4	978	3	0.75%
5	1800	2400	1.25%	O-SII_#5	720	2	0.5%
6	2400	3000	1.5%	O-SII_#6	413	2	0.5%
7	3000	4000	1.75%	O-SII_#7	360	1	0.25%
8	4000	10000	2%				

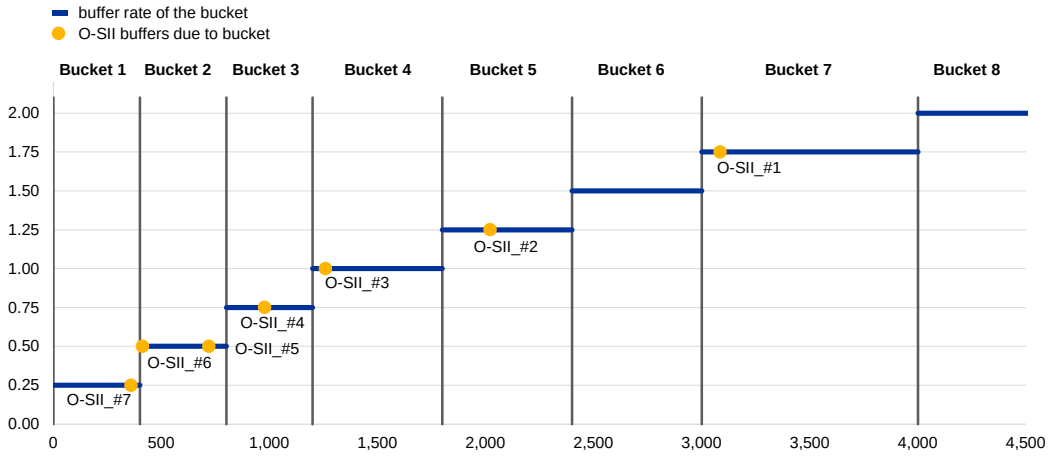
Source: ESRB.
Notes: Score is in basis points.

The number of buckets, their size and corresponding buffer rates must be set in accordance with the expert judgement, and affect the final buffer levels. Charts C and D document the differences in the calibration of the buffer under different assumptions.

Chart C

Graphical representation of the O-SII buckets and allocation of O-SIIs to buckets according to their systemic importance scores

x-axis: O-SII scores
y-axis: O-SII buffer (CET1 %)

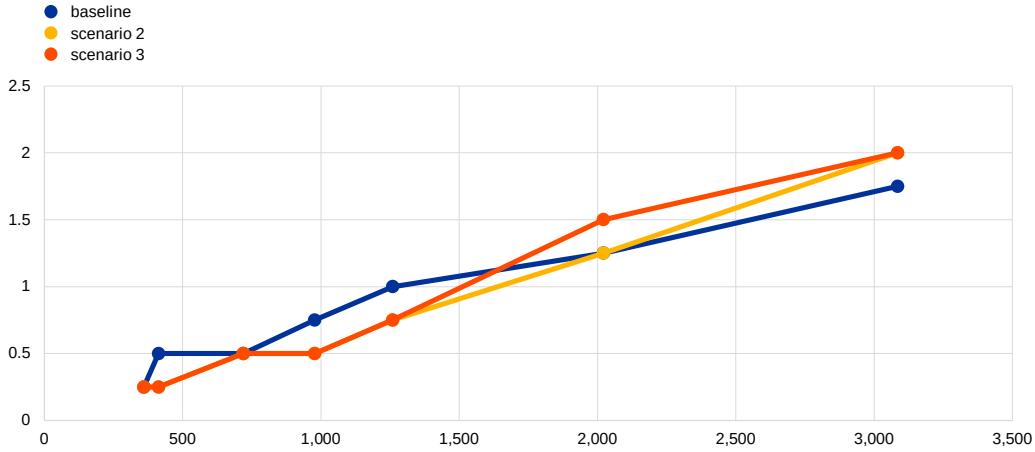


Source: Own calculations

Chart D

Vulnerability to assumptions

x-axis: systemic importance score
y-axis: buffer rate (%)



Source: Own calculations
Notes: Baseline refers to the buckets presented above. In Scenario 1, there are still nine buckets of equal size (350 b.p.) In Scenario 3, there are seven buckets of equal size, although the buffer rates assigned to each bucket are as follows: 0.25%, 0.5%, 0.75%, 1%, 1.5%, 2%.

Equal expected impact – an illustrative example

In order to show how arbitrary assumptions regarding choice of reference bank or definition of default may affect outcomes, and to illustrate the vulnerability of the results to different assumptions, a simulated EEI calculation was performed on a set of 40 banks that form a hypothetical banking sector. Each bank was assigned a systemic importance score calculated on the basis of its total assets. A history of losses from the Bankscope database was used. Of the 40 banks, seven institutions are considered to be O-SIIs.

EEI methodology was then applied to obtain estimates of the O-SII buffer under different assumptions. As a first step, the RORWA was calculated for each bank and period, using a four-quarter rolling cumulative sum of quarterly profits/losses related to the RWA at the beginning of the window (as, for example, in the Federal Reserve System, 2015).

Second, a cumulative density function was calculated on the basis of the empirical distribution of RORWA. Since a hypothetical dataset was used, no known distribution was fitted to the data (e.g. EE used a Cauchy distribution for this purpose). This approach is therefore similar to that used, for example, by CZ (see Skorepa and Seidler 2013).

Third, a reference bank was chosen. A number of potential candidates were considered: a bank with the highest systemic importance score that was not considered to be systemically important ("last non-systemic"), a hypothetical bank with a score of 350 b.p., a hypothetical bank with a systemic importance score equal to the average score of non-systemically important banks, and a hypothetical bank with a systemic importance score equal to two times the average score of non-

systemically important banks. Once the reference bank had been chosen, the relationship of the scores between each O-SII and the reference banks was determined.

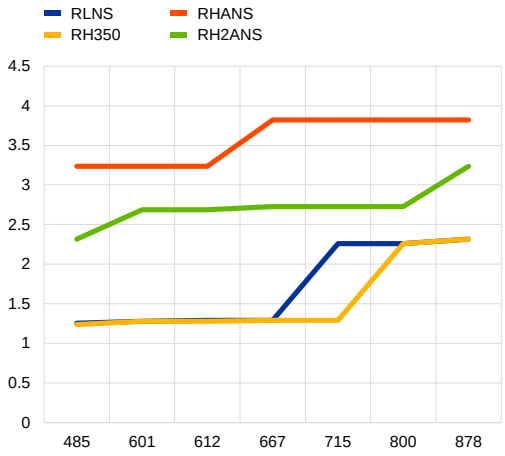
Fourth, a PD of the reference institution was calculated. Since it was impossible to determine this at bank level (given the lack of big losses for the majority of institutions in the sample), it was determined on the whole sample and the CDF fitted previously. As in the baseline scenario, it was assumed that default occurs when RORWA<=-2.5% (which means that the loss exceeds the CCoB). Other definitions are used in alternative scenarios.

The results of the simulation show that the arbitrary choice of parameters greatly affects the final calibration of the buffer. As Chart E shows, especially for smaller O-SIIs, a change in the reference bank can substantially increase the buffer – from around 1% in a scenario where the reference bank is last non-systemic or a hypothetical bank with a score equal to 350 b.p., to over 3% where the reference point is an average systemic importance score of non-systemically important banks. Increasing (e.g. doubling) the reference score not only lowers the buffers but may also decrease the number of banks subject to a positive buffer rate (see Skorepa and Seidler 2014). Much bigger changes in the calibration of the buffer are due to changes in the calculation of the RORWA. This parameter is key to determining the PD – using rolling RORWA matches the assumption that the cumulative fourth quarter loss must be large enough for a bank to fail. Such a big loss in a single quarter is not likely to happen, which is reflected in very low estimates of the buffer – see Chart F. Also, changing the default threshold affects the final result. Setting this at 1.25% (which is equal to the level of CCoB required by CRD IV in 2017) results in much higher buffers for smaller O-SIIs. Despite the assumptions made in all cases, a higher systemic importance score for a bank is generally associated with a higher buffer rate, although the relationship is not linear (as in the case of methods with direct mapping).

Chart E

Simulation results – changing the reference bank

x-axis: systemic importance score
y-axis: O-SII buffer (%)

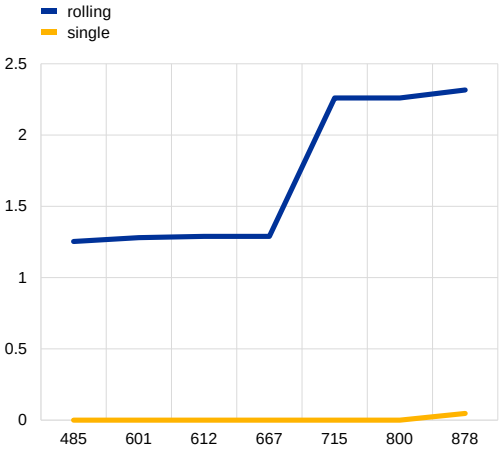


Source: Own calculations.
Note: Description of the scenarios: RLNS – reference bank is last non-systemic; RH350 – reference bank is a hypothetical bank with a systemic score equal to 350 points; RHANS – reference bank is a hypothetical bank with a systemic score equal to the average score of non-systemically important banks; RH2ANS – reference bank is a hypothetical bank with a systemic score equal to the 2-times average score of non-systemically important banks.

Chart F

Simulation results – changing the RORWA calculation

x-axis: systemic importance score
y-axis: O-SII buffer (%)

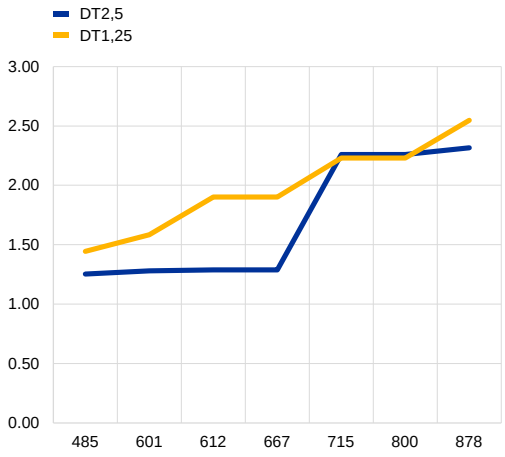


Source: Own calculations.
Note: Description of the scenarios: Rolling – RORWA is calculated using rolling 4-quarter losses; Single – RORWA is calculated using the losses of given quarter.

Chart G

Simulation results – changing default definition

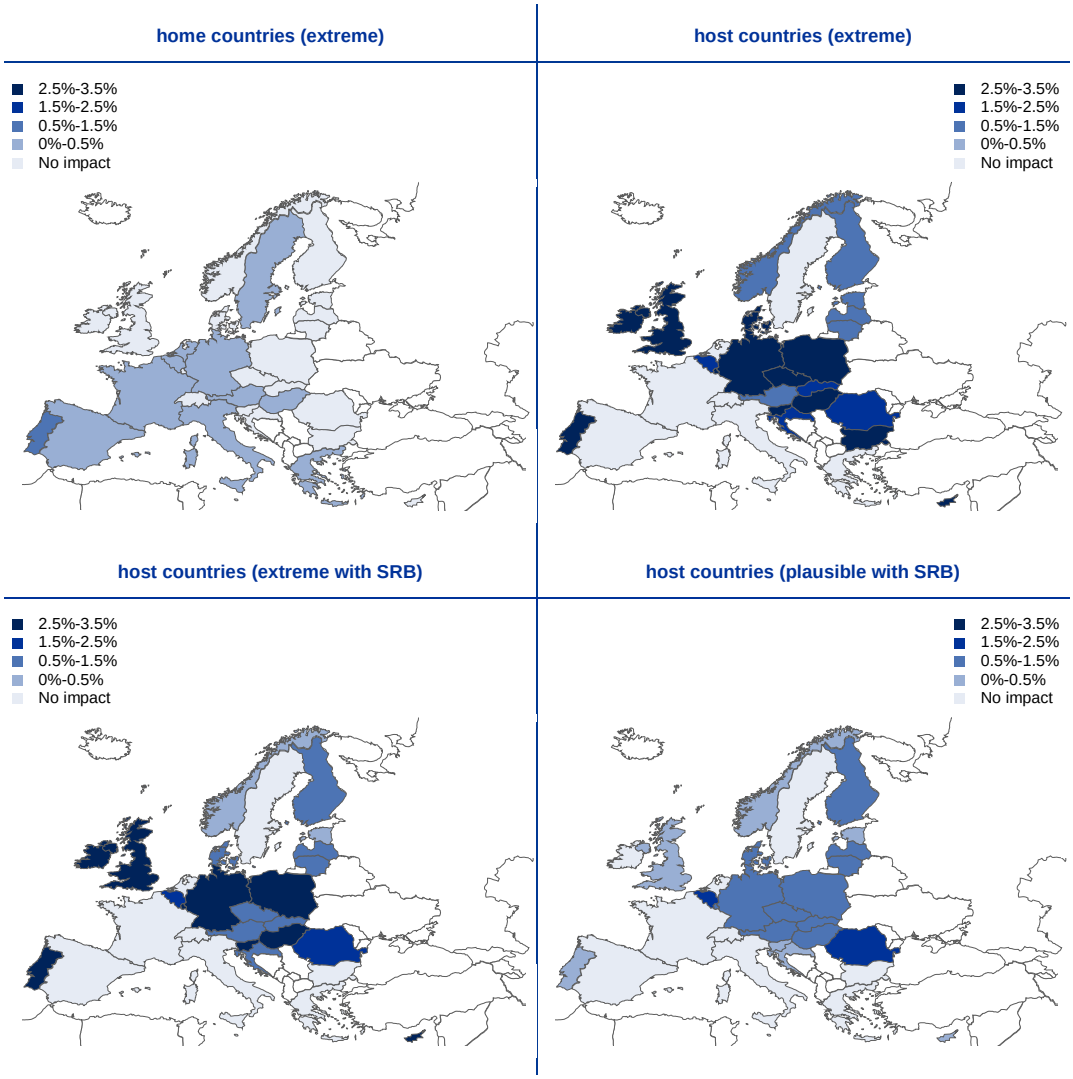
x-axis: systemic importance score
y-axis: O-SII buffer (%)



Source: Own calculations.
Note: Description of the scenarios: DT2.5 – default threshold is 2.5% RWA; DT1.25 – default threshold is 1.25% RWA.

Annex 10
Further simulation of the potential impact of lifting the O-SII buffer caps

Increase in capital requirements in response to the removal of the cap for subsidiaries (as % of RWA)



Source: ESRB (2017, Annex 3), notifications, SNL and ESRB calculations.
Notes: The simulated impact under three different scenarios is shown. Extreme scenario assumes that all subsidiaries will increase their O-SII buffers to 3.5%. Scenarios "with SRB" assume that the increase in the O-SII buffer will be partially offset by decreased SRB buffers covering the SII risks. The plausible scenario assumes that subsidiaries with O-SII score above 1000 will be subject to a 3.5% O-SII buffer, all other O-SIIs will have their O-SII buffers doubled, to a maximum of 3.5%. Calculations are based on risk-weighted assets of individual banks as of the end of 2015, taken from the SNL database (in a few cases, data were collected from banks' individual financial statements).

Annex 11
Suggested metrics for measurement of long-term non-cyclical risks

Table A

Metrics for measuring structural systemic risks stemming from the propagation and amplification of shocks within the financial system

Specific risk factor	Metrics	Availability in the ESRB Handbook	Possible data sources
Exposure concentration / asset commonality	Banks' CRE/RRE loans as % of total assets	Y	COREP / FINREP + BSI
	Domestic and foreign general government debt as % of total assets	Y	
	Contingent claims, guarantees extended and other off-balance sheet items as % of total assets	N	
	Herfindahl Index of asset classes	Y	
	Herfindahl Index of banks' turnover in particular markets	Y	Bloomberg / Reuters
	Banks' international claims as % of total assets	Y	BIS-CBS + SNL Financials
	Banks' international claims against top ten debtor countries (incl. off-balance sheet claims) - Country breakdown - Counterparty sector breakdown	Y	BIS-CBS
	Banks' securities holdings as % of CET1 - Country breakdown - Counterparty sector breakdown	N	SHS-G + BSI
	Share of forex loans as % of total loans	Y	
	Share of households' loans in foreign currency as % of total loans	Y	
	Share of foreign currency deposits		
	Herfindahl Index of currency exposures	Y	
Commonality in bank business models	Structure of banks' liabilities – equity, deposits (other than interbank), interbank deposits, other non-core liabilities[155]	N	FINREP

[155] Relying on a statistical clustering technique and using the balance sheet characteristics of 222 international banks, Roengpitya, Tarashev and Tsatsaronis (2014) identify three bank business models: a retail-funded commercial bank, a wholesale-funded commercial bank, and a capital markets-oriented bank. According to the authors, the banks' funding mix is a key distinguishing feature of their business model. In particular, they identify the share of non-deposit debt and the share of interbank liabilities to total assets (net of derivatives exposures) as the relevant ratios that help to differentiate bank business models. In their work, the share of gross loans and the size of the trading book are the only variables relating to the composition of banks' assets.

Specific risk factor	Metrics	Availability in the ESRB Handbook	Possible data sources
Commonality in bank business models	Non-core liabilities ratio[156]	N	BSI
	Share of gross loans as % of total assets	N	BSI
	Size of trading book (sum of trading securities and fair value through income book)	N	BSI
	Securities (sum of trading assets and liabilities net of derivatives)	N	BSI
	Maturity mismatch indicators		
	Leverage ratio (Tier 1 capital/Total assets)	N	BSI
Financial interconnections and contagion[157]	Banks' intra-financial sector linkages Intra-financial assets (as % of total assets) Intra-financial liabilities (as % of total liabilities)	Y	FINREP + BSI
	Banks' cross-holdings of securities (in % of CET1)		SHS-G + BSI
	Banks' ranking in terms of network centrality metrics (e.g. degree of closeness centrality) Comparison with ranking based on banks' Core Tier 1 ratio		Network analysis depending on available bank-to-bank data + BSI
	Mean geodesic distance (shortest path) between banks in the network	Y	Network analysis depending on available bank-to-bank data
	Model-based estimates of financial contagion - Number of banks failing due to contagion following the default of a network counterparty - Bank-level losses due to contagion following the default of a network counterparty, as % of CET1 - System-wide losses due to contagion following the default of a network counterparty, as % of banking system capital	Y	Network-based simulations depending on available bank-to-bank data + BSI

Source: ESRB.
Notes: The following data sources are referred to in the last column of this table and subsequent tables in this section: Eurostat / ECB refers to data based on financial accounts and monetary statistics (non-consolidated balance sheets of the respective entities); BSI refers to publicly available balance sheet items; COREP refers to supervisory reporting (consolidated balance sheets of the reporting entities, scope of group consolidation as defined by CRD IV); FINREP refers to financial reporting (consolidated balance sheets of the reporting entities, scope of group consolidation as defined in the IFRS); EBA refers to data collected by the European Banking Authority; SHS-G refers to the Securities Holdings Statistics – Group database providing data on 26 European SIFIs holdings of equity and short and long-term debt; BIS – CBS refers to the international consolidated banking statistics of the BIS.

[156] Hahm, Song Shin and Shin (2012) present a model of credit supply which identifies banks' non-core liabilities as an indicator of financial vulnerability. The authors provide evidence that a lending boom is reflected in the composition of bank liabilities when traditional retail deposits – or *core* liabilities – cannot keep pace with asset growth, and banks turn to other funding sources (*non-core* liabilities) to finance their lending.

[157] Note that the network-based indicators proposed in this section should be based on good quality bilateral exposure data. Furthermore, model-based estimates of financial contagion depend on the specific assumptions made regarding the contagion channels taken into account in the underlying network model. Accurate robustness checks of the model(s) used for simulations should be carried out before the results are used for policy purposes.

Table B

Metrics for measuring risks stemming from structural characteristics of the banking sector

Specific risk factor	Metrics	Availability in the ESRB Handbook	Possible data sources
Size and importance for the financing of the economy, and concentration of the domestic banking sector	Total (consolidated) assets as % of GDP	Y	FINREP / BSI, Eurostat / ECB
	Total retail deposits as % of GDP	Y	FINREP / BSI, Eurostat / ECB
	Share of bank credit to the PNFS of broad credit		
	Share of top five banks as % of total assets	N	BSI
	Herfindahl Index of banks assets	N	BSI
Foreign ownership	Share of foreign ownership (non-domestic assets as % of total bank assets)	N	
	Structure of foreign bank ownership Number of foreign subsidiaries and foreign branches Assets held by foreign subsidiaries and foreign branches (as % of total assets) Foreign-owned equity as % of total equity of the domestic banking sector	N	
	Share of lending to the PNFS by foreign branches and subsidiaries (as % of total lending)	N	
	Share of lending to the PNFS by foreign non-banks (as % of total lending)	N	
	Contribution of host country deposits to the financing of the entire banking group		
	Share of contribution of host countries' subsidiaries of profit of parent bank		
Other potentially structural risks	Aggregate banks' non-performing loans (RRE and all loans) In EUR billions As % of banks' total assets	N	
	Aggregate banks' coverage ratio – RRE and all loans (as % of NPLs)	N	
	Aggregate securities (sum of trading assets and liabilities net of derivatives)	N	BSI
	Aggregate leverage ratio (Tier 1 capital/Total assets)	N	BSI

Source: ESRB.

Notes: The following data sources are referred to in the last column of this table and the subsequent tables in this section: Eurostat / ECB refers to data based on financial accounts and monetary statistics (non-consolidated balance sheets of the respective entities); BSI refers to publicly available balance sheet items; FINREP refers to financial reporting (consolidated balance sheets of the reporting entities, scope of group consolidation as defined in the IFRS).

Table C

Metrics for measuring risks to the banking sector stemming from the real economy

Specific risk factor	Metrics	Availability in the ESRB Handbook	Possible data sources
Economic openness	Trade openness ((Export+Import) as % of GDP)	N	Eurostat / ECB
	Concentration of exports/imports of specific sectors to/from individual countries		Eurostat + national statistics bureau
	Current account balance-to-GDP ratio	Y	
	Indicators of financial soundness of the sovereign: - Debt-to-GDP ratio - Interest rates on sovereign debt - Government deficit/surplus		Eurostat
	Foreign currency reserves of the financial system: - Reserves of the banks - Reserves of the central bank		
Sectoral risks to the private non-financial sector (PNFS) (breakdown by NACE code), to households and to the public sector	Identification of relevant sectors Size of each sector Total credit extended to each sector Total debt of the sector (debt as % of value added) Share of exposures to each sector	N	FINREP + Eurostat / ECB
	Identification of bank exposure concentration for each sector Share of exposures to each sector Herfindahl index of exposures to each sector Number of banks exposed to each sector	N	FINREP + BSI
	Identification of high-risk sectors Average PD (estimated by banks or rating) of borrowing non-financials for each sector NPLs/ amount of provisions for claims by sector Insolvency rates for each sector	N	FINREP + Eurostat / ECB
	Share of credit risk originating from each sector compared to the overall credit portfolio risk of banks Sectoral credit portfolio models	N	

Source: ESRB.
Notes: The following data sources are referred to in the last column of this table and the subsequent tables in this section: Eurostat / ECB refers to data based on financial accounts and monetary statistics (non-consolidated balance sheets of the respective entities); BSI refers to publicly available balance sheet items; FINREP refers to financial reporting (consolidated balance sheets of the reporting entities, scope of group consolidation as defined in the IFRS);

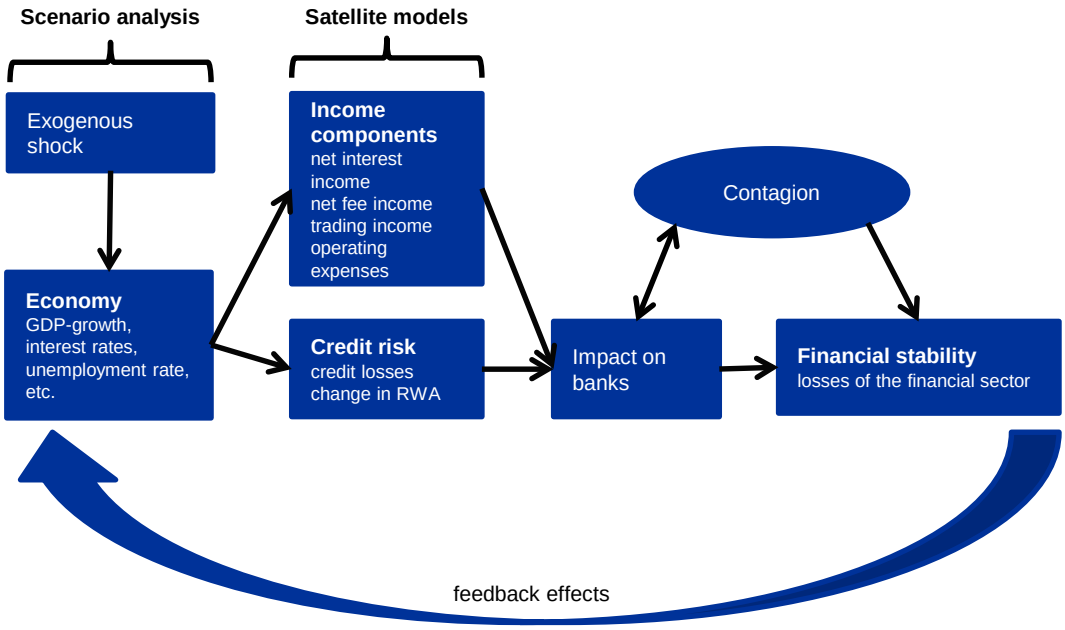
Annex 12
Typical steps in a stress test

The typical steps in a stress test are described as follows (Chart A):

- The scenario provides a hypothetical shock to the banking system. The shock should be similar to that used for the calibration of the SRB.
- Key elements of the real economy and the financial sector are affected by the macroeconomic shock. This includes a reduction in GDP growth, an increase in the unemployment rate, etc.
- The macroeconomic driver variables hypothesised in the scenarios are input into econometric models – typically dynamic panel data models. These models describe the evolution of several income components of the banks, including net interest income, loan loss provisions, trading income and net fee income. The macroeconomic projections enter the variables as regressors – projections are then produced of the income components for each bank in the scenario horizon.
- For each bank, the projected earnings can be calculated, as well as potential losses leading to a reduction of regulatory capital. Banks that cannot comply with minimum regulatory capital requirements are considered to have defaulted and their assets are assumed to be lost.
- Defaulting banks may impose further losses on other banks via their obligations in the interbank market. These spill-over effects amplify the initial shock.
- In addition, distressed banks may reduce their lending, which may hamper the smooth working of the real economy. These feedback effects from the financial system to the real economy may exacerbate the initial shock.

Chart A

Stress test approach



Source: ESRB.

Annex 13
National institutional set-up, implementation of structural capital buffers and cooperation requirements

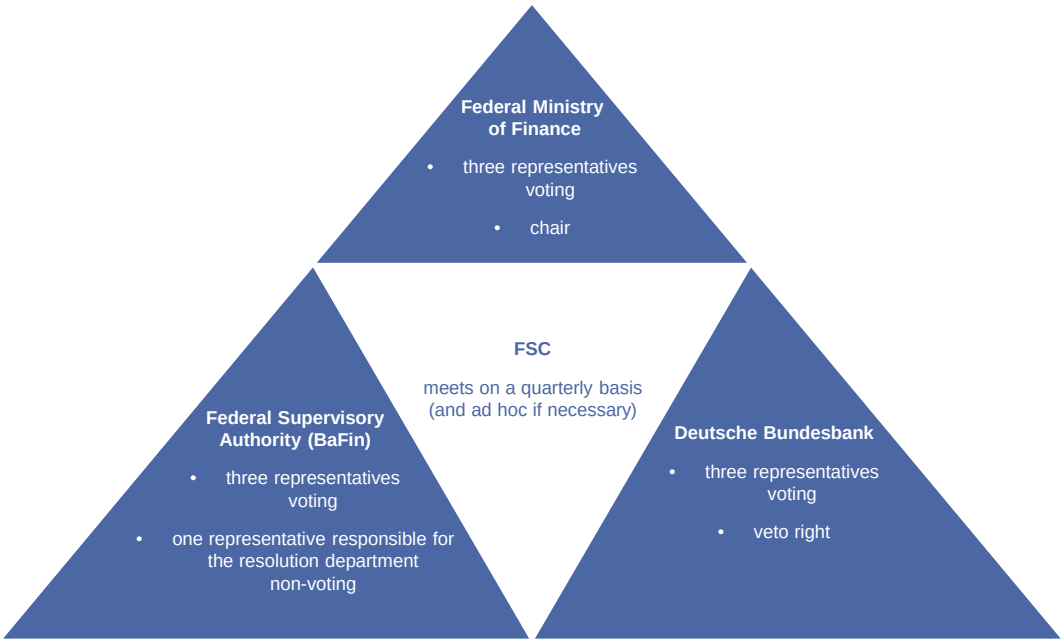
Germany

In Germany, the German Federal Financial Supervisory Authority (Bundesanstalt für Finanzdienstleistungsaufsicht – BaFin) and the central bank (the Bundesbank) act as national banking supervisors. BaFin, in mutual agreement with the Deutsche Bundesbank, identifies, on at least an annual basis, which institutions should be classified as G-SIIs and O-SIIs according to national legal requirements – in respect of the O-SIIs – and the EBA's uniform Europe-wide scoring model. The application of the capital buffers is determined by BaFin which, as the NDA, publishes the list of affected credit institutions as well as the level of the capital buffers to be held. As BaFin and the Bundesbank must mutually agree regarding the identification and designation of O-SIIs, close working cooperation is already required. For this reason, BaFin and the Bundesbank have agreed on an internal process detailing the steps and the timeline necessary for the identification of the O-SIIs (e.g. a yearly evaluation of the method, computation of scores and quality checks, and the preparation of a notification template). Milestones must be confirmed at senior levels throughout the process, and decisions such as the identification of institutions must, in principle, be taken by the decision-making bodies of both institutions. This approach ensures that micro- as well as macroprudential aspects are constantly taken into consideration.

The method used for identification and the yearly updated list of the O-SIIs and their respective buffer levels is noted by the German Financial Stability Committee (G-FSC) as the NMA of Germany. The G-FSC, as a central committee, strengthens cooperation in the area of financial stability between the Ministry of Finance, BaFin and the Bundesbank. It is chaired by the Ministry of Finance, although micro- as well as macroprudential authorities are represented on an equal footing (see Chart A) and, in this vein, contribute to the discussions based on the analyses conducted by the Bundesbank. The Bundesbank has the right to veto major decisions, while the Committee can issue warnings or recommendations following a comply-or-explain procedure.

Chart A

The German Financial Stability Committee as of January 2018



France

In France, the High Council for Financial Stability (Haut Conseil de stabilité financière – HCSF), the NDA, is in charge of the SRB. In contrast, the Prudential Supervisory and Resolution Authority (Autorité de contrôle prudentiel et de résolution – ACPR) is the authority responsible for the designation of G-SIIs/O-SIIs and the calibration of their buffer levels. The HCSF is entrusted by law with the oversight of the whole financial system and the conduct of macroprudential policy. The ACPR is an administrative authority attached to the Banque de France (BdF) – its Chairman is the Governor of the BdF. Both the BdF and the ACPR are members of the High Council, with the central bank having a prominent role in the institutional set-up, notably in terms of the Governor's exclusive right to advise the Council to activate binding macroprudential instruments. To accomplish its tasks, the HCSF "shall ensure cooperation and the exchange of information between the institutions that [the HCSF's] members represent, as well as between these institutions and itself. To this end, the ACPR […] can provide to the Council information protected by professional secrecy". In practice, the HCSF performs its coordination role at its quarterly meetings as well as during the preparation for these meetings, at which time information is exchanged and discussions take place among the staff of member authorities.

A key example of coordination is the semi-annual "Assessment of risks to the French financial system" report, published by the BdF as part of its mission to safeguard financial stability, and coordinated with the HCSF. The identification of risks and vulnerabilities in the French financial system, along with its strengths and sources of resilience, is conducted jointly by BdF and ACPR staff, and forms the basis for the assessment of cyclical and structural systemic risks that might require macroprudential intervention by the HCSF. More precisely, in the light of the specific

macroprudential competences attributed to the authorities, the BdF has a leading role in respect of the analysis and assessment of structural macroprudential risks that could possibly be targeted by a SRB, while the ACPR leads the annual G-SII/O-SII designation and calibration of the buffer levels.

Regarding the O-SII decision-making process, there is continuous coordination and exchange of information between the ACPR and the BdF during the various steps. This ensures that the BdF – which is responsible for preparing the Governor's proposals for the SRB – is kept fully informed and is in agreement with the methodological choices made by the ACPR in its annual evaluation of SIIs. This allows micro- and macroprudential perspectives to be brought together and the consistency of overall capital requirements is thereby enhanced. In addition to methodological choices, the ACPR shares with the BdF the results of the automatic designation procedure and the calibration of O-SIIs buffers as well as related qualitative and quantitative analyses, including those that support supervisory judgement. Remarks from the BdF's staff and management are taken into account by the ACPR before policy decisions are transmitted to the ACPR Board. Finally, the ACPR informs the HCSF of its decisions as an example of good practice with regard to cooperation.

External communication between the French NDA and the NCA is also coordinated. The HCSF's communication, a "soft" instrument at the disposal of the High Council to bolster its macroprudential actions, consists of providing the general public with information and explanations regarding the measures implemented (e.g. through quarterly press releases or an annual report), and also organising consultations with experts and relevant stakeholders to improve decision-making. Communication is coordinated ex ante with the NCA by the HCSF's secretariat.

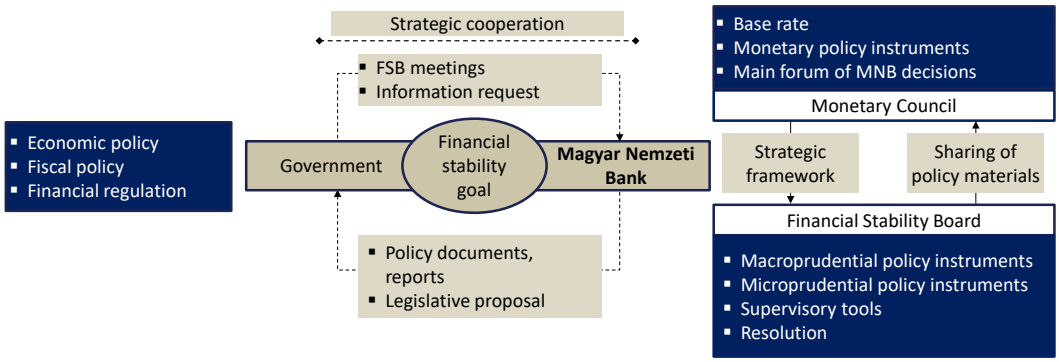
Hungary

The MNB Act adopted in 2013 provided the Central Bank of Hungary (MNB) with a clear and strong macroprudential mandate aimed at preventing and mitigating systemic risks. Within the organisation of the MNB, the Monetary Council (MC) establishes the strategic framework regarding macroprudential policy without prejudice to the primary objective of the MNB, which is to achieve and maintain price stability. The Financial Stability Board (FSB) is the body responsible for the actual definition and achievement of specific macroprudential policy objectives. In addition to macroprudential analytical and regulatory tasks, the FSB is responsible for tasks relating to microprudential policy and for decisions relating to the tasks of the supervisory and resolution authority. Moreover, where appropriate the FSB provides a tripartite forum involving the MNB and the ministry in charge of the regulation of the capital and insurance markets for the preparation for and management of crises.

Given that the integrated institutional model has been vested with such a broad mandate, the MNB aims to achieve various benefits. The free flow of information between the microprudential and macroprudential areas could potentially improve the efficiency of individual areas. Moreover, a macroprudential authority integrated into the central bank could utilise the expertise and experience typically available in any central bank in the performance of its core tasks. Although there may be conflicting opinions, coordination between the areas is promoted effectively by the concentrated decision-making mandates entrusted to a single body. The benefits of this model are enhanced by consistent communication and the unambiguous, uniform messages conveyed.

Chart B

The Hungarian financial stability institutional system



The MNB integrates the competent and designated authorities. The designated authority is in charge of identifying the O-SIIs, assessing structural risks related to the SRB and calibrating the O-SII buffer and the SRB buffer rates. As preparation for a final decision, the Macroprudential Directorate discusses the proposal at the Coordination Forum for Microprudential and Macroprudential Policy and with the Resolution Directorate. The subsequent discussion of the planned buffers with the stakeholders of the banking sector represents a single position of the MNB. The preparation procedure promotes the transparency of macroprudential objectives in the system. It also supports the consistent distinction during the risk analysis stage between systemic structural risks covered by the different instruments, preventing any overlapping of targeted risks and their interaction during the later buffer implementation. The decision is taken by the FSB on the group of O-SIIs, the O-SII and SRB buffer rates, and any methodological change or revision applied to the identification or calibration process. The O-SII identification methodology and its results are used as inputs for various microprudential tasks and are taken into consideration by the Resolution Directorate whenever relevant. The MNB annually adopts a supervisory examination programme for institutions that are considered systemically important, during which the Macroprudential Directorate shares views, helps evaluate capital plans and follows ILAAP assessments.

Before the Hungarian implementation of the SRB for concentrated risks stemming from problem project loans (see the stock take for more information), it was necessary to ensure that the possibilities of applying alternative CRD IV or CRR instruments, especially Pillar 2 instruments, had been exhausted. Frequent and direct interaction between the macro- and microprudential institutional divisions and the consistent representation of macroprudential goals has been instrumental in timely and accurate risk recognition and the assessment of feasible policy responses. A further example of close cooperation required during the implementation of the SRB is provided by the introduction of specific supervisory reporting requirements for monitoring problem exposures at the relevant institutions. This was developed utilising the expertise of a number of microprudential departments.

Abbreviations

Countries

BE	Belgium	**HR**	Croatia	**PL**	Poland
BG	Bulgaria	**IT**	Italy	**PT**	Portugal
CZ	Czech Republic	**CY**	Cyprus	**RO**	Romania
DK	Denmark	**LV**	Latvia	**SI**	Slovenia
DE	Germany	**LT**	Lithuania	**SK**	Slovakia
EE	Estonia	**LU**	Luxembourg	**FI**	Finland
IE	Ireland	**HU**	Hungary	**SE**	Sweden
GR	Greece	**MT**	Malta	**UK**	United Kingdom
ES	Spain	**NL**	Netherlands	**NO**	Norway
FR	France	**AT**	Austria	**US**	United States

Other

3D model	Model with three layers of default by Clerc et al (2015)
APRA	Australian Prudential Regulation Authority
AWG	Analysis Working Group
AT1	Additional Tier 1 capital
b.p.	basis point(s)
BCBS	Basel Committee on Banking Supervision
BoE	Bank of England
BRRD	Bank Recovery and Resolution Directive
BSLoss	Banking system loss
CBD	Consolidated banking data
CBS	Consolidated banking statistcs of the BSI
CCoB	Capital conservation buffer
CCyB	Countercyclical capital buffer
CEE	Central and Eastern Europe
CESEE	Central, Eastern and South-Eastern Europe
CET1	Common Equity Tier 1
COM	European Commission
CRD IV	Capital Requirements Directive
CRE	Commercial real estate
CRR	Capital Requirements Regulation
DGS	Deposit Guarantee System
D-SIB	Domestic Systemically Important Bank
DSGE	Dynamic stochastic general equilibrium
EA	Euro area

EAD	Exposure at default
EBA	European Banking Authority
ECB	European Central Bank
EEI	Equal expected impact
EGSB	IWG Expert Group on the Use of Structural Macroprudential Instruments in the EU
EU	European Union
ESRB	European Systemic Risk Board
EW-GVAR	Early warning general VAR
EWS	Early Warning System
FAVAR	Factor-augmented VAR
FSB	Financial Stability Board
FSC	Financial Stability Committee
GDP	Gross Domestic Product
G-SIB	Global Systemically Important Bank
G-SII	Global Systemically Important Institution
IMF	International Monetary Fund
IWG	Instruments Working Group
LEI group	Long-term Economic Impact Group
LGD	Loss given default
MAG	Macroeconomic Assessment Group
MREL	Minimum Requirement for Eligible
NBR	National Bank of Romania

NACE	Statistical classification of economic activities in the European Community
NCA	National Competent Authority
NDA	National Designated Authority
NFC	Non-financial corporation
NMA	National Macroprudential Authority
OECD	Organisation for Economic Cooperation and Development
OMR	Task Force on Operationalising Macroprudential Research
P2G	Pillar 2 guidance
P2R	Pillar 2 requirement
PD	Probability of Default
PNFS	Private Non-Financial Sector
NPL	Non-performing loans
O-SII	Other Systemically Important Institution
p.p.	percentage point(s)
REA	Risk exposure amount
ROE	Return on equity
RoRWA	Return on Risk-Weighted Assets
RWA	Risk-Weighted Asset
SB	Supervisory Board
SES	Systemic Expected Shortfall
SIFI	Systemically Important Financial Institution
SII	Systemically Important Institutions
SME	Small and medium enterprises
SNL	SNL Financial
SRB	Systemic Risk Buffer
SREP	Supervisory Review and Evaluation Process
SRM	Single Resolution Mechanism
SSM	Single Supervisory Mechanism
SVAR	Structural VAR
T2	Tier 2 capital
TLAC	Total loss-absorbing capacity
VAR	Vector autoregressive model
VECM	Vector error-correction model

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