Expected Losses and Managerial Discretion as Drivers of Countercyclical Loan Loss Provisioning*

Christian Domikowsky[#]
Finance Center Münster

Sven Bornemann[#]
Finance Center Münster

Klaus Düllmann[^]
European Central Bank

Philipp Grüber[°]
Deutsche Bundesbank

Andreas Pfingsten[##]
Finance Center Münster

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Finance Center Münster, University of Münster, Universitätsstr. 14-16, 48143 Münster, Germany.

^ European Central Bank, Kaiserstr. 29, 60311 Frankfurt am Main, Germany.

° Deutsche Bundesbank, Wilhelm-Epstein-Str. 14, 60431 Frankfurt am Main, Germany.

Corresponding author: Finance Center Münster, University of Münster, Universitätsstr. 14-16, 48143 Münster, Germany, phone: +492518322881, fax: +492518322882, e-mail: andreas.pfingsten@wiwi.uni-muenster.de.

Abstract

A new debate on the sound design of credit risk provisioning schemes, which is reflected in the implementation of an expected loss model in IFRS 9, was triggered by the weak performance of incurred loss models in the financial crisis. For a long time, German banks have been a) allowed to utilize expected losses for building specific loan loss provisions, and b) endowed with a considerable amount of discretion through two provisioning items for latent risks. When studying loan loss provisions under this regime, we find that specific provisions are indeed built countercyclically by referring to expected losses. At the same time, specific provisions are utilized as a tool for earnings management, even in the presence of reserves for latent risks. The latter are primarily accumulated through a publicly invisible item when pre-tax earnings are high and specific provisions are low. The use of the second item for latent risks is predominantly motivated by tax considerations, demonstrating that local tax law also matters for risk provisioning.

Key Words: Procyclicality, earnings management, hidden reserves, nonperforming loans, loan loss provisioning, expected loss model.

JEL Classification: G21, M41.

1 Introduction

During economic upswings, improving conditions for corporate borrowers due to lower credit risk premia may boost corporate demand for debt capital. At the same time increased competition between existing banks and new market entrants for market share in loans can lead to lower borrowing standards as well as relaxed monitoring efforts (Fernández de Lis *et al.* (2001); Berger and Udell (2004)). In consequence, the average quality of a bank's loan portfolio decreases and the aggregate latent credit risk in the banking sector rises (Ogura (2006)). If banks account for the fact that the latent credit risk in their loan portfolios rises during upswings, they should increase their provisioning levels at that time and lower them during downturns as losses occur, thus build and release provisions in a countercyclical way. However, this requires an underlying accounting model that allows for the recognition of through-the-cycle losses in the loan portfolio.[1]

In this context, three different provisioning models are usually discussed: An *incurred loss model*, as stipulated by IAS 39, follows an essentially backward-looking approach and requires loan losses not to be recognized before a default becomes probable. This bears the risk of inherently procyclical provisioning (Dugan (2009)), but on the other hand it limits an entity's ability to conduct earnings management and create hidden reserves (cf. Gebhardt and Novotny-Farkas (2011) for empirical evidence from Europe). During the financial crisis, the delayed recognition of loan losses was identified as a major weakness of IAS 39 and led to the development of an *expected loss model* in IFRS 9 that was finalized in July 2014 and implemented in the latest revision of the standard.[2] In the so-called three-bucket approach of IFRS 9 it is no longer necessary for a trigger event to have actually occurred in order to recognize a credit loss, but banks are instead required to provision for expected losses already when a loan is granted and update their expectations at each reporting date. From an accounting perspective it can be argued that this model is helpful

[1] The Financial Stability Forum (2009) agrees with this view and states that the design of the underlying accounting regime has the ability to encourage pro- or countercyclical provisioning.

[2] The new rules are going to replace the incurred loss model in 2018, with early application permitted.

because it allows to better allocate income and expenses to the periods in which they actually originate, despite additional managerial discretion that comes along with the recognition of expected losses. The expected loss model, however, does not solve the problem that expectations on future credit losses might depend on the state of the business cycle when a loan is granted in which case major updates on expected losses would first be made when the downturn already kicks in. A potential solution for this problem that has been discussed extensively in the literature is *statistical provisioning* (Fernández de Lis *et al.* (2001); Pérez *et al.* (2008)), which could be called the "Spanish model". Statistical provisions are a countercyclical tool that requires banks to increase their loan loss reserves in an economic upswing and release provisions in the downturn, and disclose those provisions separately. Whilst this is a suitable tool to dampen earnings management, it limits banks' flexibility to adjust loan loss provisions in case a bank's actual (and probably better) estimate of expected losses differs from regulatory specifications.[3]

Our study adds to the discussion by presenting a fourth system (the "German model") that allows banks to take into account expected losses in the build-up of specific loan loss provisions (LLP) through the "principle of conservatism" that is an integral part of German Commercial Code (HGB). Additionally, it endows banks with the opportunity to account for latent risks in their loan portfolios via general LLP and hidden reserves for "specific banking risks", i. e. latent credit and market risk, pursuant to Section 340f of HGB (340f-reserves).[4] This system contains elements of an expected loss model since the decision to build specific LLP is based on both objective information as well as a forward-looking estimate of the probability of default for individual loans. However, it is more than an expected loss model because of the additional reserves for latent risks that can be built and released according to banks' individual needs. In that sense, the provisions for latent risks of HGB differ significantly from statistical provisions.

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[3] For some negative side effects of statistical provisioning, we refer to Illueca *et al.* (2014). A comprehensive discussion of different provisioning models and their implications is provided by Beatty and Liao (2014).

[4] Bornemann *et al.* (2012) already provide evidence on the use of 340f-reserves for earnings management.

Using both public and private information provided by the Deutsche Bundesbank, we analyze an unbalanced panel that contains a comprehensive financial history of German banks over almost two decades (1994-2011). Our data allow us to separately investigate the build-up and release of specific LLP as well as general LLP and hidden 340f-reserves. This is important since it enables us to explicitly examine cyclical effects of different provisioning items, with one of them (specific LLP) being not too far from the concept of the expected loss model of IFRS 9. Our results are in contrast to most studies on the procyclicality of LLP which generally analyze procyclical effects under incurred loss models.

In line with Bushman and Williams (2012), we use three different measures of forward-looking provisioning and find German banks to use specific LLP and 340f-reserves countercyclically, i. e. they increase their credit risk reserve during upswings and decrease them during downturns. General LLP are predominantly built and released for tax reasons and not as a buffer for business cycle risks. At last, countercyclical effects of specific LLP and 340f-reserves are mainly due to earnings management and to a lesser extent due to prudent provisioning, i. e. the anticipation of future nonperforming loans (NPL). Our findings are robust to various model specifications and panel adjustments.

We acknowledge that our sample consists of mostly small, unlisted and regionally oriented banks and that our findings could theoretically be driven by unobserved Germany-specific characteristics, which is a drawback that is common to all single-country settings.[5] Yet the property of the German accounting regime to allow banks to take a forward-looking provisioning approach is at the very least an important precondition for our findings. Furthermore, our results illustrate how tax rules affect the provisioning practice in individual accounts. Naturally, the given sample does not allow to derive direct policy implications for large and internationally operating banks. However, our findings give some notable insights: First, generally endowing banks with more discretion in the build-up and release of LLP has the potential to lead to countercyclical effects, which is generally desirable. Second, our findings with respect to earnings management show that banks use their discretion for purposes

[5] For a comprehensive description of the German banking sector, we refer to the Appendix.

that are not necessarily in line with a true and fair view of a bank's financial condition.[6] This is a trade-off which is difficult to avoid and it is the task of standard setters to balance the positive and adverse effects of different models. Altogether, one needs to be careful when it comes to the specific design of an expected loss model. Third, tax deductibility can be an important driver of LLP in unconsolidated financial statements, as we are able to show for general LLP in Germany. Hence, national authorities that are responsible for the definition of local tax rules should consider the impact of those rules more thoroughly and take into account the potentially different perspectives of accounting standard setters and regulators. In general, efforts should be undertaken to align those different perspectives (Wall and Koch (2000)).

The remainder of the paper is organized as follows: Section 2 provides a comprehensive overview of loan loss accounting rules and reporting regulations in Germany. Section 3 relates our work to different strands of the literature. Section 4 discusses the data and the empirical strategy and Section 5 presents the empirical analysis. We conduct several robustness tests in Section 6. Section 7 concludes.

[6] We refer to Bushman and Williams (2012) for an analysis of the association between different types of forward-looking provisioning and the risk-taking discipline of banks.

2 Loan loss accounting under the German Commercial Code

One of the fundamental principles of German financial accounting according to HGB is the principle of conservatism. In terms of loan loss provisioning, an important consequence follows from this principle: Banks are required to value their loan portfolios conservatively. At the closing date, they are supposed to take all information on incurred loan losses as well as future potential loan losses into account. This information, however, must be obtainable at a reasonable cost, which is demanded by the principle of economic efficiency. Overall, banks should provision for credit risk preferably early and better too much than too little. To do so, German financial accounting for banks provides three different items to provision for credit (and partly market) risk: specific LLP, general LLP, and 340f-reserves.

Specific LLP comprise provisions for individual loans and for portfolios of small and homogeneous loans.[7] There is a lack of binding regulations on trigger events for building specific LLP. However, all German banks have to adhere to the "Minimum Requirements for Risk Management in Banks". These stipulate that each bank individually has to define criteria according to which specific as well as general LLP are built (Bundesanstalt für Finanzdienstleistungsaufsicht (2012), BTO 1.2.6). With respect to specific LLP, banks might at least partly derive these criteria from the default definition of the directive of the European Parliament relating to the pursuit of the business of credit institutions (European Parliament (2006), Annex VII, Part 4, No. 44). Accordingly, credit institutions build specific LLP on loans if repayment of principal or interest is overdue by more than 90 days and/or if they generally deem the repayment of the obligations unlikely. Additionally, the principle of conservatism allows banks to build specific LLP for risks of individual loans that they anticipate at the closing date. This is an expected loss component of specific LLP. The appropriate amount of specific LLP is determined by subtracting future expected redemption and interest payments as well as the value of the collateral from

[7] Specific LLP may also comprise impairment charges for country risk, which are provisions for loans to foreign customers considered doubtful due to the political situation in the foreign country.

the book value of the loan. In contrast to IAS 39, banks that report according to HGB need not, but are allowed, to discount the future expected cash flows from a loan to the current accounting period.[8] Specific LLP are fully tax-deductible. Under the standardized approach to credit risk in Basel I and Basel II, specific LLP are not part of the regulatory capital. Under the IRB approach, banks have to compare the expected loss under the terms of Basel II with the sum of eligible specific and general LLP. If the eligible LLP exceed the expected loss amount, the difference is added to Tier 2 capital up to 0.6% of risk-weighted assets. If the expected loss amount exceeds the eligible provisions, the difference has to be deducted from Tier 1 and Tier 2 capital in equal shares (Basel Committee on Banking Supervision (2006)).[9]

Similar to specific LLP, there is a lack of binding guidance on building general LLP. They are meant to cover latent risks in the loan portfolio and are usually built as a fixed percentage of the sum of outstanding loans, i. e. on those loans that have neither been written off nor been subject to specific provisioning yet. In theory, any method that ensures continuity and a true and fair representation in determining the amount of general LLP can be used as long as it is impartially comprehensible. According to Krumnow *et al.* (1994), banks can build general LLP for specific economic risks, i. e. risks that they anticipate at the closing date, risks due to increased lending volume and what they call "general default risk". In contrast to specific LLP, general LLP are thus directed towards expected losses that cannot be related to a particular loan with reasonable certainty. Both the Federal Ministry of Finance (Bundesministerium der Finanzen (1994)) and the Institute of Public Auditors in Germany (Bankenfachausschuss (1990)) have issued guidelines to calculate the amount of general LLP. However, just the former approach that is presented in Equation (1) is relevant for the tax deductibility of general LLP. The latter approach allows for a higher amount of general LLP.

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[8] For a comprehensive summary and comparison of loan loss provisioning under German Commercial Code and IAS 39, we refer to Gebhardt and Strampelli (2005) and Gebhardt (2008).

[9] In terms of tax deductibility and regulatory capital, direct write-offs, i. e. write-offs without having built a specific LLP before, and LLP are treated similarly, especially in banks that use the aforementioned standardized approach. This will be paid attention to in Section 5.

$$GLLA_{i,t}^{taxded} = \frac{\frac{1}{5}(\sum_{k=t-4}^{k=t} LD_{i,k}) - min\{SLLA_{i,t};\, 0.4 \cdot \frac{1}{5}(\sum_{k=t-4}^{k=t} LD_{i,k})\}}{\frac{1}{5}\sum_{k=t-5}^{k=t-1} CL_{i,k}^{risk}} \cdot (CL_{i,t}^{risk} - CL_{i,t}^{SLLP}) \quad (1)$$

It is common knowledge that many banks choose to follow the guidelines from the Federal Ministry of Finance instead of building general LLP according to their own estimate of latent risks in the loan portfolio. At first glance, this is largely confirmed when we look at a few annual reports of randomly selected German banks. In almost every report it is stated that general LLP are built or released according to Equation (1). In particular, cooperative and savings banks seem to use templates issued by their respective umbrella organizations since they all use the same or similar wording when they apply the formula.

$GLLA_{i,t}^{taxded}$ denotes the total tax-deductible allowance for general loan losses of bank i in year t. $LD_{i,t}$ indicates the volume of defaulted loans which is the sum of direct write-offs (DWO) and the use of specific LLP. Incoming payments from loans that were written off before need to be subtracted from that amount. $SLLA_{i,t}$ is the total allowance for specific loan losses of bank i in year t. $CL_{i,t}^{risk}$ equals the amount of risk-carrying customer loans, i. e. all customer loans except for those that are deemed riskless (e. g. loans to bodies under public law). $CL_{i,t}^{SLLP}$ describes the nominal amount of impaired loans of bank i in year t (i. e. the amount *before* impairment). The tax-deductible general loan loss allowance is determined by subtracting the minimum of the specific loan loss allowance and 40% of the average of annual loan defaults of the current and the preceding four accounting periods from its full amount. This difference is divided by the average risk-carrying customer loans of the preceding five accounting periods and is multiplied with the volume of customer loans reduced by the nominal amount of impaired customer loans of the current period.[10] Some important features of Equation (1) are noticeable: As Bieg (1998) and Scharpf (2013) point out, $CL_{i,t}^{risk}$ does not comprise interbank loans so that this for-

[10] The Federal Ministry of Finance argues that a loan can just be impaired on an individual *or* on a general basis which would imply that the residual loan after (specific) impairment cannot contain any latent risks. This rationale is questionable.

mula (if at all) merely covers latent risks in one part of the loan portfolio of a bank. Moreover, and most important for this work, the tax-deductible limit of general LLP is heavily influenced by past specific LLP and therefore potentially backward-looking, depending on the pro- or countercyclical effects of specific LLP. Under the standardized approach to credit risk, general LLP are part of Tier 2 capital up to a limit of 1.25% of risk-weighted assets.

In addition to specific and general LLP, German banks are allowed to create reserves pursuant to Section 340f of HGB to provision against specific banking risks, which is another German characteristic with regard to risk provisioning. These 340f-reserves are meant to cover both credit and market risk. They are built by understating the value of customer and interbank loans, bonds, other fixed-income securities, shares and securities bearing variable interest that are designated as part of an asset category called the "liquidity reserve". Decisions to build or release 340f-reserves are at the sole discretion of the management. Their level, which does not have to be linked to the risks inherent in the underlying assets, is limited to 4% of the valuation base, i. e. the assets' original value. Auditors and supervisors are responsible for monitoring the compliance with this limit. Economically, 340f-reserves are a lump-sum general provision for latent credit and market risk. They are built and released at the discretion of the bank management. Due to these characteristics, 340f-reserves are not tax-deductible, but currently part of a bank's Tier 2 capital.

German financial accounting for banks contains some particularities which may have an impact on banks' use of LLP. Whereas LLP have always been clearly visible in banks' financial statements in most countries, the German legislator allowed banks to conceal this information until 2006 from investors, depositors and other stakeholders. With the help of a special compensatory account, expenses from building (income from releasing) specific LLP, general LLP, DWO and 340f-reserves may be offset against expenses from impairment (income from appreciation) of securities of the "liquidity reserve" (net security losses or NSL, henceforth).[11] In a nutshell, banks are allowed to present a single income *or* expense number in their income statement

[11] There is hardly any discretion in the valuation of NSL since banks have to follow a so-called "strict lower of cost or market principle" that compels them to value securities of the liquidity reserve at fair value with historical cost as a cap.

that combines success or failure from two very different lines of business of major importance.[12] Detailed information on each single component were provided confidentially to auditors and supervisors only. This compensatory account still exists, but since 2007, banks are additionally required to disclose information on the development of DWO as well as specific and general LLP in a separate report ("Offenlegungsbericht") that complements a bank's financial statement (Bundesministerium der Finanzen (2006)). 340f-reserves are still hidden from the public.[13]

Next to the different positions listed above, bank managers can build *visible* reserves according to Section 340g of HGB (340g-reserves). Bank managers can build these 340g-reserves by holding back an arbitrary portion of retained earnings without requiring permission from the owners of the bank. Economically, these 340g-reserves are retained earnings. Hence, they are not tax-deductible either but fully count as Tier 1 capital or even core Tier 1 capital under the Basel III framework because they need to be disclosed in the financial statement. In contrast to 340f-reserves, the volume of 340g-reserves is only limited by shareholder pressure. Overall, 340g-reserves are economically much closer to equity than to LLP which is why we do not treat them as an additional provisioning component in this study.[14] A comprehensive summary of the different elements is presented in Figure 1.

[12] As a matter of fact, one should be careful when well-established databases like BankScope report LLP numbers for Germany. It is very likely that this number is in fact the net profit or loss from the compensatory account.

[13] This might alter banks' behavior, e. g. with respect to signaling, and will be considered in a robustness test.

[14] For an analysis of 340g-reserves and their impact on bank stability, we refer to Bornemann *et al.* (2014).

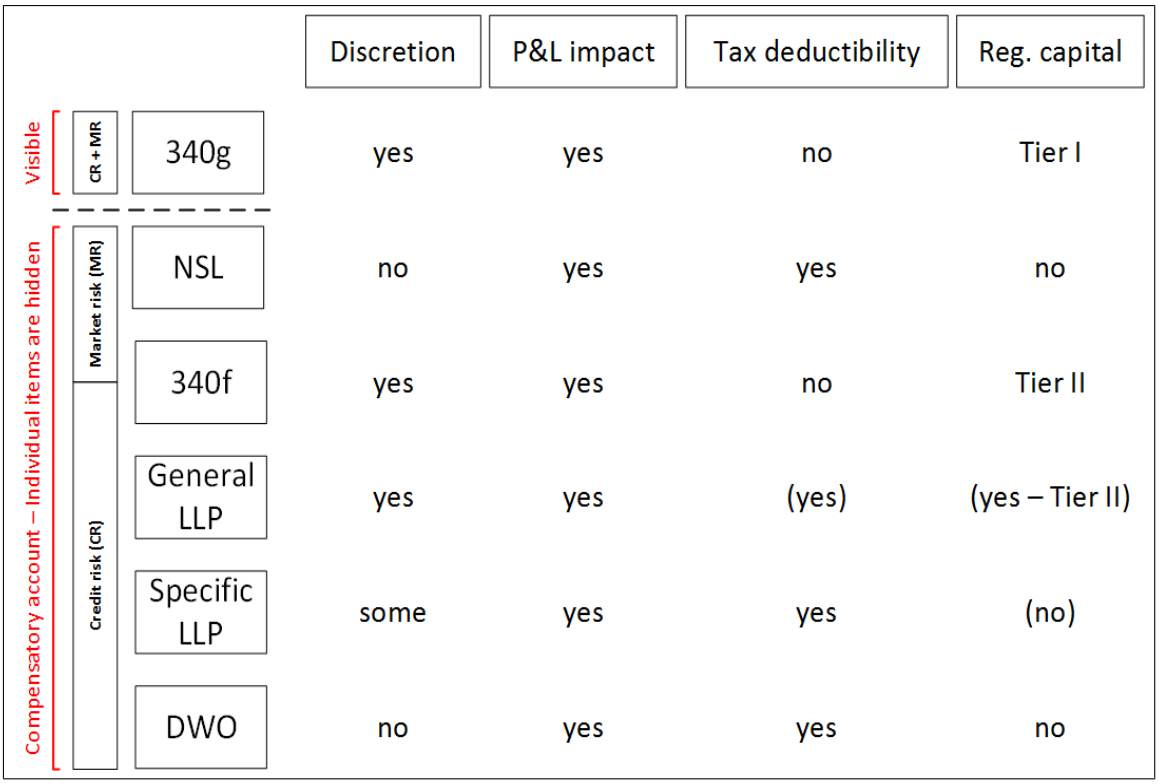

Figure 1: Cross compensation under the German Commercial Code.

3 Managerial motives and related literature

The discretionary use of LLP has been broadly discussed in different contexts and settings for at least two decades. For example, Beatty *et al.* (1995), Moyer (1990) and Ahmed *et al.* (1999) provide early evidence on the use of LLP for earnings, tax and capital management, whereas Wahlen (1994) focuses on the information content of LLP. In recent years researchers have become more interested in the macroeconomic effects of managerial discretion, namely procyclicality and its impact on lending behavior. For instance, Laeven and Majnoni (2003) analyze procyclical effects of LLP for a sample of banks from countries across the globe, whereas Beatty and Liao (2011) explicitly focus on the extent to which delayed expected loss recognition (i. e. the delayed recognition of LLP) causes reduced lending in cyclical downturns. In this context, Beatty and Liao (2014) provide an extensive summary of different studies. Our study can be classified into the extant literature from four different perspectives:

1. Underlying dataset: One can distinguish between data on individual countries versus (usually publicly available) data from a number of countries.[15] Where the former allows to conduct an in-depth analysis of country-specific features like legal requirements, using the latter has the benefit of being able to exploit heterogeneity across countries, albeit often at the cost of mixed feelings with respect to the data quality. One prominent study from the first category that accounts for procyclicality is by Pérez *et al.* (2008) who model the impact of statistical provisions on earnings management and procyclicality in Spain. Other studies are by Hoggarth and Pain (2002) for the UK or by Handorf and Zhu (2006) for the U.S. Multinational studies on the use of LLP are more frequent: Laeven and Majnoni (2003) use data on large commercial banks from 45 countries and group these countries into five different regions. Bikker and Metzemakers (2005) investigate how bank provisioning behaviour is related to the business cycle in 29 OECD-countries and Bouvatier and Lepetit (2008) take BankScope data for a panel of 186 European banks over a period of eleven years. All studies use "large N, small T" panels, "large N" meaning more

[15] The term "publicly available" is used to describe data from databases that are either free of charge or can be accessed by everybody who is willing and able to pay the required user fee.

than 1,000 observations and "small T" meaning 10-20 years or even less. Our study belongs to the first group since we use a unique dataset that comprises all data that had to be filed with the regulator for all German banks between 1994 and 2011.

2. Control variables for other motives: As noted above, LLP are subject to different types of managerial discretion. First, earnings management refers to bank managers increasing provisioning levels in periods of economic well-being and lowering them during times of poor performance to smooth earnings over time. Since this reduces the volatility of banks' reported earnings over time, it is supposed to signal financial stability, to positively influence external ratings, and to lower funding costs (Fudenberg and Tirole (1995); Kanagaretnam *et al.* (2004)). The pursuit of income smoothing is usually identified by establishing a positive association between annual amounts of various discretionary accruals (e. g. LLA) or changes in these items (e. g. LLP) and a bank's non-discretionary income, which is the income before provisions, reserves and taxes. More recent research has identified different earnings management strategies depending on the size of the earnings (Balboa *et al.* (2013)). We refer to Bushman and Williams (2012) and use a bank's non-discretionary income as a variable to capture countercyclical effects, since high profits are usually made in prosperous times. Second, regulatory capital management is another motive that has frequently been examined as underlying the use of provisions (Ahmed *et al.* (1999); Shrieves and Dahl (2003); Riepe (2014)). This is primarily relevant for banks in countries in which general or specific LLP count as any sort of regulatory capital, which includes Germany. Third, managers are found to use provisions as a means to signal information about the bank's future prospects to outsiders (Lobo and Yang (2001)). Incurring large amounts of annual provisions while maintaining a satisfactory net income level shows the bank's ability to withstand severe shocks to earnings. As we mentioned in Section 2, banks need to disclose detailed information on LLP since 2007 so signaling is a potential issue since then. Fourth, to the extent that provisions are tax-deductible they may be used for tax management, i. e. to reduce the tax liabilities of a bank (Beatty *et al.* (1995)). This is most relevant for general LLP in our setting. To sum up, our model needs to control for earnings, tax and capital management. We consider signaling (Wahlen (1994)) as a minor issue

because most banks in our sample are rather small and unlisted, but account for it in a robustness test.

3. Methodology: As we mentioned before, studies about the build-up and release of credit risk provisions commonly use panel data. Accordingly, the set of methods applied ranges from simple pooled OLS (Lobo and Yang (2001); Cavallo and Majnoni (2002)) over standard random or fixed effects panel regressions (Laeven and Majnoni (2003); Bikker and Metzemakers (2005); Handorf and Zhu (2006)) to different dynamic panel data models that cover the potential dynamics of LLP (Bouvatier and Lepetit (2008); Pérez *et al.* (2008); Soedarmono *et al.* (2012)). We will adopt the latter ones to account for gradual adjustments of provisions over time.

4. Procyclical effects: The evidence in the literature on procyclical effects of LLP is mixed. Laeven and Majnoni (2003) find that banks postpone provisioning when faced with favorable economic and income conditions until the cycle turns. This behavior is less pronounced in Asia. Cavallo and Majnoni (2002) find procyclical side effects in macroeconomic patterns for both G10 and non-G10 countries, but a more differentiated evidence for earnings management i. e. a positive relation between earnings and LLP for G10 countries and the reverse for non-G10 countries. Since a lot of cyclical effects are hidden in this variable, they conclude that procyclical effects are much more prevalent in less developed countries. Similar results were obtained by Bikker and Metzemakers (2005): The macro variable in their setting (GDP growth) is negatively associated with LLP which is an indicator for procyclicality. At the same time this effect is mitigated through earnings management. With regard to individual countries, Hoggarth and Pain (2002) detect procyclical behavior for the UK and Handorf and Zhu (2006) find procyclical behavior in large and small banks, but cannot verify significant effects for medium-sized banks. In this context, we contribute to the literature by analyzing the procyclicality of LLP in an environment that incentivizes banks to take a forward-looking approach in the assessment of their credit risk reserve, not least through earnings management.

Apart from "classic" studies on procyclicality, Beatty and Liao (2011) find that U.S. banks with more timely loss recognition, i. e. more forward-looking provisioning, do not cut back their lending during recessionary periods compared to banks with less

timely loss recognition. Similarly, Bushman and Williams (2013) find that banks with delayed expected loss recognition (which can be interpreted as procyclical behavior) contribute more to systemic risk than banks with timely loss recognition, and Vyas (2011) observes that the write-offs of U.S. financial institutions in the financial crisis were less timely than the devaluations implied by various credit indices.

4 Data and methodology

4.1 Sample

Our annual data originates from the Deutsche Bundesbank's prudential database BAKIS (Memmel and Stein (2008)). BAKIS is the information system on bank-specific data jointly operated by the Deutsche Bundesbank and the German Federal Financial Supervisory Authority (Bundesanstalt für Finanzdienstleistungsaufsicht ("BaFin")). The database contains all information on the financial statements and supervisory reports that have to be filed with the regulatory authorities. This includes detailed data on risk provisions like 340f-reserves and general as well as specific LLP that are otherwise hidden from the public which makes our dataset unique. We remove banks which report or whose parent company reports according to IFRS (316 observations) to obtain a sample that exclusively consists of HGB banks. By dropping IFRS banks for an unbiased analysis of banks that are subject to HGB rules, we essentially observe individual accounts. After eliminating a small number of implausible entries, e. g. when regulatory capital is larger than total assets, we retain an unbalanced panel that comprises 43,565 observations from 5,370 banks for years 1994 to 2011, thereby covering roughly two full economic cycles.[16] We winsorize all non-binary variables at the 1% and 99% levels which is a moderate outlier treatment that is due to the high quality of the sample.

4.2 Empirical strategy

The empirical results on the association of macroeconomic conditions as well as different bank-specific characteristics with the different provisioning items in German banks are derived from a dynamic generalized method of moments (GMM)

[16] The fact that this number is much higher than any bank/year number in Table 5 in the Appendix reflects insolvencies, entrants to the market, and mergers. In the latter case we, technically speaking, created a new bank independent of the merging ones. This new bank turns up in our dataset in the year of the merger.

estimation technique ("two-step system GMM", Blundell and Bond (1998)) with Windmeijer (2005) correction for standard errors, which is an extension of the standard GMM proposed by Arellano and Bond (1991) for dynamic "large N, small T" panels. In this regard we follow the extant literature (Laeven and Majnoni (2003); Bikker and Metzemakers (2005); Bouvatier and Lepetit (2008); Fonseca and González (2008); Pérez *et al.* (2008); Soedarmono *et al.* (2012)). Using a dynamic panel data model is particularly suitable for two reasons: First, we assume that banks only gradually adjust their provisions over time, which is particularly reasonable to assume for the provisioning items that are meant to cover latent risks, but should as well be true for specific LLP. We are not primarily interested in the coefficient of the lagged dependent variable, but include the first lag of the dependent variable as a regressor to ensure that we obtain consistent estimates of the other variables in the models. Second, we recognize the potential endogeneity of different explanatory variables in our models (one variable per model, cf. Section 4.3 for details). We account for the existence of unobservable bank-individual effects by incorporating bank-fixed effects to reduce potential problems caused by omitted variables. The Hansen test of overidentifying restrictions (Blundell and Bond (1998)) and the Arellano-Bond test for autocorrelation are applied to assess the validity of the instruments used. Since the business of most banks in our sample is regionally limited, we cluster standard errors on a state basis (16 clusters) to incorporate potential correlations across banks and/or time in a state. We deem this particularly relevant because results based on bank clustering only, i. e. allowing observations to be correlated over time only within a bank, are in most cases rejected by the Hansen test.[17] We use a limited set of instruments in all parts of the analysis to mitigate potential concerns regarding the applicability of the Hansen J statistic (Roodman (2009)). This is particularly important due to the small number of clusters.[18]

Additionally, we compare all GMM results to a plain fixed effects OLS technique with identical clustering. On the one hand, including the lagged value of the de-

[17] In an earlier version of this paper, we resorted to deeper lags to obtain valid instruments. This is no more necessary when standard errors are clustered on a state basis.

[18] We increase the number of clusters to more than 100 by clustering on a county level as a robustness test and our results are qualitatively unaffected. For a discussion about the issue of appropriate cluster sizes, cf. Cameron and Miller (2015).

pendent variable into OLS estimations incurs biased coefficients for the independent variables. This well-known "Nickell bias" is caused by the fact that the lagged dependent variable is inevitably correlated with the error term of the regression (Nickell (1981)). On the other hand, we are confident about using fixed effects OLS regressions in this context because it has been shown that this bias is rather small for small coefficients of the predetermined variable and simply ignoring it may lead to more efficient results than those from GMM estimations (Beck and Katz (2011); Judson and Owen (1999)). In addition, the bias gets smaller as the time dimension of the panel increases. Our panel covers a period of almost 20 years, thus the OLS estimates should be very useful (if not better) in our setting and we are confident to confirm potential findings if system GMM and dynamic fixed effects OLS regressions lead to quantitatively similar results. At last, and in contrast to system GMM, the R^2_{within} of fixed effects OLS gives us some insight about the explanatory power of our models.

4.3 Variables and empirical models

The BAKIS data allow us to analyze both the individual components of the total credit risk reserve as well as the drivers of the total credit risk reserve. Before we set up the different models, it is helpful to take a closer look at how the different reserve items have evolved over the last 18 years (1994-2011) to derive some tentative relationships.

Figure 2 presents graphical evidence on the development of the median of specific and general LLP, changes in 340f-reserves, and NSL, and plots their development against the Credit-to-GDP ratio for Germany. This reveals some notable preliminary findings concerning provisioning behavior of German banks over the business cycle. We first note that the P&L relevant specific LLP seem to fluctuate most over the cycle. They rise sharply after the burst of the dotcom bubble and then decline until they sharply rise again in the last year of the crisis (2009) just to fall back to a low level in the years thereafter. Altogether, however, it is reasonable to assume that the decision to build specific LLP is not independent from other reserve types. We

see that banks tend to increasingly build 340f-reserves after the burst of the dotcom bubble, potentially to complement the decline in specific LLP.[19] There is a decline in these reserves in the first two years of the crisis. It is at first glance surprising that banks seem to "refill" their 340f-reserves in the last year of the crisis. This is, however, less surprising when one takes into account the NSL that are part of the same compensatory account. It almost seems like 340f-reserves were also released in the crisis to cushion losses from securities of the liquidity reserves and then "refilled" from gains of these securities in 2009. These conjectures are, of course, speculative, but illustrate that our models need to take those potential dependencies into account.

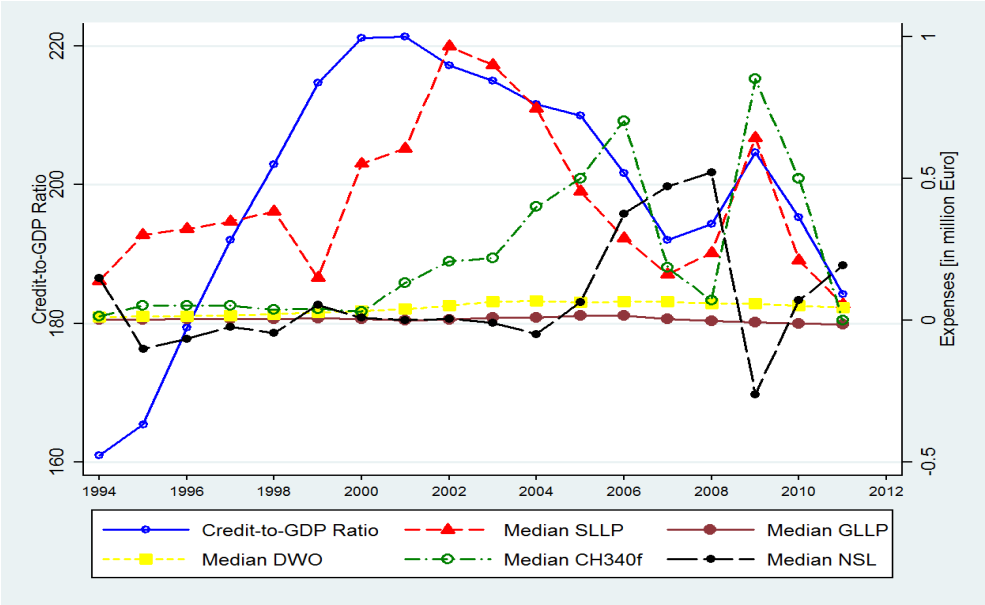

Figure 2: Risk provisions and the Credit-to-GDP ratio.

In contrast to these components, the median DWO remain very flat and on a low level over the sample period. It appears that banks tend to build specific LLP before writing off a loan and that banks *directly* write off loans only when it is inevitable. Similarly, general LLP that we suspected to be primarily tax-driven in many banks in Section 2 do not seem to fluctuate with or against the business cycle. A closer look at the parallel movement of the median general LLP and the median tax-deductible general LLP over the sample period in Figure 3 indeed indicates a strong

[19] We deem it likely that it is difficult for banks to anticipate NPL in an economic upswing and that they build 340f-reserves instead.

association that is even more striking considering that our proxy for $GLLPTD_{i,t}^{OL}$ tends to systematically overestimate the actual tax-deductible amount of general LLP.

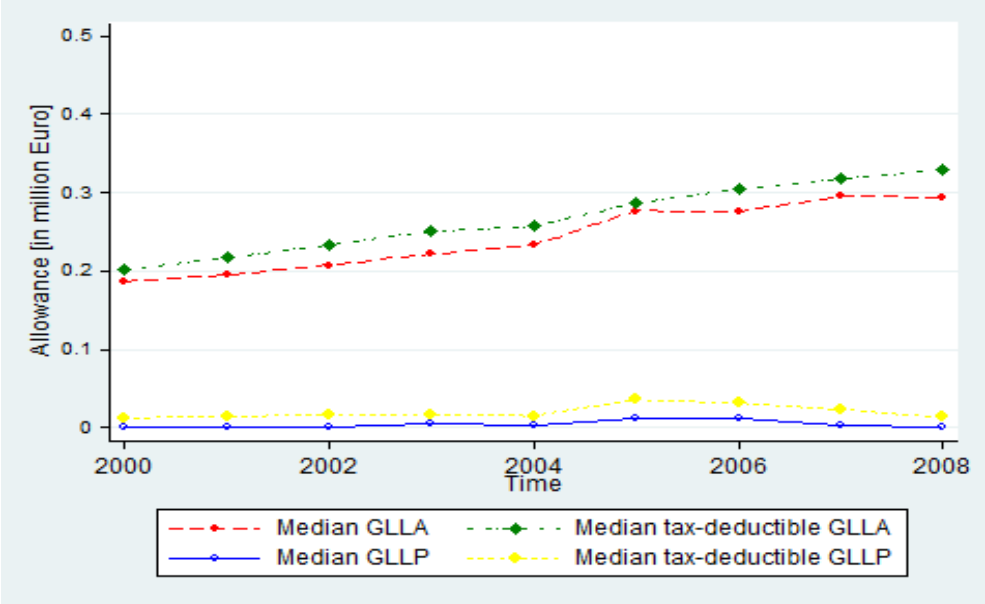

Figure 3: Actual GLLP vs. tax-deductible GLLP.

In order to investigate potential (pro-)cyclical effects of the different reserve components, we establish four different models. In the first model we use the sum of specific LLP and DWO of bank i in year t ($SLLP_{i,t}^{OL}$) as the dependent variable. As explained in Section 2 these items are not just part of the same compensatory account, but do as well share the same characteristics with respect to P&L relevance, tax deductibility and regulatory capital (cf. Kim and Kross (1998) or Alali and Jaggi (2011) for a similar discussion).[20] Obviously, there is more discretion in the build-up and release of specific LLP, but DWO are essentially very close to specific LLP.[21] To mitigate potential problems of heteroscedasticity, we measure the

[20] There are minor differences with respect to regulatory capital for banks that use the IRB approach (cf. Section 2 for details). However, the number of IRB banks in our sample is negligible.

[21] One could argue that DWO are completely non-discretionary plus exogenously given and might thus only negatively affect the build-up of specific LLP. Following this rationale, we re-estimate all models with DWO as an exogenous regressor as robustness and observe no relevant changes to our results.

sum of specific LLP and DWO as % of beginning-of-year t total loans of bank i.[22] In accordance with findings in the extant literature (Laeven and Majnoni (2003); Bikker and Metzemakers (2005); Fonseca and González (2008); Pérez *et al.* (2008)) we include the one-year lagged value of the dependent variable ($SLLP^{OL}_{i,t-1}$) as a control, assuming that banks only gradually adjust their level of specific LLP over time. Thus, we expect to see a positive, albeit small relation between $SLLP^{OL}_{i,t}$ and its first lag.

We use the growth rate of real GDP on a state level ($GDPGR_{i,t}$) in order to account for the regional focus of the vast majority of banks in our sample. Revealing a positive (negative) association between the respective macro variable and $SLLP^{TA}_{i,t}$ would indicate that German banks increase (decrease) their specific LLP during economic upswings and lower (raise) them during downturns. In this case we speak of countercyclical (procyclical) behavior.[23]

$NDI^{TA}_{i,t}$ is included to measure countercyclical effects via earnings management. This variable describes the non-discretionary income, i. e. the income before reserves and taxes of bank i in year t. A positive coefficient would reveal countercyclical behavior since profits are usually higher in times of economic well-being. Note that earnings management is often considered undesirable because it leads to a partly blurred picture of the true economic and financial situation of a company. However, it indirectly incentivizes managers to provision for latent risks in times of economic well-being. We predict strong earnings management by German banks due to their large scope for discretion and limited disclosure.

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[22] The same applies for most regressors that are scaled either by total loans (OL) or total assets (TA) which is denoted via superscripts.

[23] As robustness, we use two more macro variables: First, we replace $GDPGR_{i,t}$ with the German Credit-to-GDP ratio ($RATIO_t$) for domestic financial and non-financial institutions since it allows to take excessive credit growth compared to GDP into account. This would in fact be the most appropriate variable if it was available on a state basis. Second, we use a Credit-to-GDP gap as a deviation of the Credit-to-GDP ratio from its long-term trend, which is another macro measure of cyclicality that has been discussed in the area of countercyclical capital buffers (Basel Committee on Banking Supervision (2010)) despite diverse drawbacks that are generally associated with Credit-to-GDP gaps (Edge and Meisenzahl (2011)). GAP_t is calculated using a Hodrick-Prescott filter (Hodrick and Prescott (1997)) with the degree of trend smoothing set to 6.25 as our data is on a yearly basis (Ravn and Uhlig (2002)). Cf. Section 6 for details.

We use $CHNPL^{OL}_{i,t+1}$ which is the change in NPL of bank i from year t to $t+1$ to measure countercyclical effects via prudent provisioning. A positive coefficient would imply that banks build specific LLP to account for specific losses that they already anticipate at the closing date.[24] This is explicitly desired under HGB as regards specific LLP. Additionally, we would expect banks to accumulate 340f-reserves when changes in NPL are low (negative) because this is usually the case in an economic upswing.

We use a comprehensive set of control variables. Very much in line with Gebhardt and Novotny-Farkas (2011), three variables are used to cover the credit risk of a bank. As mentioned in Section 2, specific LLP are closely linked to NPL. Thus, we control for the non-discretionary part of concurrent specific LLP by including $CHNPL^{OL}_{i,t}$ which describes the changes in NPL of bank i in year t and expect to obtain a positive coefficient. Moreover, we include the first lag of the total volume of NPL ($NPL^{OL}_{i,t-1}$) for which we expect to obtain a positive coefficient as well, and $CHOL^{TA}_{i,t}$, which is the change of overall loans of bank i from year $t-1$ to t. This is supposed to cover changes in specific LLP that result from changes in the size of the loan portfolio.[25] We would expect banks to increase their level of specific LLP for growing loan portfolios. We consider overall loans (i. e. customer loans + interbank loans) instead of just customer loans because specific LLP can be built on both, although impairments on interbank loans have always been rare in Germany, even during the financial crisis, compared to impairments on customer loans.

$LNTA_{i,t-1}$ is the natural logarithm of total assets of bank i in year $t-1$ and is included to measure potential effects of a bank's size on risk provisioning (e. g. Alali and Jaggi (2011)). On the one hand, larger banks might better be able to diversify

[24] Note that finding positive and significant coefficients is something we would hardly be able to observe under an incurred loss model with its much closer link between credit events and loan loss provisions. This would in contrast be a clear indicator that German banks take advantage of their discretion. An excellent comparison of different provisioning models can be found in Gebhardt and Novotny-Farkas (2011) who also provide evidence in favor of this line of argument. In particular, they show that income smoothing is significantly reduced after the introduction of IFRS.

[25] In a previous version of this paper, we used $OL^{TA}_{i,t-1}$ instead of $CHOL^{TA}_{i,t}$ because it is conceivable that banks adjust their provisioning level according to their total loan volume. In any way, the choice of the control variable does not affect our results.

their loan portfolio and hence require less provisioning. On the other hand, smaller local banks could benefit from a deeper knowledge of the regional market on which they operate ("loan picking ability").

We control for regulatory capital management by including $TIER12_{i,t-1}^{RWA}$ as a regressor, which is the sum of bank i's Tier 1 and Tier 2 capital ratio at the beginning of year t. This sum predominantly stems from equity as well as 340g- and 340f-reserves. Like before, we do not have any firm prior expectation as to the sign of the coefficient. With a comfortable capital cushion from the previous year, banks might be inclined to provision less because they are more relaxed about potential loan losses (negative coefficient). Then again, a high capital ratio usually implies that a bank was both successful over the past years and its need for additional regulatory capital is less urgent. Hence there is more scope for additional risk provisions in that scenario (positive coefficient).

Additionally, we include $NSL_{i,t}^{TA}$ to control for changes in specific LLP resulting from losses or gains in securites of the liquidity reserve. We treat $NSL_{i,t}^{TA}$ as exogenous because banks have to take security gains or losses as given due to the "strict lower of cost or market principle" that compels them to value securities of the liquidity reserve at fair value with historical cost as a cap. Hence banks might adjust their specific LLP to a given profit or loss from those securities, but not vice versa. Moreover, we include $CH340f_{i,t}^{OL}$ as a regressor because banks might decide between the build-up of specific LLP and 340f-reserves simultaneously.[26] Thus $CH340f_{i,t}^{OL}$ is treated as endogenous and instrumented with its own lags. Usually, we would expect that banks prefer the build-up of specific LLP over increases in 340f-reserves because the former are tax-deductible. However, banks with low regulatory capital might prefer to increase their level of 340f-reserves instead of building specific LLP to increase their Tier 2 capital.

[26] The change in 340f-reserves is scaled with total loans instead of total assets to ensure comparability with the other positions of the reserve for credit risk, although 340f-reserves are meant to cover market risk, too. Scaling with total assets instead of total loans does, however, not affect our estimation results.

We do not control for signaling in our baseline model because a) banks did not have to publish information on specific LLP until 2007, and b) most banks in our sample are unlisted and should usually not see the need to signal strength by overstating LLP.[27] Moreover, we do not control for general LLP because we assume that they would, if at all, rather be influenced by a given change in specific LLP.[28] This leads to the following model in Equation (2):

$$\begin{aligned} SLLP_{i,t}^{OL} \;=\; & \beta_0 + \beta_1 \cdot SLLP_{i,t-1}^{OL} + \beta_2 \cdot GDPGR_{i,t} + \beta_3 \cdot NDI_{i,t}^{TA} \\ & + \beta_4 \cdot CHNPL_{i,t+1}^{OL} + \beta_5 \cdot CHNPL_{i,t}^{OL} + \beta_6 \cdot NPL_{i,t-1}^{OL} \\ & + \beta_7 \cdot CHOL_{i,t}^{TA} + \beta_8 \cdot TIER12_{i,t-1}^{RWA} + \beta_9 \cdot NSL_{i,t}^{TA} \\ & + \beta_{10} \cdot CH340f_{i,t}^{OL} + \beta_{11} \cdot LNTA_{i,t-1} + \mu_i + \epsilon_{i,t} \end{aligned} \tag{2}$$

In contrast to some of the related literature (e. g. Laeven and Majnoni (2003)) we do not include any time dummies since they would capture a lot of cyclical effects and hence distort the results for the macro variable.

The second model in Equation (3) is similar to the first one and investigates how banks build and release 340f-reserves over the business cycle.[29] There are only two major differences: we add $CHOBS_{i,t}^{TA}$ which is the change in the volume of off-balance sheet activities of bank i in year t. 340f-reserves might essentially be used to cover risks from these activities. Then, we eliminate a bank's lagged change in 340f-reserves, which is covered by $CH340f_{i,t-1}^{OL}$, from $TIER12_{i,t-1}^{RWA}$. We call the resulting variable $TIER12\_pre_{i,t-1}^{RWA}$. As in Equation (2), we recognize that banks might simultaneously decide on the build-up/release of specific LLP and 340f-reserves, and instrument $SLLP_{i,t}^{OL}$ with its own lags.

[27] We do extend our models to incorporate signaling motives in a robustness test. Our results remain unaffected.

[28] The consideration of general LLP as a regressor in a robustness test does not affect the results.

[29] The model is similar to the one in Bornemann *et al.* (2012), but with a stronger focus on cyclical components.

$$
\begin{aligned}
CH340f_{i,t}^{OL} \;=\; & \beta_0 + \beta_1 \cdot CH340f_{i,t-1}^{OL} + \beta_2 \cdot GDPGR_{i,t} + \beta_3 \cdot NDI_{i,t}^{TA} \\
& + \beta_4 \cdot CHNPL_{i,t+1}^{OL} + \beta_5 \cdot CHNPL_{i,t}^{OL} + \beta_6 \cdot NPL_{i,t-1}^{OL} \\
& + \beta_7 \cdot CHOL_{i,t}^{TA} + \beta_8 \cdot TIER12\_pre_{i,t-1}^{RWA} + \beta_9 \cdot NSL_{i,t}^{TA} \\
& + \beta_{10} \cdot SLLP_{i,t}^{OL} + \beta_{11} \cdot LNTA_{i,t-1} + \beta_{12} \cdot CHOBS_{i,t}^{TA} + \mu_i + \epsilon_{i,t}
\end{aligned} \tag{3}
$$

From the graphs in Figures 2 and 3, we saw that general LLP do not exhibit cyclical patterns over the sample period. It is still relevant to investigate the actual driver(s) of general LLP. The third model in Equation (4) thus analyzes potential drivers of general LLP ($GLLP_{i,t}^{OL}$). It is again similar to the first two models in Equations (2) and (3), with only one major difference: We include $GLLPTD_{i,t}^{OL}$, which is the tax-deductible amount of general LLP of bank i in year t. Our data allow us to reproduce Equation (1) quite accurately. However, this requires more data management. First, we eliminate all banks without a complete history because we want to make sure that we can calculate the average specific LLP and customer loans over the past five years for each bank at any point in time. For the sake of being as accurate as possible, we accept that we introduce a potential selection bias by only keeping those banks that stayed in the sample over the entire sample period.[30] Second, we cannot use data after 2008 due to a structural break in the database. This leaves us with a sample of 769 banks over a period of nine years from 2000 to 2008 and 6,921 observations.[31] For this remaining sample (henceforth "GLLP subsample"), we calculate $GLLPTD_{i,t}^{OL}$ as the amount of tax-deductible general LLP of bank i in year t. Two input variables are not directly observable for us: First, we cannot observe the incoming payments from loans that had already been written off before. Hence there is a tendency to overestimate $GLLPTD_{i,t}^{OL}$. Second, we need to use a proxy for loans without default risk. We use a bank's loans to bodies under public law for this purpose since those loans are explicitly mentioned in the official formula by the Federal Ministry of Finance. Again, there is a tendency to overestimate $GLLPTD_{i,t}^{OL}$. Nonetheless, we expect a positive and significant coefficient for $GLLPTD_{i,t}^{OL}$ to prevail.

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[30] However, the descriptive statistics in Table 2 rather speak against such a bias.

[31] It should be mentioned that the GLLP subsample is highly dominated by cooperative and savings banks. Only 69 observations per year stem from commercial banks.

Beside $GLLPTD_{i,t}^{OL}$ the model for general LLP is similar to the models for specific LLP and 340f-reserves. Note that we use $IBL_{i,t-1}^{TA}$ to control for potential effects of the volume of interbank loans of bank i in year $t-1$. The reasons are twofold: First, the previous year's volume of customer loans is already part of $GLLPTD_{i,t}^{TA}$, and second, general LLP might be used to cover latent risks inherent in interbank loans. Accordingly, we expect to see a positive coefficient for $IBL_{i,t-1}^{TA}$. The model for general LLP is illustrated in Equation (4):

$$\begin{aligned} GLLP_{i,t}^{OL} \;=\; & \beta_0 + \beta_1 \cdot GLLP_{i,t-1}^{OL} + \beta_2 \cdot GDPGR_{i,t} + \beta_3 \cdot NDI_{i,t}^{TA} \\ & + \beta_4 \cdot CHNPL_{i,t+1}^{OL} + \beta_5 \cdot GLLPTD_{i,t}^{OL} + \beta_6 \cdot CHNPL_{i,t}^{OL} \\ & + \beta_7 \cdot NPL_{i,t-1}^{OL} + \beta_8 \cdot IBL_{i,t}^{TA} + \beta_9 \cdot TIER12_{i,t-1}^{RWA} \\ & + \beta_{10} \cdot NSL_{i,t}^{TA} + \beta_{11} \cdot SLLP_{i,t}^{OL} + \beta_{12} \cdot CH340f_{i,t}^{OL} \\ & + \beta_{13} \cdot LNTA_{i,t-1} + \mu_i + \epsilon_{i,t} \end{aligned} \tag{4}$$

Overall, it is most relevant to investigate the main drivers of the sum of those credit risk reserve components that fluctuate over time ($SLLP_{i,t}^{OL} + CH340f_{i,t}^{OL} = SLLPCH340f_{i,t}^{OL}$). Hence we combine Equations (2) and (3) into a fourth model:

$$\begin{aligned} SLLPCH340f_{i,t}^{OL} \;=\; & \beta_0 + \beta_1 \cdot SLLPCH340f_{i,t-1}^{OL} + \beta_2 \cdot GDPGR_{i,t} + \beta_3 \cdot NDI_{i,t}^{TA} \\ & + \beta_4 \cdot CHNPL_{i,t+1}^{OL} + \beta_5 \cdot CHNPL_{i,t}^{OL} + \beta_6 \cdot NPL_{i,t-1}^{OL} \\ & + \beta_7 \cdot CHOL_{i,t}^{TA} + \beta_8 \cdot TIER12\_pre_{i,t-1}^{RWA} + \beta_9 \cdot NSL_{i,t}^{TA} \\ & + \beta_{10} \cdot LNTA_{i,t-1} + \beta_{11} \cdot CHOBS_{i,t}^{TA} + \mu_i + \epsilon_{i,t} \end{aligned} \tag{5}$$

Table 1 provides comprehensive descriptions of the important variables of the four baseline models.

Variable	Description
$SLLP_{i,t}^{OL}$	Sum of specific LLP and DWO of bank i in year t as % of its beginning-of-year total loans.
$CH340f_{i,t}^{OL}$	Changes in the level of 340f-reserves of bank i in year t as % of its beginning-of-year total loans. A positive value implies an expense.
$GLLP_{i,t}^{OL}$	General LLP of bank i in year t as % of its beginning-of-year total loans.
$SLLPCH340f_{i,t}^{OL}$	Sum of specific LLP, DWO, and changes in the level of 340f-reserves of bank i in year t as % of its beginning-of-year total loans.
$GDPGR_{i,t}$	Growth rate of real GDP on a state level in year t.
$NDI_{i,t}^{TA}$	Non-discretionary income (i. e. net income before changes in reserves and taxes) of bank i in year t as % of its beginning-of-year t total assets.
$CHNPL_{i,t+1}^{OL}$	Changes in NPL of bank i from year t to $t+1$ as % of its beginning-of-year t total loans.
$CHNPL_{i,t}^{OL}$	Changes in NPL of bank i from year $t-1$ to t as % of its beginning-of-year t total loans.
$CHCL_{i,t}^{TA}$	Changes in customer loans of bank i in year t as % of its beginning-of-year t total assets.
$CHIBL_{i,t}^{TA}$	Changes in interbank loans of bank i in year t as % of its beginning-of-year t total assets.
$CHOL_{i,t}^{TA}$	Changes in total loans of bank i in year t as % of its beginning-of-year t total assets.
$NPL_{i,t-1}^{OL}$	NPL of bank i in year $t-1$ as % of its beginning-of-year $t-1$ total loans.
$LNTA_{i,t-1}$	Natural logarithm of total assets of bank i at the end of year $t-1$.
$TIER12_{i,t-1}^{RWA}$	Sum of Tier 1 and Tier 2 capital of bank i in year $t-1$ as % of its end-of-year $t-1$ risk-weighted assets.
$TIER12\_pre_{i,t-1}^{RWA}$	Sum of Tier 1 and Tier 2 capital minus changes in 340f-reserves of bank i in year $t-1$ as % of its end-of-year $t-1$ risk-weighted assets.
$GLLPTD_{i,t}^{OL}$	Proxy for the amount of tax-deductible general LLP of bank i in year t as % of its beginning-of-year total assets.
$CHOBS_{i,t}^{TA}$	Changes in the volume of off-balance sheet activities of bank i in year t as % of its beginning-of-year total assets.
$NSL_{i,t}^{TA}$	Net losses of securities of the liquidity reserve of bank i in year t as % of its beginning-of-year total assets.
$SLLA_{i,t}^{TA}$	Specific loan loss allowance of bank i at the end of year t as % total assets.
$GLLA_{i,t}^{TA}$	General loan loss allowance of bank i at the end of year t as % of total assets.
$CHCL_{i,t}^{TA}$	Customer loans of bank i at the end of year t as % of total assets.
$CHIBL_{i,t}^{TA}$	Interbank loans of bank i at the end of year t as % of total assets.
$CHOL_{i,t}^{TA}$	Total loans of bank i at the end of year t as % of total assets.

Table 1: Description of variables.

5 Empirical analysis

5.1 Descriptive statistics

Table 2 provides descriptive statistics with a particular focus on the different credit risk provisioning items. For the purpose of comparison we display the statistics for the full sample period as well as the reduced sample period that we use in the analysis of general LLP.

First of all we observe that $SLLP_{i,t}^{OL}$ indeed consists primarily of specific loan loss provisions, whereas direct write-offs seem to be of minor importance. This essentially confirms what we observed in Figure 2. Overall, specific LLP are on average the most important tool to account for credit risk as measured by their average size compared to changes in 340f-reserves and general LLP. This observation is not surprising because it can be assumed that specific LLP are the primary tool to cover incurred loan losses. The average values of specific LLP and changes in 340f-reserves are slightly closer for the GLLP subsample which could be expected since we would assume those banks that do not drop out of the sample during the sample period to be somewhat more successful than other banks and thus able to accumulate more reserves. When we compare the average sizes of general LLP and 340f-reserves, we note that the latter seem to be the primary tool to address latent risks. The same applies when we look at the total allowances of the three provisioning items in the full sample; the 99% quantile of the allowance of specific LLP lies at 10.12% of total loans compared with 6.97% for 340f-reserves and only 0.80% for general LLP. The numbers reveal the considerable importance of credit risk provisions for German banks, particularly in light of the mostly below-average equity ratios of financial institutions compared to other industries. We observe that the average 340f-reserves of banks in the 2000-2008 subsample are considerably higher than in the full sample. A coherent explanation is again that the banks in the subsample a) had more time to accumulate 340f-reserves and/or b) are more profitable and had thus more opportunities to build hidden reserves compared to the full sample. Overall, the descriptive

Variable	n	Mean	Std. dev.	p1	p50	p99
1994-2011 — Full Sample						
Total assets (in billion Euro)	43,565	1.37	18.30	0.01	0.24	11.8
$SLLP_{i,t}^{OL}$ (in %)	38,069	0.44	0.78	-0.51	0.30	2.85
a) Specific LLP (in % of OL)	38,069	0.39	0.73	-0.56	0.26	2.65
b) Direct write-offs (in % of OL)	38,069	0.05	0.17	0.00	0.02	0.57
$CH340f_{i,t}^{OL}$ (in %)	38,069	0.17	0.47	-1.40	0.12	1.30
$GLLP_{i,t}^{OL}$ (in %)	38,069	0.01	0.09	-0.20	0.00	0.24
$SLLA_{i,t}^{OL}$ (in %)	43,434	2.43	2.54	0.00	1.96	10.12
$340f_{i,t}^{OL}$ (in %)	43,434	1.86	1.66	0.00	1.39	6.97
$GLLA_{i,t}^{OL}$ (in %)	38,069	0.19	0.18	0.00	0.14	0.80
$NDI_{i,t}^{TA}$ (in %)	38,175	1.11	1.48	-0.16	1.05	3.24
$CHNPL_{i,t}^{OL}$ (in %)	36,328	0.18	3.05	-5.92	0.01	7.18
$NPL_{i,t}^{OL}$ (in %)	41,907	6.17	82.57	0.12	3.88	21.79
$CL_{i,t}^{TA}$ (in %)	43,485	57.64	14.66	10.45	59.96	89.43
$IBL_{i,t}^{TA}$ (in %)	43,513	13.60	11.36	0.53	10.96	58.21
$OL_{i,t}^{TA}$ (in %)	43,434	71.27	11.94	38.09	72.36	96.64
$TIER12_{i,t}^{RWA}$ (in %)	43,126	14.10	6.69	8.80	12.26	40.60
$NSL_{i,t}^{TA}$ (in %)	38,175	0.00	0.23	-0.60	0.00	0.75
2000-2008 — GLLP Subsample						
Total assets (in billion Euro)	6,921	1.21	10.90	0.02	0.22	7.78
$SLLP_{i,t}^{OL}$ (in %)	6,914	0.40	0.52	-0.44	0.29	2.43
a) Specific LLP (in % of OL)	6,914	0.35	0.48	-0.47	0.25	2.12
b) Direct write-offs (in % of OL)	6,914	0.05	0.10	0.00	0.02	0.53
$CH340f_{i,t}^{OL}$ (in %)	6,914	0.24	0.42	-0.85	0.17	1.44
$GLLP_{i,t}^{OL}$ (in %)	6,914	0.01	0.07	-0.20	0.00	0.23
$SLLA_{i,t}^{OL}$ (in %)	6,914	2.37	1.74	0.00	2.03	8.69
$340f_{i,t}^{OL}$ (in %)	6,914	2.58	1.86	0.00	2.29	8.09
$GLLA_{i,t}^{OL}$ (in %)	6,914	0.20	0.19	0.00	0.16	0.86
$NDI_{i,t}^{TA}$ (in %)	6,921	1.15	1.16	-0.01	1.03	3.40
$CHNPL_{i,t}^{OL}$ (in %)	6,660	-0.05	4.72	-5.02	-0.09	4.85
$NPL_{i,t}^{OL}$ (in %)	6,721	4.32	8.29	0.11	3.46	15.72
$CL_{i,t}^{TA}$ (in %)	6,921	59.14	14.39	17.15	60.82	90.46
$IBL_{i,t}^{TA}$ (in %)	6,914	13.22	10.90	0.31	10.79	51.01
$OL_{i,t}^{TA}$ (in %)	6,914	72.51	11.83	39.09	73.38	97.13
$TIER12_{i,t}^{RWA}$ (in %)	6,874	14.62	5.50	8.89	13.26	33.58
$NSL_{i,t}^{TA}$ (in %)	6,921	0.08	0.23	-0.39	0.02	0.96

Table 2: Descriptive statistics.

NB: "n" is the number of observations for each variable. "Mean" ("Std. dev.") describes the mean (standard deviation) of each variable across all observations. "p1" ("p50" and "p99", respectively) refers to the 1st (50th and 99th, respectively) percentile of the distribution of each variable. Variable descriptions are provided in Table 1.

statistics of the important variables (especially $GLLP_{i,t}^{OL}$ and $GLLA_{i,t}^{OL}$) do not considerably differ between the two samples. This mitigates our concern regarding a potential selection bias in the GLLP subsample.

Looking at the NPL variables, we note the high averages compared to the medians plus an extraordinarily high standard deviation for $NPL_{i,t}^{OL}$ in the full sample. This is essentially due to some extreme values in the very early years of the sample. Eliminating these outliers does not affect the results because most of them do not enter the regressions at all due to the dynamic structure of our models.[32]

Finally, we see that customer loans play a major role in our sample compared to interbank loans.[33] This is not surprising due to the large number of cooperative banks and savings banks in the sample whose main activities are in the lending business.

5.2 Multivariate analysis

Table 3 presents the main results for our baseline models. The results in column (1) of Table 3 show the coefficient of $GDPGR_{i,t}$ to be positive, but insignificant. Hence we cannot conclude with certainty that bank managers use their scope for discretion to explicitly take account of the state of the business cycle in their decision to build or release specific LLP. However, this does not conclusively prove that there is no relationship between the business cycle and provisioning behavior of German banks. In fact, the coefficient of $NDI_{i,t}^{TA}$ is positive and strongly significant. This is essentially a sign of countercyclical behavior on a bank level because it indicates that banks increasingly build specific LLP when profits are high, i. e. in periods of bank-individual expansion. Additionally, we observe that banks use the principle of conservatism to build specific LLP for changes in NPL that they anticipate at

[32] We eliminated those implausibly extreme values in a previous version of this study with unchanged results. However, we decided to make only very limited adjustments to the sample in the present version.

[33] Interbank loans do not comprise securities issued by banks that banks hold, which explains the rather small number.

the closing date ($\beta_4 = 0.021$). The effect is strongly significant, but dominated by earnings management in terms of size. Those results are important because they reflect effects that we could imagine to observe under the expected loss model of IFRS 9 as well. However, we emphasize that it is likely that the expectation of future NPL changes over the business cycle so that banks would only build specific LLP for NPL that they anticipate when the downturn has already begun. Overall, the banks' main focus in the use of their leeway with respect to specific LLP lies on earnings management.

In column (2) of Table 3, we observe the results for the changes in 340f-reserves, which we assume to be the banks' primary reserve for latent credit and market risk. First of all, it is surprising that the coefficient of $GDPGR_{i,t}$ is negative and significant at the 5% level, which means that banks tend to accumulate 340f-reserves when regional GDP growth is low. However, the coefficient ($\beta_2 = -0.006$) is small and almost negligible compared to the effect of earnings management ($\beta_3 = 0.428$). This was expected since 340f-reserves are implicitly accepted as an earnings management tool in Germany. In contrast to specific LLP we cannot find any evidence that banks build 340f-reserves for expected NPL. This was as well expected because 340f-reserves are meant to complement specific LLP and cover latent risks, so they should in fact be built in times of low (negative) NPL changes and low specific LLP. The latter is confirmed by the negative and significant coefficient of $SLLP_{i,t}^{OL}$. Overall, it can be concluded that a primary purpose in terms of cyclical components of 340f-reserves is earnings management, which confirms earlier results of Bornemann *et al.* (2012).

Column (3) of Table 3 displays the results for general LLP. In short, $GLLP_{i,t}^{OL}$ does not significantly react to any of the variables that we use to measure countercyclical effects. At first glance, general LLP do thus not seem to serve their purpose of covering business cycle risks. However, the banks' behavior becomes more comprehensible when we look at the coefficient of $GLLPTD_{i,t}^{OL}$ which we identify to be the only economically relevant driver of general LLP. General LLP, most precisely their tax-deductible part, are primarily determined by previous specific LLP. Therefore, the application of specific LLP also determines the cyclical effects of general LLP.

		(1)	(2)	(3)	(4)
		Dependent variables			
Independent variables	Exp.	$SLLP^{OL}_{i,t}$	$CH340f^{OL}_{i,t}$	$GLLP^{OL}_{i,t}$	$SLLPCH340f^{OL}_{i,t}$
$SLLP^{OL}_{i,t-1}$	(+)	0.120***			
		(0.025)			
$CH340f^{OL}_{i,t-1}$	(+)		0.089		
			(0.083)		
$GLLP^{OL}_{i,t-1}$	(+)			0.109	
				(0.078)	
$SLLPCH340f^{OL}_{i,t-1}$	(+)				0.116***
					(0.027)
$GDPGR_{i,t}$		0.002	-0.006**	-0.001	0.000
		(0.006)	(0.003)	(0.001)	(0.003)
$NDI^{TA}_{i,t}$	(+)	0.469***	0.428***	0.007	0.636***
		(0.116)	(0.051)	(0.008)	(0.034)
$CHNPL^{OL}_{i,t+1}$		0.021***	-0.001	-0.001	0.019***
		(0.007)	(0.003)	(0.001)	(0.005)
$GLLPTD^{OL}_{i,t}$	(+)			0.524***	
				(0.039)	
$CHNPL^{OL}_{i,t}$	(+)	0.069***	0.013**	0.000	0.062***
		(0.012)	(0.006)	(0.002)	(0.008)
$NPL^{OL}_{i,t-1}$	(+)	0.026***	0.006	0.002**	0.028***
		(0.008)	(0.005)	(0.001)	(0.009)
$CHOL^{TA}_{i,t}$	(+)	-0.005***	-0.004***		-0.007***
		(0.001)	(0.001)		(0.001)
$CHIBL^{TA}_{i,t}$	(+)			-0.000*	
				(0.000)	
$TIER12^{RWA}_{i,t-1}$	(+/-)	-0.014***		0.001	
		(0.003)		(0.001)	
$TIER12\_pre^{RWA}_{i,t-1}$	(+/-)		-0.003		-0.006*
			(0.008)		(0.003)
$NSL^{TA}_{i,t}$	(-)	-0.652***	-0.612***	-0.013	-0.866***
		(0.101)	(0.047)	(0.008)	(0.033)
$SLLP^{OL}_{i,t}$	(-)		-0.483***	-0.009	
			(0.075)	(0.006)	
$CH340f^{OL}_{i,t}$	(-)	-0.626***		0.002	
		(0.195)		(0.010)	
$LNTA_{i,t-1}$	(+/-)	0.058***	-0.010	0.005	0.062***
		(0.012)	(0.076)	(0.006)	(0.011)
$CHOBS^{TA}_{i,t}$	(+)		-0.003*		-0.002
			(0.002)		(0.002)
Observations		26,930	26,814	5,110	26,814
No. of banks		4,054	4,037	751	4,037
No. of instruments		17	19	18	14
AR(1) (p-value)		0.000	0.000	0.001	0.000
AR(2) (p-value)		0.466	0.660	0.678	0.463
Hansen (p-value)		0.223	0.378	0.973	0.084

Table 3: Cyclical effects of different provisioning items. System GMM.

NB: Coefficient estimates stem from dynamic panel estimations with Windmeijer (2005) corrected standard errors (in parentheses). Table 1 provides comprehensive variable descriptions. "Exp." reveals the sign we expect to prevail for each coefficient. (+/-) indicates that we do not have a clear a priori expectation. Missing values in this column indicate different expectations in models (1)–(4). *, ** and *** indicate significance at the 10%, 5% and 1% levels.

This result emphasizes that it is crucial to consider potential side effects in the design of local tax law, especially when tax accounts and commercial accounts are closely linked, as it is the case in Germany. On the one hand, our finding interferes with the purpose of general LLP, i. e. covering latent risks in the loan portfolio. This could at first sight be worrying, because the tax deductibility of general LLP relies largely on the past use of specific LLP. On the other hand, this effect is mitigated through the principle of conservatism that encourages countercyclical behavior with respect to the build-up and use of specific LLP that in turn influences the level of tax-deductible general LLP. Moreover, the level of general LLP is on average comparatively small and supported by the opportunity to build hidden 340f-reserves. The volumes of specific LLP and 340f-reserves, as we saw in Section 5.1, exceed the volume of general LLP by far.

In Figure 2, we observed that $SLLP_{i,t}^{OL}$ and $CH340f_{i,t}^{OL}$ are the items of the total credit risk reserve that exhibit significant fluctuation over the business cycle. Generally, it can be assumed that banks manage these components together, e. g. accumulate 340f-reserves when the possibility to increase their loan loss allowance is limited. Hence it is important to add to the analysis by looking at the drivers of the sum of these items (column (4)). As expected, the most important driver of $SLLPCH340f_{i,t}^{OL}$ is the non-discretionary income, i. e. earnings management. General macroeconomic circumstances do not seem to play a role and banks use their credit risk reserve to provision, at the closing date, for NPL that they anticipate to incur in the next period. Overall, we conclude that earnings management is the strongest motive. This is essentially a drawback if the primary motive and overriding principle of an accounting regime is to provide a true and fair view of the financial situation of a company (financial institution), but may be appropriate to incentivize banks to adjust their allowance for credit risk countercyclically.

Our control variables are largely as expected. The proxies for non-discretionary changes in credit risk ($CHNPL_{i,t}^{OL}$, $NPL_{i,t-1}^{OL}$, $CHOL_{i,t}^{TA}$) largely meet our expectation; the former two variables exhibit positive and strongly significant influence on specific LLP (column (1)). In this context it is not surprising that the by far strongest impact on specific LLP stems from changes in NPL which is the variable that is

supposed to cover the incurred loss component. We obtain similar results, albeit less pronounced in terms of economic and statistical significance, in column (2). It is, however, surprising that banks seem to react to increases in the volume of total loans with lower 340f-reserves. With respect to general LLP (column (3)), we see some reaction to $NPL^{OL}_{i,t-1}$, which is statistically significant, but economically negligible. The results for $SLLPCH340f^{OL}_{i,t}$ are very similar to those in column (1).

We find that banks with a lower capital ratio in year $t-1$ build on average more specific LLP in year t which supports the assumption that banks with low capital ratios generally perform worse (or are simply more risky) than their competitors with higher capital ratios and hence need to provision more in subsequent years. This finding, again, is strongly significant. Interestingly, we find no evidence that banks with low regulatory capital ratios pre changes in 340f-reserves use those reserves to increase their regulatory capital. It is conceivable that those banks with low regulatory capital ratios prefer to retain profits (Tier 1 capital) instead of accumulating 340f-reserves (Tier 2 capital). In the case of low regulatory capital ratios, it should as well be easier for banks to make shareholders accept lower dividend ratios so that retaining earnings is possible in the first place. Again, the results for $SLLPCH340f^{OL}_{i,t}$ are very similar to those in column (1).

With respect to the other items of the compensatory account, we essentially observe what we expected: The association between $NSL^{TA}_{i,t}$ and specific LLP as well as changes in 340f-reserves is negative, indicating that banks are reluctant to build specific LLP and/or to release their 340f-reserves when they have to take high net losses of securities of the liquidity reserve and vice versa. This effect is obviously even stronger when we look at column (4) because it is not unlikely that banks use specific LLP and 340f-reserves at the same time to cover a given loss of securities of the liquidity reserve. The same applies for $CH340f^{OL}_{i,t}$ ($SLLP^{OL}_{i,t}$) for which we assume that they might in some cases be used as an alternative to $SLLP^{OL}_{i,t}$ ($CH340f^{OL}_{i,t}$). General LLP are, as expected, independent from changes in other items of the compensatory account. In terms of size, larger banks in our sample on average provision more which can have a number of reasons. Changes in off-balance sheet activities do not seem to influence changes in 340f-reserves to a relevant extent (column (2)).

		(1)	(2)	(3)	(4)
		Dependent variables			
Independent variables	Exp.	$SLLP^{OL}_{i,t}$	$CH340f^{OL}_{i,t}$	$GLLP^{OL}_{i,t}$	$SLLPCH340f^{OL}_{i,t}$
$SLLP^{OL}_{i,t-1}$	(+)	0.108***			
		(0.014)			
$CH340f^{OL}_{i,t-1}$	(+)		0.055*		
			(0.027)		
$GLLP^{OL}_{i,t-1}$	(+)			-0.011	
				(0.011)	
$SLLPCH340f^{OL}_{i,t-1}$	(+)				0.059***
					(0.018)
$GDPGR_{i,t}$		0.003	-0.005**	0.001	-0.000
		(0.003)	(0.002)	(0.001)	(0.002)
$NDI^{TA}_{i,t}$	(+)	0.428***	0.432***	0.011*	0.646***
		(0.065)	(0.036)	(0.006)	(0.038)
$CHNPL^{OL}_{i,t+1}$		0.018***	-0.005***	-0.001	0.014***
		(0.003)	(0.001)	(0.001)	(0.002)
$GLLPTD^{OL}_{i,t}$	(+)			0.582***	
				(0.033)	
$CHNPL^{OL}_{i,t}$	(+)	0.071***	-0.003**	-0.002	0.056***
		(0.006)	(0.001)	(0.002)	(0.004)
$NPL^{OL}_{i,t-1}$	(+)	0.023***	0.000	0.004**	0.022***
		(0.007)	(0.002)	(0.001)	(0.006)
$CHOL^{TA}_{i,t}$	(+)	-0.006***	-0.003***		-0.007***
		(0.001)	(0.000)		(0.001)
$CHIBL^{TA}_{i,t}$	(+)			-0.000	
				(0.000)	
$TIER12^{RWA}_{i,t-1}$	(+/-)	-0.014***		-0.000	
		(0.002)		(0.001)	
$TIER12\_pre^{RWA}_{i,t-1}$	(+/-)		-0.000		-0.011***
			(0.002)		(0.003)
$NSL^{TA}_{i,t}$	(-)	-0.564***	-0.571***	-0.006	-0.806***
		(0.036)	(0.030)	(0.005)	(0.031)
$SLLP^{OL}_{i,t}$	(-)		-0.338***	0.009	
			(0.019)	(0.008)	
$CH340f^{OL}_{i,t}$	(-)	-0.522***		-0.004	
		(0.042)		(0.003)	
$LNTA_{i,t-1}$	(+/-)	0.139**	0.194***	-0.009	0.245***
		(0.047)	(0.029)	(0.015)	(0.068)
$CHOBS^{TA}_{i,t}$	(+)		-0.002		-0.006*
			(0.002)		(0.003)
Observations		26,930	26,814	5,110	26,814
No. of banks		4,054	4,037	751	4,037
R^2_{within}		0.399	0.388	0.517	0.457

Table 4: Cyclical effects of different provisioning items. Fixed effects OLS.

NB: Coefficient estimates stem from dynamic panel estimations with Windmeijer (2005) corrected standard errors (in parentheses). Table 1 provides comprehensive variable descriptions. "Exp." reveals the sign we expect to prevail for each coefficient. (+/-) indicates that we do not have a clear a priori expectation. Missing values in this column indicate different expectations in models (1)–(4). *, ** and *** indicate significance at the 10%, 5% and 1% levels.

We re-estimate Equations (2)–(5) using fixed effects OLS as described in Section 4.2. The results are shown in Table 4. In short, the vast majority of coefficients remain qualitatively and quantitatively similar. Thus we limit our comments to the few major differences between GMM and OLS results. First of all, the coefficient of $CH340f^{OL}_{i,t-1}$ in column (2) of Table 4 is now significant. Most importantly, however, the OLS results indicate that banks increase their level of 340f-reserves when current changes in NPL or NPL changes in the next period are low (negative). This is essentially what we would expect if banks used that reserve to complement specific LLP and accumulate reserves when NPL are low. Additionally, the fixed effects OLS regressions indicate more pronounced size effects for $CH340f^{OL}_{i,t}$ and $SLLPCH340f^{OL}_{i,t}$. At last, the effect of tax-deductible general LLP on actual general LLP is even stronger in Table 4. The R^2_{within} values point to a high explanatory power of our four models.[34]

[34] As regards general LLP, the explanatory power almost drops to zero if we omit $GLLPTD^{OL}_{i,t}$ from Equation (4).

6 Robustness

Macro variables In line with most of the provisioning literature, we used the growth rate of real GDP in Section 5 to test if banks explicitly consider the business environment in their provisioning behavior. More precisely, we used the growth rate of real GDP on a state basis to account for the fact that the majority of banks in our sample have a regional focus, which is especially true for cooperative and savings banks. Nonetheless, it is well conceivable that banks do not directly react to GDP growth in their provisioning behavior, but to excessive credit volumes compared to GDP. Thus we replace $GDPGR_{i,t}$ by the German Credit-to-GDP ratio for domestic financial and non-financial institutions which allows to take excessive credit volumes compared to GDP into account. We repeat all estimations using a Credit-to-GDP gap as the deviation of the Credit-to-GDP ratio from its long-term trend, which is another macro measure of cyclicality that has been discussed in the area of countercyclical capital buffers (Basel Committee on Banking Supervision (2010)).[35] The Credit-to-GDP gap is calculated using a Hodrick-Prescott filter (Hodrick and Prescott (1997)) with the degree of trend smoothing set to 6.25 as our data is on a yearly basis (Ravn and Uhlig (2002)). Unfortunately these data are not available on a state basis. Essentially, we observe that $SLLP_{i,t}^{OL}$, $CH340f_{i,t}^{OL}$ and $SLLPCH340f_{i,t}^{OL}$ are positively associated with the Credit-to-GDP ratio, but this effect is only strongly significant for $CH340f_{i,t}^{OL}$ and $SLLPCH340f_{i,t}^{OL}$ in both GMM and OLS regressions.[36] The same applies for the Credit-to-GDP gap. Overall, this is an indicator that banks take excessive credit volumes compared to GDP primarily through their 340f-reserves for latent risks into account. The size of this effect is, however, negligible compared to the earnings management component. $GLLP_{i,t}^{OL}$, as before, does not significantly react to any macro variable.

[35] For diverse drawbacks that are generally associated with Credit-to-GDP gaps, we refer to Edge and Meisenzahl (2011).

[36] Tables for this and all the other robustness tests mentioned below are available on request.

Subsectors A second concern addresses the validity of our results for the different subsectors of the German banking sector. As emphasized before, our sample reflects the particularities of the German banking sector and is thus dominated by savings banks and cooperative banks. Therefore, we re-estimate Equations (2)–(5) for all three subsectors to test if the results hold across subsectors, and in particular for commercial banks. In contrast to cooperative and savings banks, commercial banks usually operate at least nationwide. Consequently, we cluster standard errors on the level of the individual bank and replace the growth rate of real GDP on a state basis by the growth rate of real GDP for Germany. Overall, and as expected, the results for savings banks and cooperative banks are almost identical. Interestingly, we observe earnings management for commercial banks, but it is less pronounced and less significant (only at the 5% level) than in the other two subsectors. Moreover, commercial banks do not build specific LLP for NPL that they anticipate at the closing date. This holds across both GMM and OLS regressions. This may have a number of reasons, e. g. stronger shareholder pressure or a voluntary compliance of a subset of commercial banks with IAS rules that we are unable to verify. The latter is conceivable because IAS 39 provisions can be seen as the "minimum provisions" that banks need to build under HGB rules.

Clustering on a county level We address concerns regarding the limited number of clusters (16) with a heterogeneous size structure by clustering on a county level. This increases the number of clusters to more than 100 and leads to more evenly distributed clusters. Generally, clustering on a county level does not affect the results.

Specific LLP vs. DWO One might be concerned that DWO are not an alternative to the build-up of a specific LLP, but essentially an exogenously given requirement. To address this concern, we eliminate DWO from $SLLP_{i,t}^{OL}$ and include DWO as an exogenous regressor. Again, our results remain the same. This is not surprising given the minor importance of DWO for German banks.

Signaling In Section 2, we identified signaling as a potential motive for the build-up and release of specific and general LLP since 2007 and deemed this unlikely. Nonetheless, we extend our models and control for signaling by first including a dummy that takes the value 1 for each bank from 2007 on and 0 in any other case. Then, we include $NDI^{TA}_{i,t+1}$ and the interaction term of those two variables. If banks want to signal strength by overstating their current LLP, we would expect higher provisions to be associated with higher future income and hence a positive coefficient for the interaction term. In contrast to this hypothesis we observe a negative coefficient for specific LLP and no significant effect for general LLP. Unsurprisingly, our key results remain unchanged, although including signaling effects makes the interpretation of the respective macro variable more difficult due to the dummy that takes the value 1 from 2007 on, which partly captures macroeconomic effects for this period.

Total loan loss reserve Equation (5) used the sum of $SLLP^{OL}_{i,t}$ and $CH340f^{OL}_{i,t}$ as dependent variable because a) these components fluctuate over the business cycle, and b) $GLLP^{OL}_{i,t}$ are small and exclusively tax-driven. Nonetheless, we re-estimate Equation (5) and add $GLLP^{OL}_{i,t}$ to the sum of $SLLP^{OL}_{i,t}$ and $CH340f^{OL}_{i,t}$. Unsurprisingly, we do not observe any changes.

7 Conclusions

Increased LLP during downturns reduce banks' regulatory capital and may induce further cuts in lending. In essence, this may amplify the swings of the business cycle and decrease financial stability, which is undesirable. In theory, accounting regimes that allow banks to take into account through-the-cycle losses via forward-looking LLP can help to mitigate these effects, but empirical evidence on the procyclicality of LLP in such systems is limited. This is the starting point of our study.

We use a unique panel of German banks from 1994 to 2011 under an accounting regime that allows expected losses to be taken into account in the determination of specific LLP. Additionally, this regime endows banks with the option to generously consider latent risks in their loan portfolio via 340f-reserves and general LLP, which is in contrast to other well-established provisioning systems like the incurred loss model of IAS 39 or statistical provisioning as in Spain.

We find significant countercyclical provisioning behavior for specific LLP, which mainly stems from earnings management. However, German banks as well build specific LLP for NPL that they anticipate at the closing date, which is desirable. 340f-reserves are mainly accumulated in times of high non-discretionary earnings and when NPL and specific LLP are low. In that sense, they serve their purpose of covering latent risks. Moreover, they are used to cushion losses from security write-offs. Finally, we show that general LLP are solely built for tax purposes and that tax deductibility can be an important driver of LLP in individual accounts if tax accounts and commercial accounts are closely linked. Consequently, national authorities being responsible for the definition of local tax rules should consider the impact of those rules thoroughly and take into account the potentially different perspectives of accounting standard setters and regulators. Generally, efforts should be undertaken to align those different perspectives.

Our findings contrast with the results of several previous studies for other countries. The fact that the German accounting regime allows banks to take a forward-looking provisioning approach and to account for expected losses as well as latent risks in

determining appropriate provisioning levels provides a coherent explanation for this difference, although we cannot fully rule out the possibility that this finding is due to other, unobserved Germany-specific characteristics. Managers are encouraged to take into account expectations about future impairments when determining the current value of a loan and thus provision for credit losses at an early stage already. This fact promotes countercyclical provisioning and potentially enhances financial stability, but it simultaneously increases managerial discretion, which makes disclosed information harder to interpret. This is a trade-off that is difficult to avoid and it is the task of standard setters to balance the favorable and adverse effects that come along with different degrees of discretion.[37]

Obviously, the design of accounting standards is a function of the underlying principles of an accounting regime. In this context, one of the primary goals of German HGB is creditor protection, whereas the focus of IFRS exclusively lies on a true and fair view of a company's accounts. It is thus remarkable that the IASB has now introduced an expected loss model that endows banks with more discretion. Given the different philosophies of HGB and IFRS, however, it is not surprising that managerial discretion in HGB still exceeds the discretion in IFRS 9.

Certainly, the ultimate goal is to identify the effects of different provisioning rules on lending behavior and bank stability. A first step in this direction was made by Beatty and Liao (2011). In this regard, however, our study is limited by definition since all banks in our sample are subject to the same accounting, tax and regulatory capital rules.

[37] In this context, we refer to Bushman and Williams (2012) for an analysis of the association between different types of forward-looking provisioning and the risk-taking discipline of banks.

A Appendix

The German banking sector consists of three subsectors. The first one (cooperative banks) comprises small and local credit cooperatives as well as two cooperative central institutions that service local cooperative banks in their business with large clients and conduct their own business as well. The local credit cooperatives are owned by their members, each of whom is allowed to hold a very small number of cooperative shares only. Each member has the same voting right, no matter how many shares they hold. The central institutions are stock corporations with their shares being exclusively held by local cooperative banks.

The second category (savings banks) consists of local savings banks as well as state banks. Both types of institutions are subject to public law. Local savings banks are owned by cities and counties in their area of business whereas owners of state banks are partly the local savings banks and partly the state(s) in which they are located.

The third category (commercial banks) comprises large and internationally operating commercial banks as well as smaller institutions. Whilst the large commercial banks, many of them excluded from our study due to their IFRS reporting, are listed companies, the smaller institutions are often manager-owned. We follow Bornemann *et al.* (2012) and exclude other types of financial institutions such as mortgage or securities banks since they do not meet the definition of a bank according to section 1 of the German Banking Act and/or do not conduct core banking business such as lending and borrowing. Table 5 provides an overview on the number of banks observed in the panel and the split between bank categories per year.[38]

As it reflects the structure of the German banking sector, the sample is dominated by cooperative and savings banks. Savings banks, which are the primary competitors of cooperative banks, are on average larger in terms of their customer loan volume and their total assets. Considering their plain numbers, commercial banks are of less importance. The declining total number of observations during the sample period

[38] The total number of observations in Table 5 differs from the number of observations reported in the analysis because leads or lags of relevant variables are not considered.

reflects the persistently high numbers of mergers (particularly between cooperative banks and between savings banks) in the German banking sector.

	Coops		*Savings banks*		*Commercials*		*Total*	
Year	No.	Row %	No.	Row %	No.	Row %	No.	Col. %
1994	2,655	73.67%	664	18.42%	285	4.13%	3,604	8.27%
1995	2,592	73.78%	637	18.13%	284	4.13%	3,513	8.06%
1996	2,505	73.78%	620	18.26%	270	3.69%	3,395	7.79%
1997	2,419	73.48%	611	18.56%	262	3.50%	3,292	7.56%
1998	2,246	72.33%	607	19.55%	252	4.34%	3,105	7.13%
1999	2,031	71.14%	591	20.70%	233	5.33%	2,855	6.55%
2000	1,793	69.17%	576	22.22%	223	5.73%	2,592	5.95%
2001	1,621	67.97%	554	23.23%	210	5.40%	2,385	5.47%
2002	1,485	67.16%	532	24.06%	194	5.24%	2,211	5.08%
2003	1,391	66.78%	501	24.05%	191	4.83%	2,083	4.78%
2004	1,333	66.68%	490	24.05%	176	4.43%	1,999	4.59%
2005	1,289	66.96%	469	24.51%	167	4.29%	1,925	4.42%
2006	1,253	66.97%	457	24.36%	161	4.03%	1,871	4.29%
2007	1,231	66.58%	446	24.43%	172	4.06%	1,849	4.24%
2008	1,194	66.52%	433	24.12%	168	3.81%	1,795	4.12%
2009	1,156	66.25%	430	24.64%	159	4.11%	1,745	4.01%
2010	1,131	65.91%	427	24.88%	158	4.51%	1,716	3.94%
2011	1,106	67.85%	366	22.45%	158	4.74%	1,630	3.74%
Total	30,431	69.85%	9,411	21.60%	3,723	8.55%	43,565	100.00%

Table 5: Number of observations in the panel.

NB: *Coops* (*Savings banks*) includes local cooperative banks and cooperative central institutions (local savings banks and "Landesbanken"). *Commercials* comprises the German money-center banks, as well as regional banks. "No." gives the number of observations in the panel by category and year. "Row %" reveals the share of each bank category on the overall number of observations in the panel by year. "Total No." displays the overall number of observations by year. "Total Col. %" gives the share of observations by year on the overall number of observations in the panel.

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