Identifying the provisioning policies of Belgian banks

Working Paper Research

by Emrah Arbak

July 2017 No 326

National Bank OF BELGIUM

Eurosystem

Editor
Jan Smets, Governor of the National Bank of Belgium

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ISSN: 1375-680X (print)
ISSN: 1784-2476 (online)

Abstract

Loan loss reserves make up an essential part of a bank's soundness and more generally its viability. An under-provisioned reserve account implies that capital ratios may overstate a bank's ability to absorb future losses. For this reason, both supervisory authorities and investors regularly assess the adequacy of the loan loss provisions alongside the more popular capital ratios. The aim of the paper is to identify what motivates the loss provisioning policies employed by Belgian banks, especially whether banks use provisioning to inter-temporally smooth their earnings or capital positions. Owing to the relatively long data series, the paper also investigates whether the introduction of the IAS-39 "incurred loss" accounting standards or the onset of the financial crisis in 2008/9 had any impact on the provisioning decisions. The results show that provisioning practices of Belgian banks have been rather tightly linked to future losses, although the relationship has weakened considerably after the introduction of the IAS-39 standards and, to a lesser extent, after the financial crisis. There is also evidence that Belgian banks might have used provisioning decisions to manage their current earnings and to some extent to signal future profitability, although the latter motive also appears to have weakened after the introduction of IAS-39 standards.

JEL classification: C23, G14, G21, G28, M41.

Keywords: Belgian credit institutions; loan loss provisioning; event-based provisioning; forward-looking provisioning; earnings-smoothing; cyclical provisioning; implementation of international accounting standards.

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The author would like to thank BCBS Research Task Force (RTF) Accounting & Regulations work-stream members as well as Janet Mitchell, Patrick Van Roy, Cristina Vespro, Stijn Ferrari, Annick Bruggeman, Michel Colinet, and Frank Trimpeneers for their invaluable comments and input.

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1 INTRODUCTION[1]

The 2008/9 financial crisis has led to a deep debate among the banking industry players, regulators and accounting specialists on whether the international accounting standards need to be revised to provide investors a more realistic view of a bank's assets, liabilities and profitability. A key topic of discussion has been the adequacy of loan loss reserves[2]. Much like capital reserves, loan loss reserves aim at absorbing future losses that a bank may face. However, loan loss reserves are meant to be maintained to absorb expected losses while the minimum capital requirements aim at absorbing unexpected losses.

The primary motivation of this study is to identify what factors have driven the provisioning policies of Belgian banks in recent years. Owing to the relatively long history of the supervisory monitoring data set used in the study, the paper pays close attention to the evolution of provisioning practices in response to the introduction of the IAS-39 as well as following the onset of the financial crisis. The study in particular aims to understand the factors that may be determining provisioning decisions.

What makes these research aims feasible is the fact that the supervisory data used in the study is reported under the Belgian Generally Accepted Accounting Principles (BGAAP). Under BGAAP, banks have been granted substantial freedom over their provisioning practices. In particular, banks can set aside reserves for exposures that are classified by the bank to be "non-recoverable", or those for which there is sufficient evidence that debtors will be unable to honour their credit obligations. In addition, banks can also establish loss reserves for loans with "uncertain outcomes" as long as there is some probability that the debtor or a group of debtors will face difficulties. In either case, the identification methods and the standards of evidence that need to be met for classifying exposures under either category are left almost entirely to the discretion of the bank.

In contrast, the international accounting standards that were developed in early 2000s (or the so-called "IAS-39 standards")[3] provide less discretion to banks. Banks can provision only in response to events that have already occurred, or only after there is objective of some "incurred losses". The standards provide substantial detail on the events that are acceptable as the basis of provisioning.[4] Losses due to anticipated future events, no matter how likely they may be, cannot be recognized. In many cases, the result is that a bank can only set aside reserves for loans that are past-due (i.e. non-performing) but cannot do the same for loans that are expected to become past-due in a future period.

The aim for developing the IAS-39 standards was to limit the possibility of using provisioning for any other purpose than absorbing future losses. When a bank sets aside provisions, it effectively reduces the (net) value of the corresponding loans on its balance sheet, which in turn lowers its

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1 See Arbak (2016) for a more concise description of the various problem loan categories, including loan loss reserves, and some of the high-level results developed in this paper.

2 In the rest of text, loan loss reserves refer to the stock of provisions, which are determined in each accounting period. The term "provisioning" is used to refer to these choices by the banks. In turn, the term "loan loss reserves" is used to refer to the capacity of a bank to absorb future losses.

3 The IAS-39 standards were endorsed in the EU by Commission Regulation (EC) No. 2086/2004 of 19 November 2004, henceforth ("EU Regulation"). The EU-version included two exceptions to the international standard: the fair-value option and hedge accounting carve outs. The first exception excluded own debt from the scope of the "full fair-value option", which was resolved through Commission Regulation (EC) No. 1864/2005. The second exception, which continues to be in effect, allows EU entities to qualify a broader category of portfolio (i.e. macro) hedges under hedge accounting.

4 In particular, the specific events that can be recognized include "significant financial difficulty of the issuer…; a breach of contract…;borrower [entering] bankruptcy…; disappearance of an active market for that financial asset…; observable data indicating … a measurable decrease in estimated future cash flows…", (IAS-39.59).

equity position.[5] Thus, a bank with a particularly low capital position may be deterred from provisioning in order to avoid falling foul of the regulatory minima or the market's expectations. In some jurisdictions, part of the provisioned amounts may be recognized as regulatory capital, which may have an offsetting impact. In addition, the newly provisioned amounts also appear as an expense item in the profit and loss account. A bank thus has the ability to reverse these reserves in the future, allowing the allocation of profits between different periods. Thus, managers that aim at achieving a certain level of profitability may use provisioning to hit that target if their pre-provisioning income is insufficient.

In short, when banks have full discretion over their provisioning choices, those may be partly determined by their motivation to manage their earnings or capital positions. The incurred loss approach simply reduces this discretion by instructing banks to incorporate only losses arising from reduced cash flows due to the incurred loss event.[6]

Although it constrains the ability of banks to exercise an undue amount of discretion, the incurred loss approach also has some disadvantages. A key concern relates to potential pro-cyclicality.[7] More specifically, since provisioning decisions under IAS-39 are to a large extent backward-looking, loan loss reserves may not be adequately built in advance during down-turns, (Laeven & Majnoni, 2003; Bouvatier & Lepetit, 2008; 2012). Under-provisioning may also make it more costly for troubled banks to remove the distressed loans from their balance sheets in later stages of down-turns, which is identified as a potential driver of low credit growth in certain European countries in recent years, (Aiyar *et al.*, 2015). If loan loss reserves are systematically inadequate to absorb the expected losses, even a well-capitalized bank may find itself in severe distress. Moreover, the pro-cyclicality of provisioning may further amplify the self-perpetuating relationship between lending standards, loan growth, and economic activity, (Berger & Udell, 2004; Dell'Ariccia & Marquez, 2006; Foos *et al.*, 2010).

These concerns have led the world leaders at the G-20 London summit in April 2009 to call for "the accounting standard setters to work urgently with supervisors and regulators to improve standards on valuation and provisioning and achieve a single set of high-quality global accounting standards". The resulting new international accounting standards for financial instruments (or, the so-called "IFRS 9 rules) allow banks to use a much broader set of information to estimate expected credit losses than the current IAS 39 rules, including not only past and current evidence but also future information. In doing so, the new standards also eliminate the heavy reliance on incurred losses but introduces other risk categories where expected credit losses can be recognized. In the EU, the IFRS 9 standards will be phased-in gradually, starting from 1 January 2019 to 31 December 2023.[8]

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5 Depending on the accounting treatment, loan loss reserves may appear as a liability or as a "contra-asset" in an institution's financial report. As an example, under the Belgian Generally Accepted Accounting Principles (B-GAAP) rules, certain types of reserves (i.e. "uncertain loans") appear as liabilities, effectively offsetting the amounts lent. In turn, under the IAS-39 rules the reserves for other types of impaired assets (i.e. "non-recoverable loans") may be directly incorporated into the carrying amount of those assets without the use of an allowance account on the liabilities.

6 The IAS-39 rules state that "the amount of the loss is measured as the difference between the asset's carrying amount and the present value of estimated future cash flows (excluding future credit losses that have not been incurred) discounted at the financial asset's original effective interest rate (i.e. the effective interest rate computed at initial recognition)," (IAS 39.63).

7 In the context of provisioning, pro-cyclicality refers to the fact that the amount of loan loss reserves that banks accumulate may be positively correlated with the underlying credit quality.

8 The IFRS-9 standards were adopted in the EU under the Commission Regulation (EC) No 2016/2067, which entered into force in November 2016. As part of its CRR/CRDIV revisions issued at the same time, the European Commission introduced a 5-year phasing in period for the new standards, starting from 1 January. For a more detailed description of how the IFRS-9 standards may impact banks, see Arbak (2016).

This study relies on the unconsolidated supervisory data based on local BGAAP reporting rules, covering the years 1999 to 2014. Owing to the relatively long historical series, the study focuses on the factors that may be driving the provisioning decisions of banks. In particular, the study pays close attention to whether the introduction of the IAS-39 rules or the financial crisis has changed the importance of these factors.

Belgian credit institutions that report on a consolidated basis have gradually adopted the IAS-39 standards for their consolidated financial reports within a period over 2004 to 2006. Listed credit institutions had to adopt the regulation by January 2005 for their consolidated reports. The non-listed credit institutions were allowed to withhold the adoption of the standards up until January 2006. Several Belgian institutions opted to adopt the rules at an earlier date than these dates, including a major listed bank that published its first IAS-compliant consolidated report on January 2004.[9]

The paper aims to exploit the fact that the Belgian banks have a choice over their provisioning approaches at the unconsolidated level. Unlike the IAS-39 rules, BGAAP allows banks to opt for or against the incurred loss approach for their unconsolidated reporting.[10] The identification strategy hinges on the fact that some banks may have implemented rules that are similar to IAS-39 rules for their unconsolidated reporting while others may use the flexibility afforded in BGAAP to continue with their pre-IAS-39 approach.

This study differs from other studies in a number of ways. First, it relies on a longer time-series, covering the years between 1999 and 2014. Second, it incorporates competing explanations for provisioning practices of banks. Most of the literature, on the other hand, focuses on a single or a set of complementary explanations such as earnings or capital management, economic cycles, backward or forward-looking orientation, and so forth. Lastly, the supervisory reports are based on a uniform accounting standard (BGAAP), which allows the identification of the impact of the regime changes.

The results of the study are informative for a variety of reasons. First, they shed light on what motivates the loss provisioning policies employed by Belgian banks. Moreover, they allow an assessment of whether the implementation of the IAS-39 incurred-loss rules or the recent financial crisis has led to a shift in provisioning practices. A key question that the paper seeks to answer is whether the banks effectively use provisioning policies to achieve their primary purpose, to accumulate reserves to absorb future expected losses. Lastly, the findings may also be informative on what type of changes that Belgian banks may face when the harmonized accounting rules will soon be replaced by the IFRS-9 forward-looking "expected loss" approach.[11]

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9 For more information on the implementation of IAS/IFRS rules in European banking, see Ernst & Young (2006).

10 The general standards relating to Belgian GAAP are defined by the Royal Decree of 23 September 1992 on the annual accounts of credit institutions, Articles 19 and 35.

11 The new rules were developed by the International Accounting Standards Board (IASB) and were published in July 2014.

2 RELATED LITERATURE ON EXPLANATORY FACTORS OF PROVISIONING

2.1 Provisioning to manage earnings or capital positions

There are several reasons why provisioning decisions may be determined by a bank's earnings, regulatory capital, or even its tax liabilities. Provisions are booked as expenses and thus lower the firm's profits and, assuming that losses from provisioning are tax deductible, its tax liabilities.[12] Managers may thus use provisioning to manage inter-temporally its publicly disclosed profits. With regards to capital, higher provisioning often lowers retained earnings and thus regulatory capital. In parallel, increasing loan loss reserves lowers the book value of the bank's total assets and thereby worsens its equity position. In turn, ever since the introduction of Basel I regulatory capital standards, a part of loan loss reserves can be recognized as regulatory capital, which could offset some of these negative impacts.[13]

Since provisioning has an impact on earnings, capital positions and tax liabilities, a bank's managers may want to use it to meet multiple ends. Provisioning decisions may be used to smooth the volatility in earnings or capital ratios since these measures are often perceived as measures of risk, (Dye, 1988; Barth *et al.*, 1999). Similarly, they can be used to meet the market expectations in earnings or the lower cost of capital at times when funding conditions tighten, (Scholes *et al.*, 1990). Managers may be motivated to use provisioning to attain specific earnings targets or capital ratios to smooth their managerial pay over business cycle, (Degeorge *et al.*, 1999; Koch & Wall, 2000). Amassing reserves when earnings are high can be a way for "saving for a rainy day" (Greenawalt & Sinkey, 1988). Ample reserves may signal financial health and may contribute to higher *future* earnings through lower cost of capital, (Beaver *et al.*, 1989; Wahlen, 1994; Beaver & Engel, 1996). Managers may use any discretion they may have to "window-dress" the bank's public accounts with the use of provisioning reversals (i.e. negative provisioning) to improve the earnings or capital positions artificially, (Yasuda *et al.*, 2004). Managers may also choose to delay provisioning when pre-provisioning profits are negative to benefit from lower future tax liabilities when things improve. If any of these motives weigh sufficiently heavily, provisioning decisions would exhibit a significant positive correlation with the bank's net earnings and capital ratios.

The correlation between the earnings and capital positions on the one hand and the provision decisions on the other may also be due to factors that are beyond the direct control of managers. Most notably, lower net earnings and capital positions often indicate the presence or the build-up of underlying risks, which may lead to increased provisioning. Managers may also face increased investor or supervisory pressure to provision more at those moments, (Laeven & Majnoni 2003). Similarly, the introduction of introduction of international accounting standards (IAS-39) could reduce managers' discretion and may offset these relationships, (Ashbaugh & Pincus, 2001).

Empirical evidence generally supports the idea that earnings management is an important motive in provisioning decisions when the managers can exercise discretion over their provisioning

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12 Belgian tax law allows specific loan loss provisions to be tax deductible as long as the bank can provide evidence that the losses have already incurred.

13 Under the 1988 Basel Capital Accord (Basel I), banks were allowed to include loan loss reserves created against the possibility of losses not yet identified, i.e. "general reserves", under Tier-2 capital up to a maximum of 1.25% of risk-weighted assets. Provisions linked to future expected losses due to deterioration on particular exposures, i.e. "specific reserves", had to be excluded from regulatory capital. With the implementation of the revised Basel Capital Accord (Basel II) rules, these rules continued to be applicable for banks using the standardized approach for the calculation of regulatory capital requirements for credit risk. For banks that opt for the internal ratings based method (IRB) for the calculation of capital requirements, the recognition of reserves in regulatory capital depends on the extent that the former covers for the model-based estimates for expected losses (EL). Shortfalls are deducted from Tier-1 and Tier-2 capital on an equal-basis (50%-50%). Excesses may be recognized in Tier-2 capital only up to a maximum of 0.6% of risk-weighted assets. These provisions were left unchanged under the more recent (Basel III) standards.

decisions.[14] Indeed, most of the earlier evidence, based on US data, shows that current and past earnings are a significant determinant of loan loss provisions in the banking sector, (Greenawalt & Sinkey, 1988; Ma, 1988; Scholes *et al.*, 1990; Collins *et al.*, 1995; Kim & Kross, 1998).[15] More recent research provides a more conditional support to the idea of earnings management with the use of more detailed accounting data, (Anandarajan *et al.*, 2003; Perez *et al.*, 2011), and cross-country comparisons, (Hasan & Wall, 2004; Bikker & Metzemakers, 2005; Bouvatier & Lepetit, 2008; Leventis *et al.*, 2011). A common finding in these more recent studies is that while managers may have the ability use provisioning to smooth their earnings in good years, the relationship may turn negative for banks facing poor results, highlighting varying levels of discretion available to the management. Indeed, Ahmed *et al.* (1999) show that the earnings management plays a role only in the determination of non-discretionary provisions (i.e. current and past non-performing loans) and not over the total provisioning decisions, which may be suggesting that a third factor (i.e. economic conditions) that influences both variables may be driving the results.

The evidence on the impact of the IAS-39 on the use of earnings management is mixed.[16] Ball *et al.* (2003) argue that adopting high quality standards is one of the necessary conditions for ensuring the availability of high quality public information to investors, but that it cannot alone be sufficient. Van Tendeloo & Vanstraelen (2005) provide evidence that German firms (including both financial and non-financial entities) adopting the international norms on a voluntary basis exhibited similar earnings management behavior as others. In turn, Barth *et al.* (2008) use an international sample of financial and non-financial institutions to show that the adoption of international norms has lowered the use of earnings management. More recently, Leventis *et al.* (2011) and Gebhardt & Novotny-Farkas (2011) found evidence that the adoption of IAS-39 standards has reduced earnings management practices for EU banks.

Unlike earnings management, the empirical evidence on the use of provisioning to manage capital ratios is much less convincing. Although certain studies that rely on find some evidence, (Moyer, 1990; Beatty *et al.*, 1995; Ahmed *et al.*, 1999; Wall & Koch, 2000; Bouvatier & Lepetit, 2008), more recent studies fail to provide any statistical evidence, (Collins *et al.*, 1995; Hasan & Wall, 2004; Leventis *et al.*, 2011). The lack of a relationship may be explained by the fact that loan loss reserves are only partly considered to be part of regulatory capital. The mixed panel results may also be due to the non-linear nature of the relationship between capital and provisioning. Indeed, Hasan & Wall (2004) find that loan loss allowances and capital ratios posit a *negative* relationship, which could reflect the need for poorly capitalised banks to set aside more provisions, possibly due to market or supervisory pressure.

2.2 Cyclical components of provisioning

As already noted above, economic conditions often have a strong impact on credit risks. It would therefore be natural to have a pro-cyclical component in provisioning decisions if banks respond to

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[14] Not all studies find earnings management to be significant determinant of loan loss provisioning. Using a US bank sample, Beatty *et al.* (1995) fail to find any evidence of income smoothing and suggest that the link between loan loss provisioning and earnings could be weakened once other simultaneously determined accrual decisions, such as write-offs, loss recognition and asset sales, are accounted for.

[15] Several US-based studies have also confirmed that provisioning decisions may be used to signal financial strength, (Liu & Ryan, 1995; Beaver & Engel, 1996; Liu *et al.*, 1997). Other studies, including Ahmed *et al.* (1999) for US banks and Anandarajan *et al.* (2003) for Spanish banks find no evidence of signaling.

[16] Not all studies support the idea that IFRS reduced the opportunities for earnings management. In particular, Van Tendeloo & Vanstraelen (2005) provide evidence that German firms (including both financial and non-financial entities) that adopted the international norms on a voluntary basis exhibited similar earnings management behavior as others. The authors argue that high quality standards may not be fully effective if they are not complemented by equally strong investor protection rights. Similarly, Ball *et al.* (2003) argue that adopting high quality standards is one of the necessary conditions for ensuring the availability of high quality public information to investors, but that it cannot alone be sufficient.

any build-up of such risks. Bikker and Metzemakers (2004) confirms that there is a negative relationship between provisioning and real GDP growth, even if the relationship is weakened by income smoothing, or as banks provision less in bad times to maintain their income measures. Pain (2003) shows that the provisioning decisions of major UK banks are also positively correlated with real interest rates as well as lagged aggregate lending. Other studies provide evidence that banks provision more the deeper they are into an economic downturn, (Laeven & Majnoni, 2003; Bouvatier & Lepetit, 2008; 2012). Banks may also choose to provision more during good times by taking account of the building-up of credit risks as excessive credit growth outpaces their ability to properly monitor creditworthiness and service debt, (Borio *et al.*, 2001; Borio & Lowe, 2001). The dynamic provisioning rules that currently are in place in Spain, Portugal and some other Latin American countries favor this alternative – i.e. counter-cyclical – approach, requiring banks to hold more reserves as credit growth surges, (Saurina, 2009).

Pro-cyclicality can also arise if provisioning decisions are backward-looking. Indeed, as noted above the "incurred loss model" of the IAS-39 prescribes banks to increase provisions only when they experience specific stress events. Since those events are more likely to occur during macro-economic down-turns, aggregate provisioning is likely to be pro-cyclical under IAS-39. Possibly owing to the prevalence of IAS-39 rules, most empirical studies confirm the significance of backward-looking parameters as explanatory factors.

2.3 Provisioning to absorb expected future losses

Finally, banks may be more forward-looking in assessing any potential changes in credit quality and increase their LLP (loan loss provision) ratios in anticipation of potential future losses. The empirical literature mainly focuses on the extent to which provisioning decisions are timely, occurring before the problem loans start amassing. While these studies do not specifically focus on whether provisioning decisions are correlated with forward-looking estimates, there is evidence of a lower degree of pro-cyclical lending for banks with relatively timelier provisioning (Beatty & Liao, 2011). Another focus has been the impact of various accounting standards on the measured timeliness of provisioning decisions. There are mixed results on whether the IAS-39 standards have reduced the timeliness of provisioning decisions. O'Hanlon (2013) shows that the introduction of IAS-39 in the UK did not necessarily have a negative impact on the timeliness of provisioning.[17] In turn, Gebhardt & Novotny-Farkas (2011) use a different measure of timeliness to find exactly the opposite result for a relatively large sample of European banks, including the UK banks. Interestingly, Illueca et al. (2012) find that the introduction of the Spanish dynamic loss provisioning rules in 2000, which preceded the IAS-39 standards, has led to increased risk-taking, particularly for banks that had a timelier provisioning prior to the new rules.

[17] It is possible that the result is due to similarity of the UK GAAP to the IAS-39 regime on the treatment of loan losses. Indeed, among the possible explanations for their finding, O'Hanlon (2013) cites one of the expert testimonies before the House of Lords Committee inquiry on the potential impact of the new norms. The expert argued that "there is no major difference in the requirements of the SORP on Loans and Advances, which represents UK GAAP on the topic, and IAS-39 under IFRS: both are incurred loss models," (p. 232).

3 METHODOLOGY AND DATA

The prior literature has taken only a subset of these factors as a basis for estimating loan provisioning, with some notable exceptions such as Bikker & Metzemakers (2005), Laeven & Majnoni (2003) and Bushman & Williams (2012). Unlike many other studies, this paper aims to explain provisioning decisions while accounting for various capital and income-management motives, cyclical macro-economic drivers, and, perhaps most importantly, forward-looking expected losses. The models will also control for the introduction of the IAS-39 and the onset of the financial crisis following the Lehman bankruptcy in 2008.

This section provides an overview of the panel data and the model used in the study, with a particularly detailed exposition of how expected losses may enter into the current provisioning decisions.

3.1 Data

Table 1. Bank-specific descriptive statistics (1999 – 2014)

	Obs.	Mean	St. dev.	Median	10th pct	90th pct
			Entire sample			
$LN(TA)$	326	22.38	2.17	22.22	19.99	25.79
LLR	325	1.81%	2.72%	1.05%	0.34%	2.85%
ΔLLR	325	0.03%	0.44%	0.01%	-0.21%	0.32%
$LOSS$	325	0.22%	0.44%	0.08%	0.00%	0.63%
$EBTP$	325	0.31%	0.40%	0.17%	-0.01%	0.84%
$EQBP$	326	6.65%	6.33%	5.47%	2.39%	9.54%
			IAS-39 banks			
$LN(TA)$	124	23.67	1.91	23.56	21.45	26.10
LLR	124	0.93%	0.53%	0.89%	0.24%	1.72%
ΔLLR	124	0.00%	0.20%	-0.01%	-0.15%	0.16%
$LOSS$	124	0.20%	0.31%	0.09%	0.02%	0.52%
$EBTP$	124	0.30%	0.44%	0.16%	-0.02%	0.77%
$EQBP$	124	5.44%	2.23%	5.30%	2.45%	7.92%
			Post-crisis (≥2008)			
$LN(TA)$	149	22.67	2.08	22.58	20.14	26.00
LLR	148	1.88%	3.14%	0.98%	0.32%	2.85%
ΔLLR	148	0.08%	0.56%	0.03%	-0.21%	0.41%
$LOSS$	148	0.24%	0.50%	0.09%	0.00%	0.67%
$EBTP$	148	0.28%	0.41%	0.17%	-0.03%	0.80%
$EQBP$	149	6.55%	6.36%	5.50%	2.55%	8.94%

Note: *LN(TA)* gives the log of total assets; ∆*LLR* is the first difference (annual) in loan loss reserves divided by total loans; *LOSS* gives the final losses on loans divided by total loans; *EBTP* is the earnings before taxes and provisioning are taken into account divided by total assets; *EQBP* is the equity before the impact of provisioning via retained earnings is taken into account, divided by total assets.

The individual bank-level data are extracted from the unconsolidated supervisory reporting database (the so-called "Schema-A reports") of the National Bank of Belgium (NBB) covering the period 1999 and 2014 for a total of 25 Belgian credit institutions. Although the data is available on a quarterly basis, in many cases banks delay a big part of their annual provisioning decisions and charge-offs until the last quarter. To avoid any unnecessary seasonality, annual data was used in the paper. The supervisory data is based on the Belgian Generally Accepted Accounting Principles (BGAAP), which gives reporting institutions substantial freedom over the provisioning practices. The reported loss provisions cover provisions on interbank loans as well as customer loans and receivables. The data was corrected for mergers and overtaking of lending activities. Where data availability was not an issue and the merger did not result in an artificial volatility (i.e. often-times

due to gradual transfer of activities), either pre- or post-merger data was used to maximize the sample size.

Table 1 provides the descriptive statistics on the various indicators used in the study. *LN(TA)* is the log of total assets, which is used as an indicator of the size of each bank. *LLR* is the (annual) stock of loan loss reserves divided by total loans, which represents how much the bank has accumulated to absorb loan losses. ΔLLR is the first difference of the loan loss reserves divided by total loans. As will be clarified below, the change in reserves, which is closely associated with provisioning levels, was used to keep the focus on the impact on profits and losses. *LOSS* gives the gross losses[18] on loans divided by total loans, which will be modelled to investigate whether loss expectations may drive current provisioning decisions.[19] *EBTP* is equivalent to the each bank's net income before taxes and provisioning divided by total assets, which will be used to account for any earnings-management or signaling motives. Lastly, *EQBP* is equivalent to each bank's net equity position before the impact of provisioning on retained earnings divided by total assets, which will be used to account for any capital-management motives. IAS-39 banks are those that were obliged by the EU Regulation to use those standards for their consolidated supervisory reports, but not necessarily for the unconsolidated reports.

Banks on average set aside 0.03% of their gross loans to increase their loan loss reserves, representing less than one seventh of their write-off losses. In other words, for the sample as a whole, a single year's losses could be offset by seven years of provisioning accruals. In turn, the stock of loan loss reserves is sufficient to absorb around 9 years of losses on average, without any need of additional provisioning. The figures also show that the provisioning policies have clearly changed after the crisis, with banks needing around three years of provisioning accruals to offset their annual losses on average. Although these observations could be an evidence of how Belgian banks have changed their provisioning policies over time, the fact that the standard deviations are relatively high suggests that differences may well be explained by other factors.

Figure 1 depicts the evolution of the write-off losses and the loan loss reserves over time. It is clear that losses have increased substantially during three distinct periods: first in 2002, probably in response to the losses associated with the Dotcom bust of 2000/1; second in 2009/10, in the aftermath of the subprime mortgage crisis of 2008; and lastly in 2013, possibly in response to the 2011/2 Eurozone sovereign crisis.

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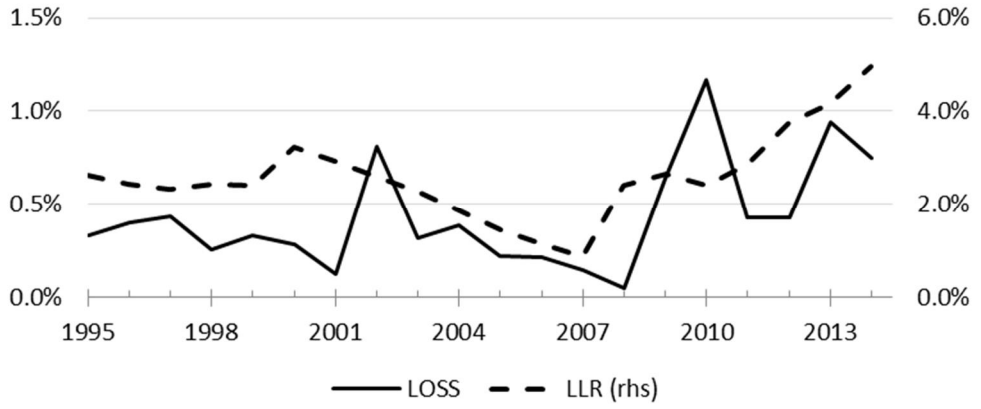
[18] NBB's Schema A reporting does not distinguish between losses arising from various types of derecognized assets, i.e. write-offs, write-downs (i.e. partial write-offs or debt relief as part of loan restructuring solutions), and asset sales. For the sake of brevity – and since asset sales are relatively rare in Belgium – all of these losses are referred to as write-off losses in the rest of the text.

[19] Due to unavailability of data, the losses on written-off loans were calculated by taking advantage of the double reporting of provisioning and changes in reserves on the balance sheets and on the profit and loss accounts. The gross value of written-off losses were calculated by subtracting the change in loan loss reserves as recorded on a bank's balance sheet (i.e. equivalent to new provisioning minus reserves readily built for written-off loans) from the impact of these transactions on the profit and loss account (i.e. equivalent to new provisioning plus losses on written-off loans net of reserves readily built). Thus, the variable $LOSS$ can be treated as a measure of the total haircut on the written-off loans since origination, i.e. without netting out the provisioned amounts.

Figure 1. Evolution of write-off losses and loan loss reserves (% of loans)



Source: NBB, Schema-A reports

3.2 Model

We now provide a theoretical discussion of how banks build their loan loss reserves. In doing so, we introduce the relationship between provisions, future losses and other factors mentioned in the literature. We also highlight some of the empirical problems and the solutions associated with the identified model.

We first assume that provisioning decisions are purely made with consideration of future losses. Thus, at any given point in time, a bank sets its loan loss reserves, LLR_t, equal to the sum of its reserves that are earmarked to absorb a proportion of expected future losses that are written-off, $LOSS_t$:[20]

$$LLR_t = \sum_{k\geq 1} \gamma_k E_t[LOSS_{t+k}] \quad (1)$$

where $\gamma_k \geq 0$ determines the extent to which loan loss reserves are built to absorb the k-period forward-looking losses [21].

This simple notational form[22], and in particular the possibility that $\gamma_k < 1$, allows for the fact that loan loss reserves may not be fully aligned with losses. In turn, the possibility that $\gamma_k > \gamma_{k+1}$ accounts for the fact that provisioning policies may be more sensitive to immediate losses than future losses. Putting these two together, a timely and adequate provisioning would imply sensitivities that are equivalent to or very close to unity. In turn, an adequate provisioning that is not timely, however, would imply that $\gamma_1 = 1$ but rather quickly decreases with k.

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[20] Apart from the adjustments due to changing expectations, the loan loss reserve account is also adjusted in each period by mechanically removing reserves that have been accumulated for losses on loans that were derecognized (i.e. written-off or sold) in the current period. For more, see equation (3) below.

[21] In this characterization, the future risk sensitivity parameter, γ_k, also incorporates the discount rate. The results do not change if a uniform discount rate is assumed to be separate from the risk sensitivity parameter.

[22] A more accurate notation would highlight that the expectations are a function of the information set Ω_t available at time *t*. Note that individual bank subscripts are also dropped. A more complete formulation of the expectations would then be $E[LOSS_{i,t+k}|\Omega_{i,t}]$. These simplifications have been introduced to save space and simplify the exposition.

Beyond the loan loss provisions, banks may also fail to write-off bad loans in a timely or adequate manner. More broadly, a finding of timeliness or adequacy of provisioning may matter less if the write-offs are recognized with substantial delay or only partially. In other words, the yardstick that we use to assess provisioning may itself be biased. It should be noted however that both provisioning (that is the change in reserves) and write-offs lead to an identical impact on a bank's profits. Indeed, in terms of their immediate impact on net incomes, both actions are substitutable.[23] Thus, a finding of timeliness or adequacy in one should in principle imply the timeliness or adequacy of another. Alternatively stated, if a bank chooses to write-off its loans late or only partially, it only makes sense for it to also provision for those losses in a similar manner.

To keep the focus on the impact on profits, which is arguably what motivates most managers (i.e. earnings or capital management), the flow variable of change in loan loss reserves is considered as the endogenous variable in all models. Using equation (1), we can write the change in reserves as:

$$\Delta LLR_t = \{\sum_{k\geq 1}(\gamma_k E_t[LOSS_{t+k}] - \gamma_k E_{t-1}[LOSS_{t-1+k}])\} \quad (2)$$

$$= \{\sum_{k\geq 1}(\gamma_k E_t[LOSS_{t+k}] - \gamma_{k+1} E_{t-1}[LOSS_{t+k}])\} - \gamma_1 E_{t-1}[LOSS_t]. \quad (3)$$

Although it will not be the basis of the models below, equation (3) is useful in identifying the mechanics of how loan loss reserves are built over time. In every period, a bank revises its total reserves due to incremental changes in expectations regarding losses for each future period. This revision, which is captured by the summation terms in curly brackets in equation (3), is necessary due to the arrival of new information regarding expected future losses. A positive term implies additional provisions are necessary, while a negative term would imply that reversals dominate. As noted above, the bank also mechanically removes the reserves that were deemed necessary for any current losses, which is captured by the negative term after the curly brackets.

The forward-looking model[24] above cannot be estimated directly since the expected future losses are latent variables. We thus substitute the expectations with the following forecast terms:

$$E_t[LOSS_{t+k}] = LOSS_{t+k} + \eta_{t,t+k}$$

where $\eta_{t,t+k}$ are the forecast errors, which are assumed to be independently and identically distributed with a zero mean. Equation (2) can thus be simplified as:

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23 One difference between provisioning and loss recognition is that the former can be reversed, implying a certain degree of flexibility and space for earnings or capital management. Losses that are recognized as write-offs in one period, however, cannot be reversed and can only be altered if the loss assessments made in the initial recognition change over time, for example due to changing recovery rates or changing collateral valuation.

24 Equation (2) assumes an infinite-period forward-looking model and in doing so covers a number of finite-period models. For example, one could assume that provisioning decisions do not take account of forward-looking losses beyond K periods (*myopia)*, γ_i = 0 for all $i > K$. Another alternative is that current information cannot be used to estimate future losses beyond K periods, ($E_t[LOSS_{t+K}] = E_{t-1}[LOSS_{t+K}]$).

$$\Delta LLR_t = \sum_{k\geq 1} \gamma_k \Delta LOSS_{t+k} + \varepsilon_t, \quad (4)$$

where $\varepsilon_t = \sum_{k\geq 1} \gamma_k (\eta_{t,t+k} - \eta_{t-1,t-1+k})$ is the sensitivity-weighted changes in forecast errors.

We now also consider that other factors, such as the earnings or capital management motives, earnings signaling, bank size, or macro-economic variables may also play a role in shaping provisioning decisions. In addition to bank size (*Size*), which his log of total assets, we use current earnings before taxes and provisioning shares (i.e. $EBTP_t$) to control for the presence of earnings-management motives. Similarly, each bank's net equity position before the impact of provisioning on retained earnings (i.e. $EQBP_t$) is used to account for any capital-management motives. One would expect these two factors to be positively related to provisioning decisions if the latter is used as to smooth results, meet the market expectations, attain internal profitability or capital targets, or to improve disclosed results. In turn, a negative coefficient would indicate higher provisioning needs arising from a build-up in underlying risks, possibly due to market pressure. We also use future earnings before taxes and provisioning shares (i.e. $EBTP_{t+1}$) to control for the presence of earnings signaling motives, where a high level of provisioning could be used to indicate (to outside investors) that future core profits will also be high.

The macro-economic indicators include macro-economic variables of real GDP growth, short term interest rates measured by the 3-month Belgian treasury certificates (*ST rate*) and the spread between the ST rate and the 10-year Belgian government bond yield rate (*LT spread*). These variables are commonly used in most studies investigating the determinants of provisioning decisions of banks, often yielding a negative sign for real GDP growth and a positive sign for the interest rate measures.

We also keep the forward-looking estimates limited to two years, implying that the banks provision today to account for potential losses that will happen up to two years ahead.[25] Lastly, we allow for the possibility that provisioning may occur gradually and include lagged changes in loan loss reserves (ΔLLR_{t-1}) as a right-hand side variable. As highlighted in equation (3), this variable also incorporates past-write offs, or the extent to which that provisioning decisions are backward-looking.

Lastly, we use interaction terms to investigate the impact of the crisis and the introduction of the IAS-39 standards on the key explanatory factors, including lagged changes in loan loss reserves (ΔLLR_{t-1}), future losses ($LOSS_{t+1}$ and $LOSS_{t+2}$), as well as variables accounting for earnings management, capital management, and earnings signaling motives ($EBTP_t$, $EQBP_t$, and $EBTP_{t+1}$, respectively).

[25] Using a simplified model (i.e. regressing ΔLLR_t on $\Delta LOSS_{t+k}$ for different number of forward-lags *k*), the optimal number of forward-lags is found to be 2 according to the Akaike information criterion (AIC) and 1 according to the Bayesian Schwarz information criterion (BIC). The results are robust to the small sample correction described in Hurvich & Tsai (1989).

With these specifications, the basic model to be estimated in the rest of the paper is:

$$\begin{aligned}\Delta LLR_t = {} & IAS39 + Crisis + \beta X_t \\ & + \delta_1^1 \Delta LLR_{t-1} + \delta_1^2 \times IAS39 \times \Delta LLR_{t-1} + \delta_1^3 \times Crisis \times \Delta LLR_{t-1} \\ & + \gamma_1^1 \Delta LOSS_{t+1} + \gamma_1^2 \times IAS39 \times \Delta LOSS_{t+1} + \gamma_1^3 \times Crisis \times \Delta LOSS_{t+1} \\ & + \gamma_2^1 \Delta LOSS_{t+2} + \gamma_2^2 \times IAS39 \times \Delta LOSS_{t+2} + \gamma_2^3 \times Crisis \times \Delta LOSS_{t+2} \\ & + \rho_1^1 EQBP_t + \rho_1^2 \times IAS39 \times EQBP_t + \rho_1^3 \times Crisis \times EQBP_t \\ & + \rho_2^1 EBTP_t + \rho_2^2 \times IAS39 \times EBTP_t + \rho_2^3 \times Crisis \times EBTP_t \\ & + \rho_3^1 EBTP_{t+1} + \rho_3^2 \times IAS39 \times EBTP_{t+1} + \rho_3^3 \times Crisis \times EBTP_{t+1} + \varepsilon_t\end{aligned} \tag{5}$$

where X_t is the vector of macro-economic and certain bank-specific variables comprising of *Size*, *GDP growth*, *ST rate, and LT rate.*

Before outlining the estimation strategy in detail, it may be worthwhile to highlight several statistical attributes of equation (5) that make estimations less straight-forward. First, the error terms have intrinsic serial auto-correlation since both ε_t and ε_{t-1} contain the same forecast error terms, i.e. $\eta_{t-1,t+k}$. Second, one would expect the forward-looking error terms, $\eta_{t,t+k}$, to be negatively correlated with changes in future losses, $\Delta LOSS_{t+k}$.This is a natural outcome of our formulation since expected losses are by definition based on the current information set of the bank's managers.[26] In addition, the amount of loan loss reserves built to absorb losses at any moment may *constrain* the losses deemed acceptable in the future, which could arise if managers aim to substantial net losses. Such a correlation would imply an under-estimation of the sensitivity parameters, γ_k. Third, once the cross-sectional heterogeneity is taken into account (i.e. by including a fixed-effect), the inclusion of the lagged provisioning term, ΔLLR_{t-1}, as a right-hand side variable will lead to the well-known dynamic panel bias in the estimate of the lagged dependent variable coefficient, (Nickell, 1981).

We conduct three sets of analyses to estimate model (5). We first conduct a simple pooled OLS regression as a benchmark. Then, we conduct fixed-effects (FE) regressions to account for cross-sectional heterogeneity and to ensure that the estimates are robust to the presence of bank-specific and time-invariant omitted variables. Although the fixed-effects approach is a popular choice in the literature on loan loss provisioning, it does not take into account of dynamic panel bias, the potential endogeneity, error autocorrelation, or the possibility that the forecast errors $\eta_{t,t+k}$ may be correlated with future losses, $LOSS_{t+k}$, which may lead to auto-correlation in the error terms in equation (5). More generally, neither approach attempts to model how expectations may be formed. To account for these, we lastly apply the system generalized method-of-moments (SYS-GMM) estimation.

[26] The forward-looking error term $\eta_{t,t+k}$ may also be correlated with current loses, $LOSS_t$, since those may also determine future expectations. The correlation between the forward-looking error term and past losses is not of concern here since the latter are not directly included as right-hand side variables.

First proposed by Blundell & Bond (1998), SYS-GMM refines on the Arellano & Bond (1991) estimator. The latter method has been commonly employed to address dynamic panel bias and endogoneity via instrumental variables approach while accounting for unobserved individual specific heterogeneity by transforming the original model (i.e. in levels) into first differences. Sequential moment conditions are then introduced for each right-hand side variable that may exhibit a correlation with error terms. The instruments for these variables contain lagged values of the variable in question, as well as other variables that may be included as necessary. It has been demonstrated by Blundell & Bond (1998) that these so-called difference GMM estimations can have poor finite sample properties when the series display persistence. The SYS-GMM essentially adds more moment conditions to the system of equations by also considering level equations to account with these situations.

Instruments for the SYS-GMM regressions are selected carefully to account for the dynamic panel bias, the inherent error autocorrelation and to model forward-looking expectations. In particular, the lagged endogenous variable (ΔLLR_{t-1}) is instrumented by its second-order and third-order lags in order to take account of auto-correlation in error terms.[27] A selection of macro-economic and financial variables from the prior period *t-1* is also included as instruments on top of the usual set of exogenous variables within the model. The changes in future losses ($\Delta LOSS_{t+1}$ on $\Delta LOSS_{t+2}$) are instrumented by their third-order lags. Once again, first-order differences of a selection of current macro-economic variables are included onto the usual set of instruments. The choices over the lags are driven to reflect the fact that forward-looking loss estimates are based on current or past data. The selection of optimal macro-economic instruments is done by choosing the model yielding the most preferable test statistics for over-identifying restrictions and residual autocorrelation.[28]

[27] Including higher than third-order lags in general increased the likelihood of over-fitting and was thus avoided.

[28] Due to data availability issues, the list of candidate macro-economic variables were limited to real GDP growth, unemployment rate, Belgian house price index (obtained from International House Price Database of Federal Reserve of Dallas), BEL-20 stock market index, short-term interest rates, ST rate and the LT spread.

4 RESULTS

The OLS regressions in Table 3 highlight that the introduction of the IAS-39 standards and the financial crisis are not statistically significant contributors to the bank's provisioning decisions. Holding all else constant, bank size appears to have a relatively small negative impact on provisioning levels, although the statistical significance of the coefficient varies substantially from one model to another. In turn, GDP growth seems to robustly reduce provisioning while the long-term interest spreads have the opposite impact, highlighting the important of the cyclical components. Short-term interest rate variable also has the expected sign, albeit with a relatively weak statistical significance.

Table 3. Pooled (OLS) regression results for ΔLLR(t)

	I	*II*	*III*	*IV*	*V*	*VI*	*VII*	*VIII*
IAS-39	-0.000	-0.000	-0.000	0.000	-0.000	0.000	-0.000	0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)
Crisis	-0.000	-0.001	-0.000	-0.001	-0.001	-0.001	-0.001	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Bank size	-0.000	-0.000***	-0.000	-0.000*	-0.000	-0.000*	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
GDP growth	-0.029*	-0.027*	-0.029*	-0.027*	-0.030**	-0.027*	-0.031**	-0.028*
	(0.014)	(0.014)	(0.014)	(0.013)	(0.014)	(0.014)	(0.015)	(0.014)
ST rate	0.037	0.034	0.036*	0.030	0.027	0.024	0.023	0.019
	(0.022)	(0.021)	(0.019)	(0.023)	(0.021)	(0.023)	(0.023)	(0.023)
LT spread	0.088*	0.086*	0.087*	0.080*	0.082	0.074	0.083	0.077
	(0.046)	(0.045)	(0.049)	(0.047)	(0.052)	(0.048)	(0.053)	(0.050)
ΔLLR_{t-1}	0.019	-0.056	0.021	-0.074	0.043	-0.037	0.049	-0.044
	(0.132)	(0.116)	(0.133)	(0.107)	(0.123)	(0.095)	(0.124)	(0.086)
... x IAS-39	-0.373***	-0.323**	-0.379***	-0.322***	-0.336***	-0.286**	-0.359***	-0.305***
	(0.112)	(0.122)	(0.113)	(0.115)	(0.116)	(0.120)	(0.103)	(0.107)
... x Crisis	0.402*	0.450**	0.400*	0.448***	0.345	0.381***	0.364*	0.407***
	(0.234)	(0.171)	(0.228)	(0.149)	(0.207)	(0.125)	(0.205)	(0.122)
$\Delta LOSS_{t+1}$	0.637***	0.689***	0.641***	0.724***	0.654***	0.708***	0.668***	0.745***
	(0.063)	(0.072)	(0.062)	(0.064)	(0.067)	(0.080)	(0.059)	(0.073)
... x IAS-39	-0.183	-0.198	-0.189	-0.229	-0.155	-0.177	-0.146	-0.186
	(0.202)	(0.207)	(0.199)	(0.201)	(0.200)	(0.197)	(0.205)	(0.202)
... x Crisis	-0.006	-0.033	-0.006	-0.047	-0.044	-0.064	-0.077	-0.109
	(0.089)	(0.067)	(0.090)	(0.069)	(0.086)	(0.073)	(0.084)	(0.081)
$\Delta LOSS_{t+2}$	0.433***	0.442***	0.438***	0.450***	0.427***	0.461***	0.421**	0.442***
	(0.147)	(0.153)	(0.141)	(0.133)	(0.153)	(0.153)	(0.154)	(0.146)
... x IAS-39	0.110	0.087	0.105	0.077	0.110	0.055	0.126	0.086
	(0.164)	(0.195)	(0.166)	(0.197)	(0.165)	(0.188)	(0.172)	(0.195)
... x Crisis	-0.368**	-0.339**	-0.371**	-0.348**	-0.337**	-0.305**	-0.315**	-0.288**
	(0.156)	(0.147)	(0.153)	(0.138)	(0.142)	(0.126)	(0.138)	(0.123)
$EQBP_t$		-0.017***		-0.023***		-0.020***		-0.023***
		(0.005)		(0.005)		(0.005)		(0.006)
... x IAS-39		-0.003		-0.006		-0.010		-0.010
		(0.009)		(0.013)		(0.014)		(0.014)
... x Crisis		0.011		0.017*		0.011		0.015
		(0.010)		(0.009)		(0.009)		(0.009)
$EBTP_t$			0.052	0.224**			0.057	0.192**
			(0.096)	(0.085)			(0.086)	(0.077)
... x IAS-39			0.017	-0.059			0.004	-0.061
			(0.084)	(0.122)			(0.116)	(0.144)
... x Crisis			-0.048	-0.144*			-0.203*	-0.274**
			(0.082)	(0.079)			(0.108)	(0.130)
$EBTP_{t+1}$					0.027	0.161	-0.022	0.029
					(0.118)	(0.106)	(0.091)	(0.094)
... x IAS-39					-0.138	-0.181	-0.108	-0.107
					(0.109)	(0.149)	(0.137)	(0.154)
... x Crisis					0.206	0.152	0.315	0.287
					(0.198)	(0.174)	(0.220)	(0.203)
Obs.	250	250	250	250	250	250	250	250
R^2	0.469	0.521	0.471	0.543	0.483	0.546	0.489	0.561

Notes: *, ** and *** denote significance at the 10%, 5% and 1% levels respectively. Constant term was suppressed to save space.

The results also highlight that provisions are built more gradually after the crisis but not necessarily for banks that report under the IAS-39 standards. Indeed, the coefficient estimates for lagged endogenous variable (ΔLLR_{t-1}) that is interacted with the crisis dummy variable are significant and remain consistently around 40% in all models, while the interaction with the IAs-39 has an opposite offsetting impact. In other words, in the post-crisis era, banks that have not been under IAS-39 have generally built their loan loss reserves in a more gradual manner, while those under IAS-39 have continued to operate similar to how they operated prior to the crisis. As noted above, these estimates may be biased due to inherent correlation of the lagged endogenous variable with the current error terms, which will be treated below.

Perhaps the most striking finding that emerges from Table 3 is the relatively tight link between future write-offs and current provisioning levels. Indeed, banks appear to build-up reserves to absorb nearly 70% of their losses within one year and around 45% between first and second years[29], although the latter relationship almost entirely disappears after the crisis. The sensitivity of current provisioning to future losses appears to be slightly weakened after the implementation of the IAS-39 standards, although the relationship is generally statistically significant except under the third column. Once again, it is important to note that the potential correlation between the forecast errors and the written-off losses due to the potential endogeneity of future losses and current provisioning may be biasing the results.

There also appears to be a very strong and robust relationship between provisioning decisions and the level of equity before provisioning ($EQBP_t$). This implies that banks that have a weak equity position tend to increase their provisioning levels. As noted above, weakly capitalized banks may be increasing their current provisioning to ensure that future losses do not lead to a further deterioration in capital levels, possibly under pressure from investors. The statistical significance may also be a part of the business model, in that less capitalized banks tend to provision more as they may be taking more risks.

The evidence on the impact of earnings management and earnings signalling on provisioning decisions are relatively mixed. In particular, the coefficient estimates on current earnings ($EBTP_t$) are significantly positive in only two model specifications (columns IV and VIII) and are insignificant when the net equity position before current retained earnings ($EQBP_t$) is left out of the model (columns III and VII).[30] The results also show that the earnings levels matter less after the crisis. The coefficient estimates for the one-year forward earnings are not statistically significant in any model specification.

It is possible that some of the OLS findings are due to the fact that bank-specific factors are not adequately taken into account. Indeed, the regressions may not be efficient if such factors are not adequately summarized by the bank-specific variables (eg. size, written-off losses, current and future earnings, and the capital measures) that are readily included in the regressions.

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[29] Note that by the construction of equation (1) and the equations that follow, the γ_1 and γ_2 determine the extent to which loan loss reserves are built to absorb the losses within the next two years.

[30] This result could also be due to the first degree autocorrelation, which is typical in earnings data.

Table 4. Fixed-effects (FE) panel regression results for ΔLLR(t)

	I	*II*	*III*	*IV*	*V*	*VI*	*VII*	*VIII*
IAS-39	-0.000	0.002**	0.000	0.002	0.000	0.002	0.000	0.002
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Crisis	-0.001	-0.001	-0.000	-0.002	-0.001	-0.002*	-0.001	-0.002**
	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Bank size	0.000	-0.000	0.000	0.000	0.000	-0.000	0.000	-0.000
	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
GDP growth	-0.023*	-0.020	-0.024*	-0.022*	-0.024*	-0.021	-0.025*	-0.023*
	(0.013)	(0.013)	(0.012)	(0.012)	(0.013)	(0.013)	(0.012)	(0.012)
ST rate	0.051*	0.054**	0.051*	0.046*	0.031	0.034	0.031	0.029
	(0.026)	(0.025)	(0.029)	(0.025)	(0.025)	(0.025)	(0.027)	(0.025)
LT spread	0.104**	0.107**	0.104**	0.103**	0.081*	0.085**	0.087*	0.089**
	(0.040)	(0.039)	(0.042)	(0.038)	(0.042)	(0.041)	(0.043)	(0.040)
ΔLLR_{t-1}	-0.008	-0.088	-0.010	-0.105	0.011	-0.064	0.019	-0.074
	(0.061)	(0.063)	(0.064)	(0.076)	(0.059)	(0.052)	(0.064)	(0.068)
... x IAS-39	-0.070	-0.095	-0.052	-0.082	-0.040	-0.067	-0.029	-0.058
	(0.145)	(0.153)	(0.125)	(0.134)	(0.142)	(0.144)	(0.113)	(0.122)
... x Crisis	0.010	0.135	-0.013	0.136*	-0.040	0.080	-0.056	0.091
	(0.167)	(0.079)	(0.171)	(0.079)	(0.165)	(0.071)	(0.159)	(0.065)
$\Delta LOSS_{t+1}$	0.963***	0.971***	0.980***	1.002***	0.961***	0.966***	0.989***	1.008***
	(0.155)	(0.163)	(0.144)	(0.155)	(0.151)	(0.159)	(0.146)	(0.156)
... x IAS-39	-0.266	-0.217	-0.289*	-0.242	-0.227	-0.187	-0.239	-0.198
	(0.169)	(0.163)	(0.168)	(0.165)	(0.176)	(0.168)	(0.178)	(0.173)
... x Crisis	-0.326**	-0.367**	-0.321**	-0.384**	-0.345**	-0.379**	-0.367**	-0.421**
	(0.133)	(0.151)	(0.131)	(0.147)	(0.138)	(0.150)	(0.150)	(0.162)
$\Delta LOSS_{t+2}$	0.712***	0.658***	0.713***	0.664***	0.725***	0.680***	0.710***	0.657***
	(0.168)	(0.172)	(0.161)	(0.156)	(0.168)	(0.174)	(0.165)	(0.169)
... x IAS-39	-0.085	-0.024	-0.090	-0.004	-0.124	-0.063	-0.099	-0.013
	(0.134)	(0.174)	(0.136)	(0.182)	(0.138)	(0.174)	(0.142)	(0.186)
... x Crisis	-0.500***	-0.512***	-0.490***	-0.522***	-0.455***	-0.476***	-0.428***	-0.454***
	(0.150)	(0.162)	(0.153)	(0.148)	(0.129)	(0.134)	(0.127)	(0.124)
$EQBP_t$		-0.022		-0.035*		-0.022		-0.033
		(0.014)		(0.018)		(0.013)		(0.020)
... x IAS-39		-0.043**		-0.017		-0.032		-0.023
		(0.016)		(0.020)		(0.023)		(0.023)
... x Crisis		0.015		0.022**		0.015*		0.021*
		(0.009)		(0.010)		(0.008)		(0.010)
$EBTP_t$			0.160	0.279*			0.167	0.285*
			(0.124)	(0.148)			(0.105)	(0.165)
... x IAS-39			-0.132**	-0.196			-0.113	-0.177
			(0.059)	(0.123)			(0.078)	(0.154)
... x Crisis			-0.069	-0.179*			-0.184*	-0.283*
			(0.080)	(0.093)			(0.095)	(0.141)
$EBTP_{t+1}$					0.174	0.177	0.098	0.078
					(0.182)	(0.181)	(0.150)	(0.159)
... x IAS-39					-0.331**	-0.297*	-0.238	-0.189
					(0.160)	(0.162)	(0.155)	(0.156)
... x Crisis					0.178	0.147	0.293	0.284
					(0.178)	(0.157)	(0.207)	(0.196)
Obs.	250	250	250	250	250	250	250	250
Banks	25	25	25	25	25	25	25	25
R² (within)	0.564	0.589	0.573	0.609	0.586	0.607	0.596	0.629

Notes: *, ** and *** denote significance at the 10%, 5% and 1% levels respectively. Constant term was suppressed to save space.

Table 4 provides the results for the fixed-effects panel regressions in order to take account for the bank-specific results. Comparing these panel regressions to the pooled regressions in Table 3, we see that none of the statistically significant coefficient estimates change their signs. Also, the signs and the statistical significance of the macro-economic variables and the earnings variable ($EBTP_t$) remain virtually the same. Only the dummy variables for IAS-39 and crisis periods exhibit some statistically significant power, although not consistently so.

Despite similarities, there are some key differences between the OLS and FE regressions. In particular, the lagged endogenous variable (ΔLLR_{t-1}) is no longer a statistically significance explanatory variable, except under one model when it is interacted with the crisis dummy variable. Moreover, the statistical significance of the coefficients for equity levels ($EQBP_t$) are much lower,

which gives support to the explanation that the level of capital may be related with bank-specific risk-taking.

Another key difference relates to how future losses may be related to current provisioning decisions. According to the fixed-effect regression results, banks build reserves to absorb nearly all of their losses in the next period and about two-thirds of their losses beyond that period within two years. The sensitivities of current provisioning decisions to both the one- and two-year forward-looking losses decline after the crisis.

Some of these differences are likely to be a direct consequence of the inclusion of bank-specific fixed effects. In particular, the increased standard errors for the coefficient for $EQBP_t$ most likely imply that equity levels serve as a good proxy for time-invariant credit risk portfolio of each bank. It is nevertheless curious that the same has not happened for interaction terms between equity and the crisis dummy, or to that extent, to the IAS-39 dummy.

Neither the OLS nor the FE panel regressions take into account the potential due correlation between the lagged endogenous variables and future losses and errors terms. Table 5 attempts to take account of these potential errors with the use of system generalized method-of-moments (SYS-GMM) estimation.

Before delving into the results, it is important to assess two key statistical qualities of the SYS-GMM estimations. First, the two tests for tests of over-identifying restrictions return a negative result. In particular, neither the Sargan or Hansen J-statistics tests can reject the null hypothesis that the over-identifying restrictions are valid. Indeed, this outcome was partly assured by selecting the instruments that yielded the highest p-values for the two J-statistics.[31] Second, despite the expectation that the error terms would be serially auto-correlated, the first- and second-degree tests for autocorrelation are rejected at the 10% significance level. These results are also striking since, beyond the inherent serial correlation of error terms arising from equation (5) above, the SYS-GMM estimations introduce an additional source of autocorrelation as they involve differenced equations (i.e. $\varepsilon_t - \varepsilon_{t-1}$ would be naturally correlated with $\varepsilon_{t-1} - \varepsilon_{t-2}$).

Turning to the comparison of the estimates reported in Table 5 with earlier regressions, *GDP growth* remains as the only statistically significant macro-economic factor while neither the short-term interest rate nor the long-term spreads matter, despite the fact that the coefficient estimates have in almost all cases the expected signs. The crisis does not seem to have had any direct impact on provisioning, at least not statistically significantly so, but the introduction of IAS-39 might have weakly reduced the provisioning levels in general. Dynamic panel bias appears to be weakly present since unlike earlier regressions none of the coefficient estimates are statistically significant. It is also interesting to note that most of the coefficient estimates remain with similar signs obtained in earlier studies.[32]

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[31] In the reported regressions, the models yielded the best results when the first lags of the house price index were used as the instrument for the lagged dependent variable and the changes in the unemployment rate and BEL20 stock market index was used as instruments for the forward-looking losses.

[32] Results that are not provided here confirm that the loss of significance is not due to the treatment of the endogeneity of the forward-looking losses. Indeed, the lagged dependent variables lose their significance when the difference-GMM approach is only used to treat the dynamic panel bias (eg. without using instruments for the forward-looking variables).

Table 5. SYS-GMM regression results for ΔLLR(t)

	I	*II*	*III*	*IV*	*V*	*VI*	*VII*	*VIII*
IAS-39	-0.002	-0.003*	-0.002	-0.003*	-0.002	-0.003*	-0.003	-0.003
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Crisis	-0.001	-0.001	-0.001	-0.002	-0.002	-0.002	-0.001	-0.002
	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.002)
Bank size	0.000	0.000	0.001	0.001	-0.000	-0.000	0.001	0.001
	(0.001)	(0.001)	(0.002)	(0.001)	(0.003)	(0.002)	(0.002)	(0.002)
GDP growth	-0.033*	-0.035*	-0.035*	-0.036*	-0.031*	-0.033*	-0.034*	-0.034*
	(0.019)	(0.019)	(0.020)	(0.019)	(0.017)	(0.018)	(0.019)	(0.019)
ST rate	0.037	0.025	0.039	0.025	-0.001	-0.010	-0.001	-0.010
	(0.036)	(0.031)	(0.037)	(0.031)	(0.036)	(0.032)	(0.040)	(0.040)
LT spread	0.057	0.043	0.051	0.038	0.022	0.010	0.006	-0.003
	(0.047)	(0.038)	(0.053)	(0.041)	(0.052)	(0.045)	(0.052)	(0.048)
ΔLLR_{t-1}	-0.016	0.013	0.001	-0.009	0.025	0.060	0.061	0.035
	(0.131)	(0.115)	(0.146)	(0.087)	(0.117)	(0.121)	(0.128)	(0.097)
... x IAS-39	0.043	-0.009	0.105	0.066	0.260	0.218	0.339	0.381
	(0.205)	(0.265)	(0.232)	(0.317)	(0.210)	(0.315)	(0.233)	(0.378)
... x Crisis	0.004	-0.005	-0.092	-0.085	-0.236	-0.268	-0.409	-0.452
	(0.277)	(0.315)	(0.322)	(0.292)	(0.296)	(0.354)	(0.349)	(0.375)
$\Delta LOSS_{t+1}$	1.588***	1.528***	1.583***	1.435***	1.390***	1.291***	1.392***	1.226***
	(0.224)	(0.198)	(0.225)	(0.196)	(0.264)	(0.204)	(0.192)	(0.224)
... x IAS-39	-1.178***	-1.101***	-1.249***	-1.154***	-1.040*	-0.995**	-1.034**	-1.040**
	(0.437)	(0.355)	(0.452)	(0.366)	(0.596)	(0.438)	(0.524)	(0.438)
... x Crisis	0.021	-0.015	0.120	0.171	0.118	0.153	0.132	0.325
	(0.477)	(0.526)	(0.514)	(0.512)	(0.486)	(0.529)	(0.488)	(0.511)
$\Delta LOSS_{t+2}$	1.608**	1.720***	1.718**	1.745***	1.509***	1.661***	1.655***	1.652***
	(0.660)	(0.622)	(0.804)	(0.553)	(0.448)	(0.434)	(0.531)	(0.393)
... x IAS-39	-0.858***	-0.845***	-0.944***	-0.933***	-0.886**	-0.889***	-0.947**	-0.989***
	(0.307)	(0.267)	(0.334)	(0.274)	(0.416)	(0.331)	(0.386)	(0.353)
... x Crisis	-0.549	-0.705	-0.587	-0.655	-0.304	-0.485	-0.446	-0.391
	(0.762)	(0.568)	(0.845)	(0.525)	(0.486)	(0.411)	(0.601)	(0.401)
$EQBP_t$		-0.019		-0.026		-0.003		-0.000
		(0.025)		(0.020)		(0.026)		(0.021)
... x IAS-39		0.035		0.035		0.032		0.024
		(0.028)		(0.032)		(0.026)		(0.033)
... x Crisis		-0.001		0.011		0.001		0.018
		(0.016)		(0.018)		(0.016)		(0.018)
$EBTP_t$			0.367**	0.407***			0.588***	0.656**
			(0.160)	(0.145)			(0.218)	(0.290)
... x IAS-39			-0.077	-0.171			-0.186	-0.254
			(0.242)	(0.243)			(0.206)	(0.226)
... x Crisis			-0.088	-0.089			0.008	-0.015
			(0.203)	(0.168)			(0.188)	(0.173)
$EBTP_{t+1}$					0.220	0.244	0.488*	0.551*
					(0.144)	(0.161)	(0.260)	(0.293)
... x IAS-39					-0.308	-0.326	-0.492*	-0.556*
					(0.224)	(0.225)	(0.267)	(0.293)
... x Crisis					0.418	0.379	0.385	0.354
					(0.403)	(0.420)	(0.340)	(0.401)
Obs.	250	250	250	250	250	250	250	250
Banks	25	25	25	25	25	25	25	25
Hansen p-val	0.999	1.000	0.998	1.000	1.000	1.000	1.000	1.000
Sargan p-val	0.850	0.842	0.883	0.823	0.912	0.909	0.978	0.978
AR(1) p-val	0.312	0.192	0.386	0.157	0.290	0.113	0.625	0.340
AR(2) p-val	0.474	0.734	0.240	0.892	0.548	0.752	0.250	0.709

Notes: *, ** and *** denote significance at the 10%, 5% and 1% levels respectively. Constant term was suppressed to save space. The dynamic panel bias due to the potential correlation of ΔLLR_{t-1} with the error terms, including the interaction terms, was addressed by using the second and third lags of lagged dependent variable, all the exogenous variables, as well as the first lag of the house price index as instruments. The correlation of the forward-looking loss variables ($\Delta LOSS_{t+1}$ and $\Delta LOSS_{t+2}$) and the interaction terms with the forecast errors was addressed by using third and fourth lags of each relevant variable, the exogenous variables, as well as the change in unemployment and BEL20 stock market indices as instruments. The lagged instruments were only used in the first difference equations in system GMM regressions. All regressions follow Roodman (2009) in collapsing the instrument matrix. The Sargan and Hansen tests report the p-values for the null hypothesis of instrument validity, which are not rejected in any model. The values reported for AR(1) and AR(2) are the p-values for the first and second order auto-correlated disturbances.

Perhaps the most striking difference between the SYS-GMM regressions and the earlier results relate to the forward-looking loss components. In particular, the coefficient estimates for the forward-looking losses are much greater, with banks provisioning more than their expected losses in these periods. Perhaps more interestingly, this strong sensitivity of current provisioning decisions to future losses weakens considerably after the introduction of the IAS-39 standards. In particular, the introduction of the IAS-39 standards appears to have made current provisioning levels almost entirely insensitive to one-year forward looking loss estimates and much less sensitive to two-year forward looking losses. As in prior regressions, the crisis has also had a similar impact, although not statistically significant.

Moving beyond the forward-looking losses, the coefficient estimates for current equity levels ($EQBP_t$) are not statistically significant. As argued above for the FE regressions, this decreased the explanatory power of equity levels is most likely due to the time-invariant relationship between equity levels and risk-taking, which is taken into account by differencing the equation. Unlike prior regressions, the coefficient estimates on current earnings ($EBTP_t$) are not only significantly positive but also consistent across different models. Moreover, the coefficient estimates for the IAS-39 interaction variable ($EBTP \times IAS\text{-}39_t$) are also unequivocally negative, although not highly significant. Another alternative motivator of provisioning, the signalling of future earnings, is weakly present but appears to have disappeared after the implementation of the IAS-39 standards.

5 CONCLUSIONS

The key finding of the paper is that current provisioning decisions of Belgian banks appear to be strongly linked to forward-looking loan losses. Our results show that the link has considerably weakened with the introduction of the IAS-39 standards. This implies that the introduction of these accounting standards have effectively made provisioning decisions more backward-looking, at least as far as one could assess using the BGAAP-based unconsolidated supervisory reporting. It is possible that the Belgian banks have changed their loss recognition procedures amidst the financial crisis, which has overlapped with the introduction of the IAS-39 standards as well as other standards.[33] Our results lend some support to that possibility, although the estimates are not consistently statistically significant across different empirical models.

Apart from the importance of forward-looking losses, three results emerge from the study. First, although provisioning policies are strongly correlated with capital levels, this relationship weakens considerably once bank-specific time-invariant factors are accounted for. Thus, although undercapitalized banks may face higher credit risks -- and may thus require more provisioning -- this relationship seems to be related to the business model of each bank rather than the conditions in the credit market. Second, once the bank-specific factors and the endogeneity problems are addressed, there is a statistically significant positive relationship between provisioning and net earnings levels. This finding suggests that earnings management could be at play, implying that banks are strategically increasing or decreasing their provisioning levels to smooth their earnings. The introduction of the IAS-39 standards appears to have weakened the importance of this factor, but only mildly so since the coefficient estimates for the relevant factors are not statistically significant. Third, a similar – albeit much weaker – relationship is also present between the current provisioning levels and future net earnings. Thus, earnings signalling might also be present, although the introduction of the IAS-39 standards also weakens this relationship.

The findings underline two distinct issues that could have policy relevance. First, the introduction of the IFRS-9 rules is likely to change how Belgian banks provision for their future losses. However, judging by the pre-IAS 39 results, this would in some sense represent a *déjà vu*, at least for some banks. Second, earnings management motives appear to be present for Belgian banks, before and after the introduction of the IAS-39 rules. Once again, supervisors may need to monitor closely whether earnings management continues to be a potential motivating factor after the introduction of the IFRS-9 rules.

Future research might focus on a number of issues that have not been addressed in this paper. Since the aim of this paper was to primarily focus on the provisioning policies, a complementary assessment of whether Belgian banks delayed loss recognition was not made here, which could be topic of future research.[34] Moreover, the paper relies entirely on supervisory reports that are prepared under the BGAAP standard. A parallel reporting is also available for consolidated entities since 2005 that is entirely based on the IAS-39 standard and uses the non-performing loan criteria set forth under the Basel II rules. This database could be used to dig deeper into the loss-recognition policies of Belgian banks with the help of such an “objective measure” of asset quality.

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[33] Such a development has been observed in some of the Eurozone economies that have faced substantial worsening of asset quality, (Aiyar *et al.*, 2015; Jassaud & Kang, 2015).

[34] A particularly complicating factor that makes the analysis more difficult here is that Belgian banks have started using an “objective” criteria for non-performing loans (eg. based on number of days of non-payment) only recently. This makes the assessment of loss recognition quite difficult, at least for the period considered in this paper.

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Registered office: boulevard de Berlaimont 14 – BE-1000 Brussels
www.nbb.be

Editor

Jan Smets
Governor of the National Bank of Belgium

Layout: Analysis and Research Group
Cover: NBB AG – Prepress & Image

Published in July 2017