Measuring and Managing the Impact of IFRS 9 and CECL Requirements on Dynamics in Allowance, Earnings, and Bank Capital

Abstract

Reserving for loan loss is one of the most important accounting aspects for banks. Its objective is to cover estimated losses on impaired financial instruments due to defaults and non-payment. Reserve measurement affects both the balance sheet and income statement. It impacts earnings, capital, dividends and bonuses, and attracts the attention of bank stakeholders ranging from the board of directors and regulators to equity investors. In response to the so-called “too-little, too-late” problem experienced with loan loss reserve during the Great Financial Crisis, accounting standard setters now require that banks provision against loan loss based on expected credit losses (ECL). Arguably, calculating the Expected Credit Loss Model under IFRS 9 and CECL presents a momentous accounting change for banks, with the new standards coming into effect sometime between 2018 and 2021, depending on the jurisdiction.

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1. Overview

Reserving for loan loss is one of the most important accounting aspects for banks. Its objective is to cover estimated losses on impaired financial instruments due to defaults and non-payment. Reserve measurement affects both the balance sheet and income statement. It impacts earnings, capital, dividends and bonuses, and attracts the attention of bank stakeholders ranging from the board of directors and regulators to equity investors. In response to the so-called “too-little, too-late” problem experienced with loan loss reserve during the Great Financial Crisis, accounting standard setters now require that banks provision against loan loss based on expected credit losses (ECL). Arguably, calculating the Expected Credit Loss Model under IFRS 9 and CECL presents a momentous accounting change for banks, with the new standards coming into effect sometime between 2018 and 2021, depending on the jurisdiction.

The new impairment models required to meet these standards replace existing “incurred loss models” with more forward-looking approaches that incorporate future credit loss forecasts. Regulation requires banks recognize and update ECL at each reporting date to reflect credit risk changes. Firms must base their ECL measurements on reasonable and supportable information, which includes historical, current, and forecasted details.

While banks worldwide are fully engaged in meeting the new standards’ implementation challenges for data, methodology, IT, governance, and disclosure, the new standards’ impacts reach far beyond these implementation challenges. For the most part, discussions surrounding CECL and IFRS 9 center around the immediate impact on allowance and capital levels. This said, there is increasing awareness of the potential impact on portfolio-level dynamics and volatility. Report on Results from the EBA Impact Assessment of IFRS 9 highlights that 75% of the banks anticipate that IFRS 9 impairment requirements will increase profit or loss volatility. 1 In May 2017, The Wall Street Journal reported that, “Finance chiefs at 18 U.S. regional banks have asked Treasury Secretary Steven Mnuchin to conduct an analysis of the long-term economic effects of [CECL]… banks would have to book loan losses and take reserves based on economic forecasts that are inherently uncertain, the reserves will be subject to significant volatility…”2 Also in May 2017, Risk Net reported that banks are preparing for the volatility of loan-loss provisioning from the new accounting standard by using additional own-funds protection.3

The new standards will potentially upend many business areas within a bank, affecting loan origination, commercial policies, and portfolio strategy and management. The key to preparing for the new standards requires assessing the impact on allowance, earnings, and capital. The main objective of this paper is to explore how CECL and IFRS 9 might impact loss allowance, earnings, and capital dynamics, and how these dynamics might affect credit portfolio management. We begin by exploring the mechanism by which IFRS 9 and CECL feeds into allowance, earnings, and capital at the loan-level. We find that loss allowance measured to reflect forward-looking credit measures, combined with the IFRS 9 staging rule, can result in materially different patterns for allowance, earnings, and capital surplus when compared to the incurred loss model. In addition, we explore how portfolio dynamics might react to the new rules and find that the impact can be striking. We then review empirical studies that use historical borrower- and loan-level bank consortium data to compare loss allowances under the incurred loss model with CECL and IFRS 9 results. While we find that under CECL and IFRS 9 allowances build-up more aggressively during the financial crisis (potentially addressing “too-little, too-late”), we observe significant variations in allowances across banks and over time. Considering the analysis controls the allowance models, the differences are entirely driven by portfolio composition and risk characteristics.

Results from empirical studies lead us to examine how to align portfolio composition with loss accounting. Said differently, how should CECL and IFRS 9 affect organizations’ loan origination and portfolio choices, and how should they design decision measures to improve performance by incorporating the impact of the new standard? We present studies that formalize the portfolio optimization problem as a tradeoff between economic risks and return, while recognizing regulatory constraints and loss recognition rules. At the top-of-the-house level, the studies explore how much capital an organization should hold above and beyond the minimum required level, recognizing that a buffer is needed to account for capital surplus fluctuations driven by (CECL or IFRS 9) allowance and earnings volatility. At the sub-portfolio or loan-level, the studies explore risk and capital allocation measures that maximize portfolio performance, while recognizing loss accounting regulatory capital constraints. Perhaps not surprisingly, the analysis suggests that CECL and IFRS 9 can have a material impact on portfolio strategy. As an example, institutions that find a material increase in portfolio capital surplus volatility resulting from CECL and IFRS 9 have an incentive to better diversify lending. Another interesting dynamic results from the IFRS 9 staging rule, which incentivizes organizations to originate assets unlikely to migrate to Stage 2 and longer-dated, taking advantage of the one-year allowance required under Stage 1.4

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1 Report on Results from EBA Impact Assessment of IFRS 9, European Banking Authority, 2016.
4 With allowance, earnings, and capital volatility the focus of this paper, we abstract from the nuances of Stage 3 classification.
While loan loss reserve is an accounting concept, at its core, it should be about credit risk. Assessing the impact and aligning an organization’s strategy to the new rules is a credit portfolio risk management problem. While the impact of the new standards can be, in part, measured and managed as an economic scenario forecasting and loss modeling exercise, it is our intention to focus on the underlying risk drivers that ultimately affect loss allowance, earnings, and capital — their levels as well as their volatilities and overall dynamics. These fundamental risk drivers, certainly not new to banks, are default, credit migration, recovery, correlation, and concentration. New to banks is the possibility that CECL and IFRS 9 will magnify and heighten the importance of these drivers.
2. The Mechanisms by which IFRS 9 and CECL Impact Allowance, Earnings, and Capital Dynamics

This section outlines how IFRS 9 and CECL impact allowance, earnings, and capital. While most discussions regarding CECL and IFRS 9 focus on their immediate and one-time impact on income statements and balance sheets, we focus on the resulting dynamics over time; the resulting volatility and possible extreme values that allowance, earnings, and capital surplus might exhibit. We present material using stylized and illustrative case studies, along with our intuition for why allowance, earnings, and capital surplus may change.

To begin, earnings from a loan portfolio consist of interest income, change in loss allowance, and net charge-offs. IFRS 9 and CECL impact a loan portfolio’s earnings via their impact on loss allowance. Institutions must recognize expected credit loss for a financial instrument as soon as the instrument is originated or purchased. In addition, institutions must update loss allowance to reflect the current credit environment at each reporting date, using forward-looking credit measures. One of the primary motivating factors for the new standards was concern that incurred loss resulted in delayed loss recognition and updates to loss allowances that were "too-little, too-late" during economic downturns. Most stakeholders believe that IFRS 9 and CECL will have a significant impact on allowance, earnings, and capital, given that allowances will be measured using economic forecasts that are inherently uncertain. In addition, IFRS 9 introduces the concept of "Staging." When a borrower experiences a material deterioration in credit quality (but continues to perform), and an associated credit exposure transitions from “Stage 1” to “Stage 2,” loss allowance increases from one-year to lifetime expected loss; CECL losses are always under a lifetime measure. Since the difference between one-year and lifetime expected loss can be large, especially for longer-dated instruments, loss allowance will exhibit a spike when the instrument transitions to "Stage 2."

The new standards affect capital surplus as retained earnings, which includes credit impairment charges, as discussed above, and flow into capital supply. A rise in impairment inevitably depletes the capital adequacy of banks using the Standardized Approach to credit risk. The result is less clear for Internal Ratings Based (IRB) banks, because of the relationship between impairment and the IRB capital formula outcomes. Nevertheless, the new standards will impact regulatory capital adequacy dynamics.

Levy, et al. (2017) highlight how IFRS 9 ties loss allowance dynamics more closely with the credit migration of the underlying borrower. With loss allowance propagating to earnings, changes in credit quality are immediately recognized and flow into capital surplus. Table 1 is based on their study and illustrates the differences between earnings and the resulting change in capital surplus for an individual loan under IFRS 9, CECL, and incurred loss. The example assumes the loan has a $10,000 (USD for CECL and, say, CAD for IFRS 9) face value, a five-year maturity, 50% LGD, and a 1% annual coupon rate with quarterly payments. In this example (and for the remainder of this section), we keep regulatory capital fixed for non-defaulted loans, so that earnings drives any change in capital surplus, enabling us to focus on the allowance impact. To streamline the case studies, we focus on a Loss Emergence Period (LEP) of one-year, along with a rating system with Through-the-Cycle (TTC) properties, to generate one-year expected loss under incurred loss. Under incurred loss, earnings, which equate to the change in capital surplus, are constant during the first three quarters, as the credit rating and, hence, the TTC PD and loss allowance of the loan do not change. Under CECL and IFRS 9, however, earnings and the change in capital surplus fluctuate with changes to the loan’s forward-looking PD. Notice the difference between the one-year IFRS 9 and lifetime CECL allowance; allowances are more sensitive to changes in credit quality under the lifetime measure. During the fourth quarter, the borrower experiences a severe downgrade, which lowers its credit rating from Baa3 to Ba3 and causes the loan to be classified as “Stage 2” under IFRS 9. Consequently, the loss allowance under IFRS 9 increases significantly and equates with CECL allowance as the lifetime expected loss is recognized. This flows through and results in large, negative IFRS 9 earnings for the quarter. While earnings under incurred loss is also negative during the quarter, its magnitude is much smaller than under IFRS 9.

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5 This paper uses the term "earnings" as shorthand for credit earnings and omits the impacts of interest rate and other income streams on earnings. This definition should not lead to confusion, given this paper focuses on credit.

6 See Adrian Docherty’s Integration into Regulatory Capital Framework in The New Impairment Model Under IFRS 9 and CECL, by Jing Zhang for the details of the interactions between the accounting and regulatory capital framework.

As illustrated in the case above, quarter-to-quarter fluctuations in earnings and changes in capital surplus are more pronounced under CECL and IFRS 9 than under incurred loss, as earnings are more closely tied to the forward-looking loss measures. The case provides a useful platform for exploring the extent to which the new rules address "too-little, too-late." The rules are intended to encourage organizations to build-up allowances in preparation for a potential default. The example clearly demonstrates this build-up indeed occurs with the new rules, generally resulting in more reactive increases in allowances each quarter as credit quality deteriorates. This observation can have profound effects on whether banks address "too-little, too-late" at the portfolio level. If most loans deteriorate and do not default, the new rules can place more pressure on capital surplus than under the old rules; higher allowances drive lower (or negative) earnings, which impacts capital surplus. The punchline is that we expect a loan portfolio’s earnings volatility to be higher under the new rules, as loss allowances are based on forward-looking measures, coupled with the “Staging,” which further adds to the volatility under IFRS 9. With these observations, we now turn our attention to a more detailed exploration of the implications CECL and IFRS 9 have on portfolio allowance and earnings dynamics.

Before moving on, it is worth pointing out two nuances related to the interplay of credit migration and the new standards. First, the horizon over which credit earnings are analyzed and a loan’s maturity. If we define horizon as the loan’s maturity date, default is the only loss state, and earnings volatility will be independent of the loss recognition rule for non-defaulted assets. In the end, accounting rules do not impact income if measured over a loan’s entire lifetime. Accounting rules only determine when and how earnings are recognized. However, when the horizon is shorter than the maturity, as is generally the case with quarterly reporting for typical loan portfolios, credit migration will impact earnings volatility differently across various accounting standards. Second, some short-dated instruments may exhibit lower sensitivity to credit migration under the new rules. For example, a loan not expected to renew, with contractual maturities lower than associated LEP, may experience a reduction in the sensitivity of allowance to changes in credit quality under the new rules. While the forward-looking loss measures will be more dynamic under IFRS 9 and CECL, the countervailing effect of maturity being shorter than the LEP may prevail. In general, the proportion of assets with these characteristics is small and will not change the overall dynamics at the portfolio level.
3. Constructing the Future Distribution of Earnings and Capital Surplus

The case study outlined in Table 1 demonstrates dynamics in allowance, earnings, and capital driven by credit migration for a single loan. We now explore the broader set of risk drivers: default, credit migration, recovery, correlation, and concentration that ultimately determine the distribution of earnings capital surplus. To illustrate dynamics, Figure 1 compares the distribution of earnings for a sample loan portfolio under CECL, IFRS 9, and incurred loss. In this example, we set a one-year horizon lower than the maturities of the loans in the portfolio. The distribution of earnings under IFRS 9 and CECL is more likely to realize pronounced negative values and have higher volatility than under incurred loss, aligning with the “too-little, too-late” discussion above. One might argue that earnings surrounding a catastrophic sequence of events where all, or almost all, loans default would be more negative under incurred loss, where allowances do not build-up to the event. However, the chance of such an event is negligible for a reasonably well-diversified portfolio. Instead, a negative earnings event (or even a 10 bps tail event) is more likely associated with higher allowance due to credit quality deterioration, more aggressively captured by CECL and IFRS 9, and transitioning from “Stage 1” to “Stage 2” under IFRS 9. This recognition drives earnings to be more negative under the new rules in that region of the distribution. So, while the portfolio earnings exhibit volatility under incurred loss, the new rules can result in materially higher sensitivity of allowance and earnings, which makes measurement and management ever more relevant.

Figure 1  Distributions of Portfolio Earnings and Capital Surplus at Horizon

Recognizing the potential impact of the new rules on volatility, we dig deeper and explore the roles the various elements play in driving portfolio dynamics. In particular, we explore different PD, LGD, credit migration, and correlation models and relate them to the impact of using forward-looking loss measures in CECL and IFRS 9.

Industry uses a wide spectrum of PD measures, frequently characterized based on the extent to which they are Through-the-Cycle (TTC) or Point-in-Time (PIT). While there is no generally accepted definition of either, for the purposes of this paper, we use a Moody’s rating to represent a TTC migration and a Moody’s Analytics EDF™ (Expected Default Probability) credit measure to represent a PIT measure, recognizing that many measures fall somewhere in between the two as it relates to their general statistical properties. Table 2 and Table 3 provide examples of one-year ratings and EDF-based migration matrices, where each element denotes the transition probability from one rating or EDF category (converted to equivalent rating) to another. The heavy weighting on the diagonal of the ratings-based transition matrix in Table 2 highlights the low likelihood of transitioning from the current credit state. Meanwhile, the relatively high weighting on the off-diagonal of the EDF-based matrix seen in Table 3 is associated with a high likelihood of migrating up or down in credit quality. The result of the relative weights on the diagonal and the off-diagonal suggest a PIT forward-looking measure recognizes changes in credit quality much more aggressively, as observed by higher probabilities of migration to different credit states than the TTC measure.

Earnings Volatility

- IFRS 9: 1.1%
- CECL: 1.2%
- Incurred Loss: 0.8%

Likelihood of Negative Earnings

- IFRS 9: 5.7%
- CECL: 6.6%
- Incurred Loss: 3.4%

Capital Surplus Volatility

- IFRS 9: 0.9%
- CECL: 1.1%
- Incurred Loss: 0.7%

Likelihood of Capital Breach

- IFRS 9: 1.0%
- CECL: 1.5%
- Incurred Loss: 0.6%
TABLE 2
TTC Credit Migration Transition Matrix (%)

<table>
<thead>
<tr>
<th>Initial Rating</th>
<th>Rating at End of One Year</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Aaa</td>
</tr>
<tr>
<td>Aaa</td>
<td>91.56</td>
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<tr>
<td>Aa</td>
<td>0.86</td>
</tr>
<tr>
<td>A</td>
<td>0.06</td>
</tr>
<tr>
<td>Baa</td>
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</tr>
<tr>
<td>Ba</td>
<td>0.01</td>
</tr>
<tr>
<td>B</td>
<td>0.01</td>
</tr>
<tr>
<td>Caa</td>
<td>0.00</td>
</tr>
</tbody>
</table>

TABLE 3
PIT Credit Migration Transition Matrix (%)

<table>
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<th>EDF- Equivalent Rating</th>
<th>Rating at End of One Year</th>
</tr>
</thead>
<tbody>
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<td></td>
<td>Aaa</td>
</tr>
<tr>
<td>Aaa</td>
<td>65.50</td>
</tr>
<tr>
<td>Aa</td>
<td>25.53</td>
</tr>
<tr>
<td>A</td>
<td>4.10</td>
</tr>
<tr>
<td>Baa</td>
<td>0.43</td>
</tr>
<tr>
<td>Ba</td>
<td>0.10</td>
</tr>
<tr>
<td>B</td>
<td>0.00</td>
</tr>
<tr>
<td>Caa</td>
<td>0.00</td>
</tr>
</tbody>
</table>

Relating this trait to the new accounting standards, both CECL and IFRS 9 use language highlighting the need to use forecasts or forward-looking information. While many mechanisms can meet these requirements, including overlaying TTC credit measures with forward-looking scenarios, the ultimate measure is more dynamic than something typically characterized as TTC. The point being, allowances under IFRS 9 and CECL that rely on forward-looking measures produce more volatile allowances and earnings compared to the TTC measures frequently used within the context of incurred loss. Table 1’s case study highlights this point, where the sequence of credit quality changes flows into loss allowance and earnings.

Moving to LGD, two broad approaches can account for variation in LGD and the tendency for LGD to increase during deteriorating credit environments. With downturn-LGD, a single conservative LGD term structure is used in allowance calculations. Alternatively, we can account for LGD dynamics using a comprehensive model that explicitly addresses variation in LGD, as well as its correlated dynamics with PDs. This second approach generally allows for a more accurate representation of a loan’s earnings volatility. In particular, it reinforces the swings in allowance given the tendency of LGD to increase (decrease) when PD increases.
(decreases). CECL and IFRS 9 forward-looking expected losses should account for counter-cyclical LGD that affects earnings volatility if LGD cyclical is previously unaccounted for. Figure 2 presents Moody’s Analytics LossCalc™ LGD dynamics by sector going back to 1999. The figure demonstrates the cyclical nature of LGD, which reinforces cyclical PIT PDs and allowance. To obtain a sense of magnitude, LGD was estimated at approximately 50% in 2007 for Banks and S&L prior to the crisis, increasing to 65% at the peak in 2009. Allowance increases by roughly 30% as a result.

Figure 2   LGD Time Series by Sector

Next, we turn our attention to the impact of credit correlations. In building the distribution of portfolio earnings, we require a characterization of loans’ earnings co-variation. Figure 3 compares the earnings distribution of two portfolios. In the “diversified portfolio,” the correlation between loan credit migration is lower than in the “concentrated portfolio” under CECL, IFRS 9, and incurred loss. We can immediately see that the two distributions differ, with portfolio credit earnings volatility significantly higher for the “concentrated portfolio,” regardless of the accounting measure. It is interesting to note that the volatility and likelihood of extreme loss is materially higher under CECL and IFRS 9 compared to incurred loss. This difference is related to the interaction between migration, correlation, and the sensitivity of allowance and earnings to credit quality changes. We discuss this issue further in the portfolio management section.
While we can use a number of approaches to estimate correlations for various asset classes, credit correlations are particularly challenging given the dearth of publicly available data. In addition, we need tractable representations of pairwise correlations for credit portfolios, which can frequently involve a large number of loans and borrowers.

Factor models such as Moody’s Analytics GCorr® have proven to work well in describing credit correlations. These factor models frequently describe the correlation of the borrower’s underlying assets to infer co-movements in credit quality and defaults. They can also describe correlated LGD (or recovery) linked through the correlated factors.

The benefits of leveraging a factor structure such as GCorr Corporate include the ability to differentiate across borrowers and their respective sensitivities to industry- and country-factors. GCorr enables the added benefits of broad asset class coverage as well as

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*For additional details see Qiang Meng, Amnon Levy, Andrew Kaplin, Yashan Wang, and Zhenya Hu, “Implications of PD-LGD Correlation in a Portfolio Setting.” Moody’s Analytics Whitepaper, February 2010.*
integrated linkages to macroeconomic variables, which can be used within the context of scenario-based loss measures, including those required under IFRS 9. 10

With PD and LGD migration and correlation models, along with loss allowance rules, we can map portfolio earnings dynamics and changes in capital surplus, and then use the analysis to manage earnings dynamics and support strategic decisions. These measures can supplement traditional risk measures such as Economic Capital and RORAC, as they provide an additional lens for assessing the value of various strategies. Earnings measures provide an assessment of portfolio risk from an accounting perspective rather than from a conventional economic perspective. Ultimately, risk managers may consider consolidating credit earnings volatility measures with traditional measures to obtain a composite view of risk. Before getting into the details of how we can use these analyses, the next section explores the magnitude of the impact institutions might expect when transitioning to CECL and IFRS 9 using historic bank consortium data as a benchmark.

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The previous section explores the theoretical mechanisms by which CECL and IFRS 9 impact allowance, earnings, and capital. We now turn our attention to exploring CECL and IFRS 9’s potential impact from an empirical perspective. We review recent studies that leverage historic bank consortium loan- and borrower-level data to benchmark CECL and IFRS 9 models against an incurred loss model. The first study, by Pan, Wang, and Wu (2017) examines CECL’s potential impact, using historical data (500,000 commercial and industrial (C&I) loans from 15 U.S. banks). They compare loan- and portfolio-level loss allowances under the incurred loss model and CECL. The study finds that loss allowances estimated under the CECL are more responsive to market changes and are generally sufficient to cover banks’ realized losses during different time periods. Interestingly, the impact varies significantly across banks and over time. The relative changes in portfolio loss allowance levels are driven primarily by their current allowance practice (e.g., LEP), cross-sectional variation in portfolio composition (e.g., credit quality and maturity), and the economic cycle. If CECL is implemented immediately under current, more moderate economic conditions, the authors find that allowance levels may actually decrease for some banks. Results are in-line with market expectations that CECL will generally lead to higher volatility in loss allowances when compared to the incurred loss model. The second study, by Xu and Levy (2017) examines 350,000 borrower financial statements from 1990–2015 as reported by banks in the United Kingdom. They compare loss allowances under an IFRS 9 model with an incurred loss model. Results are similar to Pan, Wang, and Wu (2017), in that, they find a pronounced spike in aggregate allowances under IFRS 9 when compared to the more stable allowance under IAS 39 during the deterioration in credit environments in 2001 and 2008–09. Xu and Levy (2017) highlight that these observed dynamics are a result of the forward-looking PD under IFRS 9 being more reactive to the credit environment than banks internal ratings, and the proportion of Stage 2 assets increases dramatically with allowance shifting to lifetime measures.

4.1 Benchmarking CECL

The Pan, Wang, and Wu (2017) CECL benchmarking study leverages a unique loan accounting system (LAS) dataset, part of Moody’s Analytics Credit Research Database (CRD). The CRD is one of the world’s largest historical time series of private firm, C&I loan data. The dataset collects facility and loan information at the draw level from contributing banks at a quarterly frequency, including origination date/amount, contractual maturity, unpaid balance, delinquency and default status, bank internal rating, and/or probability of default (PD). Pan, Wang, and Wu (2017) use banks’ internal ratings along with Moody’s Analytics models to generate TTC, PIT EDF, and LGD measures for each observation within the loan accounting system database. They calculate the loan loss allowances compliant with the two impairment models and compare the two loss allowance rates with banks’ historical reported net charge off (NCO) rates.

The incurred loss model’s goal is to estimate those loan losses incurred in the portfolio but not yet identified and charged-off. Most banks in the United States use a LEP to adjust the annual loss rate in their loss allowance calculations. To get a sense for the motivation behind the LEP approach, consider a typical loan portfolio that takes two years to move from loss event to charge-off. In this case, the bank has two years of losses inherent in its portfolio at any given point. If the estimated annual loss rate is 2%, and the bank uses 2% to estimate allowance, it will only reserve one year of losses. However, if the bank multiplies the annual loss rate by an LEP of two years, it will reserve for two years of losses. In general, the loss allowance rate under the incurred loss model for each loan is calculated as LEP·(one-year TTC PD(t))·LGD(t), and the loss rate of a loan portfolio equals the balance-weighted sum of loan allowance rates.

Pan, Wang, and Wu (2017) leverage FR Y-9C reports on C&I portfolio allowance rates for Q1 2013–Q4 2015 and estimate an LEP ranging from 1.33 years to 2.55 years across banks, with an average of 1.90 years. Figure 4 compares the modeled C&I portfolio incurred loss allowance rate for the 15 banks, in aggregate, with the publicly reported loss allowance rates. The red line represents the modeled incurred loss allowance rate, and the blue line represents the actual loss allowance rate collected from banks’ FR Y-9C reports, beginning Q1 2013 when that data was first reported. The modelled incurred loss allowance represented by the red line is constructed using bank internal assigned PDs or the one-year TTCPD generated by Moody’s RiskCalc™, depending on data availability. In addition, LGD is modeled using the long-term loan-level LGD generated from Moody’s Analytics LossCalc. The matching red and blue lines suggest that Pan, Wang, and Wu’s (2017) model assumptions are reasonable and consistent with the banks’ internal practices for loss allowance calculation under existing GAAP rules.

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Next, Pan, Wang, and Wu (2017) calculate the CECL loss allowance as the lifetime expected credit loss using Moody’s Analytics forward-looking RiskCalc PIT PD term structure, Moody’s Analytics LossCalc LGD term structure, and the contractual time to maturity of each individual loan. Figure 5 compares the aggregated loss allowance rates of the C&I portfolios across the 15 CRD-contributing banks under CECL and incurred loss, along with historical one-year NCO rates (i.e., NCO over the next four quarters for each time t). The two sets of allowance rates fluctuate over time and cross each other. However, during the financial crisis, the CECL allowance increases earlier and faster than the incurred loss curve and remains above the NCO line. This suggests our modeled CECL loss allowance is more responsive to market deterioration than the incurred loss approach, and the CECL reserve would have been sufficient to absorb the loss during the following year.

Figure 6 presents results from four individual banks selected from the Pan, Wang, and Wu (2017) study. There is clearly significant variation in trends and levels for both loss allowance rates and historical loss experiences over time. Loss allowances created under CECL are generally sufficient to cover the actual losses banks experienced the following year. However, the CECL loss allowances are not always higher than those seen under the incurred loss model during the analysis period, and the relative change in allowance level varies across banks. The authors point out that the economic cycle is a key driving factor, as indicated by these charts. When retroactively applied to the financial crisis period, the CECL model calls for dramatically higher loss allowance rates than the incurred loss model. Under the current, relatively benign economic conditions, with historically low loss experience, CECL’s loss allowance level remains close to banks’ existing reserve levels. For some banks, the CECL allowance level may even be lower than the incurred loss allowance.
Pan, Wang, and Wu (2017) observe interesting dynamics across banks and the impact that CECL might have on loss allowance. Focusing on Figure 6, the average LEP used by Bank A is 2.30 years, the highest among the four banks and very close to the average time to maturity of 2.37 years in its C&I portfolio. The authors point to the PIT PD being generally lower than the long-run average TTC PD after the financial crisis as the driver for the CECL loss allowance level being lower than the incurred loss allowance level during the current environment. The same argument applies to Bank B, which has an average LEP of 1.95 and an average time to maturity of 1.94 years. Bank B’s portfolio is slightly riskier than Bank A’s, with a balance-weighted, one-year TTC PD of 3.1%, compared to Bank A’s 2.7%. For Banks C and D, the portfolios’ lifetimes are much longer than the LEP used in the incurred loss model. Banks C and D have average times to maturity of 2.62 years and 2.44 years, respectively, compared to LEPs of 1.60 years and 1.46 years. For those banks, the CECL loss allowance level is nearly always above the allowance level generated by the incurred loss model.

Our introduction highlights how the Pan, Wang, and Wu (2017) study speaks to the extent to which organizations can manage their portfolios in order to address allowance volatility. Prior to the crisis, modeled allowance rates under CECL were very similar for Bank B and Bank-D, just under 2%. Interestingly, allowances spike to more than 5.5% for Bank-D, compared to just over 4% for Bank-B, under CECL. Given the same model is used to produce both allowances, the difference is entirely attributed to portfolio composition — cross-sectional variation in credit quality, maturity, and correlation. This finding speaks directly to the extent organizations can manage risk via portfolio management, discussed further in the next section.

Pan, Wang, and Wu (2017) also explore the question of whether the “reasonable and supportable forecast,” CECL’s forward-looking requirement, may inject additional volatility into banks’ loss allowances. Table 4 from their study lists the standard deviations of the historical loss allowance rates under the two accounting standards for two different analysis periods. The volatility of the loss allowance rate under the incurred loss model is significantly lower than the loss allowance rate volatility under the CECL model, in-line with the discussion above.
Table 4

<table>
<thead>
<tr>
<th>Volatility of Loss Allowance Rates</th>
<th>Standard Deviation</th>
<th>Incurred Loss</th>
<th>CECL</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003Q3-2015Q4</td>
<td>0.55%</td>
<td>0.83%</td>
<td></td>
</tr>
<tr>
<td>2007Q1-2010Q4</td>
<td>0.66%</td>
<td>1.04%</td>
<td></td>
</tr>
</tbody>
</table>

The key point here is that loss allowances estimated under CECL react more to changes in the credit environment, and they are generally sufficient to cover banks’ realized losses at different time periods. This said, CECL impact varies significantly across banks and over time, with the relative changes in portfolio loss allowance levels driven primarily by their current allowance practice (e.g., LEP), cross-sectional variation in portfolio composition (e.g., credit quality and maturity), and the economic cycle.

4.2 Benchmarking IFRS 9

Similar to the Pan, Wang, and Wu (2017) study, Levy and Xu (2017) explore IFRS 9’s impact on allowance dynamics for banks in the United Kingdom. Levy and Xu (2017) use Moody’s Credit Research Database (CRD) for UK banks. The data contains annual financial statement and default information for 348,452 private borrowers, 1990–2015; a total of 1,408,886 entries. With loan-level data unavailable, each borrower is assigned three synthetic loans: one with a one-year maturity, one with a seven-year maturity, and a third with maturity between one and six years. Loan commitment amounts are set proportionally to the borrower’s current and long-term debt, available in the CRD, and cross-referenced with Pillar III data (introduced in 2009, with more granularity beginning in 2012). They use Moody’s Analytics forward-looking RiskCalc PIT PD term structure and Moody’s Analytics LossCalc LGD term structure for IFRS 9 allowance calculations. They use internal ratings and PD mappings from the CRD when calculating allowances under incurred loss. A loan is categorized as Stage 2 if its associated PD increases by more than 130% from the time of origination and is above 0.66%, or if the PD is above 5%.

Figure 7 speaks to the key message of the Levy and Xu (2017) study. Figure 7 shows the pronounced spikes in the 2001–2002 and 2008–2009 allowances under IFRS 9 compared to the more stable allowances under incurred loss. These are driven by two factors. First, depicted on the left-hand side of Figure 8, forward-looking PDs under IFRS 9 react more to the credit environment than banks’ internal ratings. Second, depicted on the right-hand side of Figure 8, the proportion of Stage 2 assets increases during those periods as PDs cross 130% and the 5% level, Stage 2 thresholds.

Figure 7  IFRS 9 Versus IAS 39 — Observed from the CRD UK Sample Portfolio
4.3 Too-Little, Too-Late

We now turn to the question of whether or not the CECL and IFRS 9 benchmark studies shed light on how well IFRS 9 and CECL address “too-little, too-late.” Both studies suggest that loss allowance will generally be more reactive to a deteriorating credit environment under CECL and IFRS 9, although there may be outlier institutions. Factors such as LEP may result in allowances under incurred loss being roughly in-line with CECL. Organizations with allowances that do not react to the credit environment under incurred loss will likely experience the largest change in dynamics. Whether IFRS 9 and CECL address “too-little, too-late” depends on the portfolio. If most loans deteriorate and do not default, the new rules can place additional pressure on institutions’ capital surplus. This point leads us to the next section, which explores how organizations can manage and improve portfolio performance while recognizing dynamics introduced by CECL and IFRS 9.
5. **Aligning Loan Origination and Credit Portfolio Management with the New Standards**

In a classic risk management setting, credit portfolio risk focuses entirely on economic measures that reflect dynamics such as diversification, concentration, and other economic risks. The empirical and theoretical IFRS 9 and CECL impact studies discussed highlight the material impact loss accounting has on an institution’s earnings and capital surplus. Coupled with a constrained regulatory capital environment, it is clear that economic measures such as Economic Capital (EC) alone are insufficient when making credit portfolio management decisions. This section reviews a number of studies that explore how loss accounting can help supplement metrics used for credit portfolio management, including capital allocation, risk-based pricing, incentive compensation, and limits.

The approach we focus on formulizes an organization’s portfolio optimization problem as a tradeoff between economic risks and return, while recognizing regulatory constraints (CCAR or Basel) and loss recognition rules. The approach originated with Levy, Kaplin, Meng, and Zhang (2012), who propose a unified decision measure that incorporates regulatory capital requirements into the traditional economic framework underpinning EVA and RORAC-style business decision measures. Since this paper, a number of advances have been made, including accounting for loss recognition in portfolio optimization. Levy and Xu (2017) introduce a Composite Capital Measure (CCM) that integrates economic and regulatory capital along with loss accounting, which can be used to optimize formally the risk-return performance of a portfolio while adhering to regulatory requirements. Levy and Xu (2017) observe that loss allowance serves the same purpose as capital; it is a reserve against potential future losses. From a decision-metric perspective, we will see that loss allowance can be viewed as an additional capital requirement. An increase in loss allowance decreases earnings, which, in turn, reduces available capital. Their model distinguishes between two separate effects allowance has on setting a target capital level: (1) the impact allowance has on an institution’s current capital surplus, and (2) the impact allowance has on capital surplus dynamics and the additional capital surplus needed to limit the likelihood an organization’s regulatory minimum is violated on future dates.

The measure Levy and Xu (2017) introduce has a number of appealing characteristics. At the portfolio-level, the aggregated capitalization rate across loans coincides with the institution’s top-of-the-house capital, which assures compliance with regulatory requirements and loss allowance, along with the additional capital buffer above the minimum required to allow for fluctuations driven by allowance and earnings volatility (impacted by CECL or IFRS 9). At the loan-level, the measure accounts for both the economic risk and the capital redistribution needed to reflect the impact of each loan’s required regulatory capital and allowance. The measure also recognizes the degree to which regulatory capital and the added required surplus is constraining, with it playing a more prominent role in the measure as the constraint becomes more severe.

To better understand how loss accounting enters into the CCM, Levy and Xu (2017) walk through a simple thought exercise that demonstrates how to view loss allowance as an additional capital requirement when considering its impact from a decision metric. In Table 5 from their paper, an institution raises cash to originate two loans, A and B. Both loans have a $10,000 notional and $800 required regulatory (Tier-1) capital. The loss allowances for Loans A and B are $200 and $500, respectively. To originate Loan A, the institution must raise at least $1,000 capital (and issue $9,000 debt) since, once the loan is originated, it must write-off a $200 loss allowance from its available capital immediately, bringing its total available capital level to $800, just meeting the regulatory requirement. Similarly, to originate Loan B, the institution must raise $1,300 in capital. In general, the effective capital associated with each asset always equals its required regulatory capital plus loss allowance.

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15 Note, we ignore taxes and focus on Tier-1 capital. The case for Tier-2 capital is more complicated, as institutions can use some portion of loss allowance to serve as Tier-2 capital.
TABLE 5
Relationship between Loss Allowance Level and Effective Capital

<table>
<thead>
<tr>
<th></th>
<th>Loan A</th>
<th>Loan B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Required Regulatory Capital (Tier 1)</td>
<td>$800</td>
<td>$800</td>
</tr>
<tr>
<td>Total Capital Raised (Effective Capital Required)</td>
<td>$1,000</td>
<td>$1,300</td>
</tr>
<tr>
<td>Loss Allowance</td>
<td>$200</td>
<td>$500</td>
</tr>
<tr>
<td>Available Capital (= Total Capital Raised − Loss Allowance)</td>
<td>$800</td>
<td>$800</td>
</tr>
</tbody>
</table>

With CECL and IFRS 9’s impact on effective capital in mind, we turn our attention to the resulting impact on the likelihood of a capital breach. When markets are liquid, institutions can issue equity or sell assets to improve capital ratios in order to prevent a breach. In reality, many instruments, such as loans, do not have a liquid secondary market; selling these assets can result in material costs. In addition, capital breaches are more likely to occur during economic downturn scenarios, when the cost of capital tends to be high. Managing these balance sheet challenges makes credit portfolio composition particularly important. Levy, Liang, and Xu (2017) provide a framework that quantifies the desired capital buffer limiting a capital breach to a target probability level. To highlight portfolio effects, Levy, Liang, and Xu (2017) present the distribution of changes in capital surplus across two portfolios with different concentration levels. Figure 9 presents three, one-year capital surplus distribution comparisons for well- and poorly-diversified portfolios under CECL, IFRS 9, and incurred loss (similar to Figure 3, which focuses on earnings). We highlight three take-away points. First, and well-understood, is the observation that the likelihood of a capital breach is greater for a poorly-diversified portfolio. Second, specific to the discussion of loss accounting, capital surplus above and beyond the regulatory minimum that limits the likelihood of a capital breach is greater under CECL and IFRS 9 than under incurred loss. This observation is related to the “too-little, too-late” discussion. With CECL’s forward-looking lifetime loss allowance’s sensitivity, credit migration drives capital surplus to be more reactive for Stage 1 loans under IFRS 9. There is the Stage 2 “cliff” effect that can result in a higher sensitivity under IFRS 9 when compared to CECL. Meanwhile, capital surplus is least reactive under incurred loss given the TTC nature of the credit measure. The third effect worth noting is sensitivity to concentration. Notice the difference in the likelihood of a capital breach between the concentrated and diversified portfolio under CECL and IFRS 9 compared to incurred loss. The interplay between migration and correlation is the driver here; more sensitivity to migration will generally result in correlation having a larger impact. As a final note, an important caveat follows, that this analysis is limited to a particular set of allowance calculations that generally differ across banks (e.g., LEP). This point is demonstrated in the Wang, Pan, Wu (2017) study.

Figure 9  Distributions of Portfolio Capital Surplus at Horizon

---

Under CECL, Levy, Liang, and Xu (2017) analyze and decompose the optimal capital surplus under the three accounting rules. Figure 10 demonstrates, under their sample portfolio, an organization needs roughly 12% effective capital under CECL, 11% under IFRS 9, and 9% under incurred loss. The simple case keeps regulatory capital at 8%. The impact of current allowance on effective capital: 1.6% under CECL, 0.7% under IFRS 9, and 0.6% under incurred loss (with a one-year LEP). As highlighted in the benchmarking studies, the degree to which the new rules might be higher or lower than incurred loss very much depends upon the state of the credit environment, as well as the portfolio and the approaches used to measure allowance. The additional capital needed to prevent a capital breach over a one-year horizon at 50bps is higher under CECL and IFRS 9 (2.2% and 2.5%, respectively) than under incurred loss (0.8%). Given the substantial difference, it is fair to say that organizations should consider the extent to which they can design their portfolios to minimize allowance dynamics using diversification mechanisms and optimal terms and conditions design.

**Figure 10  Effective Capital Breakdown**

![Effective Capital Breakdown Chart](chart.png)
Thinking through portfolio composition, we turn our attention to loan-level dynamics, and the interaction between credit migration and the three accounting standards. Figure 11 demonstrates that longer-dated loans are associated with a significantly higher Earnings Risk Contribution under CECL when compared to IFRS 9 and incurred loss. The dramatic difference between CECL and IFRS 9 stems from allowances being limited to one-year loss under Stage 1. CECL considers lifetime measures, where the sensitivity of loss to credit migration increases with maturity. At horizon, the Stage 1 one-year loss is not impacted by loan maturity beyond one-year; allowance is the same for a loan that has one year remaining as one with ten years remaining. The slight increase in Earnings Risk Contribution with maturity is driven by the likelihood of Stage 2 reclassification and loss allowance set to lifetime. Meanwhile, losses are always below one year using incurred loss in this example. The implications of this dynamic in portfolio design can be profound. An IFRS 9-compliant organization focused, say, on maximizing expected returns while limiting earnings and capital surplus volatility should steer the portfolio toward loans that have a low probability of migrating to Stage 2, and possibly longer-dated loans frequently associated with higher spread income.

Figure 11  Earnings Risk Contribution Across Maturities Under Different Accounting Rules

With a sense for how terms and conditions impact dynamics, we now explore the characteristics of a portfolio optimized from an earnings’ mean and variance perspective under the three accounting regimes. While it is not realistic for loan portfolios to be optimized this way, the results are helpful in understanding the degree to which certain loan characteristics will be more appealing under the new rules. Table 6 presents loan and borrower characteristics under the three rules. Consistent with the analysis in the above paragraph, the average PD and maturity is substantially lower under CECL than IFRS 9 and incurred loss. This trait is driven by earnings volatility being more sensitive to maturity under CECL, driving down the optimal maturity and PD. Also consistent with the above discussion, optimal portfolios under IFRS 9 and incurred loss tend to target higher income loans, with longer-dated maturities and higher PDs. There are two effects from RSQ: (1) higher systematic risk leads to higher portfolio correlation and portfolio risk, and (2) higher systematic risk is compensated with higher coupons (all else equal). Under IFRS 9, and even more under incurred loss, the muted effect on risk relative to CECL leads to the optimal portfolio having a higher average RSQ.

Our point at the end of Section 2, The Mechanisms by which IFRS 9 and CECL Impact Allowance, Earnings, and Capital Dynamics, highlights some shorter-dated instruments with maturities shorter than LEP can exhibit a reduction in allowance volatility. While not explicitly analyzed, it should be clear that those instruments will become even more attractive under the new rules.
TABLE 6
Characteristics of Optimized Portfolios under the Various Accounting Rules

<table>
<thead>
<tr>
<th>Average Value (weighted by holding)</th>
<th>Original Portfolio</th>
<th>CECL Optimized</th>
<th>IFRS 9 Optimized</th>
<th>Incurred Loss Optimized</th>
</tr>
</thead>
<tbody>
<tr>
<td>PD</td>
<td>1.33%</td>
<td>1.18%</td>
<td>1.27%</td>
<td>1.80%</td>
</tr>
<tr>
<td>Maturity</td>
<td>3.5 years</td>
<td>2.5 years</td>
<td>4.6 years</td>
<td>4.9 years</td>
</tr>
<tr>
<td>RSQ</td>
<td>48%</td>
<td>27%</td>
<td>36%</td>
<td>40%</td>
</tr>
</tbody>
</table>

As Figure 12 depicts, the portfolio-level income and volatility tell a consistent story. Income, in particular, is striking, as the optimized portfolio shifts to much higher income-producing loans under incurred loss and lower-income loans under CECL. Notice the dramatic reduction in volatility across the board. This characteristic is typical of optimized loan portfolios and should not be taken literally, given the limitations of shifting a portfolio to the degree that the optimum suggests.

Figure 12  Optimal Portfolio Income and Volatility

We direct the reader to Levy, Liang, and Xu (2017) for additional details on how they formally optimize the portfolios under their CCM. They analyze and decompose the impact of regulatory capital, economic risk, and loss accounting to help explain how each affects the degree to which borrower characteristics and terms and conditions are more or less attractive under the various rules. This said, the ultimate impact of the new accounting rules on banks’ top-of-the-house allowance, earnings, and capital surplus dynamics very much depends on how credit portfolio managers react and refine their portfolio compositions.
6. Summary

We highlight the importance of loss accounting as a preparation mechanism for deteriorating credit environments. In particular, we review empirical benchmarks that assess how allowances behave under CECL and IFRS 9 when compared to incurred loss. While results can vary across banks, analysis suggests the new rules will introduce a material increase in reactiveness to the credit cycle. While there is an element suggesting that the new rules move toward addressing "too-little, too-late," there is the potential for them to increase allowance, earnings, and capital surplus volatility. Recognizing this dynamic has implications for credit portfolio management. We review studies that explore decision metrics recognizing economic risk and return, along with regulatory requirements and loss accounting. The rules formalize a decision process that allows organizations to achieve optimal economic performance while adhering to regulatory constraints.

This paper highlights the importance of loss accounting as a preparation mechanism for deteriorating credit environments. In particular, we review empirical benchmarks that assess how allowances behave under CECL and IFRS 9 when compared to incurred loss. While results can vary across banks, analysis suggests the new rules will introduce a material increase in reactiveness to the credit cycle. While there is an element suggesting that the new rules move toward addressing "too-little, too-late," there is the potential for them to increase allowance, earnings, and capital surplus volatility. Recognizing this dynamic has implications for credit portfolio management. We review studies that explore decision metrics recognizing economic risk and return, along with regulatory requirements and loss accounting. The rules formalize a decision process that allows organizations to achieve optimal economic performance while adhering to regulatory constraints.
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