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Balázs Zsámboki

7 f dbPQT PaT RP_XP QdUUTab.

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Abstract

This paper analyses banks' ability to use capital buffers in the euro area, taking into account overlapping capital requirements between the risk-based capital framework and the leverage ratio capital framework from 2016 to 2022. This analysis is the first to quantify buffer usability in multiple jurisdictions and across various bank types, identify key drivers of buffer usability and assess the impact of various policy measures using longer time series. The paper shows that while both risk-based and leverage frameworks play a key role in enhancing the resilience of the banking system and ensuring financial stability, their simultaneous application creates interactions that may affect the functioning of capital buffers. In this regard, we investigate to what extent banks could have drawn down regulatory capital buffers in the risk-based framework without breaching current leverage ratio requirements, which is in line with the approach to buffer usability taken in ESRB (2021b). We show that buffer usability was partially constrained in the period examined and is expected to remain so under the current regulatory framework and if risk weight densities (RWDs) remain low. This finding indicates that the leverage ratio constitutes an effective backstop to the risk-based framework, both as regards minimum requirements and capital buffers. Limited buffer usability was identified especially for global systemically important institutions (G-SIIs) that rely largely on internal modelling approaches to calculate risk-based capital requirements, leading to comparably low risk weights and making the leverage ratio relatively more binding. Adding to previous contributions, we find that banks' ability to use capital buffers fluctuated over time, generally increasing before 2019 and decreasing

= cTRW XRP bd Pah

Macroprudential buffers are regulatory capital requirements that are applied on top of minimum capital requirements. Buffers are intended to be used by banks in times of stress to absorb unexpected losses, so that they are not forced to cut back their vital services to the broader economy. Furthermore, capital buffers should generally increase the resilience of the banking system and certain elements of the framework also aim at dampening the financial cycle. Thereby, capital buffers overarching objective is to safeguard the stability of the financial system. Over the years, the regulatory framework has been adjusted to account for the lessons learned from the global financial crisis. The risk-based framework has been complemented with parallel regulatory requirements that further strengthen bank resilience and facilitate the recapitalisation of troubled banks and therefore strongly promote financial stability. While capital buffers feature prominently in the risk-based prudential framework, they are less prominent or absent in other frameworks. This creates complex interactions between the parallel requirements and may lead to circumstances in which buffers in the risk-based framework might not be fully usable in practice and thus might not be able to fully achieve their objectives.

In particular, banks are now required to simultaneously comply with (i) the risk-weighted (RW) framework, (ii) the leverage ratio (LR) framework and (iii) resolution requirements (minimum requirement for own funds and eligible liabilities, MREL). The RW framework determines the level of capital a bank must hold in relation to the risk profile of its portfolio. The LR framework requires banks to hold capital in relation to their non-risk-based exposures. The LR framework therefore enhances overall resilience and limits excessive leverage in the banking system, making it an important pillar of the overall prudential framework. Furthermore, the LR framework provides additional safeguards against model risk and measurement error by complementing the RW capital framework with a relatively simple non-risk-based measure that is binding especially when risk weights are low.[1] Meanwhile, MREL is designed to ensure that a bank has the resources required to guarantee its resolvability in case it fails.

To some extent, banks can use the same capital to comply with these parallel requirements. Therefore, for banks that are relatively more constrained by the parallel requirements, part of the capital that constitutes the risk-based macroprudential buffer may actually be needed to fulfil the LR or resolution requirements. In such cases, banks cannot fully use the capital buffers to absorb losses, as doing so would imply violating these parallel requirements. This issue is known as limited buffer usability with respect to capital overlaps. The analysis in this paper focuses on the overlaps of macroprudential capital buffers with the LR requirement, since information on the LR requirement has been available since 2016 whereas the MREL intermediate targets have only applied since 2022.

[1] BTT 121B

Generally, it is important to note that buffer usability is a multidimensional phenomenon. 1P Zb dbT URP_XP QdUUTab ST_T Sb c h cVTXaPQXXh QdcPb their willingness to do so. Banks may be reluctant to dip into buffers to avoid the negative consequences of restrictions on distributions or due to fears of market bcXV P 0 P PhbX UQP Zb f XXV Tbb c dbT RP_XP QdUUTab X dcside the scope UcVX _P_Ta Pb X_daTh U RdbTb QP Zb PQXXh c dbT RP_XP QdUUTab f XW dc breaching overlapping capital requirements.[2]

This paper contributes to the analytical literature on buffer usability by examining for the first time how buffer usability with respect to the LR evolved and changed in the euro area from 2016 to 2022, using a multi-country and multi-year bank-level dataset. The LR has been a binding requirement since June 2021; however, it was also reported and publicly disclosed by banks beforehand, which allows for the extension of the time series backward. Furthermore, one could argue that public disclosure rules encouraged banks to comply with the LR requirement via market discipline and peer pressure even before it became formally binding. In fact, our data show that the vast majority of banks would have complied with the LR requirement in the years before it became legally binding. With this perspective, the paper analyses how buffer usability might develop in different phases of the financial cycle and also whether it differs across countries. The paper therefore broadens the analytical evidence to support ongoing discussions on buffer usability. We do not focus on MREL due to its later phase-in and resulting data limitations.

The analysis shows that buffer usability was limited in past years, especially for systemically important banks that generally have lower risk weights. The level of buffer usability increased from the end of 2016 onwards with the phasing-in of buffers, but then decreased during the coronavirus (COVID-19) pandemic. This decrease is partially due to monetary and fiscal measures, which supported financial stability in general but at the same time affected bank balance sheets, risk weight density (RWD) and regulatory requirements in a way that changed the relative bindingness of RW and LR requirements and led to reductions in the usability of buffers. This pattern differs across countries, with some having persistently high usability and others seeing varying usability over time.

Analysing the main drivers of buffer usability, this paper provides empirical evidence that RWD is the key factor determining buffer usability with respect to the LR. In this regard, it shows that there is a critical RWD range in which buffer usability is highly reactive to changes in RWD. This critical range is determined by the design and relative calibration of risk-based and leverage-based minimum requirements. The majority of euro area banks, including all global systemically important institutions, fall in this critical range, indicating that the LR functions as an effective backstop to low risk weights for these institutions.

Beyond loss absorption, buffers also provide important incentives for banks, and higher levels of buffer usability support the effective functioning of the macroprudential framework. In the absence of policy changes or substantial adjustments to QP Zb QP P RT bWTTc P S RWDs, limited buffer usability is likely to

2 BTT cWX PcTa U aXbcP RT 1TW TcP 421 Q 121B P S121B

prevail in the long term as well. This highlights the need to closely monitor the impact of various policy measures and regulatory reforms, which are expected to increase buffer usability by changing the relative bindingness of the RW and LR frameworks. In this regard, the paper assesses the possible effects of positive neutral countercyclical capital buffers and LR buffers as well as the full implementation of the Basel capital standards (Basel III) on buffer usability. The paper can hence contribute to a better understanding of the impact of various measures on the usability of buffers without compromising the objectives of leverage requirements.

1 8ca SdRcX

Macroprudential policy was developed based on the lessons learned from the global financial crisis of 2007-08. One of the main lessons of the crisis was that ensuring safe and sound individual banks does not guarantee financial stability at the system level. For this reason, the individual bank-focused prudential framework of banking supervision and microprudential policy was complemented with macroprudential policy. Macroprudential authorities analyse and assess the stability of the financial system as a whole and deploy policies aimed at safeguarding financial stability at the system level.

Among these macroprudential policy tools are capital buffers, which are dedicated regulatory capital requirements banks must maintain above minimum levels. If unexpected losses materialise, banks could use these buffers to cushion them without having to breach regulatory minimum requirements. Capital buffers should also ensure that in stressed times banks do not have to deleverage and cut back lending to households and businesses in order to absorb materialising losses, by instead using buffer capital for this purpose. Besides this primary objective, buffers can also help mitigate risk-taking, disincentivise lending to overheating sectors and dampen the financial cycle. By increasing the resilience of the financial system and reducing the systemic risk it faces, capital buffers are also beneficial for the real economy.

However, capital buffers may not always work effectively in practice as they might be not completely usable for banks. Since the regulatory framework is multidimensional by design, banks have to comply not only with capital buffers that are part of the risk-based capital requirements, but also with other parallel requirements such as the leverage ratio (LR). Box 1, at the end of this introduction, presents a comprehensive overview of the risk-based and LR regulatory frameworks in the EU. Capital buffers feature prominently in the risk-based prudential framework, whereas they are less prominent or absent in other frameworks. Therefore, banks might not be able to deplete their risk-based macroprudential buffers, fully or partially, without simultaneously breaching other requirements. Breaching these other requirements is associated with more severe consequences than breaching risk-QPbTS QdUUTaaT dXaT T db f WRW Ph R bcaPX QP Zb PQXXh c dbT dWTXa buffers. This phenomenon occurs due to overlapping capital requirements and is referred to as X XTS QdUUTadbPQXXh U adVT _da_ bT UdVX _P_Ta ; X XPcX b c buffer usability could impede the functioning of the macroprudential framework, as buffers that are not fully usable might not achieve their financial stability objectives.

Parallel requirements are not necessarily the only reason for limited buffer usability, in fact banks might also not be willing to use buffers. Limited buffer usability is a multidimensional phenomenon, and overlapping capital requirements are just one aspect of it. The coronavirus (COVID-19) experience provides indications that banks may avoid dipping into buffers and instead lend less or rebalance portfolios towards safer assets to ensure sufficient capital headroom, because they want to avoid negative consequences associated with buffer breaches such as limitations on distributions and market stigma effects.

A dedicated analysis of buffer usability from the perspective of banks' willingness to use buffers is beyond the scope of this paper but has been the subject of other extensive studies. Contributions to this literature include Abad and Garcia Pascual (2022), BCBS (2021), BCBS (2022), Behn et al. (2020) and ECB (2022b). Banks may not be willing to use their buffers because of the negative consequences (e.g. restrictions on distributions and stigma effects) they face when breaching buffer requirements. This is especially associated with structural buffers, compared with buffers that can be released by authorities, as releasing such buffers would free up capital that can be used by banks without restrictions. Therefore, one of the policy conclusX b STaXTS Qh cWT XTaPcdaT STP XVf XWQP Zb d f XXV Tbb to use buffers is to call for a higher share of releasable buffers. In this regard, the ECB (2022b) sets out different implementation options, such as introducing a positive neutral level of the countercyclical capital buffer (CCyB), introducing a core systemic risk buffer (SyRB) or making the capital conservation buffer (CCoB) releasable. However, from this angle the question of banks ability to use buffers without breaching other parallel requirements is also important. First, if banks are willing to use their buffers, they also have to be able to do so and, second, releasing capital buffers will not be effective if the released buffer capital is still needed to meet a parallel requirement.

The issue of potentially limited buffer usability stemming from the presence of parallel requirements is receiving increasing international attention. The work of the ESRB (2021b), which analysed buffer usability for EU countries and established a reference approach to assess buffer usability as result of overlapping parallel requirements, brought the issue of limited buffer usability to international attention.[3] This work showed that because of existing capital overlaps with the LR framework, risk-based capital buffers are only up to 65% usable on average, and even less if resolution requirements[4] are also taken into account. Earlier studies, mainly by national central banks and supervisory authorities, analysed buffer usability in individual jurisdictions. In this regard, Swedish, Danish and Czech authorities studied the interaction between the LR minimum requirement and capital buffers, or their explicitly releasable part, the CCyB, finding evidence of limited buffer usability for banks in their countries (Finansinspektionen, 2016, Danmarks Nationalbank, 2018, and Pfeifer, 2020). Other studies like Norges Bank (2021), Danmarks Nationalbank (2020) and Cornacchia and Guerra (2022) also considered the need to meet the minimum requirement for own funds and eligible liabilities (MREL) as a potential limitation on buffer usability and consistently found MREL to be more constraining on buffer usability than the LR framework.[5] The most recent contributions come from Danmarks Nationalbank (2022), which shows that the

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[3] CWT P__a PRW UcWT 4BA1 Q X R ST bTS P S PST PePXPQT Pb P b Uf PaT _PRZPVT RP TS cWT QdUUTadbPQXXh bX dPcX c DB8C f WRWcWX _P_TaSaPf b TgcT bXTh

[4] BTT 4BA1 Q U aSTcPXb

[5] 8cX f acW cXVcWPc2 a PRRWXP P S 6dTaaP R SdRcTS cWTXQdUUTadbPQXXh P PhbXU f XV P PcTa PcXT R _T T cPah P__a PRWc cWT aTUTaT RT P__a PRW UcWT 4BA1 bTT 1 g U4BA1 Q U aUdacWTaSTcPXb f WRWTPSbc WXWTaQdUUTadbPQXXh U a8P XP QP Zb X R _PaX f XWcWT 4BA1 aTUTaT RT P__a PRW

usability of the CCyB is reduced by almost half due to the need to comply with the LR framework, and from Fernández Lafuerza et al. (2022), who assess buffer usability for Spanish banks during the COVID-19 pandemic. Finally, the limitations on buffer usability were also acknowledged by BCBS (2022). Assessing buffer usability for a global bank dataset following the approach of the ESRB (2021b), it found that buffer usability is constrained in all BCBS jurisdictions, where, on average, around 73% of buffers would be usable without breaching the LR. However, this aggregate number hides strong geographical heterogeneity across countries. In these studies, the low level of risk weights was considered as one of the primary reasons for limited buffer usability.

While these studies have shown certain limitations on buffer usability, ongoing policy discussions suggest the need for additional analytical work. For example, in the context of the recent review of the European macroprudential framework, the European Central Bank (ECB) advised the European Commission to further monitor and assess whether impediments to buffer usability remain significant before considering if a fundamental framework revision is required.[6] Therefore, it seems that existing studies provide a good starting point in flagging the issue of buffer usability, but more work is needed to fully understand the phenomenon and better inform future policy discussions. In particular, one could argue that studies have so far used data from one specific observation in time and therefore do not reveal whether limited buffer usability is a snapshot issue due to specific circumstances at a given point in time or whether it is a more permanent issue that exists by design.[7] Furthermore, multi-country analysis remains scarce, with the exception of ESRB (2021b) and BIS (2022). The observed heterogeneity in the usability of buffers (e.g. geographical or by bank type) has generally not yet been analysed in sufficient detail. Relating observed heterogeneity to underlying structural factors such as differences in banking system or macroprudential policy stance would help inform the discussion on the expected materiality of the concerns and policies to address them.

The goal of this paper is to substantiate, strengthen and expand the analytical literature on buffer usability by shedding more light on the above-mentioned gaps and enrich the policy discussion with new insights. To the best of our knowledge, this analysis is the first multi-country time series analysis of buffer usability from a capital overlap perspective, conducted on the so far richest euro area cross-sectional micro-level bank dataset, observing 1,725 individual institutions over 25 quarters and resulting in more than 40,000 datapoints. Drawing on this large dataset allows us to explore for the first time how buffer usability has evolved over time. This not only enables us to assess to what extent limited buffer usability was an issue in the past, but also allows us to look forward based on historical experience and understand whether it is likely to remain a permanent issue. Furthermore, given the period under investigation, we can analyse how buffer usability behaved in pre-crisis times, when macroprudential capital buffers were generally being phased in,

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6 BTT cWT 4BA1 aTb_ bT 410 aTb_ bT P S 421 aTb_ bT c cWT RP U aPSeXRT UcWT 4da _TP 2 XbX P S cWT dPaVTcTS R bd dPcX cWT PRa _adST cXP aTeXTf

7 7 f TeTa cWT 4BA1 Q R SdRcb bRT PaX P PhbTb Wf QP Zb PSYdbcc d_R XVUXP aT dXaT T db P SUXSb cWPc X XTS QdUUTadbPQXXh f X _TabXc Pb XX P aTbd c UcWT RdaaT caTVd Pc ah bTcd_

and how the dynamics changed due to the circumstances of the COVID-19 pandemic. Also, by exploiting the bank-level and geographical heterogeneity of our rich dataset, this paper puts a stronger focus on investigating how observed low risk weight densities (RWDs) for larger banks, in combination with the calibration of minimum requirements, are a key determinant of limited buffer usability, compared with previous contributions on this topic. Finally, we analyse how different measures, such as positive neutral CCyBs and LR buffers, as well as the full implementation of the Basel capital standards (Basel III), could have changed buffer usability over time by means of counterfactual simulations.

Box 1

0 eTaeXf UdWT 4D _adST cR UaP Tf aZU aQP Zb

CWT PX UdWX Q g Xc VXT P QaXU eTaeXf[8] UdWT 4da _TP _adST cR UaP Tf aZ f WRW aT dXTb QP Zb c Ud UXSXUaT c_PaP T RP_XP aT dXT T cb 0 VdWbT f T f X U Rdb da PcT cX aXZ QPbTS aT dXT T cb P S TeTaPVT QPbTS aT dXT T cb CWbT aT dXT T cb dbc QT Tcf XWaTVdPc an RP_XP f WRWS XUaT cRcTb QTdf TT CXa RP_XP P S CXa RP_XP CWT U a TaX P WXWTa dP Xh RP_XP cWPcPQb aQb bbTb bch P V XVR RTa QPbX XT QTU aT P QP ZUPXb P S X cWT bd U2 4 dXh CXa 2 4C P S 0 SSXX P CXa 0C RP_XP f WXT cWT PcTaX P f Ta dP Xh RP_XP cWPcPQb aQb bbTb P V T R RTa QPbX XT f WT cWT QP ZWPb UPXTS 2 4C RP_XP X cWT Ubcc PQb aQ bbTb P S X PX h R _ bTS UR bWPaTb P S aTcPXTS TPa XVb f WXT 0C RP_XP X R _ bTS U cWTa Xbcad T cb cWPcRP bcX PQb aQ bbTb QdcPaT c dP XTS Pb 2 4C bdRWPb R cXVT cR eTaXQT Q Sb CXa RP_XP X PX h R _ bTS UbdQ aSXPcTS STQc

Risk-based capital framework

CWT aXZ QPbTS RP_XP UaP Tf aZ aT dXTb QP Zb c W S aTVdPc an RP_XP PRR aSXVc cWT aXZ _a UXT UdWTXaPbbTcb CWT QPbX U aRP Rd PcXV aXZ QPbTS aT dXT T cb X cWTaTU aT cWT c cP aXZ f TXWcTS PbbTcb Pb RP TS cWT c cP aXZ Tg_ bdaT P d c CA40 f WTaT aXZ XaTg_ bdaTb R caXQdcT aT bca Vh c RP_XP aT dXT T cb CWT UaP Tf aZ X R _ bTS UP X X d aT dXT T c P QdUUTaaT dXT T cP S ? XPa VdXSP RT

- **Minimum requirement:** CWX X R _ bTS UP ? XPa ? aT dXT T cT dP U aP QP Zb P S P QP Zb_TRXUR ? XPa aT dXT T c ? A ? X _ bTb P X X d 2 4C RP_XP aT dXT T c U UdWT CA40 P CXa RP_XP aT dXT T c U% UdWT CA40 P S P c dP RP_XP aT dXT T c U UdWT CA40 0 Q eT ? bd_TaeXb ab Ph X _ bT P ? A c aTUTRc XRa _adST cR aXZb UdWT _PaRd PaQP Z caTUTRcTS X ? f WRWRP QT _PaR h Ud UXTS f XWQ cWCXa P S CXa RP_XP _a eXSTS cWPcPc TPbc UdWT RP_XP X CXa P S U cWT CXa RP_XP X 2 4C < XX d RP_XP aT dXT T cb dbcQT TcPcP cX Tb 1 aTPRWXV P h UdWT RP aTbd cX bTeTaT R bT dT RTb U aQP Zb Rd XPcXV X cWT f XWSaPf P U cWTXaQP ZXV XRT RT

[8] 0 R _aTWT bXT STbRaXcX UdWT UaP Tf aZ RP QT U d S U aTgP _T X 4B A1 Q

- **Buffer requirement:** CWX dbcQT Tcf XW2 4C RP_XP P S X R _ bTS UdWT RP_XP R bTaePcX QdUUTa 2 2 1 RP_XP QdUUTab U aV QP P S dWTabhbcT XRP h X _ aP c XbcXdcX b 6 B8b P S B8b dWT bhbcT XR aXbZ QdUUTa BhA1 P S dWT R d cTa hR XRP RP_XP QdUUTa 2 2 h1 4PRW UdWTbT QdUUTab Xb bTcbT_PaPcT h f XWP SXUTaT c _da_ bT Qdcf XWdWT bP T PRa _adST cXP PcdaT[9] 0 dWT QdUUTab c VTdWTaR bcXdcT dWT R QXTS QdUUTa aT dXaT T c 2 1 A f WRWbcPRZb PQ eT dWT aXbZ QPbTS X X d aT dXaT T c CWT R bT dT RTb UQaTPRWX V dWT 2 1 A PaT XSTadWP dWT X X d aT dXaT T c 8 STTS X cX Tb UbcaTbb QP Zb bW d S QT PQT c SX_Xc dWT QdUUTab f XWdWT R bT dT RTb U aTbcaRcX b SXcaXQdcX SXXST Sb bWPaT Qdh QPRZb R d_ _Ph T db 0C Xbcad T db P S Q dbTb P S _a eXSTS dWh bdQ XP RP_XP R bTaePcX _P XRdSXVP cX TUP T U a dWT XRaTPbT U f Ud Sb f XWdWT QYTRcXT U TTcXV Ud h dWT 2 1 A

- **Pillar 2 guidance (P2G):** CWX X P XbcXdcX b_TRXR aT dXaT T cbTcQh bd_TaeX ab bcPRZXV PQ eT dWT 2 1 A 8 R caPbcc dWT X X d aT dXaT T c P S 2 1 A P QaTPRW U? 6 S Tb c Xe eT P h Pdc PcXR aTVd Pc ah R bT dT RTb f XWdWT TgRT_cX UWPeXVc _a eXST PaVd T db U a c TTcXV? 6 c bd_TaeX ab P S WPeXVc bdQ XP aTeXTS RP_XP _P U a dWT TeT dP aTbc aPcX UR _XP RT[10]

Leverage-based capital framework

CWT TeTaPVT UaP Tf aZ X STbXV TS Pb P aT dXaT T c QPbTS dWT bXT UQP P RT bWTTcP S UUQP P RT bWTTcXT b f XW dcUPRc aXV X dWT aXbZXTbb UTg_ bdaTb & X XcT STS c aTbcaRcdWT QdXS d_ U TeTaPVT X dWT QP ZXV bhbcT P S c R _T T cdWT aXbZ f TXWdTS aT dXaT T db Pb P bX _T QPRZbc _ TPbdaT PVPXbc ST aXbZP S TPbdaT T cTaa a[11] CWT QPbX U aRP Rd PcXV aT dXaT T db X dWT c P TeTaPVT aPcX Tg_ bdaT TPbdaT ; A4 <[12] BX XPac dWT aXbZ f TXWdTS UaP Tf aZ X X R _ bTS UP X X d aT dXaT T c P RP_XP QdUUTa U a6 B8b P S _ cT cXP h ? 6

- **Minimum requirement:** CWX X R _ bTS UP ? aT dXaT T cP S P ? A[13] 1 dW TTS c QT Tcf XWCXTa RP_XP CWT ? aT dXaT T c X bTcT dP U aP QP Zb Pc UdWT ; A4 < f WXT dWT ? A X QP Z b_TRXR P S Ph QT bTcQh bd_TaeX ab 0 b X dWT aXbZ QPbTS UaP Tf aZ dWT ? A bcPRZb PQ eT dWT ? aT dXaT T c 8U TeTaPVT QPbTS X X d aT dXaT T db PaT QaTPRWTS R bT dT RTb bX XPac dW bT U aQaTPRWX V aXbZ QPbTS aT dXaT T db PaT P__XTS 8 dWT 4D dWT TeTaPVT aPcX QTRP T P QXSXV X X d aT dXaT T c X 9d T

- **Buffer requirement:** 0 b U 6 B8b TTS c TTcP CXTa RP_XP QdUUTa aT dXaT T cT dP c dWT ; A4 < d cX_XTS Qh[14] UdWT P__XRPQT aXbZ QPbTS 6 B8 QdUUTa aPcT CWX QdUUTa aT dXaT T cbcPRZb PQ eT dWT TeTaPVT aPcX X X d aT dXaT T c 8 RPbT U; A QdUUTa QaTPRWTb bX XPaR bT dT RTb PaT P__XTS c dW bT U adWT 2 1 A

[9] < aT XU a PcX dWT 2 1 A RP QT U d S dWT 4B A1 URP f TQbXT

[10] 3 Tb_XT dWX QXSXV Tbb QP Zb cT S c R _h f XW? 6 8 PSSXX aT_TPcTS R _XP RT f XW? 6 Ph aTbd cX ? A XRaTPbTb

[11] BTT 1 2 1 B

[12] ; A4 < X P TPbdaT c RP_daT dWT aXbZ UTgRTbbXT TeTaPVT X QP Zb R _aXXV Q dW QP P RT bWTTcP S UUQP P RT bWTTcTg_ bdaTb

[13] 5 aSTcPXb bTT dWT 4 2 1 1P ZXVBd_TaeXX f TQbXT

[14] CWX d QTa X R h aTUTaaTS Pb dWT R eTabX UPRc a

- **Pillar 2 guidance (P2G-LR):** CWX XP XbcXdcX b_TRXR TVP h QXSXV aT dXT T cbTc Qh bd_TaeX ab P S QPbTS P QP Zb bcaTbb cTbc aTbd c 8bdPRZb PQ eT cWT TeTaPVT aPcX QdUUTa aT dXT T c 0b U ? 6 ; A aT dXT T cb WPS QTT X _T T cTS

CWT TeTaPVT aPcX f Pb RP XQaPcTS Pb P QPRZbc _c aXZ QPbTS _adST cP aT dXT T cb TP XV cWPc h P X XTS d QTa UV QP h PRcXT QP Zb PaT Tg_TRcTS c UXS cWT TeTaPVT aT dXT T cb aT aTbcaXRcXT cWP aXZ QPbTS aT dXT T cb 7 f TeTa SdT c cWT f aXZ f TXVWcb U PaVT QP Zb X 4da _T cWT TeTaPVT aPcX UaP Tf aZ X _PacXRd Pah R bcaPX X V U a 4da _TP QP Zb[15] 4eT cW dVW eTaP aXZ QPbTS aT dXT T cb PaT bcX WXWTaU a bc 4da _TP QP Zb cWP eTaP TeTaPVT aT dXT T cb cWT SPcP bWf cWPc cWT TeTaPVT aPcX Ud RcX b Pb P QPRZbc _ c h c cWT aXZ QPbTS X X d aT dXT T c QdcX P h RPbTb Pb Pb P ST UPRc QPRZbc _ c cWT QdUUTa aT dXT T c X _hXV X XTS QdUUTa dbPQXh

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[15] 5 aTgP _T 3 T 7PP P S : PZTb UXS cWPc _TPZ bbTb PRRd d PcTS SdaX V cWT _TaXS % f d S TgRTTS cWT X X d aXZ QPbTS aT dXT T cU a UQP Zb f WTaTPb cWTh f d S TgRTTS cWT TeTaPVT aT dXT T cU a UQP Zb CWX bWf b cWPc cWT bb PQb aQT Rh UQ cW X X d aT dXT T cb X aPcWTaR _PaPQT

2 CWTR RT_c UQdUUTadbPQXXh P S Xb PX STcTa XP db

The analysis conducted in this paper strictly follows the conceptual and empirical approach to buffer usability laid out in ESRB (2021b). We therefore analyse whether banks can deplete (use) their macroprudential capital buffers that stack on top of risk-weighted (RW) minimum requirement without simultaneously breaching the parallel applicable leverage ratio (LR) minimum requirement.[16] Unlike the ESRB (2021b), we do not consider potential additional restrictions on buffer usability due to the MREL framework, because for the observed period MREL requirements were not applicable and data were not available.[17]

Since banks' capital instruments that are used to meet buffers in the RW framework can simultaneously also be used to meet the minimum requirement in the LR framework, there is a certain overlap between the two frameworks that may reduce the usability of buffers. If a bank meets the LR minimum requirement with capital that is also used to meet the combined buffer requirement (CBR), this part of CBR is not usable. Furthermore, given that the regulation requires banks to meet the CBR with the highest capital quality, i.e. with Common Equity Tier 1 (CET1) capital, one must focus specifically on CET1 capital to determine buffer usability. More precisely, the usability of capital buffers is reduced if the CET1 amount used to comply with the LR minimum requirement is in nominal terms larger than the CET1 amount used to comply with the RW minimum requirement.

Chart 1 illustrates the limited usability of buffers presented by the LR for a stylised bank. The vertical axis depicts the CET1 amount used to comply with the LR and RW frameworks. We assume low average risk weights for this bank, which implies that the LR minimum requirement is relatively more binding than the RW minimum requirement. This is shown in the chart by the CET1 part of the LR minimum requirement (MR-LR) exceeding the CET1 RW minimum requirement (MR-RW) on top of which the CBR is stacked. The part of the MR-LR that creates the effective overlap with the CBR is illustrated by the blue shaded area in the CBR. This part of the CBR may not fulfil its buffer role, as the bank is not able to deplete this part of the CBR without breaching the LR minimum requirement. Only the non-shaded part of the CBR is freely usable, as it exceeds in nominal terms the CET1 LR minimum requirement, i.e. there are no LR overlaps restricting the usability of this part. Ultimately, buffer usability for this bank is below 50%, meaning that a larger part of the CBR cannot be used without breaching the LR minimum requirement. This illustrates that buffer usability depends on actual bank-specific capital requirements, QP Zb aXZ _a UXT P ScWT R aaTb_ SXV aXZ f TXWb f WRWX cWX RPbT PaT

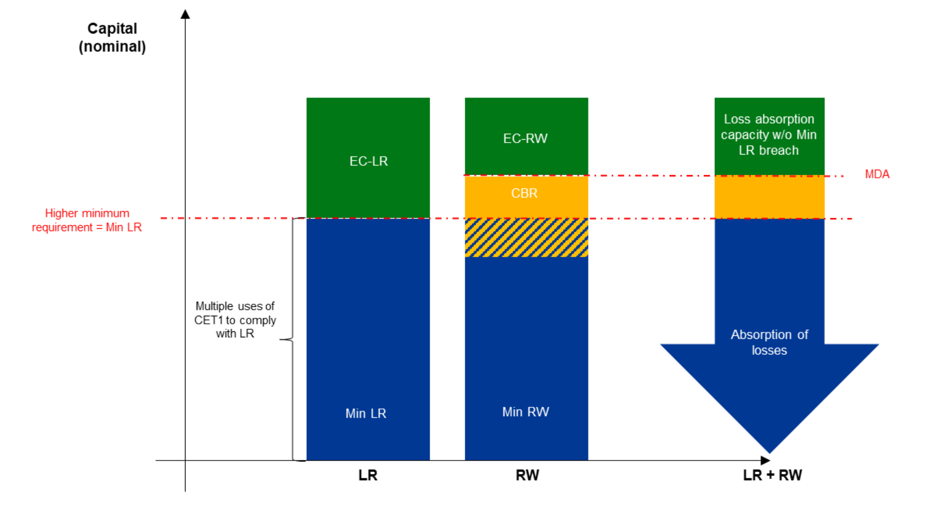
[16] CWX R RT_c X caT PcTS c QP Zb PRcdP f XXV Tbb c dbT QdUUTab 8 UPRc cWT PQXXh c dbT QdUUTab f XW dc QaTPRWXV XX d aT dXT T db X P _aTR SXX U aQP Zb f XXV Tbb c dbT QdUUTab

[17] 8cbW d S QT PRZ f TSVTS Wf TeTa cWPccWT 4B A1 0C5 aT_ ac dbXV P aP VT UPbbd _cX b U d S < A4; c QT cWT bcR bcaPXXV XbdT U a2 1 A dbPQXXh CWTaTU aT cWT P Phb X X cWX _P_TaR d S d STabX XPaPbbd _cX b QT TgcT STS c PRR d cU aQdUUTadbPQXXh Sh P X b f XWaTb_TRcc < A4;

assumed to be low). Therefore, the conceptual example cannot be generalised, and buffer usability analysis must be bank-specific.

Chart 1

4gP _T U X XTS QdUTa dbPQXXn U aP QP Z f XW f aXZ f TXWb SdT c RP_XP eTaP_b f XWdT TeTaPVT aPcX



B daRT) 4BA1 Q P T STS Qn dT 421
= cTb) CWX RWPac _aTbT db P bdn XTS TgP _T QP Z 0 R _ T db PaT Tg_aTbbTS X 24C cTa b 42 ; A, TgRTbb RP_XP ; A RP_XP bdPRZ < A ; A, XX d aT dXT T c 42 AF , TgRTbb RP_XP aXZ f TXWcTS RP_XP bdPRZ 21 A, R QXTS QdUTaaT dXT T c < A AF , aXZ f TXWcTS XX d aT dXT T c aXZ f TXWcTS RP_XP bdPRZ < 30 , PgX d SXbcaXQdcPQT P d cdWTbW S CWT UXdaT Pbbd Tb cWPc cWT < A ; A Xb cWT WXWTbc XX d aT dXT T c CWT QP Z X cWT TgP _T Xb cbdQYTRcc P 6 B8 TeTaPVT QdUTa CWT QdT hT f bWPSTS PaTP X cWT AF bdPRZ XSXRPcTb cWT dbPQT _Pac UcWT 21 A

The calculation of buffer usability is complicated by the fact that the LR and RW capital frameworks require different capital qualities. To calculate buffer usability analytically, one first has to calculate the CET1 amount used to comply with the LR and RW frameworks respectively and then evaluate the overlap between the CET1 amount used in the LR framework and the CET1 amount used in the RW framework.

In the stylised example above, any factor that decreases the amount of CET1 capital needed in the RW framework compared with the LR framework decreases buffer usability, and vice versa. These CET1 amounts are directly determined by the respective RW/LR nominal capital requirements, which further depend on the respective regulatory Pillar 1, Pillar 2 and CBR rates and on the respective underlying basis, which is the total risk exposure amount (TREA) for the RW framework and the leverage ratio exposure measure (LREM) for the LR framework. For example, a lower risk-based minimum requirement (all else being equal) means that less CET1 capital is needed in the RW framework, increasing capital overlap and reducing CBR usability. If, however, CBR rates are increased (i.e. the amount of required buffer capital above the CET1 minimum leverage requirement is higher), capital overlap will decrease and CBR usability will increase. Aside from regulatory requirements, the relative bindingness of the LR and RW capital frameworks is also determined by the risk profile of the bank, which can be described analytically by the risk weight density (RWD = TREA/LREM). The higher the RWD, the more constraining the RW framework is.

The composition of regulatory capital that banks use to comply with different requirements has a multifaceted impact on buffer usability. First, the treatment of Additional Tier 1 (AT1) capital is different in the RW and LR frameworks. The RW framework restricts the amount of AT1 capital that can be used to meet the minimum requirement (i.e. AT1 capital is capped at 25% of Tier 1 capital; Box 1), while no such restrictions exist in the LR framework. Therefore, banks may havT bda_db AT1 capital in excess of what is used to meet Tier 1 requirements in the RW framework which would be available to meet LR requirements. Any such surplus AT1 capital would therefore reduce the CET1 amount that is needed to comply with LR requirements and hence decrease the overlap and increase buffer usability. Second, as regards Tier 2 capital, it should be pointed out that this can only be used to meet the minimum requirement in the RW framework (subject to some restrictions; Box 1) and not that in the LR framework. Therefore, any eligible T2 capital used to TTc AF XX d RP_XP aT dXaT T cb f dS UaTT d_ 2 4C RP_XP Pb cWT PcTa would no longer be needed to comply with the RW minimum requirement. Lower CET1 capital locked in the RW minimum would reduce the CET1 element of the RW capital stack and would thus increase the overlap with the LR minimum requirement. This would reduce buffer usability (Chart 1), albeit increasing surplus CET1 capital above regulatory requirements. Third, if a bank increases AT1 capital when this instrument simultaneously meets RW and LR requirements, or if it increases Tier 2 capital beyond what is eligible in the RW framework (i.e. 25% of total capital), this has zero impact on buffer usability. Finally, increasing surplus CET1 capital does not affect overlap and hence has no effects on buffer usability, as surplus CET1 capital would only increase the voluntary CET1 buffers on top of the LR and RW capital stack (green boxes in Chart 1). The full analytical approach to calculate buffer usability and a more detailed discussion of the underlying determinants can be found in Annex 1.

From a broader financial stability perspective, however, higher reliance on AT1 and Tier 2 capital may not be beneficial. First, replacing higher-quality capital with lower-quality capital reduces going concern loss-absorbing capacity. The loss absorbency of CET1 capital is superior to AT1 and Tier 2 capital, so incentivising a higher share of the latter capital types may not improve financial stability. Second, banks willingness to use buffers is a further dimension of the overall phenomenon of constrained buffer usability. While a detailed analysis of banks willingness to use capital buffers is beyond the scope of this paper, it must be acknowledged that higher AT1 capital might in fact have a negative impact on buffer usability from this perspective. Notably, banks with more AT1 capital may have stronger incentives not to dip into buffers in order to avoid the cancellation of AT1 coupon payments.[18]

[18] C XRaTPbT cWT dbPQXXh UQdUUTab cWPcPaT caT TPbPQT cWT 421 U aXbcP RT bd__ ab bcaT VcWT XV cWT UTPcdaTb U0C Xbcad T cb c aTSdRT cWT bcX P TUUTRcb Pbb RXPcTS f XWQP Zb RP RT XV0C R d_ _Ph T cb f WT cWTh UP QT TPcWcWT TeT UcWTXaR QXTS QdUUTa aT dXaT T cb bTT 421 Q

3 0 T _XaRP P Phb X UQdUTadbPQXX h eTacX T

This section presents the main empirical results of this paper. We show how buffer usability evolved in the observed period from 2016 to the third quarter of 2022 and also look at the heterogeneity of buffer usability across bank types and countries. Furthermore, we analyse the main drivers of the observed dynamics, such as capital composition and RWD.

3.1 4 _XaRP P__a PRWP S SPdP

For the analysis carried out in this paper, we use the buffer usability simulation tool (USIT) developed by the Analytical Task Force (ATF) of the European Systemic Risk Board (ESRB) for overlapping capital requirements. USIT is a software package based on the statistical software R that allows researchers to calculate the usability of capital buffers using bank-level data. To calculate CBR usability with respect to the LR, USIT uses the methodology of ESRB (2021b), as described in the previous section and in more detail in Annex 1.[19]

Supervisory bank-level data for a large sample of euro area banks over six years is used for this analysis. The data are obtained through supervisory common reporting obligations (COREP) and cover the capital composition of banks as well as the respective regulatory capital requirements under the RW and LR capital frameworks. Our dataset spans from the third quarter of 2016 to the third quarter of 2022. To ensure that any observed time dynamics do not result from changes in the sample composition, we use a balanced sample of 1,725 banks, containing global systemically important institutions (G-SIIs), other systemically important institutions (O-SIIs) and other smaller banks, located in 19 euro area countries.[20] The aggregate assets of the sample accounted for 75% of QP Zb total euro area assets in the fourth quarter of 2021.[21]

Our analysis describes buffer usability according to evolving regulatory circumstances at any given time in our sample. We use all requirements and capital data as reported by banks, thereby reflecting the rules applicable at each reporting date. Hence, any changes to buffer usability implied by changes to the regulatory framework are implicitly reflected in the results.[22] Following this approach, we observe actual in-time usability dynamics, but it becomes slightly more challenging to disentangle the underlying drivers of the observed effects, as they can

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19 DB8C X RdaaT ch QTXV PXdPXTS Qh dWT 421 P S X PePXPQTU a T QTab UdWT 4BA1

20 1 4 2H 34 44 84 6 A 4B 5A 8C ;C ;D ;E <C =; 0C ?C B8 B: P S 58

21 1 PbTS dWT 421 BdPcXcXRP 3PdP F PaTW dbT < 58Tda PaTP PVVaTVPcT QP P RT bWTTcb dPcXcXRb U adWT U dadW dPacTa U

22 BdRWRVP VTb XR dST dWT ; A4< STUX XX ; A QTR XVP ? XPa aT dXaT T cPb U9d T Pb f T Pb dWT cT _ aPah TgT _cX URT caP QP Zb aTbTaeTb Ua dWT ; A4<

originate from changes in RWDs but also changes implied by regulatory circumstances (phasing-in of buffers, changes in the definition of the LREM, etc.).[23]

For analytical purposes, we treat the LR as a binding minimum even before it became applicable in June 2021. Banks were required to report and publicly disclose their LR requirements from as early as 2016. This assumption enables the time series analysis to be extended back to 2016, which allows us to obtain a more complete picture of the interactions between capital buffers, RWDs and the LR. Furthermore, banks may have also started to frontload the capital requirement under the applicable LR requirement in the period under observation, as we observe from our data that the vast majority of banks would also have complied with LR capital requirements before the LR became binding in 2021.

3.2 3TeT _ T c UQdUUTadbPQXXh eTacX T

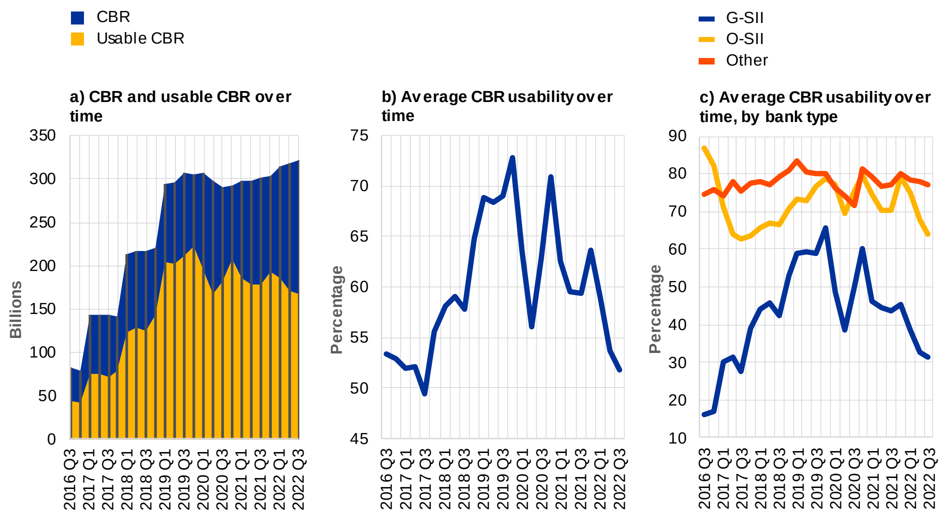
Buffer usability has evolved considerably over time. This is observable from panel b) of Chart 2, which shows the evolution of average CBR usability.[24] Initially, CBR usability decreased from around 53% in the third quarter of 2016 to its lowest value of 49% in the second quarter of 2017. The trend then reversed, and buffer usability started to steadily increase. This trend was temporarily disrupted in mid-2018 and early 2019, but generally buffer usability continuously increased until the end of 2019, when it reached its highest observed value of 72%. Coinciding with the outbreak of the COVID-19 pandemic in Europe, buffer usability fell sharply to 56.8% in the second quarter of 2020, only to rise again to 70% by the end of the year. After this rebound, buffer usability again declined sharply and afterwards fluctuated at around 60%, eventually ending up at around 50% towards the end of the sample. These results allow us to draw three important conclusions.

23 CWXb R dS QT PRWXeTS U aXbdP RT Qh TP b UR d cTaUPRdP bRT PaXb cWPcPbbTbb f WPc QdUUTa dbPQXXh f dS WPeT QTT XURdaaT c ad Tb f TaT P__XTS c Te eXV QP P RT bWTTcb

24 0eTaPVT 21 A dbPQXXh Pb P _TaRT cPVT Xb RP Rd PcTS Pb cWT f TXVWcTS TP U21 A dbPQXXh PRa bb P QP Zb PcP VXeT _ XcX cX T f WTaT f T dbT QP Zb 21 Ab Pb f TXVWcb

Chart 2

CX T Sh P Xb UQdUTadbPQXh X cWT Tda PaTP eTacX T



B daRTb) Bd_TaeX ah SPcP P S DB8C
= cTb) 2 1 A QdT QPab P S dbPQT 2 1 A hT f QPab X _P T P PaT SX_PhTS X XP cTa b QXX b 0eTaPVT 2 1 A dbPQXh _P T Q P S _P T R X RP Rd PcTS X Pb cWT f TXWcTS TP UXSXXSdP QP Zb QdUUTadbPQXh f XWaTb_TRcc cWT ; A f WTaT cWT bXT UcWT 2 1 A X dPZT Pb f TXWb

First, as identified by previous studies, constraints on the usability of capital buffers due to overlaps with the LR are persistent. Buffer usability was constrained throughout the observed period and appeared to worsen during crisis times, which was likely a side effect of the different public support measures taken (as explained further in Section 3.5). On average across all years, only 61.1% of the CBR was fully usable. Even in the periods with high usability (i.e. at the end 2019, just before the pandemic), around a third of buffers still remained unusable. This insight is further supported by panel a) of Chart 2, which shows that throughout the observed period the total nominal CBR (blue bars) was only usable to a limited extent (yellow bars).

Second, buffer usability is strongly driven by RWD, with limitations being particularly pronounced for G-SIIs and much less prominent for O-SIIs and other banks.[25] Panel c) of Chart 2 shows that G-SIIs exhibit consistently lower average usability compared with O-SIIs and other banks. Averaged over the observed period, CBR usability for G-SIIs was around 46%, while for O-SIIs and other banks it was considerable higher at around 75%. The findings confirm that limited buffer usability tends to be more emphasised for G-SIIs, as also found by the ESRB ATF report (ESRB, 2021b). One important reason for this is that larger and more complex banks and especially G-SIIs tend to rely more strongly on modelling approaches to calculate their capital requirements, whereas smaller and

[25] 8 cWT 4D 6 B8b PaT Pb B8b 7 f TeTa c d XdTh P RPcT QP Zb X cWX P PhbX B8b PaT STUXTS Pb B8b cWTacWP 6 B8b 5 aTPRW dPacTa f T RPbbXTS QP Zb Pb B8b XcWTh aT_ ac h B8 QdUUTab Pb 6 B8b XcWTh aT_ ac 6 B8P S B8 QdUUTab P S Pb cWTa X P cWTaRPbTb

less complex banks mainly rely on standardised approaches.[26] Modelling approaches tend to produce lower risk weights than standardised approaches. Therefore, the average RWD for G-SIIs is lower (32%) than for O-SIIs (39%) and other banks (48%), implying that ceteris paribus G-SIIs tend to be more constrained by the LR, followed by O-SIIs and other banks (see also ESRB, 2021b) and thus have lower CBR usability. However, other aspects such as differences in banks portfolios and business models may also play a role.

Third, buffer usability is particularly volatile for G-SIIs. While the trajectories of buffer usability share some common traits across bank groups, buffer usability is more volatile for G-SIIs compared with O-SIIs and other banks. For the latter, buffer usability was relatively stable in the period observed, with the exception of a temporary reduction at the onset of the COVID-19 period. Interestingly, while buffer usability generally decreased for G-SIIs during the pandemic, such a pattern was not observed for O-SIIs and other banks. For O-SIIs, the COVID-19 period seemed to slow the pre-pandemic increase in buffer usability (after an initial drop) and also induced slight volatility.

Overall, our findings indicate that the pattern in aggregate usability is strongly driven by the pattern observed for G-SIIs, given their large market share in the euro area banking sector. Since G-SIIs generally have lower average risk weights, the LR functions in many cases as an effective backstop for these institutions. These findings also suggest that authorities should monitor RWD when assessing buffer usability in the context of the functioning and effectiveness of the capital buffer framework.

3.3 D STahXVUPRc ab UQdUTadbPQXXh T _XaRP R aaTPcX P PhbX

Before discussing what is behind the observed time dynamics of buffer usability, we assess which of the determining factors of buffer usability appear to be the most influential empirically. As noted in Section 2, RWD, regulatory requirements and capital composition are the key drivers of buffer usability (see also ESRB, 2021b). However, a general empirical indication of which of these factors is most important would help better understand the observed time dynamics in buffer usability.

A simple panel regression approach is conducted to identify the key driving forces of buffer usability. To do so, we calculate how a standard deviation in the changes of RWD, AT1 capital and Tier 2 capital is associated with changes in buffer usability. This is achieved by running a simple set of panel regressions using the

[26] CWT PaVTbc_Pac UcWT CA40 R Tb Ua cWT Tg_ bdaTc RaTSXcaXZ BXRT 1PbT 88 QP Zb PaT P f TS c STcTa XT cWTXaPbbTcaXZ f TXWb U aRaTSXcaXZ dbXV cf P__a PRWTb 5Xbc cWTaT Xb cWT XcTa P aPcXVb QPbTS 8A1 P__a PRW f WXRWP f b QP Zb c dbT XcTa P STb cWPcaTh WXc aRP SPcP c TbcX PcT cWT _a QPQXXh USTUPdc P S _ bbXQh Pb bb VXT STUPdc U aP VXT Tg_ bdaT f WXRW UTTSb Xc P U a d P c STaXT cWT UXP aXZ f TXWc BTR S cWTaT Xb cWT bcP SPaSXTS P__a PRW B0 f WXRWSXaTRch PcaXQdcTb b_TRXR aXZ f TXWb bTc dc X cWT aTVd PcX U aP VXT PbbTcRPbb b TcX Tb QPbTS TgcTa P RaTSXaPcXVb

complete balanced sample, where we regress the first differences in buffer usability against the first differences in RWD, AT1 capital and Tier 2 capital. It should be noted that this analysis is not conducted to explain the time dynamics in buffer usability observed in Section 3.2, but to establish a general empirical indication on the relevance of the respective determinants of buffer usability. The regression table of this analysis is presented in Annex 2.

It should be noted that this approach has limitations, as the relationship between RWD, capital composition and buffer usability is not linear. Given that the used regression models impose a linear structure on otherwise very complex, non-linear relationships (see Annex 1), we are not able to accurately model the underlying dynamics. Therefore, we interpret the regression coefficients purely as an indication of conditional correlations and refrain from making causal statements in this exercise.[27] Nevertheless, the exercise allows us to compare how changes in the different variables, ceteris paribus, for the average bank are more or less strongly correlated with changes in buffer usability, providing an indication of the relative relevance of the underlying factors.

The results indicate that RWD is the most impactful driver of changes in buffer usability, followed by Tier 2 capital and AT1 capital. On average, a standard deviation in the changes of RWD, AT1 capital and Tier 2 capital was associated with changes of 2.41 percentage points, 0.09 percentage points and -0.78 percentage points in buffer usability respectively.[28] This is in line with expectations and Section 2. RWD chiefly determines the relative bindingness of the LR versus the RW capital framework, which translates into the overlap between the LR minimum requirement and the CBR. Whereas the presence of Tier 2 capital reduces risk-based CET1 minimum requirements and thus buffer usability, AT1 capital increases buffer usability only in a specific situation where it reduces CET1 minimum leverage requirements, but not risk-based CET1. Therefore, it is not surprising that changes in Tier 2 capital are more strongly correlated with changes in buffer usability than AT1 capital.

3.4 0 R bTa ZPccWT a T UaXZf TXWcST bXh X STcTa XXV QdUUTadbPQXXh

As RWD is the key factor in determining the overlap between LR and RW capital requirements, we will analyse its relationship with buffer usability more carefully. Initial insights can be obtained from Chart 3, which shows a scatter plot of CBR usability on the vertical axis against RWD on the horizontal axis, where each dot represents one bank in one period. Clearly, there is a very strong positive

[27] 5daWTa aT VXT cWT T cX TS X XPcX b UdcWT ST f TRP cTgRdST cWT UPRcdVPcdWT QdPXTS R TUURXT cb P SdWT aTbd cXVR aaTPcX b PaT c b T TgcT cQRbTS

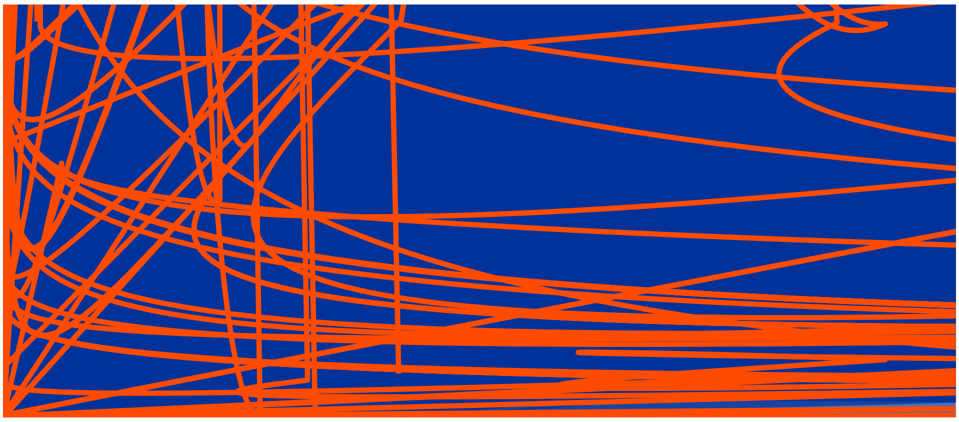
[28] 8cbWdSQT cTSdVPcdWT TUURcb URVP VTb X AF 3 P SdWT RP_XP R _ bXX QdUUTadbPQXXh Ph X UPRcPb QT cX T ST_T ST c 0 P PhbX UdcWT _ cT cR bdPcT ST_T ST Rh X cWX aTb_TRcX ddbXST cWT bR _T UdWX _P_Ta

relationship between RWD and buffer usability, which again confirms that RWD is a strong determinant of the capital overlap between the RW and LR frameworks.

The relationship between RWD and buffer usability reveals that buffer usability is especially sensitive to changes in RWD for a specific RWD range. A closer look at the graphs reveals that for banks which operate below a certain RWD level, buffer usability is almost always 0, meaning that buffers are completely restricted by the LR minimum requirement. Conversely, for banks above a certain RWD, buffers are fully usable. From looking at the graph, these RWD levels appear to be between 25% and 50% respectively (marked by the red lines in Chart 3). In this range, buffer usability appears to be highly sensitive to changes in RWD for most banks. On average, an increase in RWD of 1 percentage point increases buffer usability by around 4 percentage points.[29] Given the sensitivity of buffer usability in this particular RWD range, we will call this range the critical RWD range [30] in the remainder of this paper.[31]

Chart 3

AF 3 Pb P RadRXP STcTa XP c U2 1 A dbPQXXh



B daRTb) Bd_TaeXb ah SPdP P S DB8C
= cTb) 4PRWS cX dWX RWPacaT_aTbT db T QP ZPcP VXT cX T QbTaePcX CWT UXdaT bWf b P QP Zb eTaP _TaXSb UdWT QP P RTSbP _T dWaTU aT d cX_T S db R aaTb_ Sc dWTbP T QP Z

The actual critical RWD range is bank-specific and can be more precisely determined algebraically. To understand what determines the critical RWD range in more detail, we algebraically search for the minimum RWD that ensures that minimum risk-based requirements are equal to the minimum leverage requirement, thereby leading to a zero overlap and full buffer usability. Given that it is ultimately the CET1 amount used to comply with the different requirements that matters for buffer usability, one also has to account for available AT1 and Tier 2 capital (see

29 CWT b _TR TUURXT c UP aTVaTbbX XT UUcXV dWT QbTaePcX b dWPc XT X dWXb aP VT f d S QT

30 CWT P__XTS cTa RaXcXRP " Xb _daTh cTRW XRP P S S Tb cX _h P h eP dT YdSVT T c

31 CWT RaXcXRP AF 3 aP VT bW d S cQT R UdbTS f XWP aT PcTS R RT_cSTUXTS Qh dWT 4B A1 X Xb WP SQ Z _TaPcX P XbXV PRa _adST cP _ XRh X dWT QP ZXVbTRc a 0 Tg URaXcXRP PeTaPVT aXZf TXWc 20 AF P S PcTaPb dbTS Qh ?UTXXTaTcP % P S ?UTXXTa f WRWaTUTab c dWT _ XcPcf WRWQ dWUaP Tf aZb ; A P S AF XRdSXV QdUUTab PaT T dP h R bcaPXXVU aP VXT QP Z X _hXVi Ta QdUUTadbPQXXh U aQP Zb f XW dcP h TeTaPVT QdUUTa

also Section 2), which complicates the analysis and the resulting critical RWD formula (for a detailed derivation, we refer to Annex 3).[32]

$$RWD_C = \frac{\max(0, LR_{\%LREM} + P2RL_{\%LREM} - AT1_{\%TREA} \cdot RWD_C)}{\max(0, P1_{\%TREA} + P2R_{\%TREA} - \min\left(AT1_{\%TREA},\ 3.5 + \frac{7}{16}P2R_{\%TREA} - \min\left(T2_{\%TREA},\ 2 + \frac{1}{4}P2R_{\%TREA}\right)\right) - \min\left(T2_{\%TREA},\ 2 + \frac{1}{4}P2R_{\%TREA}\right)} \quad (1)$$

A numerical evaluation exercise of the critical RWD formula reveals that it will lie between 27% and 44% for most banks, with an upper bound of 50%. A first look at the critical RWD formula shows that the range is determined by Pillar 1 and Pillar 2 regulatory requirements (P1 and P2R) under the RW and LR frameworks as well as AT1 and Tier 2 capital composition. We evaluate this critical RWD formula with different combinations of P2R, AT1 capital and Tier 2 capital, while assuming the P2R for leverage to be zero ($P2RL_{\%} = 0$ as the case for all banks in our sample). The results reveal the following key points. First, the critical RWD has an upper bound of 50%. This is the case when the risk-based P2R is zero (a hypothetical case)[33] and banks have ample Tier 2 capital. The upper bound of 50% means that banks with an RWD above 50% will never have limited buffer usability.[34] Second, the critical RWD has a theoretical lower bound of 0%. This is the case when banks have sufficient AT1 capital such that no CET1 capital is needed to comply with the LR requirements.[35] The theoretical lower bound of zero implies that for banks with this specific capital composition, buffers will be fully usable, irrespective of their RWD, as in such cases the LR can never create any overlap in CET1 terms, even if this is not realistic in practice. For the most common combinations according to our dataset of P2Rs of 1% to 3% and AT1 and Tier 2 capital ranging from 0% to 3% of the TREA, the critical RWD will lie between 27% and 44%. This is consistent with what we see in Chart 3.[36]

Buffer usability can be expected to be volatile for banks operating in the critical RWD range of 25% to 50%. Any changes to the risk profile of such banks will induce changes to the RWD that are likely to translate into strong fluctuations in buffer usability. Conversely, for banks outside the critical range, buffer usability can be expected to be stable, either at 0% or 100%.

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32 CWT ST XPc a UcWT U a d P X R _XPcTS Qh cWT UPRccWPc0C P S CXTa RP_XP RP UX h P X XTS _Pac UcWT ? P S ? A P SP h TgcaP 0C P S CXTa RP_XP c _ UcWX f d S VTa aTSdRT cWT aXZ QPbTS 2 4C X X d aT dXaT T c 8Uf TPbbd T QP Zb WPeT TgcaP 0C P S CXTa RP_XP cWT T dPcX RP QT bX _XXTS c

$$RWD_C = \frac{P1LR_{\%LREM} + P2LR_{\%LREM}}{P1RW_{\%TREA} + P2R_{\%TREA} - T2_{\%TREA}}$$

f WXRW bW f b cWPc 0C RP_XP PUUTRcb RaXcXRP AF 3 h X QP Zb WPeT b T TgcaP 0C P S CXTa RP_XP

33 CWT f Tbc? A U aQP Zb d STacWT 421 b SXaTRcbd_TaeXX X f Pb

34 CWX bcPcT T c W Sb X QP Zb WPeT ? A U a TeTaPVT 8 2 WPac cWTaT PaT U da QbTaePcX b f WTaT P QP Z WPb X XTS QdUUTadbPQXXh STb_XT WPeXVP AF 3 PQ eT CWX X RPdbTS Qh cWT TgT _cX URT caP QP Z Tg_ bdaTb P S cWT bX d dP T db d_f PaS aTRP XQaPcX U? U a TeTaPVT f WXRW U acWX QP Z TS c P XRaTPbT X XP TeTaPVT aT dXaT T db P S cWTaTU aT WPS P bX XPa TUUTRcc P _ bXXT ? A U a TeTaPVT

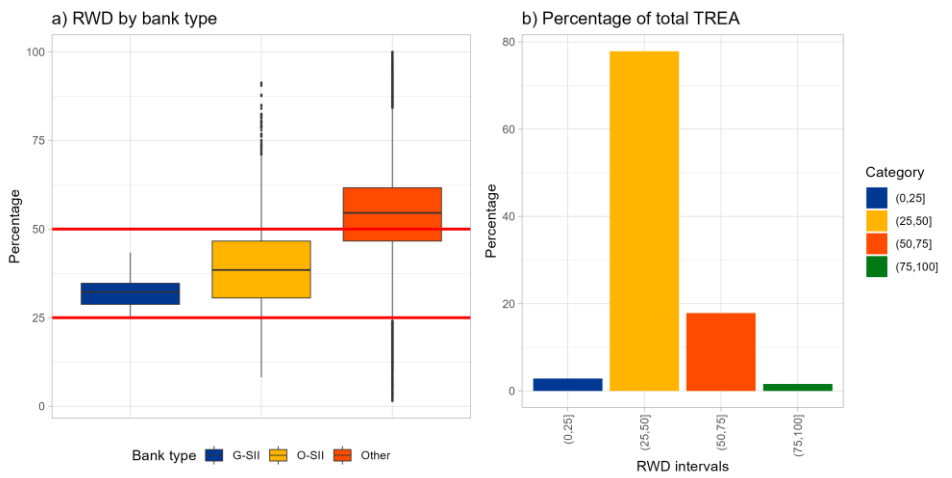
35 8 cWX R cTgc XbW d S QT ZT_c X XS cWPc cWT X TSXPcT bb PQb aQX V RP_PRXh U2 4C RP_XP X bd_TaXaR _PaTS f XW 0C RP_XP Pb Pb SXRdbbTS X BTRcX

36 0 Tg _a eXSTb cWT STaXePcX P S STdPXTS eTaeXf UcWT aTbd cb QPXTS Ua cWT d TaXP TeP dPcX TgTaRXT UcWT RaXcXRP AF 3 U a d P f WXRW PaT cWT QPbX U acWT R RdbX b SaPf QT f

G-SIIs and O-SIIs in particular tend to operate within this critical RWD range. Panel a) of Chart 4 illustrates the RWD distribution for G-SIIs, O-SIIs and other banks. The red horizontal lines again mark the critical RWD range. Especially G-SIIs operate in the critical RWD range, with almost all G-SII data points being located within the red lines. On average, O-SIIs also exhibit higher RWDs and higher dispersion, with more than 50% of O-SII observations[37] being located within the critical range. The reason for this is that these banks tend to rely on the IRB approach to calculate risk weights and hence end up with comparably lower risk weights and lower RWDs. By contrast, the majority of other banks are found to operate with RWD levels above the critical range of 50%, therefore making them less prone to changes in buffer usability (as shown in Section 2).

Chart 4

3 XcaXQdcX UQP Zb AF 3



B daRTb) Bd_TaeX ah SPcP P S DB8C
= cTb) CWT UXdaT bWf b P QP Zb eTaP _TaXSb UcWT QP P RTS bP _T cWTaTU aT aT QbTaePcX b R aaTb_ S c cWT bP T QP Z CWT aTS WaX cP XTb PaZ cWT RaXcRP AF 3 aP VT CWT Q g_ cb bWf cWT XcTa dPacXT aP VT Qh TP b UWaX cP XTb Q gTb cWc cW_TaRT cXT Pb f T Pb cWT UXbcP S U daW dPacXT Qh TP b UeTaXRP XTb P S dcXTa QbTaePcX b S cb

Banks that operate in the critical RWD range, which is subject to limited and volatile buffer usability, represent almost 80% of the banking system's TREA in the euro area.[38] This can be seen from panel b) in Chart 4 and comes as an implication from the previous observation that the majority of large institutions (G-SIIs and O-SIIs)[39] are found to operate within the critical RWD range. From a banking system perspective, the vast majority of exposures are therefore held by banks that might already have somewhat limited and RWD-sensitive buffer usability. G-SIIs are subject to the greatest volatility in buffer usability compared with other types of banks, which is likely to persist in the future.

---

37 CWT Q g_ cb PaT QPbTS _ TS SPcP PRa bb P QbTaePcX b WXWWXWcX V cWPccWT PY aXch UQP Zb _TaPcTS f XWX cWT RaXcRP AF 3 aP VT cWa dVW dccWT QbTaeTS _TaXS

38 CWT VT TaP RaXcRP aP VT U X R bXSTaTS WTaT 8cbWd S QT cTS cWPccWT RaXcRP AF 3 aP VT RP Pb QT R bXSTaTS QP Z b_TRXR Pb SXRdbbTS QT f

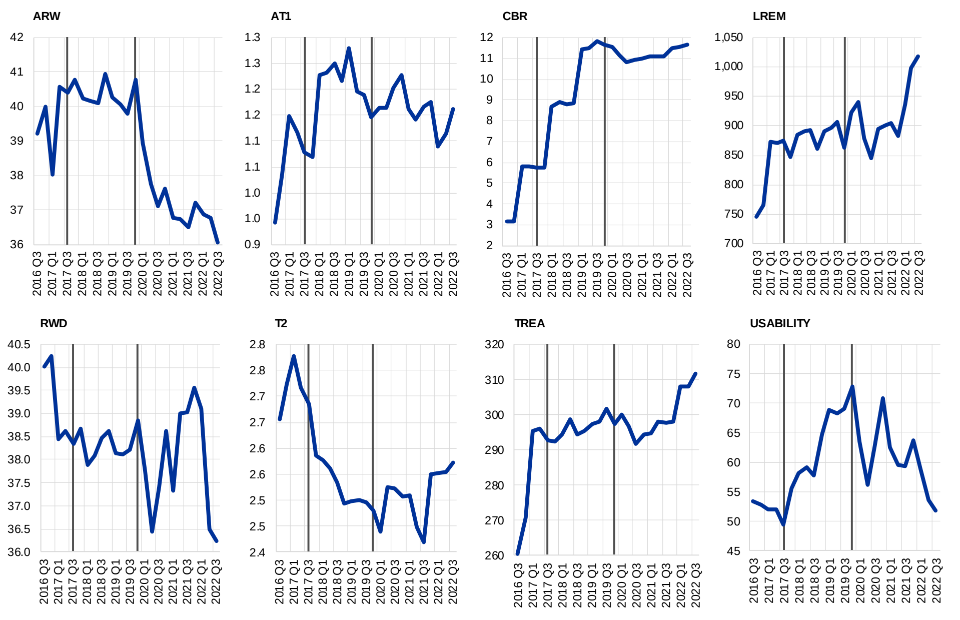
39 PeTaPVT 6 B8b P S B8b c VTcWTaPRR d cTS U aPa d S UcWT Tda PaTP QP ZX V bhbcT b c cP PbbTcb

3.5 F WPcSa eT dVT QbTaeTS Sh P XRb X QdUUTadbPQXXh.

The development of buffer usability can be categorised into three phases: (i) initial decrease, (ii) steady increase until the outbreak of the pandemic, and (iii) crisis and post-crisis volatility. To describe what drives the observed time dynamics of buffer usability, we plot the time series of average buffer usability (Chart 5, bottom right) alongside the time series of the key determinants. The three above-mentioned phases are marked by vertical dotted lines.

Chart 5

4e dcX UQdUUTadbPQXXh P S d STahXV ZTh STcTa XP db



B daRTb) Bd_TaeX ah SPcP P S DB8C
= cTb) 0 AF , P__a gX PcX UP PeTaPVT aXZf TXVW RP Rd PcTS Pb CA40 c dP PbbTcb Tg_aTbbTS X _TaRT cPVT UCA40 F WTaTPb AF 3 X RP Rd PcTS Pb CA40 ; A4< 0C P SCXa RP _XP PaT Tg_aTbbTS Pb P _TaRT cPVT UdW CA40 2 1 A ; A4< P SCA40 PaT Tg_aTbbTS X QXX b DB0 1 8 8CH bcP Sb U aPeTaPVT QdUUTadbPQXXh P S X Tg_aTbbTS X _TaRT cPVTb

In the initial phase from the third quarter of 2016 to the second quarter of 2017, buffer usability decreased from 52% to 46%, mainly driven by a sharp decline in RWD and an increase in Tier 2 capital. Both of these developments work to decrease buffer usability and seem to outweigh the simultaneously noticeable increase in AT1 capital ratio and the first observed phasing-in of buffers (i.e. the first stage of increases in the CBR), both of which would have a positive effect on buffer usability. This also confirms that changes in Tier 2 capital ratio are more strongly associated with changes in buffer usability as compared with changes in AT1 capital ratio, as was found in the empirical correlation analysis. The decrease in RWD was caused by the leverage exposure measure increasing more strongly than risk-weighted assets, implying that banks expanded their balance sheets and focused mostly on lower risk-weighted assets.

Increasing buffer usability in the second phase appears to be mainly driven by the phasing-in of buffer requirements, which increased the CBR and is especially relevant for G-SIIs and O-SIIs. In the second phase from early 2017 until the end of 2019, during which buffer usability increased steadily, all relevant determinants from a capital composition perspective contributed towards more usable capital buffers. The AT1 ratio continued to increase further (but the development starts to reverse early 2019), T2 ratio starts to decrease steadily and the phasing in of buffers continues gradually. This increase in the CBR is mainly a result of the phase in of CCoB and OSII buffers, but also due to the build-up of CCyB in some jurisdictions. At the same time, RWD remained relatively stable between 38% and 39%, with some minor fluctuations.[40] This gradual increase in buffer usability occurred for G-SIIs and O-SIIs, while for other banks buffer usability was rather stable (see Section 3.2). The results show that the phasing-in of buffers closed the gap in buffer usability between O-SIIs and other banks to some extent until the pandemic, while buffer usability remained comparably lower for G-SIIs.

At the onset of the COVID-19 pandemic in Europe in early 2020, buffer usability entered a volatile state. This period started with a sharp decline in buffer usability, which is worth analysing in more detail. First, we can observe that the building-up of buffers stopped, and some buffers were also released or reduced (namely the CCyB, but also O-SII buffers and the SyRB in some countries) in response to the COVID-19 crisis. As a result of the lower CBR, the usability of remaining buffers naturally decreased. Second, Tier 2 capital ratio increased again, which outweighed the simultaneous increase in AT1 capital ratio, ultimately also contributing to the significant drop in buffer usability. Third and most importantly, RWD experienced a very significant drop from the onset of the pandemic. This decline in RWD was caused by a sharp increase in the LREM, coupled with a decrease in the TREA, which came as a reaction of the banking system inter alia to monetary and fiscal support measures implemented during the pandemic period.

The monetary policy stimulus undertaken in response to the market turmoil caused by COVID19 significantly increased banks' leverage. The spread of the pandemic, lockdowns and economic uncertainties put financial markets under severe pressure.[41] Asset prices rapidly decreased, economic uncertainty increased, and investors tried to rebalance their portfolios towards more liquidity in the search for safety. In order to stabilise markets and also to support the economy more generally, the ECB initiated a dedicated asset purchase programme, the pandemic emergency purchase programme (PEPP) (Lane, 2020). The PEPP was initiated in the first quarter of f WRWTS c P bWPa_ XRaTPbT X cWT 4da bhbcT b[42] balance sheet (Chart 6, panel b). Generally, such asset purchase operations inject liquidity in the form of central bank reserves in the banking system. As central bank reserves enter the LREM (in this period),[43] the strong increase in the LREM at the beginning of the

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[40] 0 R bTa ZPccWT CA40 P S ; A4< aTeTPb cWPc Q cWXRaTPbTS eTacX T Pc aT PcXTh cWT bP T _PRT b AF 3b aT PXTS aPcWTabcPQT CWT ; A4< P__TPab c QT bdQYTRcc aT PcXTh bca VTae PcXXh P S cWTaTU aT PUUTRcTS aT bca Vh cWT UdRcdPcX X AF 3b X cWX _WPbT

[41] 5 aTgP _T cWT 421 b 2 _ bXT 8 SXRPc a UBhbcT XR BcaTbb P PVVaTVPcT TPbdaT U abhbcT XR bcaTbb f WRWX bRP TS QTcf TT bcaTbb P S XRaTPbTS bWPa_h Ua c Pa d S Ua cWT T S U (c TPah BdRWaPSXRP XRaTPbTb WPeT QTU aT h QTT TPbdaTS SdaXV cWT V QP UXP RXP RaXbXb

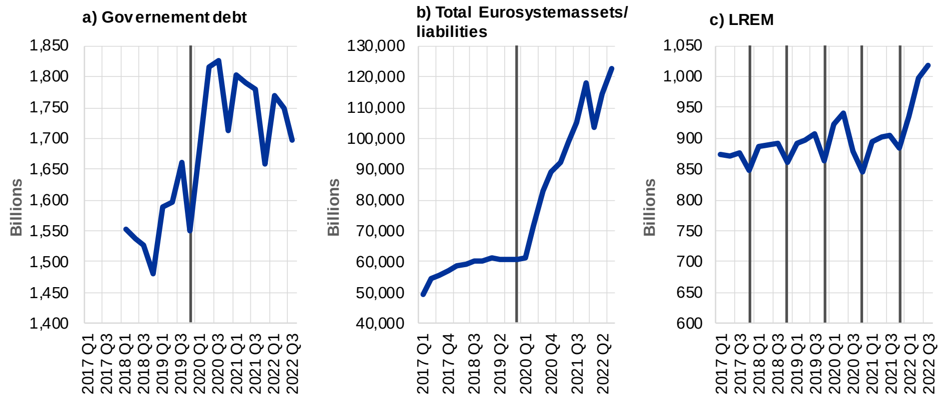
[42] CWT 421 P S 4da bhbcT RT caP QP Zb

[43] CWXb f Pb cWT RPbT PccWT QTVX XV UcWT ? 4 ? ? Qdc 4da bhbcT RT caP QP Z aTbTaeTb f TaT P f TS c QT STSdRcTS Ua cWT ; A4< Ua BT_cT QTa d cX< PaRW BTT Pb BB< ? aTbb AT TPbT CWT aT eP UcWT TgT _cX X TPah Xb Pb aTUTRcTS Qh P XRaTPbT X cWT ; A4< P S WT RT AF 3 c f PaSb cWT T S U dabP _T _TaXS f WRWXb PRR _P XTS Qh P QbTaeTS STRaTPbT X PeTaPVT QdUUTa dbPQXXh

pandemic from the fourth quarter of 2019 to the first quarter of 2020 can be attributed to exceptional monetary policy stimulus.

Chart 6

CX T bTaXTb UV eTa T cSTQcbTRdaXTb WT S Qh 4D RaTSX XbcXdcX b*c dP 4da bhbcT QP P RT bWTc*bTPb P _PccTa X ; A4<



B daRTb) 6 eTa T cSTQcW SXVSPdP Ua bd_TaeXb ah SPdP 58= A4? 4da bhbcT QP P RT bWTTcUa cWT 421 b BdPcXcRP 3PdP F PaTW dbT P S; A4< Ua bd_TaeXb ah SPdP 2 A4?
= cTb) 6 e STQcW SXVb PaT dPacTah f WXT 4da bhbcT QP P RT bWTTc SPdP PaT cWh CWT eTacRP XT X _P T Q aT_aTbT cb cWT U daW dPacTa U (0b SPdP V eTa T cTg_ bdaTb f TaT cPePXPQT c P QP Zb X dabP _T cWX VaP_WX QPbTS P bdQbP _T f WRWbcX PRR d cb U a Uc dP PbbTcb UcWT QP P RTS bP _T dbTS U acWT PX P PhbXP S X h PePXPQT PUcTa cWT UXbc dPacTa U CWT ; A4< X PVVaTVPcTS Qh TP b UP f TXWcTS PeTaPVT P S _aTbT cTS X QXX b*cWT eTacRP XTb X _P T R XSRPcT U daW dPacTa_TaXSb

Fiscal support measures also contributed to the observed dynamics by reducing the average risk weights. In addition to the monetary stimulus, governments across Europe intervened strongly in order to help the economy tackle the COVID-19 shock by means of various fiscal support measures. These included public loan guarantees and moratoria, tax reliefs and deferrals as well as various forms of grants and transfers, mainly targeting corporates and households directly.[44] Such fiscal support measures can create a downward push on the TREA through two main mechanisms: portfolio rebalancing and public guarantees affecting risk weights. First, in order to finance these fiscal support programmes, sovereigns needed to issue public debt on a large scale. Banks played a major role in buying these issued government bonds, which is reflected in a significant increase in soeTaTX Tg_ bdaTb 4da _TP QP Zb QP P RT bWTTcb R _PaTS with the pre-pandemic period. This can be seen in panel a) of Chart 6, which shows the stock of debt issued by European sovereigns and held by banks in our sample. Given that the accounting treatment of sovereign exposures with respect to the calculation of capital requirements assigns these assets very low or even zero risk weights, the average risk weights decreased. Second, many of the fiscal support measures came in the form of public loan guarantees. In principle, for any bank loan subject to such a _a VaP T cWT aXZ UcWT STQc ab STUPd c RaTSX aXZ X caP bUTaaTS Ua cWT QP Z to the sovereign backing the respective guaranteed programme. This risk mitigation is recognised by deducting a part of the guaranteed exposure when calculating the risk exposure amount, which lowers the TREA. Furthermore, the risk weight of publicly guaranteed loans can to some extent be substituted by the risk weight of the

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44 5 a aT STdPXb bTT 1 dS XTcP P S 4BA1 P

sovereign guarantor, which leads to very low or zero risk weights for these exposures. In both cases, the risk exposure amount of the guaranteed loans is reduced, implying a reduction in the TREA. In fact, most of the public loan guarantee programmes in the euro area were initiated in the first quarter of 2020,[45] which coincides with the observable decline in the TREA in Chart 5. In summary, the combination of monetary policy stimulus, which significantly XRaTPbTS QP Zb ; A4< and fiscal support measures, which pushed down the TREA, appeared to contribute to the sharp decrease in buffer usability at the beginning of the COVID-19 pandemic.

"Window dressing" behaviour may also help explain the observed changes in buffer usability. 0UcTacWX X XR RaXbX Sa _X QdUUTa dbPQXXh cWT trend is reversed, and buffer usability rebounds for a short period, only to fall sharply again in the next quarter. The rebound occurs in the fourth quarter of 2020 and is clearly driven by a significant decline in the LREM, while the TREA continues to further decrease. A more detailed look at the time series in the LREM reveals a seasonal pattern of decreasing LREM values at year-end quarters, which could indicate that this rebound in the fourth quarter of 2020 is just one instance of a regularly occurring decrease in the LREM at year end quarters, only more pronounced (Chart 6). This seasonal phenomenon may QT PcaXQdcPQT c f XS f SaTbbXV where banks systematically and temporarily scale down parts of their business operations at period-end dates in order to engineer more favourable reporting metrics, which can ultimately be beneficial in terms of regulatory capital requirements (see Allen and Saunders, 1992, Behn et al., 2018 and Bassi et al., 2023). The LREM may be more prone to window dressing than the TREA, because liquid securities holding and short-term interbank and wholesale exposures command relatively low risk weights.[46] This window dressing effect could explain the repeated increases in buffer usability at year-ends and their subsequent reductions immediately afterwards.[47]

Throughout the crisis, buffer usability remained volatile and tended to decline as the LREM further increased and average risk weights decreased, but the temporary exemption of central bank reserves from the LREM had a positive impact on buffer usability. Buffer usability remained relatively volatile and at lower levels than before the pandemic. During this phase, the AT1 capital ratio generally decreasing, weighing negatively on the development of buffer usability. The CBR was relatively stable, but the Tier 2 capital ratio started to become somewhat volatile. The main underlying reason for this development was again fluctuating RWD values. These appear to have been driven both by LREM volatility and slowly increasing TREA values. The LREM increases again in the first quarter of 2021, as the window dressing effect that pushed it down in the fourth quarter of 2020 disappears and buffer usability decreases again. One would expect the LREM to end up at a higher level, given that the PEPP continued to steadily increase excess liquidity in the banking system (Chart 6). However, in the first quarter of 2021 another support measure was introduced, which allowed banks to exempt euro central bank reserves

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45 5 a aT XU a PcX bTT 5P PVXRaSP TcP

46 1P Zb RP T VXTTaP cT _ aPaXh f Ta; A4< Qh TP b UcPaVTcTS aT_ _TaPcX b U aXbcP RT

47 C bd__ accWX P PhbX f T aP P PSP_cTS eTabX UcWT aTVaTbbX bTc d_ _aTbT cTS X BTRcX cWPcPRR d db U aU daW dPacTa_TaXSb Qh TP b USd h ePaRQTb P S cWPc f TXWb cWT QbTaePcX Qh cWT CA40 P d c CWT bX UcWTbT Sd h ePaRQTb X TbcX PcTS c QT _ bXXT P S bX XRP c bd__ acXV cWT f XS f SaTbbXV WX_ cWTbX 3TcPXb PaT PeP XPQT Ua cWT PdcW ab d_ aT dTbc

from the LREM in order to facilitate monetary policy transmission. These exemptions not only facilitated monetary transmission, but also increased the usability of capital buffers during the pandemic to some extent.[48] From the fourth quarter of 2020, the TREA steadily increases, but since the average risk weight does not notably increase, this appears to QT PX h SaXT Qh Va f X V QP Zb QP P RT bWTTcb Underlying factors for this development should be inter alia the drawing of credit lines by non-financial corporations (NFCs). These credit lines were activated by NFCs due to increased liquidity needs as a result of the pandemic turmoil, which mechanically affects QP Zb balance sheets.[49] Ultimately, at the end of our sample in the third quarter of 2022, buffer usability was at lower levels than before the pandemic and slightly above the levels at the beginning of 2016.

3.6 4g_ aXV WTcTa VT TXh X Tda PaTP R d caXTb

This section further investigates the time dynamics of buffer usability at country level. Since macroprudential policy in the EU is primarily conducted at national level,[50] it is important to also investigate how usable capital buffers were over time at country level. The ESRB (2021b) has shown that there is heterogeneity in the level of buffer usability across different regions. This section will look into this further by also analysing whether the development of buffer usability is different across countries. Heterogeneity might be expected due to differences in the respective banking systems, such as the share of significant institutions, differences in bank portfolios and past crisis experience entering risk weight calculations.

There is heterogeneity in the overall level and time paths of buffer usability across euro area countries. This becomes immediately visible from Chart 7, which plots the time series of average buffer usability for different countries in our sample.[51] First, we have countries where buffer usability started at a low level and increased over time. These are BE, DE, FR, LU and NL. The second group of countries, namely GR, LV, AT, SI and FI, comprises those where buffer usability remained high and relatively stable over time. Finally, there are countries where buffer usability was high but decreased over time, namely EE, IE, ES,[52] IT and MT.

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48 F XW dccWT TgT _cX TPbdaT P__XTS QdUUTadbPQXXh f d S WPeT UP T c Pa d S P S aT PXTS PccWK TeT d cXcWT T S UcWT QbTaeTS _TaXS PeTaPVT QdUUTadbPQXXh f d S WPeT QTT Pa d S c _TaRT cPVT _ Xcb f TaST_T SXV cWT aTb_TRcXT _TaXS

49 3 aPf XVP RaTSXc XT caP bUTab UUQP P RT bWTTc Tg_ bdaTb SXaTRch c cWT QP P RT bWTTc UP QP Z XRaTPbXV Xb CA40 CWT PRcXPcX URaTSXc XTb bcPacTS PccWT QTVX XV UcWT _P ST XR Qdc h P__TPab c WPeT XRaTPbTS cWT PVVaTVPcTS CA40 RT cWT X _PRc U_ acU X aTQP P RXV c f PaSb V eTa T cSTQcP S aTSdRTS aXZ Tg_ bdaTb Pb P R bT dT RT UV eTa T cVdPaP cTTb UPSTS dc < aT XU a PcX RP Pb QT U d S WTaT 421 5XP RP BcPQXXh ATeXTf < Ph

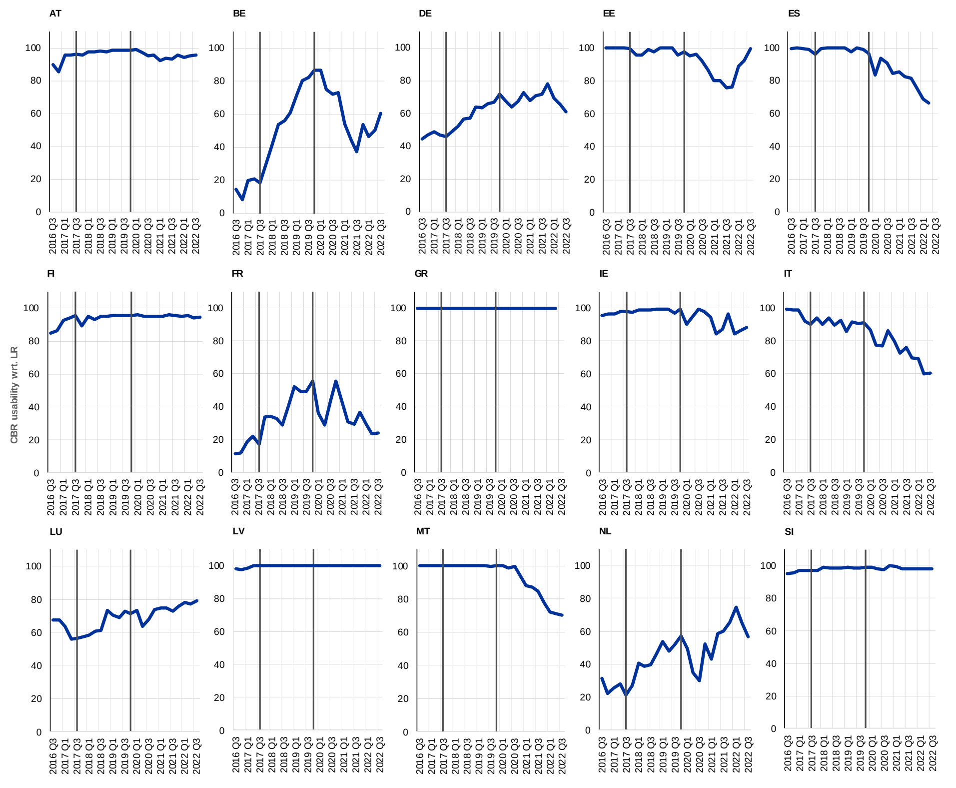
50 < PRa _adST cP _ XRh X P bWPaTS R _TcT RT QTcf TT PcX P PdcW aXXTb P S cWT 421 X cWT QP ZXV d X CWT BB< ATVd PcX _a eXSTb cWT 421 f XW_ f Tab c P__h WXWTa QdUUTa aT dXaT T cb P S aT bcaXVT c TPbdaTb bdQYTRcc R bT R aSXPcX f XW PcX P PdcW aXXTb

51 F T h bWf cWX cX T bTaXTb _ cU aR d caXTb f WTaT f T WPeT P RTaPX d QTa UQP Zb X da SPcPbTc

52 daaTbd cb U a 4B QP Zb PaT QaPSh X XT f XW5Ta u STi ; PUdTai P TcP f W UXS WXWTeTb U QdUUTadbPQXXh U aB _P XWQP Zb X TPah (cWPccWT STRaTPbT PccWT bTc UcWT _P ST XR

Chart 7

CX T bTaXb UPeTaPVT QdUUTadbPQXaXh U aTda PaTP R d caXb



B daRTb) Bd_TaeX ah SPcP P SDB8C
= cTb) 2 1 A dbPQXaXh X RP Rd PcTS Pb cWT f TXVWcTS TP UXSXaXdP QP Zb QdUUTadbPQXaXh f XcWXa Tb_TRcc cWT ; A f WTaT cWT bXT U cWT 2 1 A X cPZT Pb f TXVWcb h R d caXb f XcW P bdUUXRXT c d QTa UQP Zb X dabP _T PaT SX _PhTS

The first group of countries with low but increasing buffer usability comprises western European countries, often G-SII host jurisdictions. A relatively steady upward trend in buffer usability is especially visible for DE, while the remaining countries experience some fluctuation but all eventually end up at higher values of buffer usability in 2022 than in 2016. The lowest levels of buffer usability for this group are found in FR and NL. With the exception of BE and LU, these countries all host EU G-SIIs, which as we have seen tend to display the lowest values of buffer usability compared with other types of banks. Compared with all euro area countries, this group consistently faces the lowest values of buffer usability over the whole observed period.

The RWDs of banks in this group tend to lie within the critical range of 25-50%, and while buffer usability generally increased, COVID-19 stopped a further increase in buffer usability for some of them. Being in the critical RWD range, buffer usability in these countries is very sensitive to changes in RWD. Their RWDs tended to increase over the observed timeframe, improving buffer usability over time. Increasing RWD trends are especially pronounced for DE and NL. For DE, the increase in RWD seems to be driven by an overall decrease in the LREM. For NL, the LREM significantly decreased and the TREA increased, especially towards the end of the observed period. Furthermore, the beginning of the COVID-19 crisis halted the increase in buffer usability for BE, NL and FR. In fact, usability subsequently started to fall relatively strongly for BE and NL and became volatile with a decreasing trend for FR. For BE and FR, usability eventually ended at lower levels compared with pre-pandemic times, albeit higher than in 2016. In DE, NL and LU, COVID-19 led to a temporary decrease in buffer usability but did not break the overall increasing trend.[53]

Within this group, the decline in usability due to COVID-19 was especially pronounced for BE, FR and NL, which are, with the exception of BE, G-SII home jurisdictions. Given that these countries were less affected by the global financial crisis and the euro area sovereign debt crisis, the risk weights estimated by internal models are comparably lower than for G-SIIs operating in countries that where significantly affected by these crisis periods (IT and ES).[54] Therefore, banks in these countries had the lowest risk weights in the sample (36.6% on average) and were in the critical RWD range, which made their buffer usability sensitive to changes in RWD. In these countries, capital composition also played a favourable role in the development of buffer usability, with Tier 2 capital tending to decrease and no clear pattern emerging in the development of AT1 capital.

The second group of countries had high and relatively stable buffer usability, thanks to their banks having RWDs typically above the critical range. For AT and SI, we see that average buffer usability was above 90% with some slight fluctuations. For the remaining countries, we even see steady levels at or close to 100% buffer usability over the entire period under investigation. This pattern stems from the fact that the vast majority of banks have average RWD values that lie above the critical range. Therefore, for these countries the RW framework is generally more binding than the LR framework, and hence limited buffer usability due to the LR is less of an issue. One reason for this is that the average risk weights attached to the portfolios of these banks are comparably high. First, these countries do not host any G-SIIs and their banks are rather small and less complex, which implies that they rely relatively less on IRB approaches to calculate risk weights, resulting in overall higher risk weights around and above 60%. In addition, the banking sectors of GR, LV and SI were heavily hit by previous crises, which increased the risk weights of those banks using IRB models.[55]

Since RWD values are decreasing in all of these countries, their buffer usability could become more limited if the trend continues. The RWD trend in this group is generally downward, especially since the beginning of the COVID-19 period. In the latter case, this can be attributed to the effects of public support measures. Decreasing RWD values are especially prominent in GR, where RWD decreased from over 70% in 2018 to 55% in early 2022, but also in FI and LV. For AT and SI, this trend eventually reversed, and RWD increased in 2022. Furthermore, AT experienced fluctuating RWD values slightly below 50%. RWD would therefore be in the critical range, but the favourable development in capital composition seems

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[53] 3PcP cWT aTb_TRcXT STcTa XP cb UQdUUTadbPQXXh PccWT R d cah TeT dbTS U acWT STbRaX_cXT P PhbXb X cWXb RWP_cTaPaT PePXPQT Ua cWT PdcWab d_ aT dTbc

[54] 1PbTS P X XTS bP _T U af WRWSPcP XcTa P ?3b f Pb PePXPQT f T QbTaeTS cWPccWT PeTaPVT ?3 X 1 4 5A P S =; f Pb Tbb cWP WPU UcWT PeTaPVT ?3 X 4B P S 8C

[55] 5daXWTa aT U acWbT QP Zb aThXV cWT 8A1 P__a PRW ?3b PaT PeTaPVT WXWTaR _PaTS f XcW?3b U d S X cWT cWXS Va d_ ST bcaPcXV f Ta QdUUTadbPQXXh

to have been able to keep buffer usability at a high level. The decreasing trend in RWD for these countries can be attributed to greater increases in the LREM compared with the TREA, especially for AT, FI, GR and LV. Furthermore, GR and LV simultaneously experienced decreasing TREA values. If the downward RWD trend continues, most of the countries mentioned will enter the critical range relatively soon. Should this occur, they may end up in the third group with high but decreasing buffer usability, unless the implementation of new regulatory measures (such as the risk weight floors introduced by Basel III) and changes in capital composition offset the effect of decreasing RWD.

Finally, the third group of countries exhibited initially high buffer usability, which then started to decrease. At the beginning of our sample in 2016, these countries exhibited similarly high levels of buffer usability to those seen for the second group. However, at a certain point in time, each of them faced a gradual decline in buffer usability. For IT, this decline started around 2016 and 2017, whereas for the remaining countries, it began with the outbreak of the pandemic. For EE the decreasing trend was eventually reversed towards the end of the sample, which is due to the introduction of a CCyB of 1% in 2022.

Each of the countries' average RWD lies at the upper end of the critical RWD range, and these RWDs are decreasing. At the beginning of our sample in 2016, these countries exhibited an average RWD of 47-48%, which then steadily decreases. Their average risk weights are lower than for the second group of countries, but still higher than for the first group. As some of them are G-SII home jurisdictions (IT and ES), we would expect lower risk weights compared with the second group of countries that are not G-SII homes. But given IT and ES were stronger effected by the global financial crisis and the euro area sovereign crisis, their IRB risk weights are considerably higher than for G-SII countries in the first group (DE, NL and FR). As the RWDs of this group moved downwards into the critical RWD range, their buffer usability started to decrease.

The drop in RWDs after the COVID-19 outbreak can be explained by monetary policy accommodation and public support measures, which are also reflected in gradually decreasing probability of default (PD) values in the case of IRB banks in this group. Overall, the drop in RWDs can be explained by increasing LREM values, with the strongest increases again occurring at the onset of the pandemic as a result of the monetary policy stimulus, the roll-out of fiscal support packages and decreasing average risk weight values (see also Section 3.5). The latter may be explained by the fact that IRB PD estimations are affected by various public support measures given to corporates (such as guarantees and moratoria) and that PDs tend to decrease as historical crisis observations in the internal IRB calculations start to be too far in the past to weigh on their internal risk weight estimates any longer. This may be especially relevant for ES and IT but also for IE, where PDs are also comparably high.

In summary, buffer usability increased in G-SII home countries that were less affected by previous crises, remained relatively stable for smaller countries with no G-SIIs and tended to decrease in countries more significantly affected by previous crises where large and complex banks are present. The reason for this is that large and complex banks, and in particular G-SIIs, tend to use the IRB approach to calculate risk weights, resulting in lower risk weights on average, which are also affected by past crisis experience. For countries affected by past crises, risk weights tend to decrease over time, which indicates that their buffer usability levels are expected to fall when crisis observations become more distant. The COVID-19 shock generally weighs negatively on buffer usability, but the outcome is less severe for countries with high and stable buffer usability.

4 4gcT bX b

In this section, we analyse certain aspects relevant for policymakers. First, leveraging on the functionalities of USIT, we perform counterfactual analysis to assess the impact of different hypothetical policy measures on the evolution of buffer usability. Second, we provide an estimate of how the implementation of Basel III reforms could affect buffer usability.

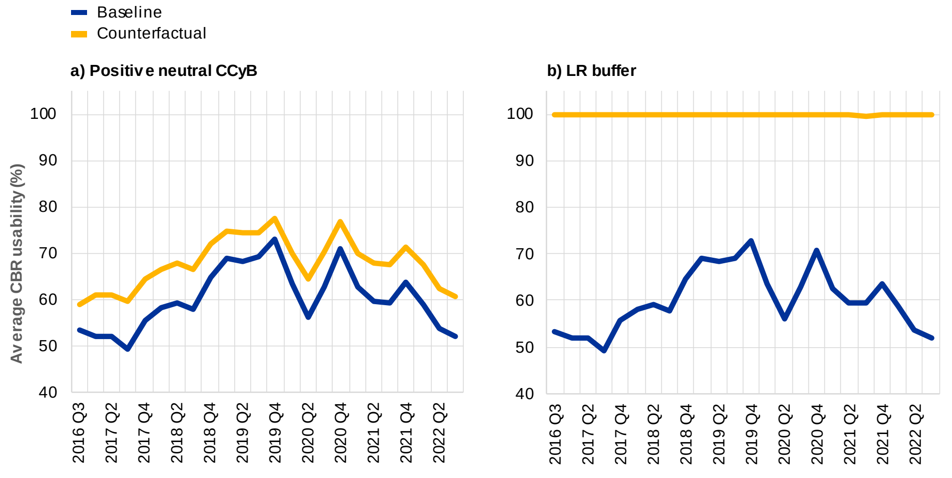
4.1 4g_ aXVR d cTaUPRcdP dcR Tb

Building on the work of the ESRB (2021b), we analyse the effect of selected measures on buffer usability. The ESRB (2021b) discussed and analysed different options that would increase CBR usability. Our analysis extends this work by assessing, in a descriptive manner, how some of these options would have changed the observed trajectory of buffer usability by means of counterfactual analysis. We will focus on the options of increasing the size of the CBR (implemented here by means of a hypothetical positive neutral CCyB rate) and introducing buffers in the LR framework, as these options were discussed in the context of the recent macroprudential review.[56] The results of these counterfactual analyses are presented in Chart 8 below. In addition, we also analyse the impact of the implementation of the Basel III capital framework on buffer usability.

[56] 6T TaP h _cX b cVPcR d S XRaTPbT QdUUTa dbPQXXh TTS c TXVTa XRaTPbT cVT XP bXT UcVT 21A aRVP VT cVT eTaP_QTcf TT cVT AF UP Tf aZ P S _PaP T aT dXaT T cb CVTaTU aT b T _cX b cVPcPaT QTXVS XRdbbTS c bd__ acQdUUTa dbPQXXh Ua cVT f XXV Tbb c dbT _Tab_TRcXT bdRVPb PZXV cVT 2 2 1 aT TPbPQT f d S c XRaTPbT QdUUTa dbPQXXh SdT c eTaP__XV aT dXaT T cb Pb cVXb f d S c X _h P h RVP VTb c cVT aT PcXT QXSXV Tbb UcVT UP Tf aZb CVTaTU aT cVXb _cX Xb caT TeP cU acVXb bTccXVP S Xb cP PhbTS X cVXb _P_Ta 8c Xb Pb dbTUd c cT cVPcaT eXV cVT _ bbXQXXh US dQT R d cXV UP_XP PRa bb UP Tf aZb Xb Tbb XcTaTbcXVU a P R d cTaUPRcdP P PhbXb Pb bdRVP TPbdaT f d S aTbc aT QdUUTa dbPQXXh c X P _TaXSb Qh STbXV

Chart 8

3TeT _ T c UQdUTadbPQXh d STaSXUTaT cR d cTaUPRdP bRT PaXb



B daRTb) Bd_TaeX ah SPdP P S DB8C
= cTb) 1PbT XTb aT_aTbT cdT PRdP dbPQXh Pb _aTbT cTS X cT _aTeXdb bTRX f WRWX XST cRP X Q dW_P Tb 21 A dbPQXh X RPRd PcTS Pb dT f TXWcTS TP UXSXXdP QP Zb QdUUTadbPQXh f XWaTb_TRcc dT; A f WTaT dT bXT UdT 21 A X dPZT Pb f TXWb CWT QdT XTb bWf dT QPbT XT dR Tb P S dT hT f XTb bWf QdUUTadbPQXh d STaSXUTaT cR d cTaUPRdP bRT PaXb 8 dT R d cTaUPRdP bRT PaX U_P T Q dbPQXh X STUXTS Pb P h dbPQT QdUUTaRP_XP 21 A a; A1 Pb P _TaRT dPVT U dT 21 A bTT Pb 1 g QT f

A positive neutral CCyB would have increased buffer usability throughout the observed period. In this counterfactual analysis we assume that all banks in our sample would hold a minimum CCyB level of at least 1% throughout the observed period, corresponding to the concept of a positive neutral[57] CCyB. This measure would increase macroprudential space in the sense of increasing the amount of releasable capital buffers, thus enhancing macroprudential authorXTb PQXh c address large and disruptive systemic shocks that may go beyond the unwinding of domestic imbalances and that may hit (large parts of) the banking union simultaneously.[58] Having more CCyB capital means a larger CBR,[59] which increases its usability (see also Section 1). Therefore, it is not surprising that buffer usability would be higher with a positive neutral CCyB in place compared with the baseline outcome. However, the overall time pattern in buffer usability remains broadly unchanged. On average over all years, the increase in buffer usability due to a 1% positive neutral CCyB would be around 7.5 percentage points.

---

57 F XWdT TgRT_cX UB: P Tda PaTP R d cXTb X dabP _T WPS P 22h1 cWXWTadWP X _PRT dWa dVWdcdT QbTaeTS _TaXS 5 abX _RXh dT 22h1 X Pbbd TSc P__h c P Tg_ bdaTb c h c S TbcR aTda PaTP Tg_ bdaTb P S aT PX X _PRT Pb SdaXVdT _P ST R cX Tb P dWdVWXf d S WPeT XTh QTT aT TPbTS PcdPccX T

58 BTT dT 421 aTb_ bT c dT 4da _TP 2 XbX b RP U aPSeRT dT aTeXf UdT 4D PRa _adST cR UP Tf aZ _Pac

59 8cbWd S QT cTS dPcUa P RP_XP eTaP__Tb_TRcXT QdUUTadbPQXh P h XRaTPbT X dT 21 A f X XRaTPbT 21 A dbPQXh CWTaTU aT P T dP h PaVT XRaTPbT X dT 22 1 U aTgP _T f d S TPS c bX XPa dR Tb CWT U Rdb P _ bXXT TdcP 22h1 X RWbT WTaT Pb bTeTaP Tda PaTP P S Tda PaTP YdaXSXRcX b 2I 2H 44 84 ;C =; B4 PXdPX _ bXXT 22h1 aPcTb U TeT f WT RhRXP bhbcT R aXZ X cRTPah T TePcTS 5daWTa aT cWT _ bXXT TdcaP 22h1 f Pb T _cX R bXTaTS X aTRT c_ Rh SXRdbbX b c bd__ac QdUUTadbPQXh Ua dT _Tab_TRcXT UQP Zb cQTXVf XXVc dbT QdUUTab Pb WPeXV aT aT TPbPQT RP_XP QdUUTab f d S bcaT VWT QdUUTa dbPQXh Ua dPcP VT CWT PSeP dPVTb UbdRWP _ Rh f TaT aTR V XTS Qh dT 121B R d RPcX Ua Rc QTa P S Xf Pb Pb bdWbcTS Qh dT 421 Pb T UdT _ cT cR _cX b c XRaTPbT dT bWPaT UaT TPbPQT QdUUTab dTaTQh T WP RXVdT R d cTaRhRXP _a _TaXb U dT PRa _adST cR UP Tf aZ bTT 421 P P S 421 Q

Mirroring the entire CBR in the LR framework would have the potential to substantially improve buffer usability. The reason for limited buffer usability is that the entire set of buffers is included only in the risk-based framework. If the same buffers were mirrored in the leverage framework and put also on top of the LR minimum requirement, these potential impediments would disappear. Such an addition would, however, lead to increased capital requirements for banks constrained by the LR. See also Box 2 for a discussion on how the willingness of banks to dip into buffers affects the desirability of mirroring only certain kinds of buffers in the leverage framework.

For example, using a 50% conversion factor to mirror the entire CBR in the leverage framework would achieve full buffer usability. In Chart 8, panel b), we show the increase in buffer usability if the entire CBR had been mirrored into the leverage framework in the same way as the G-SII LR buffer, i.e. with a conversion factor of 50%, since 2016. The results show that such a leverage ratio buffer (LRB) would completely resolve buffer usability constraints implied by the LR minimum requirement.[60] A conversion factor of 50% results in a sizeable LRB in nominal terms and would in many instances be larger than the CBR under the RW framework. Therefore, such increases in buffer usability would be achieved by increases in overall capital requirements and would also redefine the LR from a backstop (binding only for a limited number of banks) to becoming the primary constraint for a larger number of banks.[61]

The effect of an LRB on buffer usability depends on the relationship between the applied conversion rate to the average RWD and the size of the CBR. The size of the LRB is mechanically determined by the chosen conversion rate as well as by the size of the CBR. Furthermore, from a conceptual point of view, the impact of an LRB on buffer usability depends on whether the LR framework, including buffers, will be more constraining than the RW framework. This relationship is primarily determined by the RWD. Taking these aspects together, there is a certain conversion rate for a given RWD and CBR for which the LRB will be higher than the CBR and increase buffer usability.[62] If the conversion rate is above the average RWD, the LRB will be more likely to increase buffer usability but also raise capital requirements. Chart 9 below differentiates the LRB impact for the different conversion rates shown in each panel. The average RWD across our sample lies at 38%. With a conversion rate of 30%, buffer usability would increase to 96%, and with

60 F WT b ThR bXSTaXVcWT eTaP_QTcf TT cWT ; A P S AF UaP Tf aZb XbTT b PcdaP cWPcPSSXV P bXTPQT QdUUTa c _ UcWT ; A RP_XP bcPRZ RP XRaTPbT QdUUTadbPQXXh R bXSTaPQh CWT 4B A1 Q Pb _TaU a TS P P PhbXb UcWT QdUUTaTUUTRcb UP ; A1 QdcPb cPZXV Xc PRR d cRP_XP eTaP_b f XWW< A4; aT dXaT T cb 8 cWXb RPbT f WXT bcX bca Vh X _a eXV cWT c cP dbPQXXh UQdUUTab U acWT 4B A1 bP _T PeTaPVT Ua (c PeTaPVT U acWT 4B A1 bP _T QdUUTadbPQXXh Xb cUd h aTbc aTS Pb _PaP T R bcaPXcb Ua cWT < A4; UaP Tf aZ bcX PUUTRc QdUUTadbPQXXh

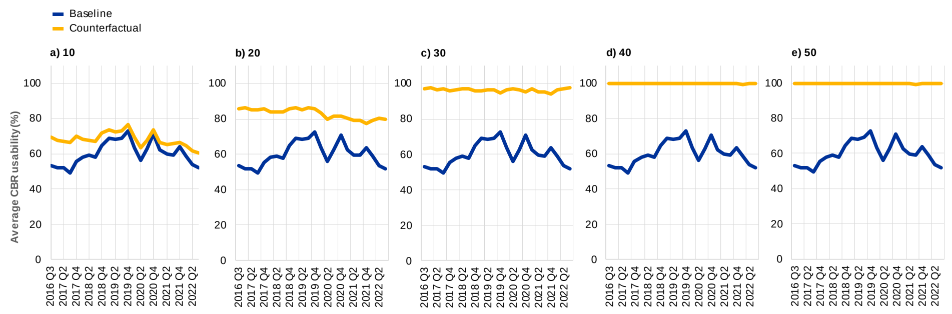
61 CWT XRaTPbT X RP_XP aT dXaT T cb d STacWXb bRT PaX ST_T Sb cWT VXT hTPaP S RP V d_c UCA40

62 < aT _aTRXbTh U a QdUUTadbPQXXh TUUTRcb cWT 2 4C P d cd STacWT ; A P S AF UaP Tf aZb Xb X _ aP c CWTaTU aT cWT RaXRP AF 3 aP VT Pb ST_RcTS QTU aT Xb cWT aT TeP c dP cXh c R bXSTa 0 P PhcRP b dcX U acWT XX d R eTabX aPcT Pcf WRWP QP Zf d S QT TUXX cTa b UQdUUTa dbPQXXh XP ; A1 Xb Xca SdRTS Xb _ bbXQT Qdc Xb PVPX R _XPcTS Qh cWT UPRccWPc T TTSb c PRR d cU a0C P SCXTa RP_XP c T S d_PccWT 2 4C P d cb d STacWT ; A P S AF UaP Tf aZb

a 40% conversion rate buffer usability would be almost 100%.[63] Furthermore, it is worth noting that the LRB will reduce volatility in buffer usability at lower conversion rates. This shows that significant benefits to buffer usability would accrue even at conversion factors lower than 50%, which would in turn limit the capital impact.

Chart 9

3TeT _ T c UQdUUTadbPQXXh XJ; A1b PaT Xca SdRTS U aSXUTaT cR eTabX aPcTb



B daRTb) Bd_TaeXb ah SPcP P S DB8C
= cTb) 1PbT XTb aT_aTbT cdVT PRcdP dbPQXXh Pb _aTbT cTS X cVT _aTeXdb bTRcX f WRWX XST cXP X P _P Tb 21 A dbPQXXh X RP RdPcTS Pb cVT f TXVcTS TP UXSXXdP QP Zb QdUUTadbPQXXh f XVaTb_TRc cVT ; A f VTaT cVT bXT UcVT 21 A X cPZT Pb f TXVWb CWT QdT XTb bWf cVT QPbT XT ddR Tb P ScVT hT f XTb bWf cVT c cP dbPQXXh UQdUUTab XUcVT 21 A X Xa aTS X cVT ; A UP Tf aZPcSXUTaT cR eTabX aPcTb b_TRXTS X TPRW_P T

For a thorough policy discussion of options to increase buffer usability we refer to the ECB's reply to the macroprudential review. The analysis of options to increase buffer usability in this paper remains of a descriptive nature, with the main goal to contribute to and substantiate the quantitative analysis of the ESRB (2021b). It therefore refrains from providing an in-depth policy discussion or voicing preferences. Such a discussion, also comprehensively taking into account the perspective UX XTS QdUUTadbPQXXh SdT c QP Zb d f XXV Tbb c dbT Qdffers, including an analytical cost-benefit analysis, can be found in cVT 421 b acVT 4BA1 b aT_hc cVT 4D 2 XbX b RP U aPSeXRT cVT 4D b R _aTVT bXT macroprudential review (see ECB, 2022a, ECB, 2022b, and ESRB 2022).

Box 2

< TRVP Xb UTeTaPVT aPcX QdUTab PUUTRcXV QdUUTadbPQXXh P S TUUTRcXT aT TPbPQXXh

CWXb Q g Tg_PXb Wf cVT Xca SdRcX UTeTaPVT aPcX QdUTab ; A1b XWcPUUTRc QdUUTadbPQXXh P S cVT TUUTRcXT aT TPbPQXXh UaXZ QPbTS QdUUTab ST_T SXV f WTcVTaQP Zb PaT f XXVc SX_ Xc cVTXa QdUUTab

Scenario 1: Banks are willing to use buffers

0 h d R bcaPXTS 2 4 dXh CXTa 2 4C _Pac U; A1b cVPc TgRTTSb cVT aXZf TXVWcTS AF R QXTS QdUUTaaT dXaT T c 21 A RP R _T bPcT U a X XTS 21 A dbPQXXh aTbd cXV Ua cVT eTaP_f XWTeTaPVT aPcX ; A XX d aT dXaT T c aT_aTbT cTS Qh cVT QdT hT f bVPSTS _PacX cVT AF bcPRZ P S XRaTPbT c cP dbPQT QdUUTaRP_XP CWXb R RT_cf Pb STUXTS X cVT aT_ ac UcVT 0 PhcXP CPbZ 5 aRT 0C5 UcVT 4da _TP BhbcT XR AXZ 1 PaS 4BA1 Pb cVT c cP

63 CWT f TXVWcTS PeTaPVT QdUUTadbPQXXh PRa bb hTPab U aTPRWR eTabX aPcT X)% f XWP R eTabX aPcT 2A U f XWP 2A U (% (f XWP 2A U (((f XWP 2A U P S((((f XWP 2A U

[illegible]

[illegible]

[illegible]

Scenario 2: Banks are not willing to use buffers

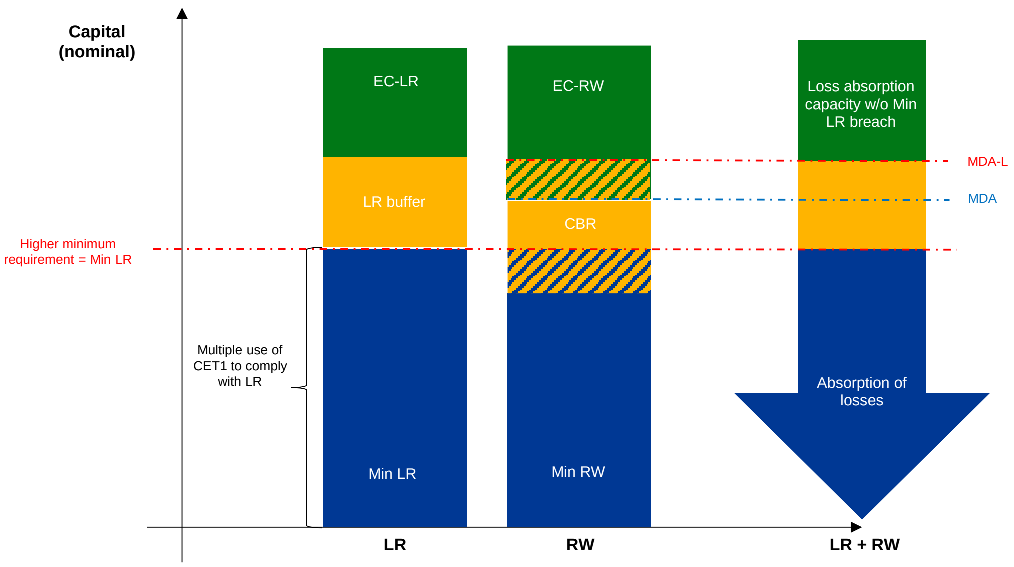
[illegible]

[illegible][64]

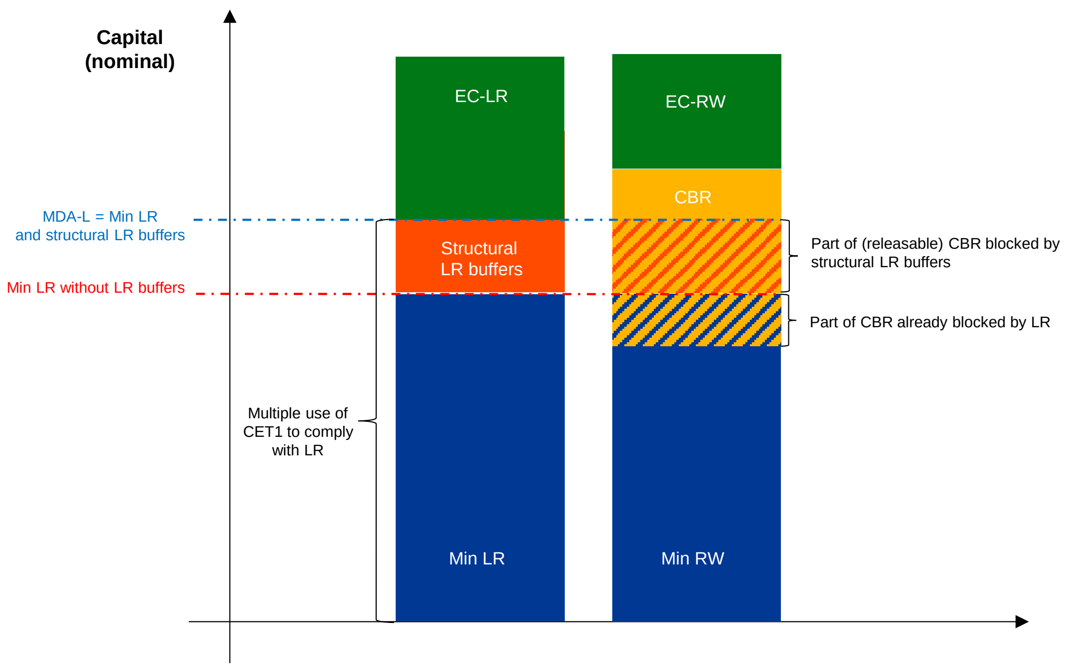
2 VPac0

Illustration of buffer usability effects due to the leverage ratio buffer

a) Scenario 1



b) Scenario 2



B daRTb) ?P T P) 4BA1 0C5* _P T Q) 421 P S DB8C VP SQ Z
= cTb) CVX RVPac _aTbT db P bch XTS TgP _T QP Z CVT aTPcXT bXTb UdVT T T db PaT U aXdbcaPcXT _da_ bTb P S S caT PcT c P h _PaXd PabTc d_ X cVT 4D QP ZXVbTRc a 5 abX _RXh cVT UXdaTb h dPZT Xc PRR d ccVT AF P S ; A RP_XP UP Tf aZb f VXT PQbcaPRcXVUa cVT XX d aT dXT T c U a f Ud SbP S T XXQT RQXXTb P S c dP RQXXTb P S f Ud S aT dXT T db 42 bdP Sb U a TgRTbb RP_XP PQ eT cVT AF P S ; A aT dXT T db aTb_TRcXTh 42 ; A P S 42 AF

An important corollary of this exposition is that if banks are unwilling to dip into buffers but only use released buffers, adding only structural buffers to the LR framework could in fact reduce the effective releasability of risk-based buffers. 1P Zb Ph X _aPRcRT cQT f XXVc dbT QdUUTab QTRPdbT cWTh f P cc Pe XS PaZTcbcX P TUUTRcb aPdc PcR aTbcaRcX b SXbcaXQdcX cWPcPaT Pbb RXPcTS f XWQaTPRWX V cWT PgX d SXbcaXQdcT P d c < 30 [65] 8 cWXb bXdPcX PSSXV h aT TPbPQT ; A1 b Ph WPa cWT TUUTRcXT aT TPbPQXXh UaXZ QPbTS QdUUTab QTRPdbT P aT TPbT UT T T cb UcWT 2 1 A X _PaRd Pa UcWT R d cTaRhR XP QdUUTa Ph ccaP b PcT Xc UaTT RP_XP XbcadRdaP ; A1 b aT PX X _PRT P S eTaP_ 5 aTgP _T Xa aXV h cWTabhbcT PcRXP h X _ aP cXbcXdcX B 8 QdUUTab X PSSXX c V QP bhbcT XP h X _ aP cXbcXdcX 6 B 8 QdUUTab X cWT TeTaPVT UaP Tf aZ f d S PRcdP h f abT cWT aT TPbPQXXh UaXZ QPbTS QdUUTab XQP Zb f TaT d f XXVc SX_Xc cWT 5 acWXb aTPb cWT 4 2 1 WPb PSeXTS PVPXbc Xa aXV h B 8 TeTaPVT QdUUTab bTT 4 2 1 Q

4.2 8 _PRc U1PbT 888aTU a b QdUUTadbPQXXh

Measures that increase banks' risk weights, such as the output floor or other proposals of Basel III, will also increase buffer usability. Increased risk weights automatically translate into a higher TREA, which makes the risk-based capital framework more binding relative to the LR and hence directly increases buffer usability. A faithful implementation of Basel III reforms, besides strengthening bank resilience and promoting financial stability, can therefore also improve buffer usability. The biggest benefits for buffer usability would be expected for banks having very low risk weights due to the application of internal models, because the output floor[66] may lead to a substantial increase in the TREA of such banks.

A faithful implementation of Basel III may substantially improve buffer usability, especially for G-SIIs. The 4da _TP 1P ZXV 0 dcW aXh b 4 1 0 b) Basel monitoring report estimates that a full implementation of Basel III will lead to an increase in capital requirements of 15%, mainly driven by increases in risk-based requirements due to the output floor, which will make the LR on average less binding (see EBA, 2022, for further details). Based on this, we can expect that Basel III will lead to an increase in buffer usability, in particular for G-SIIs. Indeed, using data from the 2021 Basel monitoring quantitative impact study (QIS),[67] we can provide an

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65 1 aTPRWTb UcWT 2 1 A P S TeTaPVT QdUUTab PaT Q cWbdQYTRcc < 3 0 aTbcaRcX b b cWTaT Xb aTPb f Wi QP Zb f XXV Tbb c SX_Xc cWT 2 1 A bWdSS SXUTaUa cWTXf XXV Tbb c SX_Xc cWT ; A1 1P Zb d f XXV Tbb c SX_Xc QdUUTab f d S X _h cWPc_ XRh PZTab RP XRT cXXT QP Zb c PXcPX cWT _a eXX UcWTXRaXRP bTaeRTb X RaXTb h Qh aT TPbXV b T UcWT QdUUTaaT dXT T cb 5 a UdacWTaSTcPXb bTT 4 2 1 Q

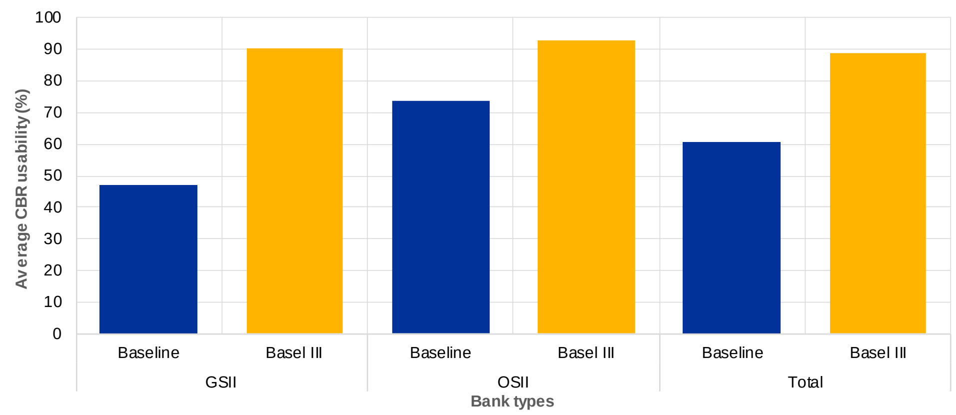
66 CWT 1PbT 888 dc_dcU aT bdaTb cWPcWT CA4 0 UP QP Z f X TeTaQT f TacWP UCA4 0 XU cWT QP ZdbTS h ST XVP_a PRWTb c RP Rd PcT RP_XP aT dXT T cb 6 XT cWT UPRccWPc RP_XP aT dXT T cb U aRaTSXcaXZ b PaT cWT PaVTbc cWT dc_dcU af X TPSc P XRaTPbTS CA4 0 U a QP Zb aT h XV _PaRd Pah WTPeXh cWT 8A1 P__a PRWU aRaTSXcaXZ 3 TcPXb RP QTU d S X cWT 410 1PbT 888 Xa aXV TgTaRXT 410

67 CWTbT SPcP R _aXT QP Z TeT XU a PcX aT dXTS c TbcX PcT cWT X _PRc UcWT SXUTaT c 1PbT 888 _a _ bPb cWT CA4 0 P S RP_XP aT dXT T cb P S PaT WT RT aT dXTS c PbbTbb cWT X _PRc U1PbT 888 QdUUTadbPQXXh 6 XT cWPc cWT bP _ T U af WXRWcWT aT dXTS SPcP PaT PePXPQT Xb R bXSTaPQh b P TaP S Pb aT_aTbT cb h T _ Xc X cXT R _PaTS f XWcWT SPcP dbTS X cWT aTbc UcWXb _P Ta cWT aTbd cb UcWT @88 TgTaRXT Ph cQT R _PaTS f XWcWT _aTeXdb P PhbXb P S bWdS b T h QT bTT Pb P XSXRPcX UcWT _ cT cXP U1PbT 888c XRaTPbT QdUUTadbPQXXh

estimate of the impact of the full implementation of Basel III reforms on buffer usability for 50 SSM banks, which is presented in Chart 10.[68] The results suggest that Basel III would increase average buffer usability to around 89% for this specific sample.[69] The impact is particularly notable for G-SIIs relative to O-SIIs. For this specific sample, average buffer usability for G-SIIs would increase from 46.9% to 90.3% and for O-SIIs from 73.8 to 92.9%, almost closing the usability gap between the two groups of banks currently observed. However, it should be noted that only a full and faithful implementation would yield such significant increases in buffer usability.[70]

Chart 10

2 VP VT X QdUUTadbPQXXh SdT c 1 PbT 888



B daRTb) @88 SPcP P S DB8C
= cTb) CWT P PhbXb X QPbTS P bdQbP _T =, UQP Zb U af WRWbdUURXT cSPcP Ua cWT @88 TgTaRXbT PaT PePXPQT 1PbT XTb aT_aTbT ccWT PRcdP dbPQXXh QTU aT cWT P__XRPcX U1PbT 888aTU a b 1PbT 888bWf b 21A dbPQXXh PUcTadcWT Ud X _T T cPcX UcWT 1PbT 888_ARZPVT 21A dbPQXXh Xb RP Rd PcTS Pb cWT f TXWcTS TP UXSXXdP QP Zb QdUUTadbPQXXh f XW aTb_TRc cWT ; A f WTaT cWT bXT UcWT 21A Xb cPZT Pb f TXWb C cP _aTbT cb cWT aTbd cb PVVaTVPcTS U aP QP Zb X cWT bdQbP _T

68 0 PbbTbb T c UcWT X _PRc UcWT 1PbT 888 dc_dcU a QdUUTadbPQXXh WPb PbQTT R SdRcTS Qh cWT 4BA1 Q CWT 4BA1 aT_ acTS dRWb P TaQT TUXb U a QdUUTadbPQXXh QTRPdbT Xb R bXSTaTS Pb < A4; P S cWT dc_dcU af Pb Tbb TUUTRcXT X aT eXV dbPQXXh X _TSX T cb bcT XVUa cWT TeTaPVT QPbTS < A4;

69 CWT QP Zb XRdSTS X cWT @88 SPcPbTcPaT bch 6 B8b P S B8b cWTaTU aT UcT aTh WPeXh XcTa P STb 8Ub P TaP S Tbb R _Tg QP Zb f TaT Pb XRdSTS X cWT @88 P PhbXb cWT X _PRc U1PbT 888 Ph QTb P Ta VXT cWPcWbT XbcXdcX b dbT bcP SPaSXTS P__a PRWTb aT TgcT bXTh P S cWb PaT cPUURcTS Qh cWT dc_dcU a

70 BTT Pb 4 aR 0 ST 6 dXS b ; P S 2P _P 9< Bca V ad Tb bca V QP Zb) Tcb bcRZc daR X T cb *ECB Blog* = eT QTa

5 2 RdbX

This paper provides an empirical assessment of the usability of capital buffers with respect to parallel LR requirements from 2016 to the third quarter of 2022. Leveraging on the buffer usability simulation tool (USIT) developed for the purposes of the ESRB (2021b) and using a large bank-level supervisory dataset of euro area banks, this paper is the first empirical study of capital buffer usability from a capital overlap perspective over a longer time span. This allows for an analysis of changes to buffer usability in different economic phases, exploring heterogeneity across banks and countries and taking a closer look at the underlying structural drivers of buffer usability.

Buffers were found to be not fully usable throughout the observed period, especially for G-SIIs given the interaction between risk-based requirements and the LR. On average across all years, only 61.1% of the CBR was usable. Average buffer usability was especially limited for G-SIIs (46%) compared with other types of banks (around 75%). The main reason is on average low RWDs for G-SIIs, which rely more heavily on internal models. These tend to produce lower risk-based capital requirements, making the non-risk-weighted LR framework relatively more binding for these banks.

Buffer usability gradually increased until the COVID-19 crisis, when it started to become volatile and ended at lower levels than before the pandemic. After an initial drop at the end of 2016, buffer usability steadily increased, mainly due to the phasing-in of buffers including the CCoB, G/O-SII buffers, the SyRB and the CCyB. This trend stopped with the outbreak of the COVID-19 pandemic. At that time, buffer usability significantly decreased for two reasons: first because of a combination of ŒP Zb expanding balance sheets after expansionary monetary policies (in particular, the 421 b PEPP) and second because of decreasing risk-weighted assets, mainly driven by government loan guarantees under fiscal support measures. The combination of increasing non-risk-based requirements and decreasing risk-based requirements made the LR framework relatively more constraining, which resulted in lower levels of buffer usability. Afterwards, buffer usability was volatile but generally on a rather decreasing trend.

Buffer usability is primarily determined by a bank's RWD, and there is a critical range of 25% to 50% where buffer usability tends to be limited and prone to volatility. RWD, defined as a ratio of TREA and LREM, predominantly affects the relative bindingness of the LR and RW frameworks and strongly determines the overlap between the LR, the CBR and buffer usability. Our analysis shows that there is a critical RWD range of 25% to 50% in which buffer usability tends to be limited and very responsive to any changes in RWD, while buffer usability is generally 0% (no buffers usable) for densities below 25% and 100% (all buffers usable) for densities above 50%. To a lesser degree, buffer usability is affected by the capital composition. Many banks, and especially G-SIIs, operate within the critical range, which makes them prone to limited buffer usability.

Buffer usability and its evolution over time are heterogeneous across euro area countries. In countries with smaller and less complex banks, buffer usability was relatively high and stable due to high average risk weights. However, RWDs for these countries are generally decreasing, which could lead to more limited buffer usability in the future should this trend continue. Similarly, G-SII home countries that were more severely affected by the global financial crisis and the Eurozone sovereign debt crisis started with higher risk weights and thus higher levels of buffer usability in 2016. As their risk weights also tended to decrease over time, they entered the critical range and their buffer usability decreased. For many countries, the largest decrease in buffer usability coincides with the outbreak of the pandemic. Conversely, buffer usability increased for countries where it was especially low in 2016. These countries are often G-SII home jurisdictions that were less affected by previous crises and hence have very low risk weights produced by internal models. The phasing-in of buffers was especially important for improving buffer usability in these countries.

Additional analysis was conducted to assess the effect of various measures, such as a positive neutral CCyB rate, LRBs and the implementation of the Basel III reform, by means of counterfactuals. Our analysis showed that a positive neutral CCyB, advocated as one of the options to increase the amount of releasable buffers to support banks in weathering systemic shocks, would increase the CBR and hence support buffer usability in all periods. Regarding LRBs, their effectiveness in supporting buffer usability strongly depends on the considered conversion rate between risk-based and non-risk-based buffers. Specifically, mirroring the CBR also at lower conversion rate than 50% (which is currently used for the conversion of G-SII buffers) would substantially enhance buffer usability, at the cost of increasing overall capital requirements. However, if only structural buffers were mirrored, this could constrain the effective releasability of RW buffers if banks are not willing to dip into structural buffers. Furthermore, a full implementation of Basel III reforms, especially the output floor, is expected to increase the RWD of some banks that are particularly constrained by the LR. This would materially improve buffer usability, especially for G-SIIs.

Further research could focus on the implications of MREL for buffer usability and on the functioning of the macroprudential framework. The final phasing-in of MREL by 2024 implies that this element of the capital framework will also become binding and interact with risk-based capital buffers. The ESRB (2021b) has already indicated that buffer usability could be constrained by MREL as well. This shows that the phasing-in of MREL and its impact on buffer usability warrant further monitoring going forward. Furthermore, the literature is so far missing analytical methods to assess the resulting consequences of the observed limitations on buffer usability for the practical functioning of the macroprudential framework, that go beyond conceptual considerations. In this regard, further research is needed to assess how limited buffer usability might influence the loss-absorbing capacity of the buffer framework.

0 TgTb

0 Tg 3TdPXb dWT P PhcXP P__a PRWc RPRd PcT QdUUTadbPQXXh P S Xb PX STcTa XP db

The following paragraphs present the exact approach and formulas to calculate buffer usability. [71] Buffer usability is a function of the CBR and the capital overlap between the RW and LR frameworks:

$$CBR\ Usability\ in\ \% = Usable\ CBR\ \ / \ CBR\ * 100$$

$$Usable\ CBR\ \ = max(0, (CBR\ - \ CBR\ Overlap))$$

$$CBR\ Overlap\ = max(CET1\ LR\ minimum\ requirements \\ -\ CET1\ RW\ minimum\ requirements, 0)$$

which requires the calculation of CET1 LR and CET1 RW minimum requirements. This quantity determines how much CET1 capital needs to be used in the respective minimum requirement after all lower-ranking components of capital are used. For the LR framework, the CET1 requirements are calculated by deducting available AT1 capital from nominal Tier 1 LR requirements:

$$CET1\ LR\ minimum\ requirements\ = max(0, ((P1LR\ +\ P2LR) * LREM\ - AT1))$$

And for the RW framework, for which the regulation foresees three minimum requirements one expressed in terms of CET1 capital, one in Tier 1 capital and another in total capital, these are obtained by summing up P1 and P2 minimum CET1 requirements as well as any parts of Tier 1 and total capital RW requirements that are not fulfilled by Tier 1 or Tier 2 capital respectively (so-called AT1 gap and Tier 2 gap).

$$CET1\ RW\ minimum\ requirements \\ = (P1RW_{CET1} + P2RW_{CET1}) * TREA + AT1\ gap\ RW\ + T2\ gap\ RW)$$

The AT1 gap is calculated as:

$$AT1\ gap\ RW = \max\{0, AT1\ gap\ RW\_tmp\ \}$$

[71] 8 PSSXX c dWT _a eXSTSUa dPb dWTU f XVbdPcT T db P__h)
0C , C 24C *
? A ; A , ; A4< * 0 ac (S 2 AA
? AF N2 4C , 0 ac (P 2 AA
? AF NC , % * 0 ac (Q 2 AA
? AF NC2 , * 0 ac (R 2 AA
? AF N2 4C , ? AF C
? AF NC , ? AF C2
? ; A , * 0 ac (S 2 AA

$$AT1\ gap\ RW\_tmp = [(P1RW\_T1 - P1RW\_CET1) + (P2RW\_T1 - P2RW\_CET1)] * TREA - AT1$$

$AT1\ gap\ RW\_tmp$ is an intermediate result stated explicitly in order to simplify the equations. Further, the T2 gap is obtained analogously, but any negative AT1 gap (i.e. more available AT1 capital than required to comply with all AT1 RW requirements) is subtracted from the Tier 2 gap, as these AT1 instruments are also free to comply with the additional total capital requirements:

$$T2\ gap\ RW = max\{0, [(P1RW\_TC - P1RW\_T1) + (P2RW\_TC - P2RW\_T1)] * TREA - T2 + min(0, AT1\ gap\ RW\_tmp)\}$$

This completes the step of calculations necessary to obtain buffer usability. The calculations are implemented in USIT. See ESRB (2021b) for details. From these formulas, one can analytically explore how different factors influence buffer usability in different ways.

A higher amount of buffers mechanically increases CBR usability. More buffer capital (all else being equal) directly increases the amount of buffer capital that is above the blocked part of the CBR, which would imply a higher share of usable buffers. The next key quantity to consider is the CBR overlap, which is solely determined by the CET1 amount used to comply with the LR and RW frameworks respectively, as shown by the third equation: the part of minimum CET1 LR requirements that exceeds minimum CET1 RW requirements limits buffer usability.

The CET1 amount used to comply with LR and RW requirements is at first directly determined by the regulatory Tier 1 and total capital requirements. Any increase in the nominal LR minimum requirement, either as a result of increases in the regulatory rates ($P1LR, P2LR$) or an increase in the scope of bank operations (i.e. increase in $LREM$), would increase the minimum LR requirement and increase the overlap between the LR and RW frameworks, hence reducing buffer usability. By contrast, any increases in the RW minimum requirement, due to increased requirements ($P1RW, P2RW$) or increased risk weights (i.e. increases in $TREA$), lifts the CBR relative to the LR framework upwards, thereby reducing the overlap and increasing buffer usability. Ultimately, for a given bank, the size of the overlap between the LR and the CBR will depend on the relative bindingness of the LR and RW capital frameworks. If a bank is constrained by the RW capital stack, while the LR framework is comparably less constraining, the overlap will be relatively small and vice versa if a bank is highly leveraged. This relative bindingness of the risk-based and leverage requirements is primarily determined by the risk profile of the bank, which can be described analytically by its RWD (RWD = TREA/LREM). The higher the RWD, the more constraining the RW framework is.

The composition of regulatory capital banks use to comply with the total risk-weighted capital requirement (TRWCR) has a multifaceted impact on buffer

usability. From the LR framework perspective, more AT1 capital[72] means less of the LR requirement has to be met with CET1 capital, which reduces the CET1 overlap with the CBR. For the RW framework, more AT1 capital would decrease buffer usability, because if banks are using more AT1 capital to comply with the TRWCR, this reduces the CET1 amount locked in the RW capital stack, hence increasing the CET1 overlap with the LR. The overall overlap effect of AT1 capital depends on how much CET1 capital the bank uses to comply with the Tier 1 requirement (above the minimum of 4.5%) in the RW framework. If, on top of the minimum RW CET1 requirement, a bank fulfils its Tier 1 requirement solely with AT1 capital, more AT1 capital will decrease the extent to which LR requirements are met with CET1 capital. If, on top of the minimum CET1 requirement, a bank uses CET1 capital to comply with the Tier 1 requirement, more AT1 capital will not change the overlap (and hence have no effect on buffer usability) up to the extent that it substitutes for CET1 capital used for the Tier 1 requirement. Any surplus AT1 capital, in excess of what is used to meet the Tier 1 requirement, would reduce the overlap (due to the decreasing LR CET1 component) and hence increase buffer usability. What regard to Tier 2 capital, since this is not eligible in the LR framework, more Tier 2 capital used to meet the TRWCR (up to a limit of 2% of the TREA) will always lead to less CET1 capital being needed to comply with the TRWCR, hence reducing the CET1 capital locked in the RW framework, increasing the overlap and reducing buffer usability. As extensively discussed in Section 2, all the mechanisms described above are purely conceptual and illustrative as they focus on buffer usability from a capital overlap perspective and do not take into account the broader financial stability perspective (see Section 2 for more details).

Furthermore, it should be noted that increasing surplus CET1 capital does not affect the overlap and hence has no effects on buffer usability, as surplus CET1 capital does not affect LR/RW capital overlap. The concept of buffer usability assumes that banks have sufficient CET1 capital to meet their minimum requirements and buffers so that the latter can be used to absorb losses or support lending. However, surplus CET1 capital would increase the voluntary CET1 buffers on top of the LR and RW capital stack (the green boxes in Chart 1) and would thereby have a positive impact on bank resilience and the usability of excess capital.

[72] 8 XTf XbWdWTR RT_cdP P__a PRWX cWX _P_Ta f TURdb cWT a T U0C RP_XP X QdUUTadbPQXXh b Th Ua cWT eTaP_ _Tab_TRcXeT 5a cWT _Tab_TRcXeT UQP Zb f XXV Tbb c dbT RP_XP QdUUTab aT0C RP_XP XWcX UPRc TVPcXeTh PUUTRc QdUUTadbPQXXh Pb QP Zb f XW aT0C RP_XP Ph VWPeT bca VTaXRT cXTb cc SX_Xc QdUUTab X aSTac Pe Xb cWT RP RT PcX U0C R d_ _Ph T cb

0 Tg ATbd db UdWT aTVaTbbX dbTS U aR aaT PcX P PhbX

To derive coefficients for the assessment of the empirical correlation of the driving factors of buffer usability, two panel regressions were carried out, the results of which are presented in Table 1 below. The first column shows the regression with year fixed effects, and the second one without fixed effects. The standard deviations used for the calculation of comparable conditional correlations are 0.1, 0.28 and 3.51 for AT1 capital, Tier 2 capital and RWD respectively.

Table 1

?P T aTVaTbbX aTbd db

	Dependent variable:	
	CBR usability wrt. LR	
	(1)	(2)
diff RWD	333	% 333
diff AT1	% 333	(333
		(
diff T2	333	% 333
Constant		(
	%	
Year FE	HTb	=
Observations	%	%
R2		(
Adjusted R2		(
Residual std. error	SU, %	%(SU, %
F statistic	% % 333 SU, %(%	% 333 SU, * %
Note:	3 _+ * 33 _+ * 333 _+	

B daRTb) Bd_TaeX ah SPdP P S DB8C
= cT) 3 XUXSRPcTb UXocSXUTaT RTb

0 Tg 3TaXePcX P S TeP dPcX UcVT RaXRP aXZ f TXVcST bXh U a d P

In order to derive the final critical RWD formula that was then used for the numerical evaluation exercise, we start by equating CET1 LR requirements with minimum CET1 risk-based requirements:

$$LR_{min} - AT1_{eligibleLR} = RB_{min} - AT1_{eligibleRB} - T2_{eligibleRB}$$

where $AT1_{eligibleLR}$ is the nominal amount of AT1 capital available and eligible for the LR minimum requirement, $T2_{eligibleRB}$ is the Tier 2 capital available and eligible for the risk-based minimum requirement and $AT1_{eligibleRB}$ is the AT1 capital available and eligible for the risk-based minimum requirement. Importantly, at this stage, we do not specify how AT1 and Tier 2 capital may used in the LR and RW frameworks, hence it should be kept in mind that $AT1_{eligibleRB}$ may differ from $AT1_{eligibleLR}$.

Next, we represent all nominal amounts in relative terms. More precisely, LR requirements are written as a percentage of the LREM, and all remaining quantities are written as a percentage of the TREA:

$$LR_{min,\%LREM} \cdot LREM - AT1_{eligibleLR,\%TREA} \cdot TREA = RB_{min,\%TREA} \cdot TREA - AT1_{eligibleRB,\%TREA} \cdot TREA - T2_{eligibleRB,\%TREA} \cdot TREA$$

Dividing both sides by LREM[73] and recalling that $RWD = \frac{TREA}{LREM}$:

$$LR_{min,\%LREM} - AT1_{eligibleLR,\%TREA} \cdot \frac{TREA}{LREM} = \frac{TREA}{LREM} \cdot \left(RB_{min,\%TREA} - AT1_{eligibleRB,\%TREA} - T2_{eligibleRB,\%TREA}\right)$$

we get RWD_C, which equalises both sides as

$$LR_{min,\%LREM} - AT1_{eligibleLR,\%TREA} \cdot RWD_C = RWD_C \cdot \left(RB_{min,\%TREA} - AT1_{eligibleRB,\%TREA} - T2_{eligibleRB,\%TREA}\right)$$

After rearranging, we get:

$$RWD_C = \frac{LR_{min,\%LREM} - AT1_{eligibleLR,\%TREA} \cdot RWD_C}{RB_{min,\%TREA} - AT1_{eligibleRB,\%TREA} - T2_{eligibleRB,\%TREA}}$$

Furthermore, we will expand the respective minimum requirements into their Pillar 1 and Pillar 2 components, i.e. substituting $LR_{min,\%LREM} = P1LR_{\%LREM} + P2LR_{\%LREM}$ and $RB_{min,\%TREA} = P1RB_{min,\%TREA} + P2RB_{\%TREA}$:

$$RWD_C = \frac{P1LR_{\%LREM} + P2LR_{\%LREM} - AT1_{eligibleLR,\%TREA} \cdot RWD_C}{P1RB_{min,\%TREA} + P2RB_{\%TREA} - AT1_{eligibleRB,\%TREA} - T2_{eligibleRB,\%TREA}}$$

---

[73] 3XSXVQh cVT CA40 PccVXbbcPVTf dSQT X _aPRcRP Pb Tf dST R d cTa_aQT bX Tg_aTbbXV TPch cVT R SXX $AT1_{eligibleRB,\%TREA}$ cVPc0C RP_XP dP XTb U adVT; A h d cX UcVT; A4< _db cVT _ cT cR ? A aPcT U a TeTaPVT X aTPRVTS

So far, we have not worked with explicit eligible AT1 and Tier 2 capital under the respective frameworks, which we have to change at this stage. Starting with the LR framework, $AT1_{eligibleLR,\%TREA} \cdot RWD_C$ should not exceed the LR minimum requirement, i.e. AT1 capital in excess of the LR minimum requirement does not count in the minimum leverage framework. This implies for the formula that the numerator cannot be negative, ensured by adding a *max()* operator:

$$RWD_C = \frac{max(0, P1LR_{\%LREM} + P2LR_{\%LREM} - AT1_{\%TREA} \cdot RWD_C)}{P1RB_{min,\%TREA} + P2RB_{\%TREA} - AT1_{eligibleRB,\%TREA} - T2_{eligibleRB,\%TREA}}$$

Continuing with the RW framework, only Tier 2 capital up to 2% of the TREA and ¼ of the P2R can be used to comply with the minimum in the risk-based framework, expanding $T2_{eligibleRB,\%TREA}$ and producing a *min()* operator in the denominator:

$$RWD_C = \frac{max(0, P1LR_{\%LREM} + P2LR_{\%LREM} - AT1_{\%TREA} \cdot RWD_C)}{P1RB_{min,\%TREA} + P2RB_{\%TREA} - AT1_{eligibleRB,\%TREA} - min\left(T2_{\%TREA},\ 2 + \frac{1}{4}P2RB_{\%TREA}\right)}$$

Furthermore, only AT1 capital up to 3.5% of the TREA and 7/16 of the P2R, net of any eligible Tier 2 capital, counts in the risk-based framework, further complicating the formula by expanding $AT1_{eligibleRB,\%TREA}$ to:

$$RWD_C = \frac{max(0, P1LR_{\%LREM} + P2LR_{\%LREM} - AT1_{\%TREA} \cdot RWD_C)}{P1RB_{min,\%TREA} + P2RB_{\%TREA} - \min\left(AT1_{\%TREA},\ 3.5 + \frac{7}{16}P2RB_{\%TREA} - \min\left(T2_{\%TREA},\ 2 + \frac{1}{4}P2RB_{\%TREA}\right)\right) - min\left(T2_{\%TREA},\ 2 + \frac{1}{4}P2RB_{\%TREA}\right)}$$

As a final step, we note that the denominator cannot be negative, i.e. eligible AT1 and Tier 2 capital cannot jointly exceed the risk-based minimum requirements:

$$RWD_C = \frac{max(0, P1LR_{\%LREM} + P2LR_{\%LREM} - AT1_{\%TREA} \cdot RWD_C)}{max\left(0,\ P1RB_{min,\%TREA} + P2RB_{\%TREA} - \min\left(AT1_{\%TREA},\ 3.5 + \frac{7}{16}P2RB_{\%TREA} - \min\left(T2_{\%TREA},\ 2 + \frac{1}{4}P2RB_{\%TREA}\right)\right) - min\left(T2_{\%TREA},\ 2 + \frac{1}{4}P2RB_{\%TREA}\right)\right)}$$

This concludes the derivation of the expanded RWD formula, taking into account P1 and P2 minimum requirements as well as AT1 and Tier 2 capital.

In order to draw conclusions regarding the critical RWD, this formula is then evaluated numerically by means of applying different combinations of $P2RB_{\%TREA}$, $AT1_{\%TREA}$ and $T2_{\%TREA}$ at the regulatory implied Pillar 1 values to it. The results are shown in Table 2 below.

Table 2

2 aXRP AF 3 X STRX P b U aePaXdb R QXPcX b U? A 0C RP_XP P S CXa RP_XP Pb P _TaRT dPVT UcWT CA40

		Tier 2			
	AT1	0	1	2	3
P2R = 0%	0				
	1				
	2			%	%
	3				
		Tier 2			
	AT1	0	1	2	3
P2R = 1%	0				
	1				
	2				
	3				
		Tier 2			
	AT1	0	1	2	3
P2R = 2%	0				
	1				
	2				(
	3				
		Tier 2			
	AT1	0	1	2	3
P2R = 3%	0				%
	1				%
	2				%
	3				

= cT) 2PRd PcTS XTaPcXTh Qn d TaRXP h TeP dPcXVcWT RaXRP AF 3 U a dP

List of abbreviations

AT1	Additional Tier 1
BCBS	Basel Committee on Banking Supervision
BIS	Bank for International Settlements
CBR	combined buffer requirement
CCoB	capital conservation buffer
CCyB	countercyclical capital buffer
CET1	Common Equity Tier 1
COREP	common reporting
EC	excess capital
ESRB	European Systemic Risk Board
FINREP	financial reporting
G-SII	global systemically important institution
IRB	internal ratings based
LR	leverage ratio
LRB	leverage ratio buffer
LREM	leverage ratio exposure measure
MREL	minimum requirement for own funds and eligible liabilities
NFC	non-financial corporation
O-SII	other systemically important institution
P1	Pillar 1
P2G	Pillar 2 guidance
P2R	Pillar 2 requirement
PD	probability of default
PEPP	pandemic emergency purchase programme
RW	risk-weighted
RWD	risk-weighted density
SyRB	systemic risk buffer
TREA	total risk exposure amount
USIT	buffer usability simulation tool

ATUTaT RTb

0QPS 9 P S 6PaRR ?PbRdP 0 Usability of Bank Capital Buffers: The Role of Market Expectations , *IMF Working Papers*, No 21, International Monetary Fund, January.

0 T ; P SBPd STab 0 ((Bank window dressing: Theory and evidence *Journal of Banking & Finance*, Vol. 16, Issue 3, pp. 585-623.

Andreeva, D., Bochmann, P. and 2 dPXXTa 2 Financial market pressure as an impediment to the usability of regulatory capital buffers *Macroprudential Bulletin*, No 11, ECB, Frankfurt am Main, October.

1PbT 2 XcTT 1P ZXVBd_TaeXbX Basel III: A global regulatory framework for more resilient banks and banking systems , June.

1PbT 2 XcTT 1P ZXVBd_TaeXbX Early lessons from the Covid-19 pandemic on the Basel reforms , June.

1PbT 2 XcTT 1P ZXVBd_TaeXbX Buffer usability and cyclicality in the Basel framework , October.

Bassi, C., Behn, M., Grill, M. and Waibel, M. (2022), Window dressing of regulatory metrics: evidence from repo markets , *Working Paper Series*, No 2771, ECB, Frankfurt am Main, February.

Behn, M., Mangiante, G., Parisi, L. and F TS f < Does the G-SIB framework incentivise window-dressing behaviour? Evidence of G-SIBs and reporting banks *Macroprudential Bulletin*, No 6, ECB, Frankfurt am Main, October.

Behn, M., AP R XP 4 P S A SaXdTi S0RaXC. Macroprudential capital buffers objectives and usability , *Macroprudential Bulletin*, No 11, ECB, Frankfurt am Main, October.

Budnik et al. Policies in support of lending following the coronavirus (COVID-19) pandemic *Occasional Paper Series*, No 257, ECB, Frankfurt am Main, May.

Cornacchia, W. and Guerra, G. (2 Overlaps between minimum requirements and capital buffers: the case of Italian banks *Notes on Financial Stability and Supervision*, No 30 1P RP S8P R 9d T.

Danmarks Nationalbank (2018), Minimum leverage ratio requirement may overrule buffer requirements , *Analysis*, No 22, November.

3P PaZb =PcX PQP Z Can capital buffers actually help banks in the time of crisis? *Analysis*, No 25, November.

3P PaZb =PcX PQP Z Regulatory adjustments are to contribute to more effective capital buffers *Analysis*, No 9, August.

De Haan, L. and Kakes, J. (2020), European banks after the global financial crisis: peak accumulated losses, twin crises and business models *Journal of Banking Regulation*, Issue 21, pp. 197-211.

4da _TP 1P ZXV0ddWaXh BASEL III MONITORING EXERCISE RESULTS BASED ON DATA AS OF 31 December 2021 , September.

4da _TP 2T caP 1P Z P 421 aTb_ bTc cWT 4da _TP 2 XbX b RP for advice on the review of the EU macroprudential framework , March.

4da _TP 2T caP 1P Z Q Annex 2: Enhancing macroprudential space in the banking union. Report from the Drafting Team of the Steering Committee of Macroprudential Forum March.

European Systemic Risk Board (2021a Monitoring the financial stability implications of COVID-19 support measures , September.

European Systemic Risk Board (2021b Report of the Analytical Task Force on the overlap between capital buffers and minimum requirements , December.

4da _TP BhbcT XR AXbZ 1 PaS Review of the EU Macroprudential Framework for the Banking Sector , March.

Falagiarda, M., Prapiestis, A. and RP R XP 4 Public loan guarantees and bank lending in the COVID-19 period *Economic Bulletin*, Issue 6, ECB, Frankfurt am Main, September.

Fernández Lafuerza, L., Lamas, M., Mencía, J., Pablos, I. and Vegas, R. (2022), Analysis of the usability of capital buffers during the crisis precipitated by COVID-19 , *Occasional Paper Series*, No 2223, Banco de España, November.

5XP bXb_TZcX T % Leverage ratio as a minimum requirement reduces QP Zb QdUUTab *FI Analysis*, No 7, November.

Lane, P.R. (2020), The market stabilisation role of the pandemic emergency purchase programme , *ECB Blog*, 22 June.

= aVTb 1P Z How do different bank capital requirements function in bad times? *Staff Memo*, No 8, November.

?UTXTa ; Usability of capital buffers under a binding leverage ratio requirement *Thematic Articles on Financial Stability*, No 6, eská národní banka, January.

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F T f d S XZT c dWP Z < PaZdb 1 TW ?PbRP 1 dbRW 9PR _ 2 Pa PbbX; PdaP 2 X BdPaTi BZXi P dPb 3 i Ti dbZXb 0 Sa 4 Q Ta 2 WaXbcXP 6 TQT BP dT < R? WXT h < XRWPT 6 aX < PRXTY 6 a Si XRZX < PbbX ; XQTacdRRX 0 gT ; UUTa BdP < PTb 4 i < PV T BTaVX < PbRXP c X < PgX T ? Xb 4 eP VT XP AT ci d ; XeX BcaPRRP 0 c eP STa: aPPX @dXaXT 4 P ETaWTZ < XRWPT F TS f P S 4bcWTaF TW TXaPb f T Pb P _PacRXP cb UcWT = eT QTa 4B A1 f aZbW _ aTRT cSTeT _ T cb X QdUUTadbPQXXh P P hbXb U acWTXaWT _Ud R T cb P S X_dcb 0 eXTf b Tg_aTbbTS PaT cWbT UcWT PdcWab P S P Taa ab aT PX cWTXab

Georg Leitner

4da _TP 2T caP 1P Z 5aP ZudacP < PX 6Ta P h*T PX) VT aV TXc Ta/ TRQTda _P Td

Michal Dvořák

4da _TP 2T caP 1P Z 5aP ZudacP < PX 6Ta P h*T PX) XRWP Se aPZ/ TRQTda _P Td

Alessandro Magi

4da _TP 2T caP 1P Z 5aP ZudacP < PX 6Ta P h*T PX) P TbbP Sa PVX TRQTda _P Td

Balázs Zsámboki

4da _TP 2T caP 1P Z 5aP ZudacP < PX 6Ta P h*T PX) QP Pi b i bP Q ZX TRQTda _P Td