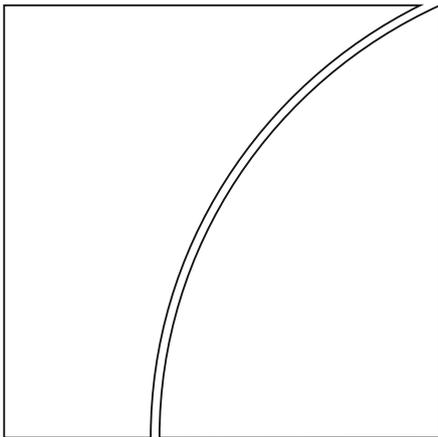


# Basel Committee on Banking Supervision

## Working Paper 39

### The procyclicality of loan loss provisions: a literature review

May 2021



The Working Papers of the Basel Committee on Banking Supervision contain analysis carried out by experts of the Basel Committee or its working groups. They may also reflect work carried out by one or more member institutions or by its Secretariat. The subjects of the Working Papers are of topical interest to supervisors and are technical in character. The views expressed in the Working Papers are those of their authors and do not represent the official views of the Basel Committee, its member institutions or the BIS.

This publication is available on the BIS website ([www.bis.org/bcbs/](http://www.bis.org/bcbs/)).

Grey underlined text in this publication shows where hyperlinks are available in the electronic version.

# Contents

- List of members of the Research Group work stream .....v
- Executive Summary..... 1
- 1. Introduction ..... 5
- 2. Relevant background information ..... 7
  - 2.1 Procyclicality ..... 7
  - 2.2 Interaction of bank regulatory requirements with accounting standards ..... 9
  - 2.3 The time profile of loan loss provisions..... 12
  - 2.4 ECL procyclicality and response to Covid-19 economic downturn..... 13
- 3. Procyclicality under IL standards and nGAAP..... 15
  - 3.1 What were the problems with the IL framework, and how can they contribute to procyclicality? ..... 15
  - 3.2 What evidence is there linking the timing of loss recognition and procyclical lending?..... 16
  - 3.3 Will a more forward-looking accounting regime moderate procyclicality? ..... 17
  - 3.4 What is the evidence on banks’ behaviour under alternative regimes? ..... 19
  - 3.5 What roles do management discretion and incentives play in affecting procyclicality? .....20
  - 3.6 Conclusion .....21
- 4. The Spanish dynamic provisioning regime.....22
  - 4.1 What is dynamic provisioning, and why was it introduced?.....22
  - 4.2 How effective was the Spanish dynamic provisioning regime? .....24
  - 4.3 Conclusions .....26
- 5. Procyclicality under the (C)ECL standards.....27
  - 5.1 Institutional background on (C)ECL accounting.....28
  - 5.2 What suggests that (C)ECL accounting could be more procyclical than the IL regime?.....29
  - 5.3 What suggests that (C)ECL accounting could be less procyclical than the IL regime? .....31
  - 5.4 Estimation methods and assumptions in (C)ECL studies and their impact on procyclicality conclusions .....33
  - 5.5 Conclusion .....35
- 6. Conclusions and suggestions for future work.....36
- References.....39
- List of abbreviations .....45
- Annex .....47



## List of members of the Research Group work stream<sup>1</sup>

Co-Chairs	Ms Fang Du, Board of Governors of the Federal Reserve System Mr Marcus Pramor, Deutsche Bundesbank	
Argentina	Mr Santiago Roberto Coen	Central Bank of Argentina
Brazil	Mr Eugenio Pinheiro	Central Bank of Brazil
France	Mr Clement Martin	Bank of France
Turkey	Mr Emre Per	Banking Regulation and Supervision Agency
United Kingdom	Mr William Francis	Bank of England
United States	Ms Jennifer Rhee Ms Natalya Schenck	Federal Deposit Insurance Corporation Office of the Comptroller of the Currency
Secretariat	Mr Martin Birn	Bank for International Settlements

<sup>1</sup> Comments by other members of the Research Group as well as from other Basel Committee groups are gratefully acknowledged.



## Executive Summary

The recent introduction of expected credit loss (ECL) accounting standards under International Financial Reporting Standard 9 *Financial Instruments* (IFRS 9) and US Generally Accepted Accounting Principles (US GAAP) (Current Expected Credit Losses (CECL)) has impacted the amount and timing of loan loss provisions (LLPs) relative to the previous incurred loss (IL) standards. ECL standards require banks to recognise credit losses projected to crystallise in the future and credit losses already incurred. Recognition of such future losses, however, was generally not permitted under IL standards, which placed significant constraints on this practice. Many contend that the constraints under IL accounting led to a possible 'too little, too late' problem that reinforced the inherent procyclicality of the banking sector and amplified the depth and duration of the 2007–09 financial crisis.

The purpose of this literature review is to shed light on the role that credit loss accounting standards play in affecting procyclicality as viewed from the lens of a prudential policymaker. Accordingly, we take as our starting point the concept of 'procyclicality' considered by the Financial Stability Forum (2009) and BCBS (2010) as being related to the reinforcing interaction between the functioning of the banking sector and the real economy, leading to excessive economic growth during upturns and deeper recessions in the downturns. In this case, procyclicality is the idea that the banking sector, through a variety of channels or 'causal' links with the real economy, can exacerbate economic cycles. This interaction is a major policy consideration, since it can hinder the efficient allocation of resources in the economy and adversely affect credit growth and financial stability. Developing a better understanding of the degree to which IL and ECL standards support (ie strengthen or weaken) these causal links – and, therefore, procyclicality – is a key aim of this literature review.

With this concept of procyclicality in mind, we note that a key expectation of prudential policymakers is that the move from IL to ECL standards should, in fact, address the 'too little, too late' problem and benefit financial stability and the broader economy. This intended effect, however, depends on bank behaviour under the ECL standards, as well as the extent to which ECL standards improve (relative to IL standards) the timeliness and accuracy of loss recognition and increase the transparency of bank balance sheets. These effects are still not well established, making it difficult to assess ex ante the impacts of ECL standards, including the risk of unintended effects. This uncertainty has prompted some to question whether ECL standards might exacerbate procyclicality relative to IL. This question has become especially prominent in light of the coronavirus disease (Covid-19) crisis and its potential consequences for banks' LLPs. One could argue that actions taken by regulatory authorities around the globe to moderate the impacts of ECL standards and facilitate banks' ability to support economic activity during the Covid-19 crisis to some extent acknowledge this question. It is also important to bear in mind that the characteristics of the unforeseen Covid-19 shock plus the additional support measures introduce further challenges for the evaluation of the procyclicality of ECL standards. More robust evidence needs to be established on loss recognition practices under IFRS 9 and CECL and the extent to which these impact bank lending behaviour before a need for regulatory intervention to address procyclicality stemming from accounting standards can be evaluated.

Such a conclusion is based in this paper on a survey of the recent literature on loan loss provisioning that offers both lessons from past experience and initial predictions of likely effects of the new standards. We draw insights from more than 90 theoretical and empirical studies examining the effects of various credit loss accounting approaches (IL, ECL, dynamic provisioning and national GAAP). We focused our review on studies published since the previous major review of the provisioning literature commissioned by the Research Task Force of the Basel Committee on Banking Supervision (BCBS) in 2013/14 (and discussed in BCBS (2015a)), although, for completeness, we discuss several influential papers that were also discussed in that earlier review.

A couple of things are worth highlighting upfront. First, of the more than 90 papers reviewed, only five examined the procyclicality of ECL standards (IFRS 9 and CECL) relative to the IL standards. Two found support for the argument that ECL accounting may be more procyclical than IL accounting, while three found support for the argument that IL may be more procyclical. These papers have been heavily cited by the industry, trade associations and regulatory bodies in the ongoing debate about procyclical effects of ECL standards. While instructive for informing the debate, all remain in the working paper stage and come with caveats that mean their findings need to be interpreted very cautiously.

Second, a key hurdle we faced in the course of our review was that many papers examined different concepts of procyclicality. This variation made it challenging to compare and weigh the merits of findings across studies. In the economics literature, “procyclicality” has originally been used to describe an economic or financial variable’s co-movement with aggregate economic activity. As mentioned, prudential policymakers’ primary concern about procyclicality is a causal feedback loop by which the financial system can amplify the business cycle and possibly lead to financial instability. This distinction is important for this review, as co-movement (including correlation) often arises inevitably, eg through demand effects, and is not a cause for concern, whereas a causal link leading to credit supply shortages is. Accordingly, depending on the concept studied, empirical evidence of procyclicality may or may not be policy relevant. To help interpret insights from this literature review, we include a separate section describing the various concepts of procyclicality typically examined in the literature. We also catalogue (in the Summary Review Table in the Annex) the extent to which the extant empirical research examines the causal-effect concept of procyclicality.

The **main messages** from this literature review are the following:

1. **It is too early for a sound statement to be made as to whether the ECL models under IFRS 9 or CECL will make a difference for procyclicality.** Given that ECL standards have been implemented only recently (IFRS 9 since 2018 and CECL since 2020 with deferrals to 2023 for smaller firms) and that the regulatory capital effects are subject to a phase-in period, there is a lack of empirical evidence on bank behaviour under ECL standards. This gap poses a significant challenge for drawing definitive conclusions about procyclicality. In addition, the ex ante impact studies provide mixed predictions, implying that procyclicality may be more or less pronounced under the new ECL standards. Those studies, however, rely almost exclusively on counterfactual analyses and make not well-established (and sometimes unrealistic) assumptions about bank behaviour under the (new) ECL regimes. Consequently, while providing indicative evidence, results from these studies come with significant caveats and must be interpreted and weighed cautiously at this time. More importantly, no studies actually carry the impact analyses through to the effects on the real economy, which is a gap in the research that needs to be addressed.
2. **There is empirical evidence linking less timely loss recognition practices with lower lending activity during downturns, however, there is only limited direct evidence of a causal link with loan supply.** The evidence suggests that banks with longer delays in loss recognition, under the IL model, tended to reduce lending more during recessions. This impact happens through a “regulatory capital channel”, as banks’ concerns about compliance with such requirements mount during downturns when credit loss recognition grows. Such concerns can affect lending activity as banks act to protect regulatory capital ratios. The literature in this area describes this finding as consistent with procyclicality but offers limited direct empirical support showing a causal link between the timing of loss recognition and lending supply. This limited support is due largely to the inability of studies to disentangle loan demand from supply. We found only one study that addressed this hurdle and showed, under the dynamic provisioning regime of Spain, that a large, one-off (unanticipated) recognition of credit losses, ie increase in provisions, during the height of a downturn can adversely affect the supply of credit and have real economic effects on borrowers.
3. **Research also finds considerable heterogeneity in the extent to which banks delayed loss recognition under the IL approach.** This evidence raises questions about whether there are

more fundamental issues (eg related to management incentives and market and supervisory pressures) with credit loss recognition behaviour that may also persist under ECL standards.

4. **There is evidence that the discretion afforded to banks in how to interpret the IFRS 9 accounting standards also affected lending activity through a transparency channel.** In this case, results support the idea that discretionary LLPs made bank balance sheets less transparent, reducing market confidence in banks' asset quality and capital adequacy, especially during economic downturns, and increasing banks' funding costs. This result might have consequences for broad economic activity if banks can pass on such higher funding costs to borrowers.

This review revealed a number of areas where future research could help shed further light on the question about procyclicality of ECL standards.

1. **Given the expected greater scope for management judgment under ECL standards, it will be important to examine the role that management incentives play in affecting loss recognition practices, including measurement and timing.** Isolating the underlying sources of management behaviour and understanding how each differentially affects banks' accounting choices and, in turn, lending activity are important avenues for future research.
2. **There is a need for research to understand the possible economic costs and benefits that come from potentially enhanced discretion under ECL standards.** Research provides evidence consistent with the idea that discretionary loan loss provisioning has, in the past, been used for earnings and capital management purposes. As previously mentioned, this correlation can imply economic costs to the extent that it makes banks' balance sheets less transparent. Alternatively, this practice also implies economic benefits to the extent that it allows banks to build buffers during good earnings periods and shield capital and lending capacity from downturns. More work is needed to understand these potential trade-offs and, in particular, the economic benefits of greater management discretion under ECL accounting. It may be important to consider how banks' disclosures evolve under the new ECL standards, which give banks greater flexibility in how to estimate expected losses, thereby making it more difficult to compare loss metrics as well as asset quality and capital adequacy measures across banks and over time.
3. **Future research should take into account banks' possible behaviour changes under the ECL standards (eg by providing a prediction model of how banks' lending or capital management practices may change under ECL accounting) when considering the effects of credit loss accounting standards on lending.** The literature that attempts to predict the procyclical effects of ECL standards relies extensively on counterfactual analysis. However, creating a counterfactual sample requires a model to describe how banks might alter their behaviour in response to the proposed change in accounting rules. The research has typically drawn conclusions about these proposed rules making the strong assumption that banks' economic behaviour will not change. Future work should focus on developing satellite models, or integrating findings from other strands of research examining the drivers, of bank lending supply behaviour to help translate the capital impacts of credit loss recognition into impacts on lending supply.
4. **More work is needed to understand the interplay between accounting standards and prudential requirements (eg Pillar 2 and countercyclical capital buffer (CCyB)) and supervisory tools (eg stress tests).** Although the interaction between loan loss provisioning and (Basel) capital requirements has been examined in earlier literature, this research focuses mostly on the role of general provisions under the Basel II capital requirements (which can be included in Tier 2 capital). For example, to our knowledge, little evidence has been provided yet on the interaction of provisioning rules and the excess or shortfall mechanism under the Basel internal ratings-based capital requirements and the consequences for bank lending. Future research is also needed on the interactions of credit loss accounting standards with prudential tools, such as

stress tests, CCyBs and Pillar 2 add-ons, and the way these interactions may amplify or mitigate procyclicality.

5. **Research examining the consequences of banks' forecasting methods, assumptions and underlying behavioural biases (eg "recency bias", where banks overweight more recent conditions and do not consider a wider range of scenarios) for procyclicality will be important.** The inclusion of forward-looking economic forecasts is one of the key distinguishing features in the ECL framework. The flexibility of the ECL standards allows banks to select the duration of reasonable and supportable forecasts, reversion and post-reversion estimation methods and the specific macroeconomic factors driving the forecasts. Among these considerations, understanding the role that commonly used vendor models and official sector's macro forecasts play in affecting systemic risk and financial stability should be included on a future research agenda.
6. **Future research should shed more light on the roles of incentives, enforcement and governance.** There is evidence suggesting that banks were reluctant to disclose loan losses beyond those permitted under IL rules even when they were allowed to do so under alternative disclosure rules. No evidence yet suggests that this issue may also not be relevant under ECL standards, which will work only if banks have an incentive to anticipate and recognise future losses properly, both in upturns and in downturns. More work on understanding banks' reluctance to disclose losses and the underlying forces is needed. Relatedly, enforcement and bank governance are important instruments for future research to study.
7. **Finally, there are lessons to be drawn from the Covid-19 crisis.** In particular, the impacts that regulatory interventions, such as transitional rules (to delay implementation), regulatory guidance on the measurement and reporting of forbearance loans and "significant increase in credit risk", have on credit activity should be examined. Comparative analysis of procyclicality under different accounting standards following the Covid-19 downturn will need to account for different government stimulus programmes and forbearance programmes, which may impact forecasts for several macroeconomic and banking sector variables. Such analyses should also attempt to distinguish forecasting of the "anticipated" turn of the business cycle, which could be reasonably foreseen through the application of selected leading economic indicators, and an exogenous economic shock such as the Covid-19 pandemic.

Overall, the literature review shows that it is too soon to draw definitive conclusions on whether IFRS 9 or CECL may increase or decrease procyclicality relative to the IL framework. This unpredictability is, in part, because we lack a sufficiently long period of experience under either IFRS 9 or CECL with which to draw inferences about bank behaviour, especially around capital management and lending. Still, aspects of the ECL standards, including around the use of, among other things, point-in-time probabilities of default, macroeconomic forecasts, internal models and greater managerial judgment, warrant closer attention going forward.

## 1. Introduction

Accounting standards require banks to evaluate all outstanding loans on a regular basis, establish a provision for loans whose repayment is in doubt and write off amounts deemed irrecoverable. Loan loss provisions (LLPs),<sup>2</sup> together with write-offs, provide important information on loan quality to investors and affect a bank's financial position. Accounting standards provide banks with some flexibility in how to measure and recognise losses. As the recognition of losses often has an immediate effect on bank capital, loan loss provisioning standards may impact lending dynamics, with possible implications for financial stability and the real economy. Their nexus with bank lending and the wider real economy has repeatedly put LLPs in the spotlight and raised policymakers' concerns that credit loss accounting can have unintended, procyclical consequences for the economy. This survey responds to these concerns by reviewing literature on loan loss provisioning that offers lessons from past experience and initial insights about possible effects under the recently implemented International Financial Reporting Standard 9 *Financial Instruments* (IFRS 9) and the Current Expected Credit Losses (CECL) standards under US Generally Accepted Accounting Principles (US GAAP).

After the 2007–09 Global Financial Crisis, the incurred loss (IL) approaches for the impairment of financial assets under the former standards,<sup>3</sup> which had loss event thresholds to trigger loan loss recognition, were widely criticised for delaying recognition of loan losses. This delay disguised weak banks and potentially amplified the decline in lending during downturns. The G20 called on accounting standard-setting bodies to improve standards for the recognition of LLPs in April 2009 (Financial Stability Board (2009)), an objective shared by banking supervision and financial stability institutions.

Accounting standard-setting bodies settled on the concept of expected credit losses (ECLs) as a potential solution to delayed loss recognition.<sup>4</sup> ECLs incorporate not only already apparent losses, but also the possible losses predicted given past events, current conditions and forecasts. In July 2014, the International Accounting Standards Board (IASB) issued the final version of IFRS 9 to provide requirements for the recognition of ECLs on a wide range of financial instruments.<sup>5</sup> After becoming effective on 1 January 2018, the "forward-looking ECL approach" for impairment assessment under IFRS 9 has replaced the "backward-looking IL approach" under International Accounting Standard 39 *Financial Instruments: Recognition and Measurement* (IAS 39). Furthermore, the Basel Committee on Banking Supervision (BCBS) published *Guidance on credit risk and accounting for ECLs* in December 2015 (BCBS (2015b)) to promote consistent interpretations and practices regarding ECL accounting.

<sup>2</sup> The term "loan loss provisions", according to BCBS capital framework terminology, is meaningfully equivalent to the loan loss allowances (reserves) in the accounting frameworks of IL, IFRS 9 and CECL. In accounting frameworks, however, "loan loss provisions" could mean an expense account on a bank's income statement, whereas "loan loss allowances" could mean a contra-asset account on a bank's balance sheet. In this paper, we use "loan loss provisions" in line with BCBS capital framework terminology, and "loan loss allowances" and "loan loss provisions" are used interchangeably.

<sup>3</sup> The referenced IL approach was IAS 39, issued by the IASB, or Financial Accounting Standard No 5: Accounting for Contingencies (FAS 5) (ASC 450-20) and related standards under US GAAP, codified by the FASB.

<sup>4</sup> Although the term "procyclicality" is not explicitly defined in the accounting standards, in the background information section of ASC Topic 326 (CECL), it was noted that "U.S. preparers and auditors supported the development of an impairment model that would address the 'too little, too late' concern. The procyclicality of reserving also was an overriding concern of those stakeholders."

<sup>5</sup> In this paper, we use the terms "financial instruments", "financial assets" and "loans" interchangeably, although these terms may have a different meaning and applicability in various accounting standards and capital regulation.

In the United States, the Financial Accounting Standards Board (FASB) introduced an ECL approach under the CECL methodology in June 2016 (US GAAP Accounting Standards Codification (ASC) Topic 326).<sup>6</sup> The effective dates for CECL implementation range from fiscal years beginning 15 December 2019 to fiscal years beginning 15 December 2022 for different types of financial institutions.<sup>7</sup> CECL replaces the previous IL methodology.

The emergence and rapid spread of the coronavirus disease (Covid-19) outbreak in the beginning of 2020 have made the adoption process of ECL standards much harder because of the difficulty of setting credit risk parameters during an economic downturn without precedent in severity in modern times. Furthermore, the rapidly changing economic forecasts have increased concerns that ECL approaches may worsen procyclicality. Measuring the effects of the pandemic on regulatory capital and comparing the forward-looking ECL allowance with the IL allowance are difficult because of ECL's high dependency on macroeconomic forecasts, model assumptions and managerial discretion. This issue is further complicated by inter- and intra-jurisdictional differences in the permitted ECL transitional measures, which make cross-country comparison virtually impossible.

Despite extensive debate on the procyclicality of credit loss standards, the concept of procyclicality is not consistently defined or understood within the literature. Such incongruity is unhelpful because it causes confusion, makes it difficult to compare results across different studies and runs the risk of drawing incorrect conclusions. In the general economics literature, the term procyclicality has been used to describe a variable's co-movement with aggregate economic activity. Using this concept, some studies that we reviewed argue that IL (or ECL) accounting is procyclical because provisions rise (will rise) during an economic downturn: ie, IL (or ECL) provisions co-move with aggregate activity. These findings could be misleading for this literature review, since focusing on this descriptive, co-movement concept fails to consider the concept of procyclicality that is of most relevance for financial stability. In banking supervisory settings, the concept of procyclicality of most interest refers to the financial (or banking) sector's self-reinforcing mechanism that magnifies fluctuations in business cycles, with risk accumulation in booms and materialisation in busts (Borio (2018)). Policymakers use this concept of procyclicality when describing and highlighting the causal feedback loops between the unintended effects of regulations and the real economy. A large portion of the literature examining the effects of credit loss accounting, however, emphasises the co-movement concept. Empirical studies, in this case, merely test for correlation, say, between loss provisions and economic activity, rather than for evidence of causal links with economic activity. This more descriptive approach is in part due to data limitations and econometric challenges in identifying causal linkages. In conducting this literature review, we have been careful to consider these caveats and set out what they mean for policymakers.<sup>8</sup>

Due to the lack of sufficient comparable data, there is no empirical evidence on whether ECL standards are more or less procyclical compared with the IL standards. Because the adoption of ECL under IFRS 9 and CECL has just occurred in 2018 and 2020, respectively, existing studies on ECL models mostly rely on counterfactual analysis heavily affected by underlying assumptions, eg about banks' capital and dividend policies and estimation methods under ECL, that are sometimes not well established or unrealistic. To remedy this empirical shortcoming, we supplement our survey with empirical literature on the Spanish dynamic provisioning (DP) model to demonstrate the effect of prudential filters on accounting standards as a countercyclical tool. We also draw lessons from studies examining alternative accounting frameworks, which exhibit at least some features similar in spirit to the ECL standards, adopted in Australia and Germany.

<sup>6</sup> For more information, see FASB (2016).

<sup>7</sup> IFRS 9 applies to various types of entities depending on jurisdictions. CECL applies to all banks, savings associations, credit unions and financial institution holding companies, regardless of size, that file regulatory reports for which the reporting requirements conform to US GAAP. We collectively refer to such entities as "banks" or "financial institutions" and use these terms interchangeably in this paper.

<sup>8</sup> The Summary Review Table in the Annex also documents the concept of procyclicality considered in each paper reviewed.

The rest of the paper is organised as follows. Section 2 provides some basic background information to set the scene for this review. It describes the concepts of procyclicality typically examined in the literature, discusses important features of the interaction between bank regulatory requirements and accounting standards, compares the time profiles of loss recognition under IL and ECL models, and discusses regulatory measures taken in response to Covid-19 under the ECL standards. Section 3 examines research on how the previous IL framework contributes to procyclicality and how these effects compare with those under different accounting regimes, including national GAAP (nGAAP). Section 4 describes the Spanish DP regime and reviews relevant papers for policy considerations. Section 5 examines procyclicality under the IFRS 9 and CECL standards by presenting the institutional background behind new ECL regimes and reviews literature that compares IFRS 9, CECL and IL accounting regimes with regard to their impact on the procyclicality of lending. Section 6 concludes. The Summary Review Table of the selected papers in the Annex provides details about empirical analysis, procyclicality definitions and brief findings of these papers.

## 2. Relevant background information

The current survey focuses on the procyclical effects of impairment standards on lending behaviour and the real economy in general and changes in that interrelationship resulting from an adoption of ECL standards in particular. The literature surveyed in the current report makes use of a number of technical concepts and institutional assumptions that can be crucial for the interpretation of stated results but that are often taken for granted and not made explicit. We also found that some of these concepts are not always applied consistently across papers and that underlying assumptions may not capture all institutional ramifications. As these technical details play an important role in evaluating and comparing research papers, we discuss a few key issues concerning terminology and institutional background in the following subsections. Section 2.1 aims to shed light on the diverse usage and interpretation of “procyclicality”, a key concept and focus in this literature survey. Section 2.2 discusses the interaction between accounting standards and banking regulation, which is key to assessing any procyclical impact of impairment standards. In Section 2.3, we illustrate the time profile of LLPs resulting from different impairment standards, which is an important consideration from a policy perspective. Lastly, Section 2.4 discusses industry concerns regarding the application of ECL standards and provides an overview of Covid-19-related measures and announcements by bank regulators and accounting standard setters.

### 2.1 Procyclicality

The dynamic behaviour of economic and financial variables is often described as “procyclical”, a term that has become prevalent in the literature especially since the 2007–09 Global Financial Crisis. Despite the term’s popularity, however, there is no consensus on its definition or interpretation, a fact that is also reflected in the papers discussed in this literature survey.

In the earlier economics literature, the term “procyclical behaviour” implies that a variable’s movement mirrors changes in the business cycle in terms of timing and direction. That purely descriptive definition is silent on the relative size of cyclical movements and on any causal interaction with real economic activity. In the debate on banking regulation, by contrast, and especially in publications by the BCBS and other supervisory bodies, the question of procyclicality reflects policy concerns about unintended consequences of the regulatory framework. Here, the focus is on the lending supply and on a causal feedback loop between the regulatory impact on lending and real economic activity. Under that causal definition, mere co-movement of an economic or financial variable with the business cycle without a causal relationship would be classified as “cyclicality” rather than “procyclicality”.

In the context of LLPs, procyclicality typically refers to fluctuations in bank lending induced by loan loss provisioning standards in a direction that mirrors movements in real economic activity.<sup>9</sup> While papers on LLPs generally share the focus on lending to gauge the impact of provisioning regimes, they show divergence in their assessment of how impairment standards affect the financial and—possibly—real sectors. Rather than suggesting a generally applicable definition of procyclicality, we want to illustrate the wide range of definitions and interpretations found in the literature and draw attention to the importance of making the intended interpretation as transparent as possible.

In economics, the term “procyclical” has historically been used in the context of fiscal policy, as the antonym of “countercyclical” dynamic behaviour. In an early reference, describing historical fiscal positions in the United States, Firestone (1960) observes that “government expenditures rose throughout the expansion phase and fell during the first half of the contraction”, a pattern labelled “procyclical” in the corresponding book review by Culbertson (1962). In their textbook on macroeconomics, Abel and Bernanke (1995) explicitly define the term – “An economic variable that moves in the same direction as aggregate economic activity (up in expansions, down in contractions) is procyclical” – and show a list of economic and financial variables falling under that definition. Lane (2003) even accounts for the amplitude of the co-movement and labels as “weakly procyclical” a series that “varies positively but less than proportionately with output fluctuations”. Therefore, the historical backdrop lends support to the prevalent interpretation of procyclicality as a description of co-movement rather than causal linkage, particularly in the economics research literature.

The Financial Stability Forum (FSF) (2009) has defined the causal interpretation of “procyclicality” adopted by policymakers as “[mutually reinforcing] dynamic interactions (positive feedback mechanisms) between the financial and the real sectors of the economy [that] tend to amplify business cycle fluctuations and cause or exacerbate financial instability”. The distinction between mere co-movement and a causal effect of lending dynamics on the business cycle is of considerable importance in evaluating the performance of loan loss provisioning standards. Lending volumes will tend to move in parallel with economic activity, regardless of provisioning regimes, due to changes in loan demand. Similarly, the financial asset quality reported on banks’ balance sheets will be of less concern under benign economic conditions, as borrowers generate more profits and are more likely to repay their loans. Thus, any accounting standard that provides a “true and fair view” will necessarily entail LLPs that tend to be lower in economic expansions than in recessions. Hence, the finding of a procyclical co-movement of lending volumes with economic conditions is, in itself, not a cause for concern, least of all from an accounting standards perspective (cf Novotny-Farkas (2016)). More relevant to policymakers are circumstances under which accounting standards amplify lending dynamics so materially that the standards may cause or exacerbate loan supply shortages during downturns. While loan supply and its causal interaction with the real economy are the key focus of policymakers, both are hard to identify empirically. Not only is separating lending supply from lending demand difficult in observed loan data, but the need to show and quantify the effect of loan supply on the real economy also places high demands on both data sources and identification strategies. These specific challenges may explain why the “co-movement” approach to procyclicality is predominant in the empirical literature despite its higher level of uncertainty regarding the magnitude and direction of reported feedback effects. In fact, showing the co-movement between two variables “x” and “y” is a necessary, but not sufficient, condition for identifying a causal relationship. Establishing that changes in “x” *cause* changes in “y” significantly sharpens the analysis by pinning down the direction of the impact and allaying concerns about the role of confounding factors.<sup>10</sup>

Selected papers reviewed in this literature survey are aggregated in the Summary Review Table (see the Annex). The list of papers included in that table is limited to studies containing original empirical

<sup>9</sup> The implicit focus on lending—rather than on LLPs—is also reflected in the usage of the misnomer “procyclical” provisioning standards, as procyclical lending dynamics are, in fact, the result of countercyclical LLPs (that rise in downturns and fall during economic expansions).

<sup>10</sup> For a more rigorous definition and discussion of causality, see Pearl (2009).

analysis focusing on IL, DP or ECL (CECL and IFRS 9) impairment standards. As a key contribution, the table summarises the various definitions of procyclicality used in empirical studies, distinguishing between co-movement and causal interaction, and lists the variables whose behaviour has been explicitly modelled and analysed in each case. All of the 37 research papers included in the Summary Review Table rely on a co-movement concept of procyclicality in their empirical implementation. While some of these papers refer to a causal definition of procyclicality in their discussion of the literature, none actually attempt to identify causal effects. Given that all of the papers presented in this literature survey rely on the co-movement interpretation of procyclicality, we do not adhere to the distinction between “cyclicality” and “procyclicality” commonly applied in banking regulation but use the two terms synonymously instead. Despite the focus on the lending impact in the policy debate on the procyclicality of LLP, only 14 papers in the table offer a quantitative analysis of lending, whereas 29 papers empirically analyse LLP (nine papers analyse both LLP and lending). Moreover, only 10 papers empirically investigate bank capital, in addition to LLP (five), lending (two) or both (three). Given the importance of lending in evaluating the policy implications of impairment standards, we consider a study that explains or models the lending behaviour quantitatively as providing stronger supporting evidence on procyclicality than a study that analyses only LLP, capital or both. Though most papers share the focus on LLP or lending, there is significant variation in the statistical approaches to measuring the degree of procyclicality across papers. The more basic quantitative techniques include graphical representations (eg Covas and Nelson (2018)) and descriptive statistics; estimation of the variability of, for example, lending (eg Loudis and Ranish (2019)) or LLP (eg DeRitis and Zandi (2018)) or computation of the correlation of lending or LLP with the business cycle (eg Jiménez et al (2017)). These approaches are predicated on the co-movement interpretation of procyclicality and figure most prominently in the literature on IFRS 9 and CECL.

A more robust and frequently used approach relies on regression analysis, in which the coefficient on a key regressor encapsulates the research hypothesis and the inclusion of a sufficiently rich set of control variables helps minimise distorting effects (eg Bushman and Williams (2012)). Not only coefficient estimates, however, but also estimation details such as the “goodness of fit” can provide valuable information to the analysis (eg as a basis for the “delay in expected loss recognition” in Beatty and Liao (2011) or Bushman and Williams (2015)). Finally, models based on calibrated parameters such as recursive ratings-migration models (eg Abad and Suarez (2018)) or dynamic stochastic general equilibrium (DSGE) models (eg Agénor and Zilberman (2015)) can provide a good basis for identifying specific effects (“transmission channels”), as well as for counterfactual analyses. However, calibrated models do not derive their key parameters directly from observed data and rely more heavily on assumptions about banks’ policies and estimation methodologies under ECL. Hence, results from these models crucially depend on the suitability and implementation of the assumptions used to represent the specific research hypotheses in question.

In evaluating the degree and source of procyclicality, it is important to compare the findings for a specific data set and impairment standard with a relevant benchmark. Without such benchmarking, establishing whether or not observations from the data constitute a cause for concern will be challenging. It is important to keep in mind that – while arguably desirable under financial stability considerations – accounting standards do *not* aim to actively lean against the credit cycle by effecting any kind of buffer element in LLAs. As the distinction between accounting standard setters’ and prudential regulators’ objectives is crucial for accurately assessing the performance of impairment standards, we provide a brief discussion of key considerations in the next section.

## 2.2 Interaction of bank regulatory requirements with accounting standards

Accounting standards are set independently of bank regulatory requirements, and each pursues different objectives. On the one hand, the fundamental objective of accounting standards is to provide information that is useful to existing and potential investors, lenders and other creditors in making investment, credit

and similar resource allocation decisions (FASB (2018) and IASB (2018)). This objective pertains to general-purpose financial statement reporting for all firms, regardless of whether firms in a particular industry may also be subject to regulation that uses such information as an input, such as the banking industry. Importantly, the FASB and the IASB indicate that, while regulators and members of the public other than investors, lenders and other creditors may find such financial reporting information useful, each clearly states that those are not the parties to whom such financial reports are primarily directed. On the other hand, the primary objective of bank regulatory requirements is prudential: to mitigate risks to the safety and soundness of individual banks and to the stability of the financial system more broadly.<sup>11</sup>

While there may be some overlaps in objectives, the accounting standard setters do not explicitly consider the effects of standards and financial reporting on financial stability. Indeed, the FASB in its deliberation of ECL approaches noted that it is not well equipped to address the financial stability objective within its accounting standards (FASB (2010)). At the same time, however, it also noted that providing relevant and faithfully represented financial information can improve users' confidence in the information and, thus, help promote financial stability.

Despite these differing objectives, the regulatory framework uses financial reporting figures as inputs and, thus, is directly affected by accounting standards and definitions. Moreover, this interaction between accounting standards and prudential requirements can create linkages to the real economy and is thus of particular relevance for the discussion of procyclicality. Impairment standards, for instance, have an impact on regulatory capital, and the compliance with capital requirements is an important consideration for banks in deciding on their lending policies. Thus, the effect of impairment standards on the financial and real sectors also depends on the regulatory framework. In fact, empirical evidence for the United States suggests that there were no significant reductions in credit supply during recessions before the introduction of the 1988 regulatory capital requirements, despite the presence of impairment standards (Beatty and Liao (2011)). However, the impact of regulatory capital requirements on lending dynamics is not driven by impairment standards but rather appears to depend on details of the regulatory framework itself (EBA (2016)).

The ECL methodology underlying IFRS 9 and CECL shares important elements with the regulatory risk-based capital framework, specifically for banks using the internal ratings-based (IRB) approach. Both the ECL and IRB methodologies are based on internal models and employ risk parameters,<sup>12</sup> which, under the IRB approach, are the basis not only for minimum capital requirements that safeguard against unexpected losses, but also for computing a prudential expected loss (EL). Despite some commonalities in methodology, a key difference between accounting ECL and prudential EL lies in the estimation and time horizon of risk parameters. Owing to the difference in objectives between accounting standards and banking regulation, ECL impairment standards require point-in-time (PIT) estimates of risk parameters for their ECL calculations, while prudential EL is typically based on through-the-cycle (TTC) or hybrid estimates of probabilities of default (PDs) (cf Graph 1 and Novotny-Farkas (2016)) and on loss-given-default (LGD) estimates reflective of downturn conditions. While ECL estimates reflect the lifetime of a financial asset under both CECL and Stages 2 and 3 of IFRS 9, prudential EL is always based on a one-year horizon. The prudential EL estimate under the IRB approach acts as a floor for the impact of accounting LLAs on regulatory capital, since any shortfall of accounting loan loss reserves relative to prudential EL is deducted from Common Equity Tier 1 (CET1) capital, thus effectively earmarking a non-distributable portion of regulatory capital to cover expected credit losses. In general, that prudential filter could reduce LLP procyclicality, as it may help protect regulatory capital during economic expansions when PIT-based LLAs may fall below the TTC- or hybrid-based prudential EL. Similarly, when accounting ECL exceeds prudential

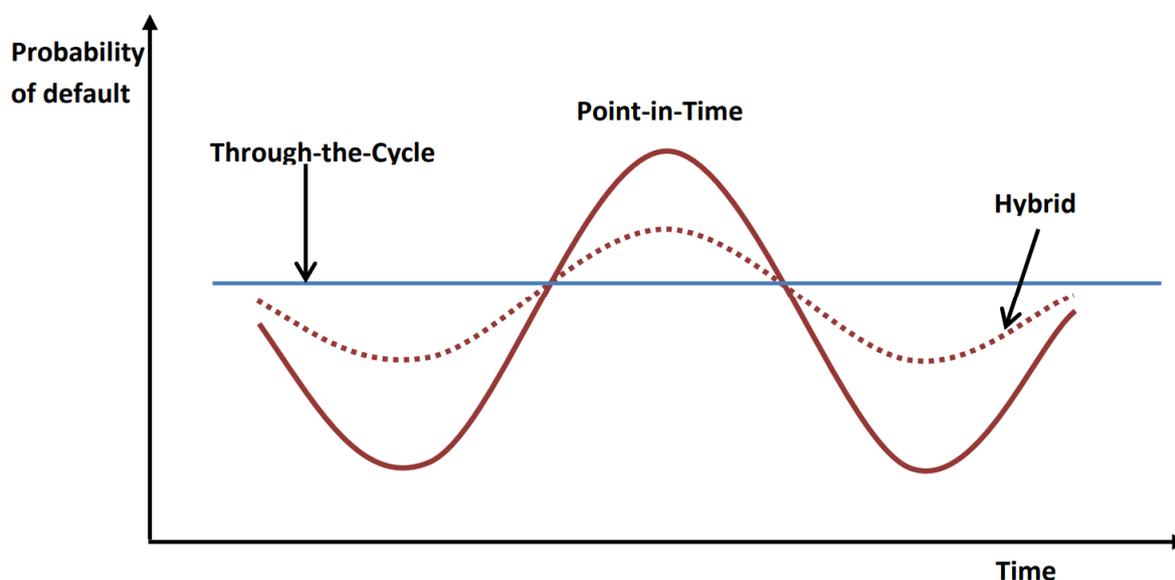
<sup>11</sup> See Basel Committee BCP01.13.

<sup>12</sup> While the IRB approach stipulates a number of key details of the prudential modelling framework, both IFRS 9 and CECL define only relatively broad requirements for the implementation of the ECL methodology.

EL (which is more likely the case during recessions), the surplus is added to Tier 2 capital, subject to a cap. A comparison of the dynamics of TTC, hybrid and PIT PDs is shown in Graph 1.

Through-the-cycle vs point-in-time PD

Graph 1



Source: Novotny-Farkas (2016) as adapted from Van Doorsselaere (2015).

There is no EL estimate specified under the standardised approach to credit risk in the Basel framework so that the amounts and dynamics of LLPs always affect regulatory capital directly. Thus, we should expect to see a differential impact on regulatory capital when impairment standards switch from IL to ECL models, depending on whether the IRB or the standardised approach is applied. That difference will not only affect standardised approach banks vis-à-vis IRB banks, but will also distinguish standardised approach portfolios held by IRB banks (an option referred to as “permanent partial use”) from the IRB part of lending. For instance, under the European Union’s Capital Requirements Regulation (CRR), IRB banks are allowed to hold sovereign exposures under the standardised approach, which assigns a zero risk weight to sovereign debt of European Union member states (see Novotny-Farkas (2016) for details). For such exposures, LLAs can make a major difference, as there will be no regulatory minimum capital requirements. In particular, sovereign lending assigned to Stages 1 or 2 of IFRS 9 will result in LLAs that did not exist under IAS 39, so in this case, accounting standards require additional capital and may have a direct impact on lending behaviour.

A special case of a prudential adjustment to accounting standards is the DP framework implemented in Spain, which requires banks to hold a countercyclical reserve in the form of a general LLA on top of the specific LLAs mandated by IFRS. As DP is a prudential requirement, the sole aim of the countercyclical add-on is to reduce the amplitude of the lending cycle. The dynamic reserve is fully disclosed and reflected in banks’ financial reporting, which leads to an interference with accounting standards and their objectives, as IFRS 9 in Spain does not permit for general provisions.

Changing impairment rules from IL standards to ECL standards (IFRS 9 and CECL) will in general result in an increase in LLAs, due in part to a longer time horizon of the LLA estimate. In order to cushion the first-time implementation impact on regulatory capital, banks were given the option of making use of

a transition arrangement that allows for a partial add-back of the incremental LLAs to regulatory capital.<sup>13</sup> Since the impact of LLPs on bank capital is of particular importance to bank regulators, the transition arrangements have subsequently been adjusted to account for the impact of the Covid-19 crisis, on which we will provide more details in the following two subsections. As there is no empirical evidence on the economic effect of ECL provisioning standards yet, any potential interaction of regulatory requirements with ECL accounting standards remains for future empirical research.

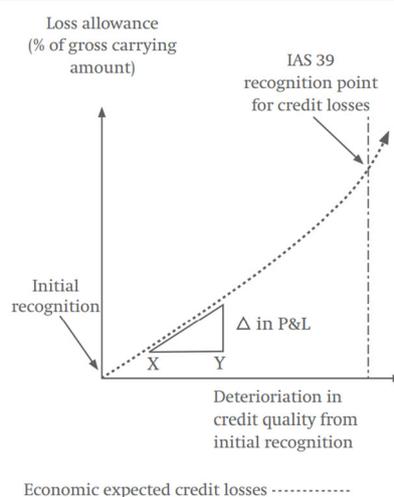
### 2.3 The time profile of loan loss provisions

The debate on the performance of impairment standards is often centred on the occurrence of large movements in LLAs, such as the much-cited cliff effect between Stages 1 and 2 of IFRS 9. While the specifics of impairment standards certainly influence both the timing and the size of LLP charges, the fact that LLPs are normally recognised only at reporting dates (ie at quarterly frequency in most jurisdictions) has an important impact on the time profile of LLAs, too. The adjustment of LLAs only at reporting dates will result in discrete and potentially sizeable movements even under impairment standards that apply a continuous mapping of loan quality to LLAs (such as CECL). As the criticism of creating a cliff effect is typically levelled at IFRS 9 only, it is instructive to compare possible time profiles under IFRS 9 with those under CECL and the previous IL standards.

The discrete change in LLAs between reporting dates is illustrated in Graph 2, where the dotted line depicts an earlier impairment standard proposal by the IASB labelled “Economic ECL”, which largely resembles a fair-value approach to EL recognition (IASB (2009)).<sup>14</sup> The change in credit quality between two consecutive reporting dates is depicted by the horizontal distance between “X” and “Y”, with the resulting LLP charge given by the corresponding vertical distance. The actual time profile of LLAs will always resemble a step function, with a more rapid deterioration in credit quality leading to a wider distance between “X” and “Y” and, hence, to a larger LLP charge (a single step is depicted in Graph 2). The graph also illustrates that, under IL standards (IAS 39), a change in LLAs would obtain only once the deterioration in credit quality reaches the IAS 39 recognition point, resulting in a substantive LLP charge.

Stepwise adjustment of loan loss allowances

Graph 2



Source: IASB (2013), p 8.

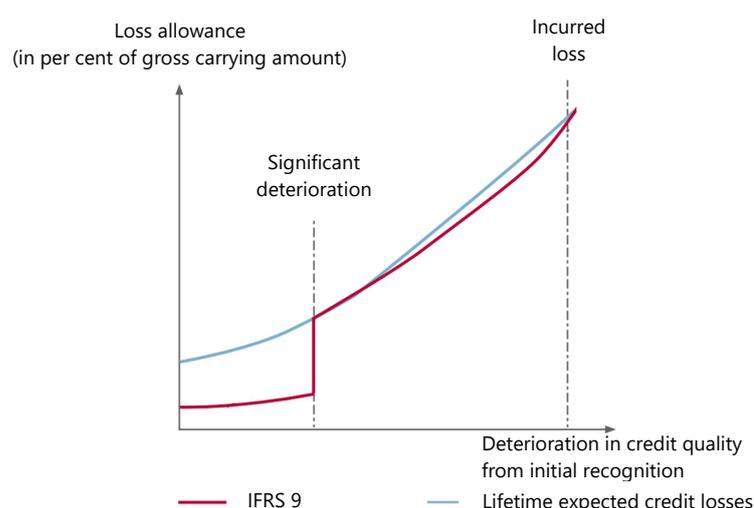
<sup>13</sup> As previous literature points out (see Section 3 of this paper), interactions between accounting and prudential standards create a link to the real economy through the capital (compliance) channel.

<sup>14</sup> The ECL model in IASB (2009) closely aligned the LLA with an economic valuation of loan quality but presented operational challenges that ultimately led to the adoption of the model in IASB (2013) instead.

The mapping functions from credit quality to LLA for IFRS 9 (red line) and CECL (blue line) are illustrated in Graph 3. A move from Stage 1 to Stage 2 under IFRS 9, a so-called significant increase in credit risk (SICR), with a corresponding shift from 12-month to lifetime ECL is shown as a jump in the mapping function. The graph also shows, however, that for a loan whose credit quality changes within Stage 2 (Stage 1), the changes in LLAs under IFRS 9 will be identical (very similar) to those under CECL. Moreover, it can be seen that concerns about a cliff effect would be larger under the previous incurred loss standards (punctuated vertical line), which would typically not allow for an LLP charge before a substantial deterioration in credit quality has occurred (eg Abad and Suarez (2018), Kund and Rugilo (2018)). Therefore, while the cliff effect around an SICR will lead to larger discrete changes in allowances under IFRS 9 than under CECL, it is still a significant improvement over the time profile of LLAs under IL standards, as it starts the build-up earlier in the economic cycle and thereby results in more frequent but smaller discrete changes in allowances. Caution is required for transitioning from IL to ECL standards, however, as, for instance, the occurrence of a recession during the transition period could lead to a jump in LLAs when the forward-looking elements of ECL impairment take effect too late to ensure a gradual adjustment. In that case, the risk of a cliff effect would arise also under CECL and not just under IFRS 9.

IFRS 9 and lifetime expected credit losses (CECL)

Graph 3



Source: adapted from IASB (2013), p 9.

Graph 2 and Graph 3 also provide an indication of how LLAs may change in a crisis scenario affecting credit quality. In a crisis, we would expect to see a larger-than-normal share of loans advance to Stages 2 and 3. As the transition would also occur more rapidly, the size of discrete changes in LLAs between reporting dates should increase considerably. However, the more that loans move to Stage 2 under IFRS 9, the less pronounced the difference in the overall level of allowances between IFRS 9 and CECL. Similarly, a higher share of loans advancing to Stage 3 will tend to reduce the difference in overall allowances between IFRS 9 and CECL, on the one hand, and IL standards, on the other hand.

## 2.4 ECL procyclicality and response to Covid-19 economic downturn

Given the very recent introduction of IFRS 9 and CECL, Covid-19 has been the first global crisis situation affecting the new ECL impairment standards. As both accounting standard setters and financial regulators are well aware of the potential impact on the dynamics and level of overall LLAs and bank capital, a number of recommendations and ad-hoc measures have been announced to cushion the effect of Covid-19 on bank balance sheets. While the recommendations primarily seek to avoid unwarranted or premature

transitions to higher stages, the ad-hoc measures are mainly focused on preserving loss absorbance capacity.

For example, the Basel Committee on Banking Supervision announced that banks should consider the extraordinary support measures when they calculate their ECLs, and agreed on amendments to the transitional arrangements for the regulatory capital treatment of ECLs (BCBS (2020)). On 20 March 2020, the European Central Bank (ECB) recommended that banks avoid “excessively procyclical assumptions” to determine provisions.<sup>15</sup> The ECB therefore expected that, within the framework provided by international accounting standards, banks give a greater weight to long-term macroeconomic forecasts based on historical information when estimating long-term expected credit losses for the purposes of IFRS 9 provisioning policies, in particular where banks face uncertainty in generating reasonable and supportable forecasts. Banks were also expected to consider that forbearance and other economic relief measures do not automatically compromise credit quality. The Coronavirus Aid, Relief, and Economic Security (CARES) Act passed by the US Congress and signed into law on 27 March 2020, among other economic assistance measures, included “temporary relief from CECL standards”.<sup>16</sup> The Board of Governors of the Federal Reserve System, the Office of the Comptroller of the Currency and the Federal Deposit Insurance Corporation issued a final rule providing an optional five-year transition instead of the existing three-year transition the banking agencies issued in 2019. This extended transition period roughly offsets the impact of CECL on regulatory capital ratios for the first two years (Board of Governors (2020)).

Concerns about IFRS 9 and CECL procyclicality have been renewed following the economic downturn induced by the Covid-19 outbreak in the first quarter of 2020. The uncertainty of forecasting such an exogenous shock has seemingly provided support to the views expressed before ECL implementation that new forward-looking ECL approaches may worsen procyclicality.<sup>17</sup> However, when the National Bureau of Economic Research declared the start of the recession to be in the first quarter of 2020 in the United States due to the Covid-19 pandemic, it recognised that this downturn has different characteristics and dynamics than previous recessions.<sup>18</sup> Under these conditions, any forecast of changes in the business cycle would be nearly impossible.

Existing studies of ECL procyclicality detailed in Section 5 of this paper do not include the impact of such a “black swan” exogenous shock resulting from the worldwide public health emergency. Future research in this area will have to consider the characteristics of the Covid-19-induced economic shock, as well as the impact of government economic assistance measures, and relief from accounting standard setters and banking supervisory authorities. Comparative studies of IFRS 9 and CECL procyclicality could focus on the cliff effect and impact of implementation timing relative to the Covid-19 economic downturn: IFRS 9 during relatively benign economic conditions (the first quarter of 2018) and CECL during the onset of the downturn (the first quarter of 2020 for some banks). At this time, with the broad impact of economic stimulus on borrowers’ default risk and, in turn, on provisioning, the implications of a Covid-19 economic downturn for ECL procyclicality remain uncertain.

<sup>15</sup> See ECB (2020).

<sup>16</sup> The act is available on the US Congress website at [www.congress.gov/116/plaws/publ136/PLAW-116publ136.pdf](http://www.congress.gov/116/plaws/publ136/PLAW-116publ136.pdf).

<sup>17</sup> More information can be found in Blakeslee and King (2020).

<sup>18</sup> For additional details, see NBER (2020).

### 3. Procyclicality under IL standards and nGAAP

This section describes how IL accounting standards contribute to procyclicality. We begin by explaining the fundamental problems with the IL framework. We then summarise empirical evidence from a few of the most prominent studies examining the effects of IL standards on bank lending.<sup>19</sup> We follow this summary with a discussion on what the theory and empirical evidence suggest about the procyclical impacts of backward-looking regimes, similar in spirit to the IL framework, versus forward-looking regimes, more consistent with IFRS 9 and US GAAP CECL. Finally, we discuss research examining the role of management discretion and incentives in influencing the timing of loss recognition and the implications these have for procyclicality. Along the way, we offer suggestions for future research.

#### 3.1 What were the problems with the IL framework, and how can they contribute to procyclicality?

Following the 2007–09 financial crisis, concerns were raised about the IL method of credit loss accounting and, in particular, about the timeliness of banks' recognition of loan loss expenses under that method. Such concerns prompted the IASB and the FASB to replace the existing IL methods of credit loss accounting with more forward-looking EL methods. The IL framework required banks to assess whether there was any objective evidence (a "loss event") that a financial asset or group of financial assets (such as a loan or a group of loans) had suffered a loss based on economic conditions as of the reporting date. The IL framework specifies that loan losses could be recognised only when a loss was probable based on past events and conditions existing at the financial statement date. This specification effectively meant that only if there were objective evidence that an impairment loss on a loan *had been incurred* was a bank permitted to recognise such loss and establish a loss reserve. Under the IL framework, losses expected as a result of future events were not recognised.<sup>20</sup>

The IL method, as a result, made the timing of banks' credit loss recognition, provisioning behaviour and capital adequacy heavily dependent on the state of the economic cycle. Studies show that, under the IL framework, loss provisions are lower during economic upturns and higher during downturns, consistent with the co-movement concept of procyclicality discussed earlier (eg Bikker and Metsemakers (2005)). This relationship adversely affected banks' capital adequacy and, therefore, lending capacity during the trough of the economic cycle, exactly when the ability of banks to raise additional capital is most challenged. Here, the implication for procyclicality is that this adverse impact on banks' lending capacity during downturns can lead to a "credit crunch" more widely, which can add to the depth and duration of the downturn. In the case of economic upswings, implications for procyclicality related to the IL model arise, as lower provisions under the IL model can lead banks to underestimate the risk, ie cost of new lending. This underestimation, in turn, can lead to loan interest rates that are too low and credit supply that is too large, fuelling the build-up of further risks during the upswing.

Several studies have examined the link between the timing of loss recognition and bank lending under the IL framework. These papers are motivated by the "capital crunch" theory, which posits that banks

<sup>19</sup> We intentionally limited our review to a small number of the seminal studies examining the impact of IL standards, including several discussed in BCBS (2015a).

<sup>20</sup> The use of the term "expected" throughout this subsection may be quite confusing for non-specialist readers. Fundamentally, for each loan issued, there is a non-zero probability of losses, so, in a sense, losses can be interpreted as "expected". The term is used in much of the academic literature examining the IL model. It is also used in describing the IL and ECL standards, but there are subtle differences between the two. The difference relates to the recognition (timing) and the allocated (measured) amount. IAS 39, for instance, explicitly stated that "losses expected as a result of future events, no matter how likely, are not recognized" (paragraph 59).

may restrict lending in response to capital inadequacy or anticipation of capital adequacy concerns (eg Bernanke and Lown (1991), Van den Heuvel (2002)). The basic intuition underlying this theory is as follows. When a bank delays recognition of expected loan losses, it creates an overhang of unrecognised losses that carries forward to the future. Such loss overhangs can increase capital adequacy concerns during economic downturns by compromising the ability of loan loss reserves to cover both recessionary loan losses and loss overhangs from previous periods. The timing of loss recognition can have a direct impact on a bank's ability to meet regulatory capital requirements. In response to the *regulatory capital channel*, banks can take several actions to rebuild capital ratios, including cutting lending supply.

The timing of loss recognition can also have an indirect impact on bank lending and procyclicality through a *transparency channel*. That is, less timely loss recognition can make banks' balance sheets more opaque, thereby increasing investor uncertainty and reducing market confidence about banks' asset quality and capital adequacy, especially during crisis periods (Haldane (2011)). In this case, higher equity-financing frictions associated with less timely loss recognition can restrict access to new equity financing and exacerbate banks' capital adequacy concerns by hampering efforts to replenish capital levels depleted by recessionary losses. Diminished transparency arising from less timely loss recognition can also impact the availability and cost of funding supplied to banks (eg Kashyap and Stein (2000), Hanson et al (2011) and Ratnovski (2013)), with consequences for banks' credit supply to the real economy more widely.

### 3.2 What evidence is there linking the timing of loss recognition and procyclical lending?

To investigate whether the timeliness of loss recognition affects lending activity, studies rely on cross-bank variation in accounting policy choices (about provisioning). They do so by exploiting differences in the discretionary application of the IL accounting rules across US commercial banks and across countries in order to estimate the extent to which banks *delay* loss recognition in current provisions. **Beatty and Liao (2011)**, for example, examine whether delays in loss recognition have an effect on banks' willingness to lend. While lending is generally more sensitive to regulatory capital constraints during recessions, the authors claim that loan loss provisioning rules may magnify this effect, which is even more pronounced if banks delay the recognition of losses until an economic downturn materialises. In this case, loan loss reserves may be too small to cover credit losses during recessions, so higher provisioning would be required, which, in turn, reduces capital adequacy and banks' capacity to lend.

**Beatty and Liao (2011)** document that banks with longer delays in loss recognition tend to reduce their lending more during recessions. They also show that such banks are more frequently affected by the capital-crunch effect during recessions than banks with shorter delays in loss recognition practices. The authors also find evidence that banks with shorter delays increase their pre-provision equity more during non-recessionary periods and reduce their pre-provision equity less during recessions, compared with banks with longer delays in EL recognition. This result suggests that banks with shorter delays are better able to avoid shrinking their lending activities during recessions without increasing their regulatory capital adequacy concerns. They interpret this finding as evidence indicating that longer delays in loss recognition practices can reduce (amplify) lending activity during economic downturns (upturns), consistent with the co-movement concept of procyclicality discussed earlier. Interestingly, however, the authors do not provide any evidence of a relation between procyclicality in lending and the capital ratio in the period before the introduction of formal capital regulation in the United States in 1982. This result suggests that regulatory capital requirements combined with longer delays in loss recognition practices bear the risk of contributing to a credit-crunch effect during recessions.

**Bushman and Williams (2012, 2015)** analyse the degree to which delayed loss recognition increases capital adequacy concerns and equity financing frictions as drivers of banks' balance sheet contraction during downturns. Their results show that delayed loss recognition coincides with loss overhang that may lead to capital inadequacy in downturns. Moreover, they document evidence that delayed loss recognition is linked with stock market illiquidity costs that increase equity financing frictions

due to lower bank transparency. Through these factors, they argue that longer delays in loss recognition practices are associated with banks contracting their balance sheets and reducing lending activity during downturns.

Overall, while these papers do not directly address the debate on whether ECL models address procyclicality (of bank lending), they shed some light on this issue by taking advantage of the variation within IL models. They show that the timeliness of LLPs, often in conjunction with the need to meet a regulatory capital constraint, emerged in the literature as an influencing factor of lending activity.<sup>21</sup> If it is the case that ECL models are more forward looking and result in more timely (ie less delayed) loss recognition, then they may have the potential to be less procyclical.

At the same time, however, the findings from these papers come with several caveats and need to be weighed cautiously in the debate about procyclicality. First, each does not explicitly exclude that there is a correlated omitted variable problem. For example, it could be that some banks (i) have more conservative management that simply tends to recognise losses earlier or (ii) have more equity but hesitate to cut credit supply during downturns because they want to maintain stable relationships with customers. In those cases, the nature of management may be driving the results and not the smaller delay in loss recognition. Second, it is not clear whether the demand and supply effects in the lending markets are adequately disentangled. Unless this is the case, the results may also reflect a general decline in demand during economic downturns. Third, as pointed out by **Beatty and Liao (2014)**, neither study considers how bank (lending) behaviour may change in response to a change in the accounting rule. This shortcoming makes drawing inferences about behaviour under ECL standards from behaviour under the IL standards difficult. Fourth, in a similar vein, the studies' reliance on cross-sectional data (and, therefore, behaviour under the IL regime) may suffer from self-selection bias associated with those banks choosing more timely loss recognition under the IL regime. As a result, it is not clear that requiring banks to recognise losses on a timelier basis under ECL models will have the same effect. This lack of clarity makes it difficult to argue that findings on the relationship between the timeliness of loss recognition and lending under the IL regime are useful for making inferences about bank lending behaviour under ECL standards. Future research needs to explore these issues and establish more firmly whether there is a causal link between loss recognition (ie loss provisioning) and bank lending.

### 3.3 Will a more forward-looking accounting regime moderate procyclicality?

Several papers take steps toward addressing these issues and provide some initial insights into how more forward-looking ECL models may mitigate lending procyclicality. **Bouvatier and Lepetit (2012)** is a theoretical study undertaken in the immediate aftermath of the 2007–09 crisis, when IAS 39 was still in place, and specifically examines the question of whether provisioning practices affect the cyclicity of bank lending. The paper takes a partial equilibrium approach, focusing on the effects of provisioning rules on loan market fluctuations. It demonstrates theoretically that a backward-looking provisioning system amplifies the procyclicality of bank lending. It also shows that a forward-looking provisioning system (eg based on statistical provisioning) smooths the evolution of total loss provisions and eliminates the procyclicality of loan market fluctuations. Interestingly, the paper also demonstrates that procyclical bank lending can be removed with a capital buffer system (similar in spirit to the countercyclical capital buffer (CCyB) now part of Basel III), but the solution implies large variation in banks' equity. Their results support the implementation of a forward-looking provisioning system to address procyclicality.

<sup>21</sup> **Wheeler (2019)** explores a third channel through which LLP accounting can affect bank lending behaviour and procyclicality. In particular, using data on US banks' supervisory evaluations, he provides evidence that loan loss accounting affects lending through its impact on regulatory actions. Regulators are more likely to place banks with inadequate loan loss allowances under enforcement actions that restrict lending, leading these banks to lend less during downturns.

**Agénor and Zilberman (2015)** focus on addressing the question of whether switching from an IL to an EL framework will mitigate procyclicality. In particular, they examine the interactions between loan loss provisioning regimes (IL and EL) and business cycle fluctuations, using a DSGE model. Importantly, their full general equilibrium analysis addresses the shortcomings of the partial equilibrium analysis of Bouvatier and Lepetit (2012). In their analysis, IL provisions are triggered by past-due payments, while EL provisions are proxied by a dynamic (ie statistical provisioning) system that considers both past-due payments and expected losses over the whole business cycle. Numerical experiments show that a dynamic provisioning regime is effective in mitigating procyclicality, and the results support the implementation of a forward-looking provisioning system to address procyclicality. A key caveat of this study, however, is that it does not consider capital requirements alongside provisioning and how they interact. The authors also note that capital buffers may be considered as an alternative to dynamic provisions, but the introduction of an EL regime along with a capital buffer regime, such as that proposed under Basel III, could change bank behaviour. This development could happen if the reasons that banks hold (excess or voluntary) capital buffers are affected by the EL regime and if such capital buffers have a signalling effect that influences borrowing costs. The authors conclude that understanding the interaction between bank capital requirements and the new credit loss accounting standards and the implications for banks' lending and procyclicality should be high on the research agenda.

**Agénor and Pereira da Silva (2017)** attempt to address the question of how the interaction between capital requirements and credit loss accounting standards affects lending. In particular, they examine the extent to which alternative forward-looking loss regimes combined with countercyclical reserve requirements (in the spirit of a CCyB) mitigate procyclicality of the financial system. They undertake an analytical study to evaluate the optimal combination of forward-looking provisioning rules and countercyclical reserve requirements in a DSGE setting. They show that cyclically adjusted (ie dynamic) provisioning is effective in mitigating procyclicality and financial volatility in response to financial shocks. The key implication is that the simultaneous use of cyclically adjusted provisioning and countercyclical reserve requirements does not improve (at the margin) the ability of either to mitigate procyclicality and financial volatility. That is, they are not complements in that a combination does not help achieve lower financial volatility than using either one separately; and optimal provisioning rules (that consider changes in nonperforming loans and cyclical output) perform better in terms of damping macroeconomic and financial volatility. The performance of, and interactions between, countercyclical capital rules and cyclically adjusted provisioning rules are still not well established and, therefore, remain important issues for further research.

In addition to these theoretical papers, there is some empirical evidence on banks' behaviour under backward- vs forward-looking LLP regimes that could help inform the debate about the relative procyclicality of EL versus IL models. Using a cross-country sample of banks and survey information on country-specific provisioning practices, **Domikowsky, Foos and Pramor (2015)** examine the association between lending activity and provisioning characteristics. The authors include a variety of country-specific macroeconomic variables corresponding to the coverage in the international bank-level data. Information contained in a survey of provisioning characteristics is further aggregated into indices that aim to capture the extent to which the national rules impede deviations from backward- or forward-looking provisioning. Data on provisioning rules are obtained from the World Bank's Bank Regulation and Supervision Survey, which was conducted in the years 2000, 2003, 2007 and 2012 for up to 150 countries. Among other supervisory and accounting characteristics, the surveys specifically cover country-specific provisioning rules in place.

Their empirical results confirm that banks in jurisdictions with more backward-looking provisioning rules contract lending much more during economic downturns than banks that operate under forward-looking regimes. In particular, nominal GDP growth has a much stronger impact on the change in loans provided by banks under LLP regimes that are more backward looking. The result is robust to a number of alternative methodological and model specifications, such as including alternative macroeconomic indicators (ie GDP growth, unemployment, etc), controlling for loan demand conditions, distinguishing smaller banks from their larger peers or focusing on only a smaller subset of countries.

Although the methodology and data used in this paper do not allow for an impact assessment of IFRS 9, its main result can be seen as evidence supporting the movement toward an EL provisioning model.

**Balasubramanyan et al (2017)** examine US banks' provisioning practices before and after the 2007–09 financial crisis. The authors investigate the co-movement of LLPs with non-performing loans, underwriting standards (using supervisory Senior Loan Officer Opinion Survey on Bank Lending Practices, or SLOOS, data), bank capital and macroeconomic variables. The paper finds evidence that, even under the IL standards of US GAAP, banks' provisioning practices were more forward looking during the 2007–09 financial crisis. This study demonstrates that banks used the IL standards to manage earnings and capital but does not draw any conclusions on procyclicality.

### 3.4 What is the evidence on banks' behaviour under alternative regimes?

Some papers have also examined banks' behaviour in jurisdictions that employed a separate prudential framework, or distinct accounting rules, under national Generally Accepted Accounting Principles (nGAAPs), which differed from the IL framework. In some cases, these regimes were closer in spirit to the standards envisioned under IFRS 9 and CECL. Therefore, results from these studies offer insights into the possible procyclical effects of ECL standards.

**Jiménez et al (2017)** provide empirical evidence from Spain on the cyclicity of dynamic provisioning, which was introduced in 2000, subsequently revised four times and tested for its countercyclicality during the 2007–09 crisis. Discussed in more depth in Section 4, dynamic provisioning effectively sets procyclical capital requirements that generate CCyBs. Accordingly, it reflects a prudential measure, as opposed to an accounting standard per se. Still, experience under this regime remains informative, as the study shows that it affected banks differentially. In particular, the study uses information on dynamic provisioning and a comprehensive credit register that comprises bank-firm level data on all outstanding business loan contracts in Spain. The results suggest that dynamic provisioning smooths credit supply cycles and, in bad times, supports borrower performance. A policy-induced 1 percentage point increase in capital buffers extends credit to firms by 9 percentage points, increasing firm employment (6 percentage points) and survival (1 percentage point).<sup>22</sup>

**Domikowsky et al (2015)** provide empirical evidence from Germany on the cyclicity of the ECL model. German banks have been allowed to use expected losses for building specific loan loss provisions and are also afforded considerable discretion through the use of two provisioning items for latent (ie hidden) credit risks. The study shows that specific provisions are built countercyclically by referring to expected losses. Specific provisions are also used as a tool for earnings management even in the presence of reserves for latent risks. The reserves for latent risks are primarily accumulated through an undisclosed account when pre-tax earnings are high and specific provisions are low. Provisions for latent risks are predominantly motivated by tax considerations (national tax law matters for risk provisioning), which suggests that incentives around tax management warrant further research and may need to be considered further in evaluating the relative procyclicality of ECL models.

**Cummings and Durrani (2016)** review empirical evidence from Australia on banks' behaviour under a forward-looking LLP regime, similar in spirit to CECL. Since 2006, Australia has maintained two distinct regimes for bank provisioning: a forward-looking model for regulatory purposes and an IL model for financial (public) reporting. The authors document that (i) banks increase provisions in anticipation of future lending growth, (ii) banks allocate voluntary capital buffers to establish provisions for future losses and (iii) banks establish higher provisions when their risk-based capital ratios and earnings are higher than

<sup>22</sup> Survival in this study means that the firm (ie borrower) did not go out of business. Firm survival data come from the Central Business Register in Spain. For estimation purposes, firm survival is defined using a dummy variable: death = 1, if the firm is liquidated during the period in question; otherwise, death = 0.

average and adjust provisions downward in periods when these measures are weaker. Findings (i) and (ii) indicate that provisioning behaviour has both pro- and countercyclical features. That is, provisions are sensitive to cyclical fluctuations in default risk, but individual banks adjust provisions to reflect expectations about future economic conditions and to mitigate the impact of cyclical fluctuations on capital adequacy and earnings. Finding (iii) provides evidence of earnings and capital management, which means that moving to an EL regime (such as IFRS 9 or CECL), which affords more discretion, may have unintended consequences for bank transparency and discipline of banks' risk-taking (eg consistent with Bushman and Williams (2012)).

### 3.5 What roles do management discretion and incentives play in affecting procyclicality?

While the formal accounting rules set out the requirements around the measurement and timing of loss recognition, they also offer bank management some discretion in how to interpret and apply them. Under the IL standards, which allegedly placed greater constraints around loss recognition, there is considerable cross-sectional variation in the timeliness of loan loss provisioning (see, among others, **Beatty and Liao (2011)** and **Bushman and Williams (2012)**). This finding provides evidence that discretion featured prominently in banks' provisioning practices, even under the IL regime.

The literature identifies two motives for setting discretionary loan loss provisions, which could have consequences for procyclicality.<sup>23</sup> First, bank managers may use discretion to smooth reported earnings (after provisions) by increasing provisions when such earnings are relatively high, which allows them to smooth earnings by drawing from loss reserves when actual losses exceed expected losses (eg in downturns). The use of discretion for this reason could reduce procyclicality (of lending), as bank profitability and GDP growth are generally positively correlated (see **Laeven and Majnoni (2003)**).

The second motivation identified in the literature for banks' use of discretionary LLP relates to capital management. That is, banks may also delay loss recognition to ensure that they do not breach minimum regulatory capital requirements. This capital management motive means that banks may reduce provisions when regulatory capital levels are low (see Balasubramanian et al (2017) for evidence of such behaviour for US banks). Such discretionary practice damps procyclicality, as banks' capital adequacy is likely lower during economic downturns.

As highlighted in **Beatty and Liao (2014)**, the literature examining earnings and capital management motives has financial reporting implications that affect bank behaviour and that should be considered in future policy debates. In particular, there may be links between the possibility that it is economically beneficial (in terms of supporting lending capacity during downturns) for banks to exercise more discretion to make loss recognition more timely and the use of loan loss provision to manage capital or earnings. Future research exploring these links may help increase the understanding of the economic effects of discretionary loss provisioning practices, especially under ECL standards, which offer greater flexibility and scope for management discretion.

**Bischof, Laux and Leuz (2020)** contend there may be potentially other, more fundamental problems that may have contributed to the delay in loss recognition under IL standards and that may also be relevant to consider under the new ECL standards. In particular, they argue that managerial reporting incentives provide another potential explanation for the delay in loss recognition evident ahead of the 2007–09 crisis under the IL regime. Bank managers may have been reluctant to recognise losses for a variety of reasons (eg earnings-based bonuses, job concerns and regulatory and capital market pressures),

<sup>23</sup> See Beatty and Liao (2014), Bushman (2014) and Ozili and Outa (2017) for more in-depth surveys. Skala (2015) documents evidence of procyclical (co-movement) provisioning behaviour and income smoothing for a sample of 179 banks in 11 Central European countries over the period 2004–12, when IL rules were in place.

and they may have exploited the discretion in the IL rules to avoid recognition, which has consequences for procyclicality.

Supporting this argument, they provide evidence on US and EU banks' reporting incentives that suggests that banks were generally reluctant to recognise losses during the 2007–09 crisis. While the authors acknowledge that it is not possible to observe the incentives that bank managers face when recognising losses directly, they note that inferences about these incentives can be drawn by studying banks' disclosures that could convey information about expected loan losses. For US banks, the authors examine two relevant types of disclosures: (i) footnote disclosures to the financial statements that banks make on the fair value of their loan portfolios (under FAS 107 at the time) and (ii) material corporate events and information on a more current basis using SEC Form 8-K. Importantly, these two disclosures are not constrained by a particular loss model. They contend that if bank managers intended to communicate potential future losses early in the crisis – say, in 2007 or 2008 – they could have disclosed them through the fair value disclosures in their footnotes or 8-K filings. Therefore, the authors note that studying these disclosures should be informative about managers' willingness to communicate expected loan losses. They compare estimates reported under these less constrained outlets with the IL estimates and generally find evidence consistent with the idea that banks were reluctant to communicate and recognise losses.<sup>24</sup>

For EU banks, the authors report evidence from the ECB's 2014 Asset Quality Review, which used the ECB's interpretation of the IL standards and showed that banks were significantly underreporting loan losses. This shortfall, they argue, provides further support for the idea that banks were not necessarily constrained by the IL rules to report higher EL estimates.<sup>25</sup> Together, these findings raise questions about the benefits of the new accounting rules (for financial stability/moderating procyclicality) and suggest that regulators should consider the role of management incentives and managerial judgment going forward.

### 3.6 Conclusion

In summary, the research examining the consequences of IL accounting suggests that the timeliness of loan loss recognition (provisions), often in conjunction with the need to meet a regulatory capital constraint, emerged in the literature as a potentially influencing factor of lending activity. Delays in loss recognition have been found to be associated with lower lending activity that can have implications for the economy. This relationship arises as delays put pressure on banks to increase provisions, particularly in the exact part of the business cycle when capital requirements are most binding. However, as pointed out by Betty and Liao (2014), Acharya and Ryan (2016) and Bischof, Laux and Leuz (2020), findings from these studies are not yet settled due to a number of outstanding methodological challenges. Of note, these studies rely on cross-sectional data and banks' voluntary choice of variation in the timeliness of loss recognition. This approach raises self-selection concerns (ie that coefficient estimates in lending specifications may be biased). Consequently, it is not clear whether ECL standards (IFRS 9 or CECL) that require banks to recognise losses in a more timely fashion will have similar effects to those implied by (potentially biased) results under the IL regime. Future work is needed to explore this issue and to establish more definitively the causal links between loss recognition (provisioning) and bank behaviour, especially lending.

<sup>24</sup> Alternatively, this finding makes the implicit assumption that banks could at least guess that losses would rise in the future. It is unclear whether bank managers themselves were simply too optimistic during that phase of the crisis and did not see these losses coming. This evidence then may also point to other, more fundamental issues related to things like "recency bias" or "disaster myopia" that can influence the efficacy of management forecasts.

<sup>25</sup> We recognise that the ECB applied its own interpretation of IAS 39 in the Asset Quality Review, which may have been more conservative in light of its emphasis on prudential risk. Nevertheless, the ECB would have been working within the constraints of the existing accounting standards in assessing the shortfall.

There is theoretical and some limited empirical support suggesting that forward-looking regimes, which are more in line with the prudential tool of dynamic provisioning or the accounting standards under IFRS 9 and CECL, may help moderate procyclicality. At the same time, however, there is evidence under IL accounting standards that discretionary LLPs were used for earnings and capital management purposes that can impact procyclicality. Whether such behaviour will persist under the new ECL standards, which afford banks even more discretion in how to measure and when to recognise losses, and what consequences this may have for procyclicality should be firmly on the radar of policymakers going forward.

Finally, there is some indicative evidence from banks' disclosures during the 2007–09 financial crisis that supports the idea that management incentives may explain banks' delayed loss recognition (**Bischof, Laux and Leuz (2020)**). Overall, banks seem to have been reluctant to report more accurate loss estimates beyond those constrained by IL accounting rules, especially during the onset of the financial crisis. This finding with respect to banks' financial reporting incentives has implications for the ongoing debate about the effect of loss accounting on procyclicality of bank lending. First, the result implies that enforcement by securities regulators, bank supervisors and auditors warrants more attention. Second, the conclusion suggests that the efficacy of the ECL approach in addressing procyclicality (and financial stability concerns) may be less than hoped. Consequently, more work is needed to understand the mechanisms that drive/alter banks' reluctance to report losses. This issue may become even more important under the ECL approach, which, while shifting the recognition of losses to earlier periods, affords more managerial flexibility in the measurement of expected losses. The evidence reported in Bischof, Laux and Leuz (2020) suggests that under the IL standards, banks used accounting discretion to understate reported losses even when they did not directly impact regulatory capital. It is not obvious that this behaviour would not also be a concern under ECL standards. More work is needed to investigate this issue.

## 4. The Spanish dynamic provisioning regime

As previously highlighted, the 2007–09 financial crisis laid bare the risks that the IL accounting standards posed to the real economy and to financial stability more broadly. In response, international regulators called for further review of the accounting standards governing loan loss provisioning and consideration of alternative approaches to recognising and measuring loan losses. This section discusses one approach that garnered a lot of attention, the Spanish dynamic provisioning regime. We first describe the regime and the motivation for its introduction. We then review empirical evidence on the regime's performance in Spain as well as results from simulations, illustrating the application of dynamic provisioning to US banking data. In reviewing these results, we highlight considerations related to (potential sources and risks of) procyclicality under the new ECL approaches.

### 4.1 What is dynamic provisioning, and why was it introduced?

Because the IL accounting framework did not specifically address the cyclical properties of credit losses, loan loss provisions failed to reflect the build-up of credit risk that typically occurs during an expansionary period when actual loss rates are below the long-run average. In addition, at least in Spain, there was also no definitive evidence that banks' capital management practices considered this shortcoming and the negative externalities that a sudden and sharp drop in lending capacity have on the wider real economy. To address this problem, the Bank of Spain implemented dynamic provisioning in July 2000 on the heels

of a period of significant lending growth and sharp increase in credit risk on Spanish banks' balance sheets.<sup>26</sup>

Dynamic provisioning requires banks to earmark a portion of capital by building a general (or "statistical") provision during good times that can be used to offset losses (and protect capital and lending capacity) during bad times. A key aim of the regime was to shield banks' capital positions – and, therefore, lending capacity – from sudden and sometimes material changes in loan loss provisioning required under the IL accounting standards. It did so by moderating the cyclical fluctuation of provisions set under the IL model and tying provisions directly to the level of credit activity and state of the credit cycle. More specifically, total provisions (TP) under the regime consisted of two elements: (i) a specific provision (SP) for impaired loans that was determined according to the IL accounting standards and (ii) a general provision (GP) for performing loans that was computed according to a statistical formula based on historical loss experience over a full credit cycle:

$$TP_t = SP_t + GP_t.$$

The second component, the general (or statistical) provision, provides a buffer to cover expected losses that are inherent in the loan portfolio but are not yet identified. It is calculated as follows:

$$GP_t = \alpha \Delta C_t + \left( \beta - \frac{SP_t}{C_t} \right) C_t.$$

In this formula,  $GP_t$  and  $SP_t$  are as previously described,  $C_t$  is the total of the credit exposure at time  $t$  and  $\Delta C_t$  is the change in the credit exposure from time  $t - 1$  to  $t$  (quarterly in the case of Spanish banks). The parameter  $\alpha$  represents the long-run average actual net charge-off rate, while the parameter  $\beta$  reflects the long-run average of the ratio of the specific provision to total credit exposure. The historical averages underlying each parameter are computed using data from at least one full credit cycle.<sup>27</sup> The first term on the right-hand side of the formula,  $\alpha \Delta C_t$ , indicates that general provisions increase based on the proportion  $\alpha$ , as credit exposure increases (loans are extended). The second term,  $\left( \beta - \frac{SP_t}{C_t} \right) C_t$ , represents the dynamic, or countercyclical, component of the general provision. In this expression, the ratio of the specific provision to credit exposure at a given point in time approximates the position in the credit cycle at time  $t$ . Because  $\beta$  captures the historical long-run average (over the credit cycle) of that ratio, the difference measures how far a bank's specific provision coverage is from the credit cycle norm. In that sense, the dynamic term acts as a mean-reverting component of the general provision (eg Fillat and Montoriol-Garriga (2010)). During expansionary periods, when credit risk is underestimated and specific provision ratios are low relative to the long-run cycle average, the dynamic term is positive and increases the total provision. During downturns, as credit losses crystallise and the specific provision ratio

<sup>26</sup> Saurina and Trucharte (2017) provide an excellent historical perspective on the Spanish dynamic provisioning regime, its origin and underlying motivations. They highlight two prominent factors as contributing heavily to the decision to introduce the regime. First, there was genuine concern about the credit cycle and how it would be controlled after Spain entered the euro area and monetary policy decisions were transferred to the ECB in the late 1990s. This concern was amplified by the strong credit growth experienced in 1998 and 1999, which was higher than that recorded in previous credit cycles in Spain that had serious adverse impacts on the economy. Second, there was strong interest in strengthening the prudent valuation and true and fair view of banks. This aim was supported by power given to the Bank of Spain, by delegation from the Ministry of Finance, to set accounting standards for banks. Such power gave the Bank of Spain the ability to determine the binding regulations dictating how banks measured credit risk and recorded loan loss provisions.

<sup>27</sup> The Bank of Spain used a large, proprietary database of individual loans spanning the period 1986–98 to estimate historical averages.

increases above the long-run cycle average, the dynamic term becomes negative and decreases the total provision.<sup>28</sup>

To determine the dynamic provisioning requirement, Spanish banks applied this formula to six homogeneous risk buckets, reflecting distinct segments of the credit market.<sup>29</sup> In practice, this approach meant that the formula for each bucket was unique and included separate and distinct  $\alpha$  and  $\beta$  parameters, which increased in risk levels, calibrated on the basis of the previous credit cycle. For instance, consumer credit was put in the highest risk bucket, business loans and mortgages were assigned to intermediate risk buckets and public debt was placed in the lowest risk bucket. As a result, while the dynamic provisioning parameters were set by the Bank of Spain, the application across the six risk classes meant that the dynamic provisions varied across banks, depending on the composition of each bank's asset portfolio.

The Bank of Spain limited the build-up of dynamic provisions that could occur during a very long expansionary phase as specific provisions remain below the cycle average ( $\beta$ ). In particular, it imposed a ceiling fixed at 125% of the latent loss of the loan portfolio, ie 125% of the product of the parameter  $\alpha$  and total volume of credit exposure. To ensure that dynamic provisions remained positive (ie not completely exhausted), the regime also originally included a floor value for the fund of general provisions set at 33% of the latent loss. During the height of the 2007–09 financial crisis, the minimum was lowered in Q4 2008 to 10% and again in Q4 2009 to 0% to allow for more usage of the general provisions previously built in the expansionary period.

To facilitate transparency of the dynamic provisioning regime, the Bank of Spain mandated enhanced disclosure requirements. Spanish banks were required to publish the amount of the dynamic provision (also known as the general provision) along with the specific provision (determined under the I/L accounting standards) each quarter. This requirement allowed users of accounting statements to “undo” the impact of the dynamic provision on a bank's net income and make comparisons of key financial metrics across banks and over time. In addition, from 2005 onward, dynamic provisions were also formally considered Tier 2 capital (eligible to count toward regulatory capital subject to the cap).

## 4.2 How effective was the Spanish dynamic provisioning regime?

Using confidential, loan-level data and a novel identification strategy to disentangle credit supply from credit demand, **Jiménez et al (2017)** assess the economic effects of this regime. Specifically, they examine how dynamic provisions influenced banks' credit supply, and the associated spillovers on real activity, over the period 1998–2013, which represents a full economic cycle in Spain. They employ granular loan-level data from Spain's confidential credit register and match these with bank- and firm-relevant information. The data set includes loan (bank-firm) level data on all outstanding commercial and industrial (C&I) loan contracts (including loan applications) at a quarterly frequency, matched with supervisory bank balance sheet variables (size, capital, liquidity, profits, real estate exposure and other key variables) and with selected firm variables (firm identity, industry, location, size, age, capital, liquidity, profits, tangible assets and whether or not the firm survives). They calculate the total exposures by each bank to each firm in each

<sup>28</sup> This idea may become clearer when expanding the formula for total provisions, which is the sum of specific provisions and general provisions:

$$TP_t = SP_t + GP_t = SP_t + \alpha \Delta C_t + \left( \beta - \frac{SP_t}{C_t} \right) C_t = \alpha \Delta C_t + \beta C_t.$$

This expression shows that the total provision at a given time does not depend on the specific provision as long as the term in parentheses is not zero and the general allowance is positive. If the term in parentheses is negative and the general allowance is zero (ie indicating that there are no statistical buffers to help cushion the capital impacts of loan losses), then the total provision is equal to the specific provision.

<sup>29</sup> The six risk segments included zero risk (cash and public sector debt), low risk (home mortgages with LTV below 80% and corporates rated A or better), low-to-medium risk (loans with real guarantees and home mortgages with LTV above 80%), medium risk (rest of loans, including corporate and SMEs), medium-to-high risk (consumer durable goods financing) and high risk (credit cards and overdrafts).

quarter from Q1 1999 to Q4 2013, with the final estimation data set consisting of C&I loans granted by more than 175 banks to 100,000 firms (with loans of at least €6,000).

They use panel data and fixed-effects estimation to analyse the impact of dynamic provisions on changes in committed credit volume as well as changes in credit drawn, maturity, collateral and cost. They focus on the impacts of the introduction of dynamic provisioning in Q3 2000. The formula-based regime meant that, at introduction, almost all banks were required to build a new provision requirement and that this additional requirement varied considerably across banks, depending on the composition of a bank's asset portfolio. In addition to examining credit supply before and after the introduction of the regime, the authors also analyse the countercyclical features of the dynamic provision funds built up by banks as of Q4 2007, following the crisis shock in Q3 2008. Findings from this analysis help them understand whether and how the regime performed in allowing banks to continue to lend during the height of the 2007–09 crisis and, therefore, whether the regime damped procyclicality of bank lending. Finally, they examine the impact of a series of policy changes made to the provisioning regime that were undertaken during the crisis to help sustain the flow of credit by banks and after the crisis to help reduce risk exposure in the construction and real estate lending sectors.<sup>30</sup> Depending on the makeup of their credit portfolio, banks were affected differently by these various policy changes. As a result, the authors rely on a difference-in-difference framework, comparing differently affected banks' lending to the same firm before and after each policy change. To assess the real effects on firm-level assets, employment and survival, the authors match granular credit data with firms' balance sheets and the Spanish register of firm failures.

The authors find that, in good times, banks that have to provision more cut credit to the same firm after the introduction of the DP regime in Q3 2000 more than other banks. This finding is consistent with the idea that higher provisioning requirements during good times lead to contractions of credit supply. Interestingly, however, they also find that, while credit availability drops immediately following the introduction of dynamic provisioning, there is no discernible drop in credit available to firms three quarters after implementation. This result suggests that in good times, the effect of dynamic provisioning is weaker in halting a credit boom at the firm level, as borrowing firms are able to switch to less affected banks.

In bad times, the results are different. The authors find that banks that had higher dynamic provisions going into the crisis increase their supply of credit to the same firm over the period 2009–10. This evidence suggests that dynamic provisioning mitigates credit supply cycles, with strong positive aggregate firm-level credit, employment and survival effects in crisis times, when switching from banks with low-to-high capital buffers and to other sources of finance is difficult. This mechanism works through preserving capital before the crisis, when bank profits and new shareholder funds to raise new capital are scarce and costly. A key implication from this study is that having abundant pre-crisis capital buffers may help banks sustain credit supply and support real activity in crisis times by avoiding the need for raising capital, exactly when it would be difficult for banks to do so.

We found two papers that provided some additional perspective on this idea by looking at how the US banking system would have fared during the 2007–09 financial crisis had a dynamic provisioning regime been in place.

Using aggregate US data from year-end quarterly FDIC banking reports, **Balla and McKenna (2009)**, for example, construct a representative (systemwide) bank and simulate loan loss provisions over two business cycles under a dynamic provisioning framework, similar in spirit to the regime implemented by the Bank of Spain. They apply the methodology to aggregated US banking sector data using representative  $\alpha$  and  $\beta$  parameters of 1.8% and 0.65%, respectively. Their simulation period extends from

<sup>30</sup> These policy changes involved (i) the lowering of the floor on the dynamic provision funds from 33% to 10% in Q4 2008 and to 0% in Q4 2009 (that permitted greater release of the countercyclical buffers and increased lending capacity for many banks) and (ii) the one time increase in provisioning that banks needed to make in 2012 on exposures to construction and real estate firms to clean up their balance sheets.

1993 to 2008, with the first five years devoted to building the statistical fund. They examine the evolution of the statistical fund given actual changes in the aggregate banking sector's loss provisions (flow variable) and allowance for loan and lease losses (stock variable) as determined under the IL accounting approach over the period 1999–2009. Two results stand out. First, by allowing the bank to use five years to build the fund (during good times from 1993 to 1998), the representative bank was able to build total allowances, both statistical and specific, equal to 3.9% of total loans. This percentage was well above the 1.7% reported under the IL framework. The simulation suggests that, under the dynamic provisioning regime, the bank is better positioned to withstand losses associated with a recession in 1999. Second, the sizeable funds of statistical provisions helped mitigate the effects of losses during US recessions (in 2001 and again in 2008) on earnings and capital adequacy (and, by implication, lending capacity).

**Fillat and Montoriol-Garriga (2010)** undertake a similar exercise to compare outcomes under the IL and dynamic provisioning approaches for a US bank constructed using aggregated regulatory Call Report data and for 13 large US banks that received government assistance as part of the Troubled Asset Relief Program (TARP) during the 2007–09 financial crisis. They calibrate loss parameters ( $\alpha$  and  $\beta$ ) based on aggregated data across all institutions in the United States using quarterly data from Q2 1987 to Q4 1999 (a full economic cycle in the United States). Their simulations span the period from 2000 to the third quarter of 2009, the end of the crisis, and show that the dynamic provision buffer generated in the upswing of the economic cycle would not have been sufficient to prevent the US banking system from having to increase loan loss provisions under the IL model at the end of 2009. At the same time, however, they show that several banks in the United States that received TARP support would not have needed such support had the dynamic provisioning requirements been in place. It is worth highlighting that their analysis relied on dynamic provisioning parameters that were calibrated to cover an average downturn period (reflected in the period 1988–99). A key implication here is that the efficacy of the dynamic provisioning regime (or, for that matter, any forward-looking regime that relies on historical episodes to estimate losses) depends critically on the severity of the crisis. As such, in cases where the potential shock to the banking system is more severe, extra buffers provided by the dynamic provisions would only moderate rather than completely offset possible procyclical effects.

While these two counterfactual studies suggest that the US banking sector would have been better positioned to deal with the 2007–09 crisis under a dynamic provisioning regime, they come with a key caveat that makes them less useful for drawing out implications for procyclicality. In particular, neither considers the endogenous responses of banks to the imposition of the dynamic provisioning regime. Among other things, such responses could include changes to underwriting standards as well as to capital and balance sheet management practices. This shortcoming makes it impossible to draw conclusions about what impact a dynamic provisioning regime would have had on the US banking sector's lending supply ahead of and during the 2007–09 financial crisis.

### 4.3 Conclusions

Several caveats regarding dynamic provisioning raise questions about whether experiences under such a regime are useful for drawing inferences about bank behaviour – and procyclicality in particular – under ECL accounting. First, research discussing the evidence and experiences under dynamic provisioning is limited to just a few countries (Spain, Peru, Colombia, Chile and Uruguay) and does not study banks' behaviour over a full economic/credit cycle (**Jiménez et al (2017)** is an exception).<sup>31</sup> These shortcomings make it difficult to know how generalisable the findings are and, therefore, what they imply for bank behaviour under ECL standards.

Second, the ability of the dynamic loan loss provisioning system – or any forward-looking provisioning framework, for that matter – to generate sufficient buffers in anticipation of stressed periods depends on the severity and time lag of the subsequent crisis, which means that working with the dynamic

<sup>31</sup> See **Ozili and Outa (2017)** for a concise review of studies of dynamic provisioning in other countries besides Spain.

provisioning system becomes more difficult if the recession is prolonged. ECL standards require reasonable and supportable forecasts, which refer to some forecast horizon and which necessitate some forward-looking information. As projections typically need to extend beyond a short horizon, ECL standards allow the use of historical data for that extended period. However, this process means that banks' ability to recalibrate and adapt loss parameters to consider the evolution of the economy more dynamically may be important under ECL standards.

Third, the efficacy of dynamic provisioning in addressing procyclicality depends greatly on a central authority's ability to detect transitions from upturns to downturns and vice versa. In practice, detecting such cycle changes is notoriously difficult. This task will likely not be any less challenging under IFRS 9 and CECL, where the banks themselves have to build their own models and make their own forecasts. Agency costs and incentive issues (eg that derive from earnings- or capital-based compensation structures) as well as capacity constraints (eg related to data limitations or internal expertise) at the bank level are important aspects to be considered in this context.

Fourth, dynamic provisioning provides banks with little discretion, as loss estimates are based on a formula set by a central authority.<sup>32</sup> This limited discretion constrains banks' ability to manage earnings and capital. In addition, under the Bank of Spain's setup, banks were required to disclose both the provisions set under accounting standards (IAS 39) and the statistical provisions set under the regulatory dynamic provisioning regime. This expanded disclosure requirement facilitated transparency under the regime, allowing users of banks' financial statements to make comparisons across banks and over time. These considerations may become even more important under ECL standards that afford banks greater discretion in the way that they measure, recognise and report credit losses as compared to IL provisioning. Increased discretion raises the scope for opportunistic earnings and capital management, with implications for procyclicality if such discretion makes banks' balance sheets more opaque (**Bushman and Williams (2012)**), making it more difficult and costly to raise capital during more trying times.

## 5. Procyclicality under the (C)ECL standards

Unlike most of the papers presented in previous sections, the papers addressing IFRS 9 and CECL cyclicity cannot be based on reported bank data or "natural experiments" because of the recent introduction of the new impairment standards. Consequently, these studies' results heavily depend on assumptions and counterfactual analyses that cannot account for the heterogeneity resulting from bank-specific models but assume representative bank behaviour.

This section (i) provides background on the institutional features of the IL and (C)ECL (IFRS 9 and CECL) standards and (ii) reviews studies that suggest that procyclicality may be more or less pronounced under (C)ECL. We place emphasis on highlighting the key features and assumptions underlying the studies' framework that are driving conclusions. Of note, these papers use varying definitions of procyclicality in the context of their studies and different sets of assumptions about the predictability of future macroeconomic conditions. These differences make it difficult to draw conclusions about the potential impact of ECL standards on procyclicality. We refer the reader to Section 2 for an overview of procyclicality

<sup>32</sup> Under the Spanish regime, banks were permitted to use their own internal models for estimating provisions starting in 2016, but few banks did (eg Saurina and Trucharte (2017)).

definitions and to the Summary Review Table (see Annex) for a more direct comparison of procyclicality definitions and selected key assumptions.

## 5.1 Institutional background on (C)ECL accounting

IFRS 9<sup>33</sup> and CECL (US GAAP ASC Topic 326)<sup>34</sup> both introduce an ECL methodology for the recognition of loan losses for financial instruments. The primary aspects of changes introduced by ECL are the timing of loss recognition and information considered in loss estimation. Under the previous IL methodology, which was based on “incurred” losses, only incurred losses were recognised, and, generally, only past and current conditions were considered in estimation.<sup>35</sup> Former IAS 39 standards relevant for financial instruments<sup>36</sup> have been substantially consistent with former IL under US GAAP.<sup>37</sup> By contrast, IFRS 9 and CECL deviate in several aspects, especially around the timing of lifetime expected credit loss recognition.<sup>38</sup>

With IFRS 9, instead of recognising lifetime losses from day one for all loans, financial assets are classified into three stages, with varying time horizons for estimating loan loss allowances. In Stage 1, only 12-month expected credit losses are recognised for financial assets whose credit risk has not significantly increased since initial recognition. Stage 2 requires loss allowances equal to lifetime ECL for all non-impaired financial assets that have experienced a significant increase in credit risk (SICR). Thus, the estimation of credit losses immediately shifts from one-year ECL to lifetime ECL between Stage 1 and Stage 2. Finally, all impaired assets fall into Stage 3, in which the loss allowance is also determined by lifetime ECL. In this respect, Stage 3 is similar to the previous IAS 39 impairment model.<sup>39</sup>

With CECL, banks recognise on day-one expected credit losses over the lifetime of financial assets within its scope. Expected losses should consider not only historical losses or current conditions, but also future conditions through “reasonable and supportable forecasts”. Both IFRS 9 and CECL pursue a similar forward-looking approach.

Under IFRS 9, an SICR triggers a shift of assets from Stage 1 to Stage 2 that leads to an increase in loan loss allowances by changing the ECL horizon from one year to remaining lifetime. As critics argue, that shift could lead to a procyclical “cliff effect” that would magnify increases in loan loss allowances and reductions in regulatory capital in, or at the beginning of, economic recessions. The evaluation of SICR is very important under IFRS 9.<sup>40</sup>

<sup>33</sup> A definition of IFRS 9 is available on the IFRS website at [www.ifrs.org/issued-standards/list-of-standards/ifrs-9-financial-instruments](http://www.ifrs.org/issued-standards/list-of-standards/ifrs-9-financial-instruments).

<sup>34</sup> See Financial Accounting Standards Board (2016).

<sup>35</sup> Incurred loss methodology typically allows a loss to be recognised only if there is objective evidence based on past events that a loss has actually occurred.

<sup>36</sup> ASU 2016-13 applies to all financial instruments carried at amortised cost, including loans held for investment and held-to-maturity debt securities. In this section, the terms “financial assets”, “financial instruments” and “loans” are used interchangeably, unless specifically noted.

<sup>37</sup> While the standards are written similarly, the implementation and practices had several notable differences. For example, US firms could recognise losses earlier by using a “loss emergence period,” which may vary by financial instrument type (retail or commercial credit) following US GAAP (under IL), and firms under IAS 39 could delay recognition until there was objective evidence.

<sup>38</sup> In the United States, FASB introduced an ECL approach under the CECL methodology in June 2016. The effective dates for CECL implementation range from fiscal years beginning after 15 December 2019 to fiscal years beginning after 15 December 2022 for different types of financial institutions.

<sup>39</sup> There can still be important differences between Stage 3 and IAS 39 allowances, eg with regard to the amount of losses recognised.

<sup>40</sup> The IFRS 9 standard does not provide a clear or mechanistic definition of SICR. According to IFRS, the standard requires that firms assess the changes in default risk over the expected life of the asset, basing this assessment on “reasonable and supportable information”; see IASB (2020).

IFRS 9 and ASC Topic 326 (CECL) do not require institutions to follow specific quantitative models or methodologies for credit loss estimation or a specific framework for macroeconomic forecast scenarios. The institutions may use reasonable and supportable forecasts for the duration of the life of the loan or may choose to revert to historical loss estimates with appropriate adjustments at some point during the remaining loan life. IFRS 9 and ASC Topic 326 do not have specific requirements for the duration of the reasonable and supportable forecast period or the method of reversion to the historical loss estimates beyond the window of reasonable and supportable forecast or prescribed number of scenarios used. Institutions are also allowed to continue incorporating appropriate qualitative adjustments, which could be similar, but not identical, to the ones used under the IL approach.

Although IFRS 9 and CECL do not prescribe a specific measurement technique, many large financial institutions currently using the IRB approach under Basel II/III capital adequacy rules may leverage probability of default (PD), loss-given-default (LGD) and exposure at default (EAD) estimation methods, albeit with significant adjustments. In addition to PD models, methods based on loss rate, vintage, discounted cash flows and other appropriate methodologies can also be used. Banks can use either their internal models and methodologies or external third-party models appropriate to a bank's circumstances to estimate expected credit losses.

## 5.2 What suggests that (C)ECL accounting could be more procyclical than the IL regime?

This section reviews two recent papers that argue that (C)ECL will be more procyclical than the IL regime. It focuses on the key assumptions and methodologies that these studies rely on in reaching their conclusions. Though these papers have not been published in peer-reviewed journals at the time of this survey, they have been cited in the industry debate leading to ECL implementation. We note, however, that the conclusions of these studies are based on counterfactual analyses of loss allowances and do not reflect the potential endogenous responses by banks (eg related to underwriting standards, capital management practices or managerial discretion) under the new accounting regimes.

**Abad and Suarez (2018)** provide a numerical comparison of loan loss allowances under IL, IFRS 9 and CECL standards, together with the prudential EL definition as implemented in the Basel IRB framework. They argue that the point-in-time recognition of credit losses under (C)ECL in an economic recession, anticipated or unanticipated, as well as a negative shock to credit quality raises procyclicality concerns.

The authors use a risk-rating migration model to simulate the dynamic effects of the different accounting standards that abstracts from possible adjustments in bank or loan market behaviour. Their model assumes three loan risk-rating categories of standard, substandard and non-performing. Abad and Suarez (2018) compare the performance of the new ECL approach under IFRS 9 and CECL to that under the IL and prudential one-year expected loss (EL) for varying hypotheses of a better foreseeable crisis, anticipated and unanticipated long crises, the arrival of an economic contraction and a negative shock to credit quality. Their conclusion is consistent under these assumed scenarios.

The dynamic profile of loan loss allowances follows a Markov process, driving the transition between loan-quality stages that is calibrated based on S&P rating migration matrices. As a key modelling component, Abad and Suarez incorporate the loan PD into their Markov transition process by assuming constant one-period PDs that apply to all maturities. However, the authors do not demonstrate whether, in re-applying one-year PDs period by period, the Markov model can sufficiently distinguish a difference between, for example, a five-year loan and a sequence of five consecutive one-year loans.<sup>41</sup> Key

<sup>41</sup> This effect of the recursive formulation could lead to EL estimates for multi-period loans in excess of 100% of loan value. For a discussion of modelling choices for the calculation of lifetime ECL under IFRS 9, see Engelmann (2018).

parameters of the loan portfolio are matched to EBA data on European corporate loans, with separate sets of parameters computed for economic expansions and contractions.

According to Abad and Suarez, the least volatile allowances are those computed under the IL approach. The most volatile are computed under the IFRS 9 approach, within which the Stage 2 loans contribute a big proportion of allowances.<sup>42</sup> The allowances computed under the CECL approach fall in between. The lower volatility of allowances under the IL approach is due to the delay of expected loss recognition, which damps the drastic increase in allowances at the beginning of the economic downturn. Conversely, under IFRS 9, assets shift from Stage 1 to Stage 2 as the recession arrives, using simplified assumptions for SICR and triggering a so-called cliff effect associated with the shift of loss recognition from one year to lifetime. While allowances under CECL do not inherit the “cliff effect” feature, its overall volatility falls between that of the IL and IFRS 9 regimes.

To measure the allowance impact, especially the ECL impact on capital reduction, the authors simulate the Common Equity Tier 1 (CET1) capital level as well as the probability of recapitalisation under economic conditions of expansion and contraction for IFRS 9, CECL, IL and prudential EL. The capital effects, including recapitalisation across a full economic cycle, factor in retained earnings and dividend payments assumptions, eg the dividend payments are assumed suspended in economic recession.

The primary findings of this paper suggest that loan loss provisions simulated in IFRS 9 and CECL approaches will rise drastically compared to ones under IL and prudential EL as the economy switches from expansion to contraction or as banks face a negative shock that affects the credit quality of their portfolios. However, this paper remains silent about the managerial discretion for the threshold of SICR under IFRS 9, in addition to a concern, aforementioned, of utilising one-period PD multiple times for the life of loans longer than one year. Despite these caveats, the reported simulations of loan loss allowances under IL standards and for one-year ECL computations provide a very useful benchmark and basis for comparison with other analyses.

**Covas and Nelson (2018)** argue that “provisioning for losses under the current expected credit loss standard is highly procyclical, not countercyclical as was intended”. Given that the authors’ analysis was conducted before the implementation of CECL, their conclusion heavily relies on the assumptions about their counterfactual CECL model: the “reasonable and supportable” macroeconomic variable forecast, the reversion period to historical portfolio performance and the historical long-run average net charge-off rate. Covas and Nelson use a vector autoregression (VAR) model to forecast the macroeconomic variables, such as unemployment rate, real GDP growth rate, the house price index and the commercial real estate price index. The number of quarterly lags of the macroeconomic variables is set to two. The reasonable and supportable forecast period is assumed to be three years. As loan maturities exceed three years, banks revert forecasted loss rate to the historical long-run average of the loss rates beyond three years. At the beginning of the recession, the VAR model tends to underestimate the severity of the recession. Conversely, as the economy recovers, the VAR model tends to overstate the severity. These under- and overestimates are more severe at longer horizons. The authors further show that, despite its weaknesses, their VAR economic forecast model performs at least as well as forecasts by the Survey of Professional Forecasters. They conclude that “macroeconomic models (and macroeconomic forecasters) are generally unable to accurately predict turning points in the business cycle”. The limited ability of the model to predict the severity and turning point of the downturn becomes central to the authors’ argument that CECL is more procyclical than the IL regime.

The authors use an OLS regression to estimate the net charge-offs associated with these forecasts to determine the loan loss allowances under CECL at a portfolio level for the banking sector. Based on the projected level of allowances under CECL in late 2008 as compared to IL, the authors conclude that loan loss provisioning under CECL is highly procyclical. This finding assumes that banks are unable to forecast

<sup>42</sup> The proportions of Stage 1 through 3 components of the loan portfolio used by Abad and Suarez are 81.35%, 15.46% and 3.19%, respectively.

the turning point in business cycles, to build up sufficient reserves ahead of the downturn or to release some reserves as the economy recovers. Subsequently, once it becomes clear the economy is entering a downturn, there would have been a large-scale build-up of allowances for much higher losses anticipated over the lifetime of the portfolio under ECL. Covas and Nelson assume banks would have been unresponsive (ie no change in balance sheet) to the capital impact of CECL until late 2008. They argue that the greater build-up in loan loss allowances would have reduced bank capital and, consequently, constrained lending and economic activity.

In this study, procyclicality of provisioning is not explicitly defined. The authors use a graphical interpretation of procyclicality, focusing on changes in the level of allowances relevant to business cycles (perfect foresight) and to IL allowances. They consider the cyclical implications of CECL on bank lending through the regulatory capital channel. Covas and Nelson posit that “CECL would have been very procyclical had it been in place during the 2007–2009 financial crisis”. However, their conclusion is sensitive to the assumptions that they invoke about how allowances would have been modelled under CECL, as well as how firms would have responded to CECL’s capital impact. The authors note that their conclusion is most sensitive to the assumed length of the reasonable and supportable economic forecast period as well as the assumed remaining life of a loan. In their study, allowances are based on quantitative models without accounting for any potential qualitative adjustments that may have reduced CECL’s apparent procyclicality. In reality, bank management decisions and qualitative overlays play a critical role in the allowance-setting process and could mitigate the allowance volatility.

### 5.3 What suggests that (C)ECL accounting could be less procyclical than the IL regime?

This section reviews several recent papers that suggest (C)ECL will be less procyclical than the IL regime. Chae et al (2019), DeRitis and Zandi (2018) and Loudis and Ranish (2019) find that CECL is expected to be less procyclical than the IL regime.

Using a sample of 30-year fixed-rate, first-lien residential mortgages originated in California for the main portion of the study, and data on originations in Michigan and Texas for robustness tests, **Chae et al (2019)** show that allowances under CECL depend crucially on the length and degree of foresight built into banks’ loss models and the frequency with which the models are updated. They find that CECL reserves peak before the trough of the business cycle, using a standard competing-hazard framework. This study applies a loan-level loss model and different assumptions related to forecasts of macroeconomic variables.

Authors forecast a time series of a macroeconomic variable house price index (HPI), which directly affects the loan-to-value (LTV) ratio and, subsequently, the expected loss rate for two years. Afterward, the expected loss rate reverts immediately to the long-run, historical measure. Under one of the assumptions for the macroeconomic variable, the path of HPI follows “perfect foresight”, ie actual observed historical values. Three other forecast options have a varying degree of foresight: optimistic forecast with constant house price growth, autoregressive forecast that projects a continuation of near-term trends and the limited foresight forecast that follows perfect foresight for two quarters and then reverts to a flat HPI forecast for the remaining 18 months. During this two-year forecast period, the refreshed loan-to-value LTV ratio is used to estimate the expected loss rate, while the original LTV ratio is used beyond two years. The authors also examine the impact of forecast adjustment frequency at 24-, 12-, six- and three-month intervals.

The study uses 11 quantitative and qualitative procyclicality measures, which are defined by the authors (for example, correlation of estimated reserves with the house price index, or percentage of increases in allowance after Q1 2008) for IL and CECL across the three forecast assumptions. The relative procyclicality is also represented in graphical form under CECL vs IL. Using this approach, Chae et al (2019)

find that CECL recognises losses earlier relative to IL in all scenarios examined. This finding is conditional on scenario assumptions. Their conclusions on relatively less procyclicality are also conditional on the selection of length of forecast horizon, duration of reversion period and frequency of adjustment of forecasts. The authors show that CECL under an optimistic forecast that projects steady growth, regardless of the macroeconomic environment, is less forward looking than a CECL model under a perfect foresight assumption. When considering the frequencies of forecast adjustments, allowance estimations under CECL are volatile and may increase procyclicality during downturns, when CECL would resemble IL. This concern could be addressed by more frequent adjustments of the forecasts used in CECL estimations. Chae et al (2019) note that Covas and Nelson (2018) show stronger procyclicality under CECL due to the assumptions of a relatively longer forecast period and reversion. They point out that the extent of procyclicality under CECL accounting standards will depend on the nature of the macroeconomic foresight built into banks' loss models, estimation methodology and how frequently these models are updated.

The authors note that CECL does not require that banking institutions disclose the modelling methods and assumptions to allow stakeholders to compare estimates across banks when CECL is implemented. Therefore, reserves can become less comparable across institutions and less informative to the market. This issue may be less of a problem with an IL approach, where increased provisioning levels corresponded to increased losses, whereas for CECL, according to the authors, "markets are not able to disentangle the degree to which the variation in provisions is driven by credit risk versus model uncertainty" related to the methodology used to construct forecasts, differences in the timing of revisions and differences in the length of the forecast windows.

**DeRitis and Zandi (2018)** use a descriptive definition of relative procyclicality as levels of reserves estimated under CECL-specific assumptions vs actual reserves during the same period of the US housing boom in the mid-2000s. To evaluate whether procyclicality would be reduced under CECL, DeRitis and Zandi compare baseline and alternative scenarios (two upside and two downside scenarios) for 10-year ECL projections applicable to US mortgage loan portfolios, and against estimated loss under IL. To estimate ECL as  $PD \cdot LGD \cdot EAD$ , the authors use a vintage-based approach with data for single-family residential mortgage loans, combining loans in origination date cohorts. A fractional logit model is used to estimate default and prepayment. The authors find that CECL would be less procyclical than IL during the housing boom in the mid-2000s. CECL would have increased reserves compared to IL during the housing boom, and in the subsequent housing bust, reserves would have been lower under CECL. The effect would be even stronger if lenders adjusted lending standards in response to heightened provisioning during the housing boom. DeRitis and Zandi note that the quality of economic forecasts and assumptions used in the CECL framework can have a material impact on estimates.

**Loudis and Ranish (2019)** estimate how changes in allowances affect banks' net income and capital and assume that the impact on capital is proportional to the impact on aggregate lending. This study contains a comprehensive literature summary of the bank capital impact on lending and distributions. The authors use the literature-based assumptions to provide a composite view (range) of lending cyclicality across the different capital adjustment processes. Loudis and Ranish characterise CECL as less procyclical relative to IL if it damps fluctuations in lending growth, and more procyclical if it exacerbates fluctuations in lending growth.

The study focuses on US bank holding companies and uses bank portfolio-level data from FR Y-9C reports from 1998 to 2014 to construct estimates applicable to a representative bank. The authors estimate the average remaining life of loan balances and make assumptions about loan runoffs. Historical loss allowances are estimated under assumptions with various loss foresights.

The study's findings of relatively less procyclicality in CECL compared to IL are based, in part, on the "intermediate" foresight scenario, with which they presume that actual future charge-offs are partially known by assuming future net charge-off rates embedded in bank stock prices at different points. Two other competing forecast assumptions used in this study are "high" foresight and "low" foresight. Under the high foresight assumption, expected losses forecasted by a bank match perfectly to actual charge-offs for four years into the future and then follow a straight-line reversion to the long-run average of charge-

offs afterward. This approach is not too different from perfect foresight. Under the low foresight assumption, expected losses immediately follow a straight-line mean reversion to the long-run average of net charge-offs over the remaining life of a loan. Low foresight scenarios are likely to be more applicable to a sudden exogenous shock or “black swan” event (like the Covid-19 pandemic), which affects economies and credit markets abruptly and the occurrence of which is impossible to forecast.

The authors generate lending growth series using the “intermediate foresight” model of CECL and one of three sets of assumptions about the banks’ capital adjustment process: (i) baseline, a regression-based estimation provided by authors; (ii) a range based on the surveyed literature and (iii) the Covas and Nelson (2018) study. They compute the volatility (standard deviation) of these lending growth series over the period from 1999 to 2014. The authors compare these volatilities with that of actual lending growth over the same period and conclude that CECL is slightly less procyclical than IL.

One of the key assumptions used in this study is that CECL does not change banks’ target capital ratios. The banks are assumed to adjust their lending and dividend distributions/stock buybacks to reach the same capital targets that they have under IL. CECL affects lending only through its impact on Tier 1 risk-based capital ratios. The banks adjust their lending and distributions proportionally to the standards’ capital impact. In addition, this study does not account for CECL’s potential impact on the set of information presented to bank management or investors.

The comparison of outcomes using a range of estimates under literature-based assumptions on capital adjustment processes shows that CECL would reduce procyclicality more than under the authors’ baseline assumptions. In addition, Loudis and Ranish note that the differences in conclusions between their study and that of Covas and Nelson (2018) are due to Covas and Nelson’s assumption that banks wait until the peak of the downturn to respond to the capital impact of CECL. As a result, lending growth volatility increases, leading to their conclusion of CECL procyclicality, while Loudis and Ranish (2019) find that CECL would be less procyclical.

## 5.4 Estimation methods and assumptions in (C)ECL studies and their impact on procyclicality conclusions

As described in the previous sections, procyclicality depends on the underlying assumptions about forecasters’ economic outlook and the forecast horizon. Therefore, many recent papers do not take a stance on the procyclicality of ECL but instead focus on the underpinnings of “reasonable and supportable” forecasts or information and what they imply for banks’ loss estimates and, in turn, procyclicality. In this section, we review the papers that highlight the sensitivity of loss forecasts to the banks’ modelling judgment and discretion.

**Breeden (2018)** studies the sensitivity of ECL estimates to modelling techniques. The author tests a wide range of ECL models for procyclicality (viewed as co-movement between loss reserves with aggregate economic activity) and shows that the degree of co-movement is more sensitive to choices of modelling techniques (eg time series, vintage, roll rate, state transition and weighted-average remaining maturity (WARM) model) than to the macroeconomic scenario. This finding suggests that a key factor in determining procyclicality in an ECL regime is the bank management’s choice of methodology rather than macroeconomic conditions. The paper also questions the effectiveness of CECL in resolving the delayed recognition of credit losses (“too little, too late”) witnessed in the 2007–09 Global Financial Crisis. Counterfactual analysis around the crisis period shows that loss recognition timing varied widely depending on the model; some models predict increases in loss reserves before the crisis, but others show that loss reserves build only after the recession begins. Breeden, like DeRitis and Zandi, illustrates the importance of capturing vintage effects within the ECL model. According to this study, the WARM model does a particularly poor job of predicting the surge in mortgage losses before and during the financial crisis.

**Muzyka (2018)** also discusses the assumptions that can affect lifetime loss estimates under CECL. Using multiple scenarios with different reversion assumptions, the author conducts counterfactual analysis on a pool of C&I loans leading to and during the 2007–09 Global Financial Crisis. Using a series of graphs, the paper shows that when the reversion period is short and historical data fail to account for the crisis, CECL does not solve the “too little, too late” problem, and reserves still fall short of the amount needed to cover losses. However, a multiple scenario model that incorporates multiple economic cycles can raise reserves to a sufficient level and help absorb the economic shock.

**Canals-Cerdá (2019)** studies the sensitivity of projected loss estimates for credit card portfolios to the choice of estimation method. Using two payment allocation rules that could be used in CECL estimations, first-in-first-out and last-in-first-out, the author examines projected default curves for different cohorts. The paper finds that low-risk portfolios are likely to be more sensitive to specific assumptions about payment allocation rules than high-risk portfolios and shows that this difference is more pronounced in economic downturns. The findings demonstrate the sensitivity of loss forecasts to the selected estimation method and point to discretion afforded to banks in measuring losses for their credit card portfolios as a potential key policy consideration.

**Handorf (2018)** applies a Basel II/III risk-based capital model to large US banks’ mortgage loans to assess the upper bound of potential losses. The author finds that the change in accounting regime does not necessarily result in a significant increase in the allowance, as projected by the financial industry. This finding is due to the fact that the accounting change affects only unimpaired long-term loans, which tend to be of better quality than classified credits.

The question of discretionary risk-management policy under a forward-looking provisioning regime is further discussed in **Bushman and Williams (2012)** and **Bhat et al (2019)**. **Bushman and Williams (2012)** define procyclicality as a co-movement between bank lending and the business cycle, which leads to exaggeration of cyclical tendencies. While the authors acknowledge that timely recognition of expected future losses in a forward-looking provisioning model can reduce procyclicality and enhance banks’ risk-taking discipline, they also argue that increased discretion can reduce bank transparency and damp risk discipline. Therefore, the authors attempt to measure the level of discretion banks use in their forward-looking provisioning and investigate how this affects the trade-off between gains from reduced procyclicality and losses in transparency. The authors identify three distinct aspects of discretionary loan provisioning practices (earnings smoothing, future performance of the loan portfolio and future trajectory of loan growth) and examine the extent to which each aspect affects banks’ risk-taking behaviour. The authors find that earnings smoothing reduces disciplinary pressure, whereas provisioning that reflects the future performance of the loan portfolio enhances bank risk-taking discipline. **Bhat et al (2019)** address the impact of modelling choices and disclosures on timeliness of loss recognition under IL, building on Beatty and Liao (2011). The paper finds that modelling disclosures are positively associated with the timeliness of banks’ loan loss provisions and, subsequently, their ability to originate loans during downturns. While the empirical analysis in the paper is limited to IL regimes, these disclosures on modelling choices and management discretion can prove to be more important under CECL.

**Krüger et al (2018)** find that IFRS 9 would be relatively more procyclical than CECL, while not drawing explicit conclusions on the comparison of relative procyclicality between IL and ECL. In this study, procyclicality is defined in terms of changes in regulatory capital: required regulatory capital increases in times of bad economic conditions and is lower in times of good economic conditions. The measure of relative procyclicality is quantitative: the authors compare a future estimated deduction of the Common Equity Tier 1 ratio in relation to the minimum required capital ratio and analyse the cyclical behaviour of the gap between CECL and IFRS 9. The authors use estimated lifetime PDs to model an SICR threshold and show that the choice of SICR threshold has a significant impact on the share of Stage 2 loans in IFRS 9. The lower is the threshold, the higher are the IFRS 9 provisions. The authors note that this portion of modelling assumptions is not transparent and that discretionary choice of SICR threshold may create incentives for banks to “manage” provisions.

The study by **Kund and Rugilo (2018)** is based on empirical observations from European stress test results from 2014 to 2018 and loss forecasts through 2020, which encompasses the implementation of IFRS 9. Although procyclicality is not a main focus of this study, the authors note that the introduction of stages in loss recognition in IFRS 9 was intended to reduce procyclicality. However, IFRS 9 does not fully mitigate the “cliff effect” under the IL regime once a loss event has crystallised, as this effect remains in the transition of a loan from Stage 1 to Stage 2. In addition, the use of PIT rather than TTC estimates still contributes to IFRS 9 procyclicality effects, according to the authors. By contrast, CECL does not have a “cliff effect” and, therefore, is expected to be less procyclical than IFRS 9, with any procyclicality effects coming from the use of PIT estimates.

Management discretion, modelling choices and related disclosures are at the heart of the ECL discussion, but considerable effort has also been expended in developing methods that assist in the estimation of ECL. **Gubareva (2019)**, for example, derives a forward-looking term structure of default probability implied in credit default swap quotes using historical default risk premiums. **Harris et al (2018)** develop a measure of next year’s expected rate of credit losses that is a linear combination of various credit-risk-related measures disclosed by banks. **Simper et al (2019)** highlight the role of technology in mitigating the impact of bad management practice in banks. They find that banks that increase technological efficiency with respect to costs have a greater ability to recognise bad loans and are able to subsequently increase loan loss provisions. These works highlight tools that banks and financial firms can use to more accurately predict the default path and minimise potential bias in a lender’s judgment, which can shift the allowance allocation away from the optimum.

## 5.5 Conclusion

Lack of sufficient empirical data and actual experience under the new (C)ECL standards (IFRS 9 and CECL) means that most of the existing research relies on models and assumptions, which vary across the studies, to estimate hypothetical (C)ECL loan loss reserves during past business or credit cycles. They use different types of historical data and products, different modelling methods and levels of granularity, various “reasonable and supportable” forecast and reversion periods and diverse sets of macroeconomic scenarios. Importantly, there is no common definition or measure of “procyclicality” employed in these studies, making it difficult to reconcile conflicting results across the papers.

Still, the papers discussed in this section highlight the sensitivity of (C)ECL provisions to the methodologies and underlying assumptions. In particular, they demonstrate that the timing of provisioning and, therefore, conclusions about procyclicality of the (C)ECL standards may depend on several critical assumptions. One key assumption is the ability of banks’ macroeconomic forecasts to predict the turning points in business cycles. Of note here are the degree and quality of foresight that feature in banks’ “reasonable and supportable” forecasts, which is the central point in several of the papers reviewed in this section (**Covas and Nelson (2018)**, **Abad and Suarez (2018)**, **Chae et al (2019)**, **DeRitis and Zandi (2018)**). Other relevant assumptions include the duration of the reasonable and supportable forecast under (C)ECL standards, the frequency of forecast adjustments and the types of macroeconomic variables used. Research examining the consequences for procyclicality that arise from banks’ forecasting methods, assumptions and underlying behavioural biases (eg “recency bias”, where banks overweight more recent conditions and do not consider a wider range of scenarios) will be important.

In addition to the assumptions and their impact on (C)ECL estimates, several papers argue that there are aspects of the new standards that are inherently procyclical and that warrant closer attention. With respect to IFRS 9, the “cliff effect” resulting from loans moving from Stage 1 to Stage 2 can potentially make loss reserves relatively more procyclical under IFRS 9 compared to CECL (**Krüger et al (2018)**). Here, the criteria that banks use in identifying a significant increase in credit risk and their internal decision-making processes around moving assets from Stage 1 to Stage 2 will be important to consider.

The discretion that banks have in regard to SICR (in IFRS 9) and the different modelling approaches to loss estimation and macroeconomic forecasting make the loan loss reserves vary across banks even for portfolios with a similar credit profile. In addition, current studies on ECL do not incorporate any qualitative portion of the allowance estimation, which is subject to management judgment and can be significant.<sup>43</sup> It will be important to examine the role that management incentives play in affecting loss recognition practices, including the measurement and timing of LLPs.

Future research should also consider possible changes in banks' practices under the ECL standards, eg related to underwriting standards, risk management or capital management when considering the effects of credit loss accounting standards. For example, the use of PIT risk parameter estimates can potentially be related to procyclical effects (**Covas and Nelson (2018)**).

Overall, it is too early to draw definitive conclusions on whether (C)ECL standards will be more or less procyclical relative to the IL standards. There are mixed results in the recent literature based on counterfactual analyses. Still, our review of these papers shows just how sensitive the conclusions about procyclicality are to the choice of models and forecasting assumptions.

## 6. Conclusions and suggestions for future work

The aim of this literature review has been to help understand better the role that credit loss accounting plays in contributing to procyclicality that potentially can affect the real economy. The 2007–09 financial crisis spurred interest in this issue, with many blaming IL accounting as being a key contributor because the loss recognition by banks may have been “too little, too late”. This response prompted international accounting standards setters to endorse ECL standards (IFRS 9 and US GAAP CECL), considered by the American Bankers Association as “the most sweeping change in bank accounting ever”.<sup>44</sup>

The transition from IL to ECL accounting, however, encouraged many to question whether this move could have unintended consequences for bank lending behaviour and, in turn, economic activity. A potential concern is that the economic costs of the new ECL standards – resulting from the way in which they may affect bank credit supply, especially in economic downturns – could be greater than those of the IL standards. Specifically, the potential for real output losses might be greater if ECL standards provoke banks to cut lending supply, which amplifies the depth and duration of the downturn. Still, more robust evidence needs to be established on loss recognition practices and bank behaviours under IFRS 9 and CECL before a need for regulatory intervention to address potential procyclicality stemming from accounting standards can be evaluated.

To assist in that direction and inform the debate about procyclicality, we reviewed more than 90 papers examining the effects of various credit loss accounting approaches (IL, ECL, Dynamic Provisioning and National GAAP). Of note, only five papers specifically examined whether ECL accounting is more procyclical than IL accounting. Two provided results supporting this idea, while three highlighted findings suggesting otherwise.

This review showed that, despite extensive discussion about the “procyclicality” of credit losses in the literature, the concept of procyclicality studied varied considerably. The vast majority of papers tended to produce results useful for explaining the co-movement of banks' balance sheet variables – including LLPs, regulatory capital and lending – with the economic cycle rather than for informing policymakers about a causal feedback loop by which the financial system can amplify the business cycle and pose a risk to financial stability, which is the concept commonly applied by regulatory policymakers.

<sup>43</sup> For example, see Gullette (2020).

<sup>44</sup> For more information, see the American Bankers Association website at <https://www.aba.com/advocacy/our-issues/cecl-implementation-challenges>.

This distinction is important for our review, because co-movement (including correlation) often arises inevitably, eg through demand effects, and is not a cause for concern, whereas a causal link leading to credit supply shortages is. Accordingly, depending on the concept studied, empirical evidence of procyclicality may or may not be policy relevant. To help interpret insights from this literature review, we include a separate section describing the various concepts of procyclicality typically examined in the literature. We also catalogue (in the Summary Review Table in the Annex) the extent to which the extant empirical research examines the causal-effect concept of procyclicality.

This review revealed a number of significant insights. First, it is still too early for a sound statement to be made as to whether the ECL models under IFRS 9 or CECL will make a difference for procyclicality. There is limited empirical data on the experience of banks under either IFRS 9 or CECL, making it challenging to compare behaviours with those under IL accounting. While informative, the ex ante analyses provide mixed predictions, implying that procyclicality may be more or less pronounced under ECL standards. Those analyses, however, rely almost exclusively on counterfactual examinations, and make not well-established (and sometimes unrealistic) assumptions about bank behaviour under ECL standards. Consequently, while providing indicative evidence, results from these studies come with significant caveats and must be cautiously interpreted and weighed at this time.

Second, there is empirical evidence that delays in loss recognition can affect banks' willingness to lend. This impact happens through a "regulatory capital channel", as banks' concerns about compliance with such requirements mount during downturns when credit loss recognition grows. Such concerns can prompt reductions in lending as banks act to protect regulatory capital ratios. While the literature examining the impact of delays in loss recognition implicitly describes this as being consistent with a causal-effect concept of procyclicality, it offers very little direct support between the timing of loss recognition and lending "supply". This shortcoming is largely due to the inability of these studies to disentangle loan demand from supply. One notable study (Jiménez et al (2017)), however, addresses this challenge by using detailed credit register data and analysing a series of policy experiments under the dynamic provisioning regime in Spain. The paper shows that a large, one-off recognition of losses (ie increase in provisions) during the midst of a crisis can reduce credit supply and adversely affect bank borrowers.

Third, research also finds considerable heterogeneity in the extent to which banks delayed loss recognition under the IL approach. This evidence raises questions about whether there are more fundamental issues (eg related to management incentives and market and supervisory pressures) with credit loss recognition behaviour that may also persist under ECL standards.

Finally, there is some evidence that the discretion afforded banks in how to interpret the IL accounting standards also affects procyclicality of bank lending. In this case, results support the idea that discretionary loan loss provisions make bank balance sheets less transparent, reducing market confidence in banks' asset quality and capital adequacy in particular. These linkages might raise banks' funding costs and, ultimately, the cost of credit in the economy more widely, lowering real activity.

## Suggestions for future research

This review revealed a number of areas where future research could help shed further light on the procyclicality of ECL standards. First, given the greater scope for management judgement under ECL standards, it will be important to examine the role that management incentives play in affecting the timing of loss recognition. Isolating the underlying sources of management behaviour and understanding how each differentially affects banks' accounting choices and, in turn, lending activity are important avenues for future research.

Second, there is a need for research to understand the possible economic costs and benefits that come from enhanced discretion under ECL standards. Research provides evidence consistent with the idea

that discretionary loan loss provisioning has, in the past, been used for earnings and capital management purposes. On the one hand, this finding can imply economic costs to the extent that it makes banks' balance sheets less transparent. On the other hand, this practice also implies economic benefits to the extent that it allows banks to build buffers during good earnings periods and shield capital and lending capacity from downturns. More work is needed to understand these potential trade-offs and, in particular, the economic benefits of greater management discretion under ECL accounting.

Third, future research should take into account banks' possible behaviour changes under the ECL standards (eg by providing a prediction model) when considering the effects of credit loss accounting standards on lending. The literature that attempts to predict the procyclical effects of ECL standards relies extensively on counterfactual analysis, which requires a model to describe how banks might alter their behaviour in response to the proposed change in accounting rules. Future work might develop satellite models, or integrate findings from other strands of research to help translate the capital impacts of credit loss recognition into impacts on lending supply.

Fourth, more work is needed to understand the interplay between accounting standards and prudential requirements (eg Pillar 2 and CCyB) and supervisory tools (eg stress tests). Here, the interaction with the excess or shortfall mechanism under the Basel IRB capital requirements and what that means for bank lending will be important. Similarly, it will also be critical to understand the role that enforcement and bank governance play in influencing loss recognition practices.

Fifth, research examining the consequences of banks' forecasting methods, assumptions and underlying behavioural biases (eg "recency bias", where banks overweight more recent conditions and do not consider a wider range of scenarios) for procyclicality will be important.

Sixth, the roles of incentives, enforcement and governance warrant greater attention by future research. Given that there is evidence suggesting that banks were reluctant to disclose loan losses beyond those permitted under IL rules even when they were allowed to do so under alternative disclosure rules, more work on understanding banks' reluctance to disclose losses under ECL standards is needed. Relatedly, enforcement and bank governance are important instruments for future research to study.

Finally, there are lessons to be drawn from the Covid-19 crisis. In particular, the impacts of regulatory interventions – such as transitional rules (to delay implementation) and regulatory guidance on the measurement and definition of default and "significant increase in credit risk" – on credit activity should be examined. Such work will need to account for different government stimulus programmes, which may impact forecasts for several macroeconomic and banking sector variables, and it should also attempt to distinguish forecasting of the "anticipated" turn of the business cycle, which could be reasonably foreseen through the application of selected leading economic indicators, and an exogenous economic shock such as the Covid-19 pandemic.

Overall, the literature review shows that it is too soon to draw definitive conclusions on whether IFRS 9 or CECL may increase or decrease procyclicality relative to the IL framework. This unpredictability is, in part, because we lack a sufficiently long period of experience under either IFRS 9 or CECL with which to draw inferences about bank behaviour, especially around capital management and lending. Still, aspects of the ECL standards, including around the use of, among other things, point-in-time probabilities of default, macroeconomic forecasts, internal models and greater managerial judgment, warrant closer attention going forward.

## References

- Abad, J and J Suarez (2018): *The procyclicality of expected credit loss provisions*, CEPR Discussion Paper No DP13135, [ssrn.com/abstract=3244507](https://ssrn.com/abstract=3244507).
- Abel, A B and B S Bernanke (1995): *Macroeconomics*, second edition.
- Acharya, V V and S G Ryan (2016): "Banks' financial reporting and financial system stability", *Journal of Accounting Research*, vol 54, no 2, pp 277–340.
- Agénor, P-R and L Pereira da Silva (2017): "Cyclically adjusted provisions and financial stability", *Journal of Financial Stability*, vol 28, pp 143–162, [doi.org/10.1016/j.jfs.2016.12.009](https://doi.org/10.1016/j.jfs.2016.12.009).
- Agénor, P-R and R Zilberman (2015): "Loan loss provisioning rules, procyclicality, and financial volatility", *Journal of Banking & Finance*, vol 61, pp 301–315, [doi.org/10.1016/j.jbankfin.2015.08.035](https://doi.org/10.1016/j.jbankfin.2015.08.035).
- Balasubramanyan, L, J B Thomson and S Zaman (2017): "Evidence of forward-looking loan loss provisioning with credit market information", *Journal of Financial Services Research*, vol 52, no 3, pp 191–223.
- Balla, E and A McKenna (2009): "Dynamic provisioning: A countercyclical tool for loan loss reserves", *Federal Reserve Bank of Richmond Economic Quarterly*, vol 95, no 4, pp 383–418.
- Basel Committee on Banking Supervision (2010): *Group of Governors and Heads of Supervision announces higher global minimum standards*, press release, 12 September, [www.bis.org/press/p100912.htm](http://www.bis.org/press/p100912.htm).
- (2015a): "The interplay of accounting and regulation and its impact on bank behaviour: Literature review", *BCBS Working Paper 28*.
- (2015b), *Guidance on credit risk and accounting for expected credit losses*, December, [www.bis.org/bcbs/publ/d350.htm](http://www.bis.org/bcbs/publ/d350.htm).
- (2016), *Regulatory treatment of accounting provisions*, discussion paper.
- (2017): "The interplay of accounting and regulation and its impact on bank behaviour", *BCBS Working Paper 31*.
- (2020), *Measures to reflect the impact of Covid-19*, 6 April 2020, [www.bis.org/bcbs/publ/d498.pdf](http://www.bis.org/bcbs/publ/d498.pdf).
- Beatty, A and S Liao (2011): "Do delays in expected loss recognition affect banks' willingness to lend?", *Journal of Accounting and Economics*, vol 52, no 1, pp 1–20.
- (2014): "Financial accounting in the banking industry: A review of the empirical literature", *Journal of Accounting and Economics*, vol 58, no 2, pp 339–383.
- Bernanke, B S and C S Lown (1991): "The credit crunch", *Brookings Papers on Economic Activity*, Economic Studies Program, The Brookings Institution, vol 22, no 2, pp 205–248.
- Bhat, G, S G Ryan and D Vyas (2019): "The implications of credit risk modeling for banks' loan loss provisions and loan-origination procyclicality", *Management Science*, vol 65, no 5, [doi.org/10.1287/mnsc.2018.3041](https://doi.org/10.1287/mnsc.2018.3041).
- Bischof, J, C Laux and C Leuz (2020): "Accounting for financial stability: bank disclosure and loss recognition in the financial crisis", *SAFE Working Paper no 283*.
- Bikker, J A and P A J Metzmakers (2005): "Bank provisioning behaviour and procyclicality", *Journal of International Financial Markets, Institutions and Money*, vol 15, no 2, pp 141–157.

Blakeslee, S and N King (2020): *COVID-19 and its impact on your allowance*, website of the American Bankers Association, accessed 15 December 2020, [bankingjournal.aba.com/2020/06/covid-19-and-its-impact-on-your-allowance](http://bankingjournal.aba.com/2020/06/covid-19-and-its-impact-on-your-allowance).

Board of Governors of the Federal Reserve System (2020): *Regulatory capital rule: Revised transition of the current expected credit losses methodology for allowances*, 27 March, accessed 28 March 2020, [www.federalreserve.gov/newsevents/pressreleases/files/bcreg20200327a2.pdf](http://www.federalreserve.gov/newsevents/pressreleases/files/bcreg20200327a2.pdf).

Borio, C (2018): *New loan provisioning standards and procyclicality*, Speech in a panel organised by Bank of Spain, the Centro de Estudios Monetarios y Financieros (CEMFI) and the BIS Financial Stability Institute (FSI), Madrid, Spain.

Bouvatier, V and L Lepetit (2012): "Provisioning rules and bank lending: a theoretical model", *Journal of Financial Stability*, vol 8, no 1, pp 25–31.

Breeden, J (2018): CECL procyclicality: it depends on the model, Prescient Models LLC, [www.prescientmodels.com/articles/CECL-Procyclicality.pdf](http://www.prescientmodels.com/articles/CECL-Procyclicality.pdf).

Bushman, R M (2014): "Thoughts on financial accounting and the banking industry", *Journal of Accounting and Economics*, vol 58, no 2, pp 384–395.

Bushman, R M and C D Williams (2012): "Accounting discretion, loan loss provisioning, and discipline of banks' risk taking", *Journal of Accounting and Economics*, vol 54, no 1, pp 1–18.

——— (2015): "Delayed expected loss recognition and the risk profile of banks", *Journal of Accounting Research*, vol 53, no 3, pp 511–553.

Canals-Cerdá, J J (2019): *From incurred loss to current expected credit loss (CECL): a forensic analysis of the allowance for loan losses in unconditionally cancelable credit card portfolios*, Federal Reserve Bank of Philadelphia Working Paper 19-08.

Chae, S, R F Sarama, C M Vojtech and J Wang (2019): "The effect of the current expected credit loss standard (CECL) on the timing and comparability of reserves", *Finance and Economics Discussion Series 2018-20*, Federal Reserve Board, revised June 2019, [doi.org/10.17016/FEDS.2018.020r1](https://doi.org/10.17016/FEDS.2018.020r1).

Cohen, B H and G Edwards (2017): "The new era of expected credit loss provisioning", *BIS Quarterly Review*, [www.bis.org/publ/qtrpdf/r\\_qt1703f.htm](http://www.bis.org/publ/qtrpdf/r_qt1703f.htm).

Covas, F and W Nelson (2018): *Current expected credit loss: Lessons from 2007-2009*, Bank Policy Institute Staff Working Paper 2018-1.

Culbertson, J M (1962): Book Review "Federal Receipts and Expenditures During Business Cycles, 1879-1958", *Journal of Political Economy*, vol 70, no 5, pp 509–510.

Cummings, J R and K J Durrani (2016): "Effect of the Basel Accord capital requirements on the loan-loss provisioning practices of Australian banks", *Journal of Banking & Finance*, vol 67, pp 23–36.

de Haan, L and M R C van Oordt (2018): "Timing of banks' loan loss provisioning during the crisis", *Journal of Banking and Finance*, vol 87, pp 293–303, [doi.org/10.1016/j.jbankfin.2017.10.003](https://doi.org/10.1016/j.jbankfin.2017.10.003).

DeRitis, C and M Zandi (2018): "Gauging CECL Cyclicity", *Moody's Analytics*, [www.economy.com/mark-zandi/documents/2018-12-03-Gauging-CECL-Cyclicity.pdf](http://www.economy.com/mark-zandi/documents/2018-12-03-Gauging-CECL-Cyclicity.pdf).

Domikowsky, C, S Bornemann, K Düllmann, and A Pfungsten (2015): *Expected losses and managerial discretion as drivers of countercyclical loan loss provisioning*, working paper, 29 January, [www.oefg.at/wp-content/uploads/2014/01/Pfungsten et al - Expected Losses and Managerial Discretion as Drivers of Countercyclical Loan Loss Provisioning.pdf](http://www.oefg.at/wp-content/uploads/2014/01/Pfungsten_et_al_-_Expected_Losses_and_Management_Discretion_as_Drivers_of_Countercyclical_Loan_Loss_Provisioning.pdf).

Domikowsky, C, D Foos and M Pramor (2015): *Loan Loss accounting rules and bank lending over the cycle: evidence from a global sample*, mimeo.

Engelmann, B (2018): *Calculating lifetime expected loss for IFRS 9: which formula is correct?*, Working Paper, [ssrn.com/abstract=3238632](https://ssrn.com/abstract=3238632).

European Banking Authority (2016): *Report on the cyclicity of capital requirements*, 22 December.

European Central Bank (2020): "ECB Banking Supervision provides further flexibility to banks in reaction to coronavirus", press release, 20 March, [www.bankingsupervision.europa.eu/press/pr/date/2020/html/ssm.pr200320~4cddbcbf466.en.html](http://www.bankingsupervision.europa.eu/press/pr/date/2020/html/ssm.pr200320~4cddbcbf466.en.html).

European Systemic Risk Board (2019): *The cyclical behaviour of the ECL model in IFRS 9*, March.

Fillat, J and J Montoriol-Garriga (2010): *Addressing the pro-cyclicality of capital requirements with a dynamic loan loss provision system*, Federal Reserve Bank of Boston Supervisory Research and Analysis Working Paper No QAU10-4.

Financial Accounting Standards Board (2010): "Chapter 1, The objective of general purpose financial reporting" and "Chapter 3, Qualitative characteristics of useful financial information", *Conceptual framework for financial reporting, Statement of Financial Accounting Concepts* no 8.

——— (2016): *Measurement of credit losses on financial instruments. Financial Instruments – Credit Losses, ASC Topic 326*.

——— (2018): "Elements of financial statements", *FASB Concepts Statement* no 8, Conceptual Framework for Financial Reporting, Chapter 4, Proposed Statement of Financial Accounting Concepts.

Financial Stability Board (2009), "G20 London Summit – Leaders' Statement", 2 April.

Financial Stability Forum (2009): *Report of the FSF on addressing procyclicality in the financial system*.

Firestone, J M (1960): *Federal receipts and expenditures during business cycles, 1879-1958*.

Gubareva, M (2019): "Weight of the default component of CDS spreads: avoiding procyclicality in credit loss provisioning framework", *Complexity*, vol 2019, pp 1–19.

Gullette, M (2020), CECL and COVID: "Inconclusive, but wait for the auditors", *ABA Banking Journal*, 21 October, [bankingjournal.aba.com/2020/10/cecl-and-covid-inconclusive-but-wait-for-the-auditors/](https://bankingjournal.aba.com/2020/10/cecl-and-covid-inconclusive-but-wait-for-the-auditors/).

Haldane, A G (2011): "Accounting for bank uncertainty", remarks at the "Information for better markets" conference, Institute of Chartered Accountants in England and Wales, London, 19 November.

Handorf, W C (2018): "Implications of the current expected credit loss accounting model", *Journal of Banking Regulation*, vol 19, no 3, pp 211–21.

Hanson, S, A K Kashyap and J C Stein (2011): "A macroprudential approach to financial regulation", *Journal of Economic Perspective*, vol 25, no 1, pp 3–28.

Harris, T, U Khan and D Nissim (2018): "The expected rate of credit losses on banks' loan portfolios", *The Accounting Review*, vol 93, no 5, pp 245–271.

Hong, Y, F Huseynov, S Sardarli and W Zhang (2020): "Bank earnings management and analyst coverage: evidence from loan loss provisions", *Review of Quantitative Finance and Accounting*, vol 55, pp 29–54.

Huizinga, H and L Laeven (2019): "The procyclicality of banking: evidence from the Euro area", *IMF Economic Review*, vol 67, pp 496–527.

International Accounting Standards Board (2009): *Exposure Draft ED/2009/12 Financial Instruments: Amortised cost and impairment*, [www.ifrs.org/-/media/project/fi-impairment/exposure-draft-2009/published-documents/ed-amortised-cost-impairment-snapshot.pdf](http://www.ifrs.org/-/media/project/fi-impairment/exposure-draft-2009/published-documents/ed-amortised-cost-impairment-snapshot.pdf).

——— (2013): *Exposure Draft Snapshot: Financial Instruments: Expected credit losses*, [www.aasb.gov.au/admin/file/content102/c3/M130\\_3.8.1\\_IASB\\_Snapshot\\_ED-2013-3\\_Financial\\_Instruments\\_Expected\\_Credit\\_Losses.pdf](http://www.aasb.gov.au/admin/file/content102/c3/M130_3.8.1_IASB_Snapshot_ED-2013-3_Financial_Instruments_Expected_Credit_Losses.pdf).

——— (2018): *Conceptual framework for financial reporting 2018*.

——— (2020): *IFRS 9 and covid-19*, 27 March, [cdn.ifrs.org/-/media/feature/supporting-implementation/ifrs-9/ifrs-9-ecl-and-coronavirus.pdf](http://cdn.ifrs.org/-/media/feature/supporting-implementation/ifrs-9/ifrs-9-ecl-and-coronavirus.pdf).

Jiménez, G, S Ongena, J Peydró and J Saurina (2017): "Macprudential policy, countercyclical capital buffers, and credit supply: evidence from the Spanish dynamic provisioning experiments", *Journal of Political Economy*, vol 125, no 6, pp 2126–2177, [www.journals.uchicago.edu/doi/abs/10.1086/694289](http://www.journals.uchicago.edu/doi/abs/10.1086/694289).

Kashyap, A K and J C Stein (2000): "What do a million observations on banks say about the transmission of monetary policy?", *American Economic Review*, June, pp 407–28.

Krüger, S, D Rösch and H Scheule (2018): "The impact of loan loss provisioning on bank capital requirements", *Journal of Financial Stability*, vol 36, pp 114–129.

Kund, A-G and D Rugilo (2018): Does IFRS 9 increase financial stability?, working paper, last revised 12 February 2020, [ssrn.com/abstract=3282509](http://ssrn.com/abstract=3282509) or [dx.doi.org/10.2139/ssrn.3282509](http://dx.doi.org/10.2139/ssrn.3282509).

Laeven, L and G Majnoni (2003): "Loan loss provisioning and economic slowdowns: too much, too late?", *Journal of Financial Intermediation*, vol 12, pp 178–197.

Lane, P R (2003): "The cyclical behaviour of fiscal policy: evidence from the OECD", *Journal of Public Economics*, vol 87, no 12, pp 2661–2675.

Loudis, B and B Ranish (2019): *CECL and the credit cycle*, Federal Reserve Board Finance and Economics Discussion Series 2019-061, [doi.org/10.17016/FEDS.2019.061](http://doi.org/10.17016/FEDS.2019.061).

Lu, Y and V Nikolaev (2019): *Expected loan loss provisioning: an empirical model*, Chicago Booth Working Paper No 19-11.

Muzyka, M (2018): "The impact of assumptions on the CECL estimate: Certified Public Accountant", *The CPA Journal*, vol 88, no 8, pp 6–9.

National Bureau of Economic Research (2020): *Business Cycle Dating Committee Announcement*, 8 June, [www.nber.org/cycles/june2020.html](http://www.nber.org/cycles/june2020.html).

Novotny-Farkas, Z (2016): "The interaction of the IFRS 9 expected loss approach with supervisory rules and implications for financial stability", *Accounting in Europe*, vol 13, no 2, pp 197–227.

Ozili, P and E Outa (2017): "Bank loan loss provisions research: A review", *Borsa Istanbul Review*, vol 17, no 3, pp 144–163, [doi.org/10.1016/j.bir.2017.05.001](http://doi.org/10.1016/j.bir.2017.05.001).

Park, H W (2019): "Securitized banking, procyclical bank leverage, and financial instability", *Structural Change and Economic Dynamics*, vol 49, pp 283–300.

Pearl, J (2009): *Causality: models, reasoning, and inference*, second edition.

Ratnovski, L (2013): "Liquidity and transparency in bank risk management", *Journal of Financial Intermediation*, vol 22, no 3, pp 422–439.

Saurina, J and C Trucharte (2017): *The countercyclical provisions of the Banco de España 2000-2016*.

Simper, R, A Dadoukis and C Bryce (2019): "European bank loan loss provisioning and technological innovative progress", *International Review of Financial Analysis*, vol 63, pp 119–130.

Skąła, D (2015): "Saving on a rainy day? Income smoothing and procyclicality of loan-loss provisions in Central European banks", *International Finance*, vol 18, no 1, pp 25–46.

Tracy, J and J Wright (2016): "Payment changes and default risk: the impact of refinancing on expected credit losses", *Journal of Urban Economics*, vol 93, pp 60–70.

Van den Heuvel, S J (2002): "Does bank capital matter for monetary transmission?", *Economic Policy Review*, Federal Reserve Bank of New York, vol 8, no 1, pp 259–265, [www.newyorkfed.org/medialibrary/media/research/epr/02v08n1/0205vand.pdf](http://www.newyorkfed.org/medialibrary/media/research/epr/02v08n1/0205vand.pdf).

Van Doorselaere, J (2015): "Expected losses accounting under IFRS 9", Wolters Kluwer Financial Services.

Wheeler, P B (2019): "Loan loss accounting and procyclical bank lending: the role of direct regulatory actions", *Journal of Accounting and Economics*, vol 67, no 2–3, pp 463–495.



## List of abbreviations

BCBS – *Basel Committee on Banking Supervision*

BRSS – Bank Regulation and Supervision Survey

CARES Act – Coronavirus Aid, Relief, and Economic Security Act

CCyB – Countercyclical capital buffer

CET1 – Common Equity Tier 1

CECL – *Current Expected Credit Losses*

(C)ECL – ECL under IFRS 9 and CECL under US GAAP 326

Covid-19 – Coronavirus disease 2019

DELR – Delays in expected loss recognition

DP – Dynamic provisioning

DSGE – Dynamic stochastic general equilibrium model

EAD – Exposure at default

EBA – European Banking Authority

ECB – European Central Bank

ECL – *Expected credit loss*

EL – *Expected loss*

EU – European Union

FAS 5 – Financial Accounting Standard no 5: Accounting for Contingencies

FAS 107 – Financial Accounting Standard no 107: Disclosures about Fair Value of Financial Instruments

FAS 114 – Financial Accounting Standard no 114: Accounting by Creditors for Impairment of a Loan

FASB – *Financial Accounting Standards Board*

FASB ASC 310-10-35 (*formerly known as FAS 114*) – Accounting Standards Codification (ASC) Subtopic 310-10-35: Receivables – Overall – Subsequent Measurement

FASB ASC 450-20 (*formerly known as FAS 5*) – Accounting Standards Codification (ASC) Subtopic 450-20: Contingencies – Loss Contingencies

FDIC – Federal Deposit Insurance Corporation

FR Y-9C – Consolidated Financial Statements for Bank Holding Companies

FSB – Financial Stability Board

FSF – Financial Stability Forum

GAAP – Generally Accepted Accounting Principles

GDP – Gross domestic product

GP – General provision

G20 – Group of Twenty  
HPI – House price index  
IAS 39 – International Accounting Standard 39 *Financial Instruments: Recognition and Measurement*  
IASB – International Accounting Standards Board  
IFRS – International Financial Reporting Standards  
IFRS 9 – International Financial Reporting Standard 9 *Financial Instruments*  
IL – Incurred loss  
IRB – Internal ratings-based  
LGD – Loss-given-default  
LLA – Loan loss allowance  
LLP – Loan loss provision  
LTV – Loan-to-value ratio  
NBER – National Bureau of Economic Research  
nGAAP – National Generally Accepted Accounting Principles  
NPL – Nonperforming loan  
OECD – Organisation for Economic Co-operation and Development  
OLS – Ordinary least squares  
PD – Probability of default  
PIT – Point-in-time  
SEC – Securities and Exchange Commission  
SICR – Significant increase in credit risk  
SLOOS – Senior Loan Officer Opinion Survey on Bank Lending Practices  
SP – Specific provision  
S&P – Standard and Poor's  
TARP – Troubled Asset Relief Program  
TP – Total provision  
TTC – Through-the-cycle  
US GAAP – United States Generally Accepted Accounting Principles  
US GAAP 326 (ASC Topic 326) – FASB Accounting Standards Codification Topic 326: Financial Instruments - Credit Losses  
VAR – Vector autoregression  
WARM – Weighted average remaining maturity

## Annex

Selected papers reviewed in this literature survey are aggregated in this table. The list of papers included in this table is limited to publications containing original empirical analysis focusing on IL, DP or ECL (CECL/IFRS 9). The Reference section provides the complete list of all papers reviewed.

In this table, we summarise the various definitions of procyclicality used in empirical studies, distinguishing between co-movement (eg Abel and Bernanke (1995)) and causality (as defined by FSF (2009)). We refer the reader to Section 2.1 of this paper (Procyclicality) for an in-depth discussion of these concepts. Three of the check-box columns, "LLP", "Lending" and "Capital", indicate whether these variables that are viewed as channels for procyclicality have been directly modelled in the study as dependent variables, either in main or supplementary tests. The check box for "Lending supply identified statistically" indicates whether the lending supply was identified statistically in some form without necessarily being the focus or modelled variable. We also include the lending product category, as ECL provisioning can vary among different types of lending products by the duration of the expected life of the loan (eg credit cards, residential mortgages or C&I loans). The other key conditional factors that can impact the conclusions of the analysis noted in this table are the sample period and countries or states covered in the empirical studies. Detailed column descriptions are listed in Table Legends.

Authors	Title	Accounting standards/ LLP regimes covered	Time periods and countries covered	Lending product categories included in the data	LLP	Lending	Capital	Lending supply identified statistically	Further key variables	Empirical measure of (pro-) cyclicity used	Procyclicality benchmark	Procyclicality definition	Procyclicality findings
Abad, J and J Suarez (2018)	Assessing the procyclicality of expected credit loss provisions	IL, EL (CECL, IFRS 9)	1981–2015, EU countries	Corporate loans	Y	N	Y	N	PD, LGD, average time to maturity, rating migrations, discount rate	Probability that a bank needs to recapitalise to finance LLP	IL	The co-movement between the economic cycle and capital reduction with more loan losses or more sudden falls in regulatory capital right at the beginning of contractionary phases of the business or credit cycle.	IFRS 9 is more procyclical than CECL, which is more procyclical than IL.
Agénor, P-R and L Pereira da Silva (2017)	Cyclically adjusted provisions and financial stability	IL, DP	Not applicable. (calibrated DSGE model)	Implied total loans (loan rates modelled as part of the DSGE setup)	Y	Y	N	Y	DSGE variables modelled: output, consumption, investment, inflation, physical capital, cost of capital, NPL, loan rate, policy rate, bond rate, LLP to loan ratio	The optimal combination of forward-looking provisioning rules and countercyclical reserve requirements in a DSGE setting shows that dynamic provisioning is effective in mitigating procyclicality and financial volatility in response to financial shocks.	IL	Discourage excessive lending in booms and strengthen banks before downturns	The findings show that cyclically adjusted (ie dynamic) provisioning is effective in mitigating procyclicality and financial volatility in response to financial shocks. The key implication is that the simultaneous use of cyclically adjusted provisioning and countercyclical reserve requirements does not improve (at the margin) the ability of either to mitigate procyclicality and financial volatility. That is, they are not complements in that using a combination does not help achieve lower financial volatility than using either one separately, and optimal provisioning rules (that consider changes in NPLs and cyclical output) perform better in terms of damping macroeconomic and financial volatility.

Authors	Title	Accounting standards/ LLP regimes covered	Time periods and countries covered	Lending product categories included in the data	LLP	Lending	Capital	Lending supply identified statistically	Further key variables	Empirical measure of (pro-) cyclical used	Procyclicality benchmark	Procyclicality definition	Procyclicality findings
Agénor, P-R and R Zilberman (2015)	Loan loss provisioning rules, procyclicality, and financial volatility	IL, DP	Not applicable (calibrated DSGE model)	Implied total loans (loan rates modelled as part of the DSGE setup)	Y	Y	N	Y	DSGE variables modelled: output, consumption, investment, inflation, physical capital, cost of capital, NPL, loan rate, policy rate, bond rate, LLP to loan ratio	Loan rate: The solution of the DSGE model shows that the type of provision system (IL or DP) and the fraction of NPLs directly influence the behaviour of the loan rate, which determines the degree of cyclical of financial and real variables in the economy.	IL	Procyclicality of the financial system overall: credit boom and busts that exacerbate the inherent cyclical of lending and distort investment decisions, by fuelling excessive growth in credit or restricting access to bank finance	A DP regime is effective in mitigating procyclicality.
Balasubramanyan, L, J B Thomson and S Zaman (2017)	Evidence of forward-looking loan loss provisioning with credit market information	IL	Q1 1997–Q3 2011, US	All categories of lending products of US banks	Y	N	N	N	earnings before taxes and loan loss provisioning, NPL, total loans, total assets, capital asset ratio, net charge offs, interest income, equity capital, LLP	Expectations of NPLs in the next period cause provisions for loan losses in the present period.	NPLs	Co-movement with aggregate economic and credit cycle variables	Loan loss provisioning is "forward-looking"; the finding is conditional on phases of financial crisis.
Balla, E and A McKenna (2009)	Dynamic provisioning: a countercyclical tool for loan loss reserves	DP	1993–2008, US	Total loans (for the US banking system)	Y	N	N	N	Net income	NA	IL	Co-movement of LLP	DP is less procyclical than IL with caveats.
Beatty, A and S Liao (2011)	Do delays in expected loss recognition affect banks' willingness to lend?	IL	Q3 1993–Q2 2009, US	NA	N	Y	Y	Y	Delayed expected loss recognition (DELR) (derived from LLP regression)	Banks with longer delays in loss recognition tend to reduce their lending more during recessions, consistent with the co-movement concept of procyclicality.	IL	Exaggeration of cyclical tendencies in aggregate economic activity	Loan growth is lower during recessions for banks with longer delays in EL recognition compared with those with shorter delays.
Bouvatier, V and L Lepetit (2012)	Provisioning rules and bank lending: a theoretical model	NA	NA	Long-term loans with a flexible interest rate (theoretical approach)	Y	Y	Y	N	Interest rates, output gap	The loan market dynamics depend on several factors including deviations of the interest rate on debt, NPLs, stock, and business cycle.	IL	Co-movement between total loss provisions and loan market fluctuations	A forward-looking provisioning system smooths LLP evolution. The issue of procyclicality of the loan market disappears.
Breeden, J (2018)	CECL procyclicality: it depends on the model	ECL (CECL)	Q1 2005–Q4 2015, US	30-year conforming fixed-rate mortgages	Y	N	N	N	vintage, roll rate, state transition, WARM	Peak of loss reserve during the crisis	Actual lifetime loss for loans outstanding	Co-movement with aggregate economic activity: Procyclicality means that loss reserves and a crisis would peak at the same time.	A key factor in determining procyclicality in an ECL regime is the bank management's choice of methodology rather than macroeconomic conditions.

Authors	Title	Accounting standards/ LLP regimes covered	Time periods and countries covered	Lending product categories included in the data	LLP	Lending	Capital	Lending supply identified statistically	Further key variables	Empirical measure of (pro-) cyclicity used	Procyclicality benchmark	Procyclicality definition	Procyclicality findings
Bushman, R M and C D Williams (2012)	Accounting discretion, loan loss provisioning, and discipline of banks' risk-taking	EL	1995–2006, 27 countries	Aggregate loan portfolio	Y	N	Y	N	Fair deposit insurance premium	NA	NA	Procyclicality refers to the exaggeration of cyclical tendencies in aggregate economic activity that amplifies business cycle fluctuations.	NA
Bushman, R M and C D Williams (2015)	Delayed expected loss recognition and the risk profile of banks	IL	1993–2009, quarterly data, US	Corporate, consumer and real estate	Y	N	N	N	Stock market liquidity risk	DELR	No comparison made	NA	NA
Canals-Cerdá, J J (2019)	From incurred loss to current expected credit loss (CECL): a forensic analysis of the allowance for loan losses in unconditionally cancelable credit card portfolios	IL, ECL (CECL)	Q1 2008–Q2 2017, US	Credit card loans	Y	N	N	N	NA	NA	NA	NA	NA
Chae, S, R F Sarama, C M Vojtech and J Wang (2019)	The impact of the current expected credit loss standard (CECL) on the timing and comparability of reserves	IL, EL (CECL)	2002–15, US (California)	30-year fixed-rate, first-lien mortgages	Y	N	N	N	Housing prices, LTV	Changes in the level of allowances for loan and lease losses under different forecast assumptions	IL; direct comparisons made	Co-movements with aggregate economic activity; overstated reserves at the trough of a cycle and understated reserves at the peak of a cycle	CECL is less procyclical than IL.
Cohen, B H and G A Edwards Jr (2017)	The new era of expected credit loss provisioning	IFRS 9, CECL	2007–15	NA	Y	N	N	N	NA	LLP and impaired loans	IL; no comparison made	Spurring excessive lending during the boom and forcing a sharp reduction in the subsequent bust	IFRS 9 and CECL should reduce the procyclicality of the financial system.
Covas, F and W Nelson (2018)	Current expected credit loss: lessons from 2007–2009	IL, CECL (US GAAP)	1977–2017, US	Aggregate loan and lease portfolio composed of 15 lending product categories	Y	N	Y	Y	Real GDP, unemployment rate, house price index, and commercial real estate price index	The procyclicality of CECL is driven by the inaccuracy of forecasts around turning points of the business cycle and not by parameter uncertainty or by not including enough recessions in the estimation of loan loss models.	IL allowance	Co-movements with aggregate economic activity: Banks reduce credit supply during downturn, leading to further declines in economic activity.	CECL would have been procyclical had it been in place during the previous crisis.

Authors	Title	Accounting standards/ LLP regimes covered	Time periods and countries covered	Lending product categories included in the data	LLP	Lending	Capital	Lending supply identified statistically	Further key variables	Empirical measure of (pro-) cyclicity used	Procyclicality benchmark	Procyclicality definition	Procyclicality findings
Cummings, J R and J K Durrani (2016)	Effect of the Basel Accord capital requirements on the loan-loss provisioning practices of Australian banks	IL and IFRS 9	Sep 2003–Dec 2012, Australia	NA	Y	N	N	N	Prudential EL	LLP	No	Countercyclicality means that credit risk is built up in a boom and materialises in a downturn.	Bank provisioning behaviour has both procyclical and countercyclical characteristics.
de Haan, L and M R C van Oordt (2018)	Timing of banks' loan loss provisioning during the crisis	IL	Post-2008 crisis period, NL	Loans ("loans and receivables")	Y	Y	N	N	Impaired loans (percentage of total loans), additions, write-offs, reversals (percentage of total loans)	NA	NA	NA	NA
DeRitis, C and M Zandi (2018)	Gauging CECL cyclicity	IL, ECL(CECL)	1999–2018, US	Freddie Mac portfolio of single-family residential mortgage loans	Y	N	N	N	FICO scores, LTV, House price index	Correlation between LLA and macro variables	IL; direct comparisons made	Co-movement with aggregate macroeconomic activity; correlation between macro variables and loss reserves; build-up of allowances in good economic time before a recession	CECL is less procyclical than IL.
Domikowsky, C, S Bornemann, K Düllmann and A Pfingsten (2015)	Expected losses and managerial discretion as drivers of countercyclical loan loss provisioning	EL (nGAAP)	1994–2011, annual observations, Germany	Total loans (customer loans and Interbank loans)	Y	N	N	N	NA	Regression coefficient (LLP on GDP)	None	Co-movement with aggregate economic activity	NA
Domikowsky, C, D Foos and M Pramor (2015)	Loan loss accounting rules and bank lending over the cycle: evidence from a global sample	IL (IAS 39, nGAAP), nGAAP (general), IL	1997–2012 (annual obs.), 52 countries' data	Total lending	N	Y	N	Y	LLP index (capturing nGAAP impairment-standards characteristics)	Regression coefficient (lending on [GDP * Provisioning index])	IL (implicitly; internal comparison based on provisioning index)	Co-movement with aggregate economic activity	EL is less procyclical than IL.
European Systemic Risk Board (2019)	The cyclical behaviour of the ECL model in IFRS 9	ECL	NA	NA	Y	Y	N	N	NA	NA	NA	There are two views: (1) Concerning co-movement, financial variables move together with and in the same direction as the financial cycle, and (2) there is amplification of the financial cycle, ie not merely going in the same direction, but reinforcing it.	The second view has been widely adopted when discussing procyclicality in macroprudential contexts, as it is associated with behaviours that can affect the depth and duration of financial crises.

Authors	Title	Accounting standards/ LLP regimes covered	Time periods and countries covered	Lending product categories included in the data	LLP	Lending	Capital	Lending supply identified statistically	Further key variables	Empirical measure of (pro-) cyclicity used	Procyclicality benchmark	Procyclicality definition	Procyclicality findings
Fillat, J L and J Montoriol-Garriga (2010)	Addressing the pro-cyclicality of capital requirements with a dynamic loan loss provision system	DP	1987–2009, quarterly, US	Aggregate loans for the US banking system	Y	N	N	N	Income	Correlation of LLP with the business cycle (assumed)	IL	Co-movement view is that LLPs correlate negatively with the business cycle, decreasing during expansions and increasing during contractions, causing credit rationing and an exacerbation of economic contractions.	DP is less procyclical than IL (with caveats).
Gubareva, M (2019)	Weight of the default component of CDS spreads: avoiding procyclicality in credit loss provisioning framework	CECL	Jul 2007–Jun 2017 (monthly averages of daily observations), North America and European countries	NA	N	N	N	N	PD	NA	NA	Co-movement with aggregate economic activity	NA
Harris, T S, U Khan and D Nissim (2018)	The expected rate of credit losses on banks' loan portfolios	EL (CECL, IFRS 9)	Q4 1996– Q2 2015, US	Three primary loan categories: real estate, consumer, and other loans (which includes C&I loans)	Y	N	N	Y	NA	NA	NA	NA	NA
Hong, Y, F Huseynov, S Sardarli and W Zhang (2020)	Bank earnings management and analyst coverage: evidence from loan loss provisions	IL	1992–2012, US	Total loans	Y	N	N	N	NA	NA	NA	NA	NA
Huizinga, H and L Laeven (2019)	The procyclicality of banking: evidence from the euro area	IFRS, US GAAP and other accounting regimes (Canada), IL	1996–2015, 32 countries (European Economic Area countries, US, Canada)	Provisions (from accounting data)	Y	Y	Y	N	GDP growth	GDP growth	NA	Co-movement view is that LLP is negatively related to GDP growth.	NA

Authors	Title	Accounting standards/ LLP regimes covered	Time periods and countries covered	Lending product categories included in the data	LLP	Lending	Capital	Lending supply identified statistically	Further key variables	Empirical measure of (pro-) cyclical used	Procyclicality benchmark	Procyclicality definition	Procyclicality findings
Jiménez, G, S Ongena, J-L Peydro and J Saurina (2017)	Macroprudential policy, countercyclical bank capital buffers, and credit supply: evidence from the Spanish dynamic provisioning experiments	DP	1998–2013, Spain	Consumer, commercial, mortgage, public debt, credit card	N	Y	N	Y	NA	Correlation of lending with the business cycle	No comparison	Co-movement of lending supply	NA
Krüger, S, D Rösch and H Scheule (2018)	The impact of loan loss provisioning on bank capital requirements	EL (CECL, IFRS 9)	1991–2013, US	US bonds	Y	N	Y	N	PD, LGD	Gap of CET1 and Core Tier 1 capital; comparison of average estimated capital increases under ECL with actuals in the past recessions	No direct comparison with IL	Co-movement with aggregate economic activity: Regulatory required capital increases in times of bad economic circumstances and decreases in times of good economic conditions.	IFRS 9 is more procyclical than CECL due to the significant SICR criterion associated with Stage 2 of IFRS 9 ("cliff effect").
Kund, A-G and D Rugilo (2020)	Does IFRS 9 increase financial stability?	IL (IAS 39), EL (IFRS 9)	2014–18 and forecasts until 2020, 15 European countries	All categories of lending products of European banks	Y	N	Y	N	NA	Volatility of impairments	IL (IAS 39)	No direct definition used	While IFRS 9 reduces procyclicality related to the cliff effect compared with IL (IAS 39), it does not fully eliminate it.
Loudis, B and B Ranish (2019)	CECL and the credit cycle	IL, ECL(CECL)	1998–2014, US	Multiple lending products: one composite representative bank with proportional asset holdings of residential real estate, C&I, commercial real estate, other wholesale, cards, other retail and auto loans	Y	Y	Y	Y	Net charge offs, loan growth, RWA, Capital distribution	Fluctuations (standard deviation) in lending growth	IL	Co-movement with aggregate economic activity: implies a reduction in lending during downturns and an increase in lending during upturns.	CECL is less procyclical than IL.
Lu, Y and V Nikolaev (2019)	Expected loan loss provisioning: an empirical model	IL, ECL (CECL)	1986–2017, US	Aggregate loan portfolio	Y	Y	N	N	Net income, stock return	Association of the reported LLPs and allowances with changes in GDP	Reported LLP (IL)	Co-movement of bank credit policy with economic cycles	ECL provision behaves in a countercyclical manner
Muzyka, M (2018)	The impact of assumptions on the CECL estimate	ECL (CECL)	2007–17, US	200 C&I loans originated in 2007 with maturity ranging from 2010 to 2017	Y	N	N	N	NA	NA	NA	NA	NA

Authors	Title	Accounting standards/ LLP regimes covered	Time periods and countries covered	Lending product categories included in the data	LLP	Lending	Capital	Lending supply identified statistically	Further key variables	Empirical measure of (pro-) cyclicity used	Procyclicality benchmark	Procyclicality definition	Procyclicality findings
Park, H W (2019)	Securitized banking, procyclical bank leverage, and financial instability	IL	1975–2012, annual observations, US	NA	N	Y	Y	Y	Asset price	NA	NA	Co-movement with aggregate economic activity	NA
Saurina, J and C Trucharte (2017)	The countercyclical provisions of the Banco de España 2000-2016	IL (IAS39), Spanish DP regime	1998–2014, Spain	Consumer; commercial; mortgage; public debt; credit cards	N	Y	N	Y	NA	Correlation of lending with the business cycle	No comparison	Co-movement of lending supply with the business cycle	NA
Simper, R, A Dadoukis and C Bryce (2019)	European bank loan loss provisioning and technological innovative progress	IL	2002–14	Aggregate loan portfolio	Y	N	N	N	NA	NA	NA	NA	NA
Skała, D (2015)	Saving on a rainy day? Income smoothing and procyclicality of loan-loss provisions in Central European banks	IL	2004–12, 11 Central European countries	Total loans	Y	N	N	N	Note: LLP in this paper represents the expense item.	Correlation of LLP with the business cycle (assumed)	NA	Co-movement with economic activity	NA (though the implication is that the IL standard could be more procyclical than a forward-looking regime, such as the DP regime)
Tracy, J and J Wright (2016)	Payment changes and default risk: the impact of refinancing on expected credit losses	IL	2003, US	Random sample of first-lien, GSE-held prime, owner-occupied, adjustable-rate mortgages	N	N	N	Y	Loan default rate, LGD	NA	NA	NA	NA
Wheeler, P B (2019)	Loan loss accounting and procyclical bank lending: the role of direct regulatory actions	IL	1990–2014, quarterly	Consumer, commercial real estate, total loans and leases	Y	Y	N	N	NA	Minimum capital ratio channel, safety and soundness channel, transparency channel	IL, no comparison made	Procyclical lending refers to supply-driven changes in lending that amplify the business cycle in a general discussion in the introduction, but the setup of the empirical analysis only captures co-movement with the business cycle.	NA

## Table legends

Columns	Explanation
Accounting standards covered	Generally Accepted Accounting Principles (GAAP) (International Financial Reporting Standards, US GAAP, other national GAAP and the name/description of impairment standards (incurred loss, expected loss, expected credit loss, Current Expected Credit Losses, dynamic provisioning and others))
Time periods and countries covered in the dataset	Years covered by the data sample and frequency of observations; either list of countries covered by the data set, name of region and/or number of countries
Lending product categories included in the data	Type of data series used in the analysis (product categories or portfolios)
LLP	Is loan loss provision (LLP) explained or modelled as a dependent variable in the empirical analysis or theoretical model ("Y" or "N")?
Lending	Is the response of lending captured by original quantitative analysis (as a left-hand-side variable in either an empirical estimation or a theoretical model equation) performed in the paper itself ("Y" or "N")?
Capital	Is capital explained or modelled as a dependent variable in the empirical analysis or theoretical model ("Y" or "N")?
Lending supply identified statistically	Is loan supply statistically identified (eg through loan-level data) or loan demand explicitly accounted for through additional control variable(s) ("Y" or "N")?
Further key variables (specify)	List of key variables other than "LLP", "Lending", and "Capital" explained, modelled or derived in the quantitative analysis that directly address the research hypothesis
Empirical measure of (pro-)cyclicality used	Statistical concept(s) used in the paper (eg graphs, mean or median values, variances, correlations, probabilities [or frequencies], regression coefficients, simulation paths) and the variables involved (eg variance of lending growth, correlation of lending with the business cycle, regression coefficient of lending on GDP) for testing the procyclicality hypothesis
Procyclicality benchmark	Benchmark for comparison of quantitative results
Procyclicality definition	Definition or interpretation of "procyclicality" used in the study and reported in terms discussed in Section 2 of the literature survey ("co-movement with aggregate economic activity" or "causal relationship"), wherever applicable
Procyclicality finding (based on procyclicality benchmark)	Findings related to procyclicality