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Loan loss provisioning and procyclicality: evidence from an expected loss model

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Non-technical summary

Research Question

High loan losses in the global financial crises have induced regulators to encourage international standard setters to rethink current loan loss provisioning regimes: By building provisions already when a loan is granted, for future losses that will materialize over the economic cycle, provisions could act as a safety cushion in the downturn. Although the negative effects of a backward-looking provisioning regime have become evident in the financial crisis, analyses of positive experiences with a forward-looking provisioning approach are more or less missing in the academic literature.

Contribution

Our paper contributes to close this gap by exploring loan loss provisioning under German national accounting rules which allow banks through the principle of prudence to take account of future losses rather early. In that context, we are able to split total loan loss provisions into specific and general loan loss provisions and analyze their drivers separately.

Results

Using three different measures of forward-looking provisioning we find (1) German banks to use specific loan loss provisions countercyclically, i. e. they increase their level of specific loan loss provisions during upswings and decrease them during downturns, (2) general loan loss provisions to be predominantly motivated by tax considerations and to be built independent of the business cycle, and (3) countercyclical effects to be mainly due to earnings management and to a lesser extent due to prudent provisioning, i. e. managers' anticipation of future loan losses at the closing date. Our findings contrast with the results of several previous studies for other countries. 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 due to the single-country setting. 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.

Nicht-technische Zusammenfassung

Fragestellung

Hohe Verluste in der globalen Finanzkrise haben Regulatoren dazu veranlasst, internationale Standardsetzer für Rechnungslegung zu ermutigen, die gegenwärtigen Wertberichtigungsansätze zu überdenken: Indem Wertberichtigungen für zukünftige Verluste, die über einen Konjunkturzyklus auftreten, bereits gebildet werden, wenn ein Kredit vergeben wird, können Wertberichtigungen als ein Sicherheitspuffer im Abschwung wirken. Wenngleich die negativen Auswirkungen einer vergangenheitsbezogenen Wertberichtigungspraxis in der Finanzkrise deutlich wurden, fehlen in der akademischen Literatur dokumentierte positive Erfahrungen mit zukunftsorientierten Wertberichtigungsansätzen weitgehend.

Beitrag

Unsere Arbeit möchte dazu beitragen, diese Lücke zu schließen, indem wir Wertberichtigungen unter der deutschen nationalen Rechnungslegung untersuchen. Diese erlaubt den Banken durch das Vorsichtsprinzip, zukünftige Verluste frühzeitig zu berücksichtigen. In diesem Kontext ist es uns zudem möglich, die gesamten Wertberichtigungen in Einzel- und Pauschalwertberichtigungen aufzuteilen und deren Treiber separat zu analysieren.

Ergebnisse

Mit Hilfe von drei verschiedenen Maßen für zukunftsgerichtete Wertberichtigungen finden wir, dass (1) deutsche Banken Einzelwertberichtigungen antizyklisch bilden, d. h. sie erhöhen ihren Bestand an Wertberichtigungen in Phasen des konjunkturellen Aufschwungs und reduzieren ihn im Abschwung, (2) Pauschalwertberichtigungen hauptsächlich aus steuerlichen Motiven heraus gebildet werden und nicht zur Abdeckung konjunktureller Risiken, und (3) antizyklische Effekte hauptsächlich aus der Nutzung von Einzelwertberichtigungen zur Steuerung des Jahresüberschusses (Ergebnisglättung) stammen und am Bilanzstichtag in geringerem Maße zur Vorwegnahme zukünftiger Verluste im Kreditgeschäft gebildet werden. Unsere Resultate stehen damit im Widerspruch zu den Ergebnissen einiger früherer Studien für andere Länder. Wir räumen ein, dass unser Datensatz überwiegend aus eher kleineren und regional orientierten Instituten ohne Kapitalmarktorientierung besteht, und dass die Resultate theoretisch auch durch deutschlandspezifische Besonderheiten getrieben sein könnten. Gleichwohl ist die Eigenschaft des deutschen Rechnungslegungsansatzes, Banken eine zukunftsgerichtete Wertberichtigungsbildung zu ermöglichen, zumindest eine wichtige Vorbedingung.

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Loan Loss Provisioning and Procyclicality: Evidence from an Expected Loss Model*

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Abstract

Several studies have addressed, with conflicting results, the issue of procyclical effects of loan loss provisions in the past. More recently, the weak performance of incurred loss models in the financial crisis has given rise to a new debate on the sound design of credit risk provisioning schemes, which is reflected in the scheduled implementation of an expected loss model in IFRS 9. This study contributes to the extant literature by separately analyzing the cyclical effects of specific and general loan loss provisions under a legislative framework that allows provisions based on expected losses in the loan portfolio. Using three different measures of forward-looking provisioning, we find typical German banks, most of them unlisted and operating regionally, to use specific loan loss provisions countercyclically, in particular for earnings management and by anticipating non-performing loans at the closing date. The use of general loan loss provisions is predominantly motivated by tax considerations, pointing out the considerable importance of the impact of local tax law.

Keywords: Procyclicality, earnings management, hidden reserves, loan loss provisioning, expected losses, managerial discretion.

JEL classification: G01, G21, M41.

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1 Introduction

Managerial discretion in the use of loan loss provisions (LLP) has attracted considerable attention from both regulators and academics for a long time. Earlier studies focused on the use of LLP for earnings management (Beatty, Chamberlain, and Magliolo (1995)), tax management (Moyer (1990)), capital management (Ahmed, Takeda, and Thomas (1999)) and signaling purposes (Wahlen (1994)). More recently, researchers have gotten interested in the timeliness of LLP over the business cycle and the associated effects on banks' lending behavior and financial stability (e. g. Laeven and Majnoni (2003), Bikker and Metzemakers (2005), Beatty and Liao (2011)). If banks account for the fact that the latent credit risk in their loan portfolios rises during upswings when competition between banks increases and monitoring efforts decrease, they should increase their provisioning level during upswings and lower it during downturns as losses occur, thus build and release provisions in a countercyclical fashion. However, this requires an underlying accounting model that allows for the recognition of through-the-cycle losses ("expected losses") in the loan portfolio.

The recognition of such expected losses reveals a considerable difference between provisioning practices within accounting regimes favoring an expected loss model and systems that promote the application of a less comprehensive incurred loss approach. The latter is for instance implemented in IAS 39 and its backward-looking application has evidently increased financial turmoil in the crisis (Dugan (2009)). This has been recognized by the IASB and triggered the ongoing development of an expected loss model in IFRS 9 (International Accounting Standards Board (2011), International Accounting Standards Board (2012)) that was finalized in July 2014.

In this context our study adds to the discussion by providing evidence on the relation between banks' credit risk provisioning practices and economic activity in an accounting environment that essentially enables banks to build provisions for expected losses. Our work complements recent studies by Beatty and Liao (2011) and Bushman and Williams (2012) who discuss the impact of provisioning practices on lending and how different measures of discretionary forward-looking provisioning affect the risk-taking discipline of banks. Additionally, Gebhardt and Novotny-Farkas (2011) examine the effects of mandatory IFRS adoption in 12 EU countries and find that the tighter rules under IAS 39 significantly reduce discretionary behavior as measured by income smoothing. We add to this by analyzing if and how German banks actually use the additional amount of discretion that they are endowed with in an expected loss model over the business cycle.

Using both public and private information provided by the Deutsche Bundesbank, we analyze an unbalanced panel of 4,392 German banks over almost two decades (1994-2011). Our data allow us to separately investigate the build-up and the release of specific LLP that are supposed to cover both incurred and expected losses for individual loans, and general LLP which are meant to cover latent risks in the whole loan portfolio. This is important since it allows us to explicitly examine cyclical effects of a provisioning item that is meant to target latent risks in the loan portfolio. 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 (1) German banks to use specific LLP countercyclically, i. e.

they increase their level of specific LLP (and direct write-offs (DWO)) during upswings and decrease them during downturns, (2) general LLP to be predominantly motivated by tax considerations and not to be built for cyclical reasons, and (3) countercyclical effects to be mainly due to earnings management and to a lesser extent due to prudent provisioning, i. e. the anticipation of future non-performing loans (NPL). Additionally, this behavior is found to be robust against the use of different macro variables for the economic cycle like a Credit-to-GDP ratio for Germany, the growth rate of real GDP on a state basis and a Credit-to-GDP gap, the latter being motivated by the literature on countercyclical capital buffers (Basel Committee on Banking Supervision (2010)). 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 due to our single-country setting. 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. 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 potential to lead to countercyclical effects, which is desirable. Second, our findings with respect to earnings management show that banks use their discretion for purposes that are not necessarily in line with a true and fair view of a bank's financial condition. 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. Hence, one needs to be careful when it comes to the specific design of an expected loss model. Third, tax-deductibility is an important driver of LLP in financial statements, as we are able to show for general LLP. Hence, national authorities being 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 introduces the relation between provisioning behavior and the economic cycle. Section 3 summarizes loan loss accounting and reporting regulations in Germany. Section 4 relates our work to different strands of the previous literature. Section 5 presents the empirical analysis with the multivariate analysis of specific and general LLP (5.3) being the core part. We conduct several robustness tests in Section 6 and Section 7 concludes.

2 Loan loss provisioning and the economic cycle

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 (Fernandez de Lis, Martinez Pages, and Saurina (2000); 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)). Naturally, this latent credit risk is likely to materialize only in the downswing. In this context the potential effects of different accounting models can be illustrated.

If the build-up of provisions is triggered by events of the past (*incurred losses*) it is difficult to account for latent credit risk in the loan portfolio. In order to cover latent risks in the loan portfolio it may instead be required to form an expectation on *expected (future) losses* and to build provisions according to these expectations. Accounting for latent risks can be beneficial from both a stability and an accounting perspective: Stability is increased by building P&L-relevant provisions in the upswing that in turn reduce profits when this does not hurt a bank very much. These provisions can be released in the downswing cushioning the P&L and capital impact when borrowers actually default. On an aggregate level forward-looking provisions can build a buffer in order to mitigate cyclical peaks and troughs. From an accounting perspective, it can be argued that provisioning for latent risks is helpful because it allows to 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 Financial Stability Forum (2009) agrees with this view and states that the design of the underlying accounting system has the ability to encourage pro- or countercyclical provisioning. An incurred loss model, as stipulated by IAS 39, requires loan losses not to be recognized before a default is probable and hence bears the risk of inherently procyclical provisioning (Dugan (2009)).

In contrast to many other countries, German financial accounting allows for the integration of latent risks (and thus expected losses) in the loan portfolio, and we believe that it is particularly important in the current debate to analyze this role model for its effect on pro- or countercyclical provisioning, despite limited comparability due to our quite specific single-country setting.

3 Loan loss accounting under German Commercial Code

One of the fundamental principles of German financial accounting according to HGB ("German Commercial Code") is the principle of conservatism. In terms of loan loss provisioning, an important consequence follows from this principle.

Essentially, bank managers are required to value their loan portfolio conservatively and explicitly take all information on incurred loan losses as well as future potential loan losses into account. Hence, they should provision for credit risk preferably early and better too much than too little. This comes close to what is generally called an "expected

loss model". In more detail, German banks are required to account for the credit risk inherent in their loan portfolio in two different ways: LLP have to be built if the borrower defaults or if his inability to pay interest is impending and loans have to be written off if they are deemed uncollectible.[1] While the principle of conservatism leads to a partly blurred image of the real economic situation of a bank, it certainly encourages managers to accumulate reserves.

In this context, German financial accounting distinguishes between specific provisions for individual loans, specific provisions for portfolios of small and homogeneous loans, and general provisions.[2] 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, it can be assumed that banks 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. 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 the book value of the loan. In contrast to IAS 39, banks reporting according to HGB need not, but are allowed to, discount the future expected cash flows from a loan to the current accounting period.[3] The way in which specific LLP are determined makes clear that they are meant to cover losses that have already been incurred. On the other hand the principle of conservatism allows the build-up of LLP for individual loans that a bank considers problematic without having any objective proof of a deteriorated loan quality. This leeway can be interpreted as an expected loss component of specific LLP. Moreover, 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 need 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 may be 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)).[4]

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

[1] It is worth noting that despite the increasing importance of IFRS across the globe, most German banks still report according to local GAAP. By dropping all German IFRS banks or members of an IFRS group, we lose only 316 observations which is less than 1% of the sample.

[2] 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.

[3] 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).

[4] In terms of tax-deductibility and regulatory capital, direct write-offs (DWO) and LLP are treated similarly, especially in banks that use the aforementioned standardized approach. This will be paid attention to in Section 5.

percentage of the sum of loans outstanding, i. e. on those loans that have not been written off or been subject to specific provisioning yet.[5] According to Krumnow, Sprissler, Bellavite-Hövermann, Kemmer, and Steinbrücker (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 future 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 given in Equation (1) is relevant for the tax-deductibility of general LLP. The latter approach allows for a higher amount of general LLP.

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

$GLLA_{i,t}^{taxded}$ 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 DWO and the use of specific LLP. Incoming payments from loans that were written off before need to be deducted 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 customer loans that carry risk, 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.[6] Some important features of the formula in Equation (1) are noticeable: As Scharpf (2009) and Bieg (1998) point out, $CL_{i,t}^{risk}$ does not comprise interbank loans so that this formula (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 contrast to most accounting regimes, German Commercial Code allowed banks to conceal the information on the build-up or release of LLP from investors, depositors and other stakeholders until 2006 using a certain compensatory account (see Appendix

[5] 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.

[6] 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.

A.1 for details). In terms of signaling, this needs to be accounted for.

In addition to specific and general LLP, German banks are to some extent allowed to create hidden (visible) reserves pursuant to Section 340f (340g) of HGB that are meant to cover both market and credit risk. However, both specific and general provisions should be bank managers' first choice, especially because the aforementioned reserves, other than LLP, are not tax-deductible. Appendix A.1 provides details about these reserves and their relation to specific and general LLP.

The provisioning rules under German Commercial Code described in this section are different from other countries in the sense that they enable bank managers to account for expected losses via both specific and general LLP, which makes our setting unique. Besides, we acknowledge that the majority of banks in our sample are rather small and have a regional focus. However, since our analysis focuses on the behavior of bank managers, we are confident that the results we derive in Section 5 are not just specific to Germany, but provide important implications for other developed banking markets, too.

4 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. Although research designs were refined and studies have become more sophisticated over time, these four motives still build the basis for most studies on provisioning behavior. 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 and Beatty and Liao (2011) explicitly focus on the extent to which delayed expected loss recognition (i. e. the delayed build-up of LLP) causes reduced lending in cyclical downturns. Our study can be classified into the extant literature on loan loss provisioning from four different perspectives:

1. Underlying dataset: One can distinguish between data on individual countries versus (usually publicly available) data from a group of countries.[7] 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 usually at the cost of mixed feelings with respect to the quality of data. One prominent study from the first category that accounts for procyclicality is by Pérez, Saurina, and Salas-Fumás (2008) who model the impact of so-called statistical provisions on earnings management and procyclicality in Spain. Other studies are from Hoggarth and Pain (2002) for the UK or Handorf and Zhu (2006) for the USA. Multinational studies on the use of LLP are more frequent. Laeven and Majnoni (2003) use data on large commercial banks from 45 countries and cluster 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

[7]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.

BankScope data for a panel of 186 banks over a period of eleven years. All studies have in common that they use "large N, small T" panels, "large N" meaning more than 1,000 observations and "small T" meaning about 10-20 years. 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, which results in more than 30,000 observations of almost 4,500 banks. This allows us to establish a detailed model on provisioning behavior that accounts for national particularities in accounting, regulation and taxation whilst being the first to distinguish between the cyclical effects of specific and general LLP.

2. Control variables for other motives: As noted above, LLP are subject to different types of managerial discretion. First, income-smoothing refers to bank managers increasing provisioning levels in periods of economic well-being and lowering them during times of poor performance. Since this reduces the variability of banks' income streams over time, it is supposed to signal financial stability, to positively influence external ratings and to lower funding costs (Fudenberg and Tirole (1995); Kanagaretnam, Lobo, and Mathieu (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, López-Espinosa, and Rubia (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)). This is primarily relevant for banks in countries that acknowledge general or specific LLP as any sort of regulatory capital. In Section 3 we elaborated that Germany is among those countries. Third, managers are found to use provisions as 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 3, 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)). As we see from Section 3, 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 as a minor issue but will nonetheless account for it.

3. Methodology: As we mentioned before, studies about the build-up and release of risk provisions commonly use panel data. Accordingly, the set of methods applied ranges from simple pooled cross-sectional time-series OLS (Lobo and Yang (2001); Cavallo and Majnoni (2002)) over standard random or fixed effects panel regressions (Bikker and Metzemakers (2005); Handorf and Zhu (2006)) to different dynamic panel data (DPD) models that cover the potential dynamics of LLP (Bouvatier and Lepetit (2008); Pérez et al. (2008); Soedarmono, Tarazi, Agusman, Monroe, and Gasbarro (2012)). We will adopt the latter ones to account for gradual adjustments of provisions over time which is particularly important in the analysis of specific LLP. However, static panel models will

be used for robustness tests.

4. Procyclical effects: The evidence in the literature on cyclical effects of LLP is mixed. Laeven and Majnoni (2003) find that banks on average postpone provisioning when faced with favorable economic and income conditions until the cycle turns. This behavior, however, 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. Apart from "classic" studies on procyclicality, Beatty and Liao (2011) find that US banks with more timely loss recognition, i. e. forward-looking provisioning schemes, 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. The rather mixed evidence from extant literature on total LLP raises the question how banks build and release specific and general LLP under an expected loss model over the business cycle.

5 Empirical analysis

5.1 Data and variables

Our annual data originates from the Deutsche Bundesbank's prudential database BAKIS (see Memmel and Stein (2008) for more details). 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 aforementioned 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. After removing banks which report or whose parent reports according to IFRS and after eliminating implausible entries we retain an unbalanced panel containing 30,534 observations from 4,392 banks for years 1995 to 2010, thereby covering roughly two full economic cycles.[8]

[8]The fact that this number is much higher than any bank/year number in Table 11 in Appendix A.2 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. Note that the number of IFRS banks in Germany is very small. By dropping IFRS banks for an unbiased analysis of banks that are subject to HGB rules, we essentially observe individual accounts.

In order to investigate potential (pro-)cyclical effects of specific and general LLP separately, we establish two models that cover the individual dynamics of both positions. In the first part we use the sum of specific LLP and DWO of bank i in year t ($SLLP^{TA}_{i,t}$) as the dependent variable.[9] As explained in Appendix A.1 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 (see Kim and Kross (1998) or Alali and Jaggi (2011) for a similar discussion).[10] Furthermore, they allow for almost the same amount of discretion. In particular, bank managers might decide between the build-up of specific LLP and a direct loan write-off simultaneously. Using their sum helps to avoid endogeneity. To mitigate potential problems of heteroscedasticity, we follow Kim and Kross (1998) and measure the sum of specific LLP and DWO as % of beginning-of-year t total assets of bank i.[11] 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 ($SLLP^{TA}_{i,t-1}$) 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 $SLLP^{TA}_{i,t}$ and its first lag.

We use variables from **three** different **categories** to measure cyclical effects of specific LLP. First, one out of three macro variables is included to test if banks explicitly consider the business environment in which they operate (**Category 1**).[12] We use 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. We repeat the estimation using 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. Another macro measure of cyclicality that has been discussed in the area of countercyclical capital buffers is a Credit-to-GDP gap as a deviation of the Credit-to-GDP ratio from its long-term trend (Basel Committee on Banking Supervision (2010)). Despite diverse drawbacks that are generally associated with Credit-to-GDP gaps (Edge and Meisenzahl (2011)) we use GAP_t as the third macro variable. GAP_t is calculated using a Hodrick-Prescott (HP) 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)). 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. Second, $NDI^{TA}_{i,t}$ is included to measure countercyclical effects via income smoothing (**Category 2**). 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

[9] Note that DWO are *direct* write-offs, i. e. write-offs on loans that were not subject to a specific LLP before. This is essentially an alternative to building a specific LLP for loans that unexpectedly default without having an abnormal probability of default before. This alternative, however, is only rarely used.

[10] There are minor differences with respect to regulatory capital for banks that use the IRB approach (see Section 3 for details). However, the number of IRB banks in our sample is negligible.

[11] In the following, all flow variables carrying the superscript "TA" are scaled by beginning-of-year t total assets and all stock variables are scaled by end-of-year t total assets. For the sake of brevity, we refrain from stating this explicitly for each variable.

[12] Altogether, we use a total of **five** variables to measure cyclical effects over three model specifications, where the model specifications only differ in the macro variable.

since profits are usually higher in times of economic well-being. Third, we use $CHNPL^{TA}_{i,t+1}$ which is the change in non-performing loans of bank i from year t to $t+1$ to measure countercyclical effects via prudent provisioning (**Category 3**), i. e. a positive coefficient would imply that banks build specific LLP to account for specific losses that they already anticipate at the closing date. [13]

We use a comprehensive set of control variables. Two variables are used to cover the credit risk of a bank. As mentioned in Section 3, specific LLP are closely linked to NPL. Thus, we control for the non-discretionary part of concurrent specific LLP by including $CHNPL^{TA}_{i,t}$ which describes the changes in NPL of bank i in year t as a regressor and expect to obtain a positive coefficient. Previous literature included the first lag of the total volume of NPL which should however already be covered by previous risk provisions. Hence we refrain from including this variable.[14] Moreover, $OL^{TA}_{i,t-1}$, which is the volume of overall loans of bank i in year $t-1$, is supposed to cover size effects of the loan portfolio of a bank. Banks with larger loan portfolios in the previous year are more likely to be hit by sudden impairment trigger events. Thus we anticipate a positive relation between $OL^{TA}_{i,t-1}$ and $SLLP^{TA}_{i,t}$. 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, due to the mutual support schemes of *Coops* and *Savings banks*.[15]

$LNTA^{TA}_{i,t}$ is the natural logarithm of total assets of bank i in year t and is included to measure potential effects of a bank's size on risk provisioning (e. g. Alali and Jaggi (2011)). To prevent endogeneity, annual LLP and DWO are added to total assets as reported on the balance sheet. We do not have any clear prior expectation as to the sign and the magnitude of the related coefficient. On the one hand, larger banks might better be able to diversify 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"). Moreover, smaller banks are usually *Coops* or *Savings banks* which are monitored by the capital market to a lesser extent.

We control for regulatory capital management by including $TIER12^{RWA}_{i,t-1}$ as a regressor, which is the sum of a bank i's Tier 1 and Tier 2 capital ratio at the beginning of a year t. This sum predominantly stems from equity, 340g-reserves 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 in 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).

Finally, we control for signaling purposes by including $NDI^{TA}_{i,t+1}$ and the interaction

[13] 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, i. e. they show that income smoothing is significantly reduced after the introduction of IFRS.

[14] As sort of a robustness check, note that this variable was included in a previous version of this paper. The coefficient was not significant and the overall results were qualitatively the same.

[15] For an overview of the German banking market, please refer to Appendix A.2.

effect $NDI^{TA}_{i,t+1} \cdot D^{SIG}_{i,t+1}$. $D^{SIG}_{i,t+1}$ is a dummy variable that takes the value of 1 for each bank from 2007 on and 0 in any other case. If bank managers 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 $NDI^{TA}_{i,t+1}$. This effect should be particularly pronounced since 2007 because information on specific and general LLP was usually not disclosed to the public before. In the following, the variable $SIG^{TA}_{i,t+1}$ will be used to describe the results for $D^{SIG}_{i,t+1} \cdot NDI^{TA}_{i,t+1}$.

It is worth noting that 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(s). Table 1 provides comprehensive variable descriptions for the analysis of specific LLP.

Variable	Description
i,t	Index for bank i and time period t.
$SLLP^{TA}_{i,t}$	Sum of specific LLP and DWO by bank i in year t as % of beginning-of-year total assets.
$RATIO_t$	Credit-to-GDP ratio for domestic financial and non-financial institutions (excluding the public sector) in year t.
$GDPGR_{i,t}$	Growth rate of real GDP on a state level in year t.
GAP_t	Credit-to-GDP gap based on World Bank data (domestic credit to private sector as % of GDP) for Germany in year t.
$NDI^{TA}_{i,t}$	Non-discretionary income (i. e. net income before LLP, other reserves and taxes) of bank i in year t as % of its beginning-of-year t total assets.
$CHNPL^{TA}_{i,t+1}$	Changes in NPL of bank i from year t to $t+1$ as % of its beginning-of-year t total assets.
$CHNPL^{TA}_{i,t}$	Changes in NPL of bank i from year $t-1$ to t as % of its beginning-of-year t total assets.
$OL^{TA}_{i,t-1}$	Volume of overall loans (i. e. customer loans + interbank loans) of bank i in year $t-1$ as % of its end-of-year $t-1$ total assets.
$LNTA^{TA}_{i,t}$	Natural logarithm of total assets pre LLP and DWO of bank i in year t.
$TIER12^{RWA}_{i,t-1}$	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.
$NDI^{TA}_{i,t+1}$	Non-discretionary income (i. e. net income before LLP, other reserves and taxes) of bank i in year $t+1$ as % of its beginning-of-year $t+1$ total assets.
$D^{SIG}_{i,t+1}$	Dummy variable that takes the value 1 from 2007 on and 0 before.
$SIG^{TA}_{i,t+1}$	Product of $D^{SIG}_{i,t+1}$ and $NDI^{TA}_{i,t+1}$.

Table 1: Description of variables for the analysis of specific LLP.

In our second model, we use $GLLP^{TA}_{i,t}$ as dependent variable. This is the build-up (or release) of general LLP of bank i in year t. As explained in Section 3, general LLP are tax-deductible up to a certain amount that is determined by Equation (1). It is conceivable that banks rather follow this backward-looking formula instead of building general LLP according to their own estimate of latent risks in the loan portfolio. At first glance, this hypothesis 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, *Coops* and *Savings banks* seem to use templates

issued by their respective umbrella organizations since they all use the same wording if they apply the formula.

Our data allow us to reproduce Equation (1) quite accurately and use it as a regressor. 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.[16] Second, we cannot use data after 2008 due to another structural break in the data catalogue. This leaves us with a sample of 597 banks over a period of nine years from 2000 to 2008, i. e. 5,373 observations.[17] For this remaining sample (henceforth "GLLP subsample"), we calculate $GLLPTD_{i,t}^{TA}$ 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 slight tendency to overestimate $GLLPTD_{i,t}^{TA}$. 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 another tendency to overestimate $GLLPTD_{i,t}^{TA}$. Nonetheless, we expect a positive and significant coefficient for $GLLPTD_{i,t}^{TA}$ to prevail.

Naturally, we use the same variables to measure countercyclical effects as in the model for specific LLP, i. e. $NDI_{i,t}^{TA}$, $CHNPL_{i,t+1}^{TA}$ and consecutively the three macro variables $RATIO_t$, $GDPGR_{i,t}$ and GAP_t. Again, we expect positive coefficients for all variables. Moreover, we add $LNTA_{i,t}^{TA}$ to control for size effects. $IBL_{i,t-1}^{TA}$ is used 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 $IBL_{i,t-1}^{TA}$. $TIER12_{i,t-1}^{RWA}$ is included again to control for regulatory capital management.[18] We do not include any measure of current or past NPL as a regressor since they should be fully covered by specific LLP. Signaling might be an issue again, hence our model includes $NDI_{i,t+1}^{TA}$ and $SIG_{i,t+1}^{TA}$ again.

Two more variables may play a role in the determination of general LLP. First, general LLP and changes in 340f-reserves might, to a certain extent, be determined simultaneously since they are both meant to cover latent risks. However, due to the additional (although limited) tax-deductibility of general LLP we assume that the build-up of general LLP is usually preferred by bank managers. Some bank managers might nonetheless prefer to build 340f-reserves. Besides, it is conceivable that they build 340f-reserves because they are concerned about the market risk in their portfolio and reduce general LLP in return. We will thus include $CH340f_{i,t}^{TA}$ as a regressor. The issue of potential endogeneity will be addressed in additional tests. If at all, we expect a negative influence of $CH340f_{i,t}^{TA}$ on $GLLP_{i,t}^{TA}$. Second, the amount of general LLP that a bank builds or releases might

[16] However, the descriptive statistics in Table 3 rather speak against such a bias.

[17] It should be mentioned that the GLLP subsample is highly dominated by *Coops* and *Savings banks*. Only 17 observations per year stem from *Commercials*.

[18] Remember: General LLP increase regulatory capital up to 1.25% of risk-weighted assets for banks that employ the standardized approach to credit risk. This threshold is passed in only fourteen cases.

depend on the profits or losses of other components of the compensatory account outlined in Appendix A.1. Hence, we use $DISCBL_{i,t}^{TA}$ which is the sum of specific LLP, DWO and net security losses as regressor. It accounts for the possibility that bank managers might choose to build less general LLP or even release them when they are urged to build more specific LLP or write off securities of the liquidity reserve. In this case, we would expect a negative association between $GLLP_{i,t}^{TA}$ and $DISCBL_{i,t}^{TA}$.

Variable	Description
i,t	Index for bank i and time period t.
$GLLP_{i,t}^{TA}$	Amount of general LLP build or released by bank i in year t as % of beginning-of-year total assets.
$RATIO_t$	Credit-to-GDP ratio for domestic financial and non-financial institutions (excluding the public sector) in year t.
$GDPGR_{i,t}$	Growth rate of real GDP on a state level in year t.
GAP_t	Credit-to-GDP gap based on World Bank data (domestic credit to private sector as % of GDP) for Germany in year t.
$NDI_{i,t}^{TA}$	Non-discretionary income (i. e. net income before LLP, other reserves and taxes) of bank i in year t as % of its beginning-of-year t total assets.
$CHNPL_{i,t+1}^{TA}$	Changes in NPL of bank i from year t to $t+1$ as % of its beginning-of-year t total assets.
$GLLPTD_{i,t}^{TA}$	Proxy for the amount of tax-deductible general LLP for bank i in year t as % of beginning-of-year total assets.
$LNTA_{i,t}^{TA}$	Natural logarithm of total assets pre LLP and DWO of bank i in year t.
$IBL_{i,t-1}^{TA}$	Volume of interbank loans of bank i in year $t-1$ as % of its end-of-year $t-1$ total assets.
$TIER12_{i,t-1}^{RWA}$	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.
$NDI_{i,t+1}^{TA}$	Non-discretionary income (i. e. net income before LLP, other reserves and taxes) of bank i in year $t+1$ as % of its beginning-of-year $t+1$ total assets.
$D_{i,t+1}^{SIG}$	Dummy variable that takes the value 1 from 2007 on and 0 before.
$SIG_{i,t+1}^{TA}$	Product of $D_{i,t+1}^{SIG}$ and $NDI_{i,t+1}^{TA}$.
$CH340f_{i,t}^{TA}$	Change in 340f-reserves of bank i from year $t-1$ to year t as % of its beginning-of-year total assets.
$DISCBL_{i,t}^{TA}$	Sum of specific LLP, DWO and net security losses by bank i in year t as % of beginning-of-year total assets.
$SLLA_{i,t}^{TA}$	Specific loan loss allowance of bank i in year t as % of end-of-year total assets.
$GLLA_{i,t}^{TA}$	General loan loss allowance of bank i in year t as % of end-of-year total assets.

Table 2: Description of variables for the analysis of general LLP.

In all parts of the analysis we control for outliers by winsorizing all non-binary micro variables at the 1% and 99% levels which is a very moderate approach. However, we emphasize that all results we present are robust to winsorizing or trimming at any conventional level and do not change either if we do not control for outliers at all. Table 2 provides comprehensive variable descriptions for the analysis of general LLP.

5.2 Descriptive statistics

Table 3 provides the usual descriptive statistics for our dataset in the corresponding time periods.

Some values are noteworthy: Specific LLP contribute a lot to $SLLP_{i,t}^{TA}$ whereas DWO seem to be of minor importance.The latter are as well very stable over time (see as well Figure 1). Compared to specific LLP with an average of 0.28% of total assets, the average general LLP are quite low (0.01%). This holds true for both the full sample and the GLLP subsample. The same applies when we look at the total allowances of general and specific provisions in the full sample; the 99% quantile of the allowance of specific LLP lies at 6.52% of total assets and that of general LLP at 0.52% of total assets. This reveals the considerable importance of LLP for German banks, particularly in light of the mostly below-average equity ratios of financial institutions in international comparisons. Moreover, we see that customer loans play a major role in our sample compared to interbank loans (with averages of 58.28% vs. 12.62%).[19] This is not surprising due to the large number of *Coops* and *Savings banks* in the sample whose main activities are in the lending business.

It is important to note that the descriptive statistics of the important variables do not seem to considerably differ between the two samples. This mitigates our concern regarding a potential selection bias in the GLLP subsample. One notable difference pertains to $NDI_{i,t}^{TA}$ for which we observe a lower standard deviation and even a positive p1 earnings value in the 2000-2008 subsample. This is exactly what would be expected given that this subsample exclusively consists of banks that were active over the whole sample period.

Plotting one of the macro variables ($RATIO_t$) against median annual specific LLP, DWO and general LLP in Figure 1 reveals some notable preliminary findings concerning provisioning behavior of German banks over the business cycle.[20] First, and quite surprisingly, the median DWO remains very flat over the whole sample period. At first sight this contradicts the comparatively large standard deviation in Table 3 which, in turn, might be driven by some large DWO. Second, and as expected, $RATIO_t$ rises continuously up to the crash of the new economy in the year 2001. Afterwards, there is a steady decline until the boom period in 2007 when $RATIO_t$ starts to rise again. Lastly, we observe another decline that we attribute to the financial crisis. For the relation between $RATIO_t$ and specific LLP we find mixed preliminary evidence. Between 1995 and 2001 where we observe a steady growth of $RATIO_t$, the median of specific LLP rises marginally, with the exception of a sharp downward spike in 1999. From 2002 onward we observe an almost parallel movement of specific LLP and $RATIO_t$, which is a first indicator of countercyclical application of specific LLP. However, further analysis is needed to reveal the actual drivers of this observation.

Compared to specific LLP the median of general LLP in Figure 1 is extraordinarily stable over time and does not seem to fluctuate at all over the cycle. This emphasizes the suspicion that $GLLP_{i,t}^{TA}$ might indeed be mainly driven by tax considerations. To

[19] Please note that interbank loans do not comprise securities issued by banks that banks hold, which explains the rather small number. For an analysis including securities of the liquidity reserve and corresponding write-offs, we refer to Section 6.1.

[20] NB: We generally plot the medians for all bank-specific variables as % of total assets. Using the aggregate values or the medians *not* scaled by total assets does not yield any material differences.

Variable	n	Mean	Std. dev.	p1	p50	p99
1995-2010 — Full Sample						
Total assets (in billion Euro)	30,534	1.25	9.41	0.02	0.25	11.1
$SLLP_{i,t}^{TA}$ (in %)	30,534	0.32	0.39	-0.31	0.23	1.88
a) Specific LLP (in %)	30,534	0.28	0.45	-0.42	0.20	1.83
b) Direct write-offs (in %)	30,534	0.04	0.22	0.00	0.01	0.39
$GLLP_{i,t}^{TA}$ (in %)	30,534	0.01	0.0.04	-0.12	0.00	0.15
$SLLA_{i,t}^{TA}$ (in %)	30,534	1.76	1.39	0.08	1.48	6.52
$GLLA_{i,t}^{TA}$ (in %)	30,534	0.13	0.18	0.00	0.10	0.52
$RATIO_t$	30,534	200.26	16.58	165.40	202.98	221.39
$GDPGR_{i,t}$	30,534	1.47	2.11	-5.58	1.74	5.53
GAP_t	30,534	0.01	1.84	-4.09	-0.15	4.84
$NDI_{i,t}^{TA}$ (in %)	30,534	1.02	0.79	-0.69	1.01	2.78
$CHNPL_{i,t}^{TA}$ (in %)	30,534	0.18	2.01	-3.58	0.23	5.36
$CL_{i,t}^{TA}$ (in %)	30,534	58.28	12.83	21.23	60.19	82.13
$IBL_{i,t}^{TA}$ (in %)	30,534	12.62	9.22	0.60	10.70	45.23
$OL_{i,t}^{TA}$ (in %)	30,534	70.90	11.05	38.33	72.14	92.03
$TIER12_{i,t}^{RWA}$ (in %)	30,534	13.63	4.88	8.82	12.29	31.08
2000-2008 — GLLP Subsample						
Total assets (in billion Euro)	5,373	1.36	12.30	0.02	0.25	7.92
$SLLP_{i,t}^{TA}$ (in %)	5,373	0.28	0.31	-0.30	0.22	1.41
a) Specific LLP (in %)	5,373	0.25	0.31	-0.34	0.20	1.33
b) Direct write-offs (in %)	5,373	0.03	0.06	0.00	0.02	0.27
$GLLP_{i,t}^{TA}$ (in %)	5,373	0.01	0.04	-0.12	0.00	0.14
$SLLA_{i,t}^{TA}$ (in %)	5,373	1.76	1.09	0.14	1.57	5.24
$GLLA_{i,t}^{TA}$ (in %)	5,373	0.14	0.11	0.00	0.12	0.51
$RATIO_t$	5,373	209.37	10.36	192.06	211.66	221.39
$GDPGR_{i,t}$	5,373	1.51	1.60	-1.27	1.40	5.49
GAP_t	5,373	-0.33	1.53	-4.09	0.21	1.54
$NDI_{i,t}^{TA}$ (in %)	5,373	1.04	0.46	0.07	0.10	2.53
$CHNPL_{i,t}^{TA}$ (in %)	5,373	-0.08	1.04	-2.95	-0.08	3.21
$CL_{i,t}^{TA}$ (in %)	5,373	59.35	11.67	26.88	60.98	81.51
$IBL_{i,t-1}^{TA}$ (in %)	5,373	12.14	8.21	0.48	10.50	39.86
$OL_{i,t}^{TA}$ (in %)	5,373	71.58	9.98	43.87	72.83	90.29
$TIER12_{i,t-1}^{RWA}$ (in %)	5,373	14.02	4.05	8.95	13.00	28.08
$GLLPTD_{i,t}^{TA}$ (in %)	5,373	0.02	0.05	-0.13	0.01	0.24
$CH340f_{i,t}^{TA}$ (in %)	5,373	0.18	0.29	-0.60	0.14	1.05
$DISCBL_{i,t}^{TA}$ (in %)	5,373	0.37	0.35	-0.32	0.32	1.62

Table 3: Descriptive statistics for continuous variables.

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. For variable descriptions see Tables 1 and 2.

further investigate the relation between $GLLP_{i,t}^{TA}$ and $GLLPTD_{i,t}^{TA}$, we plot their median values over the reduced sample period in Figure 2. These graphs indicate a strong association that is even more striking considering that our proxy for $GLLPTD_{i,t}^{TA}$ tends to systematically overestimate the actual tax-deductible amount of general LLP.

Figure 1: Risk provisions and the Credit-to-GDP ratio.

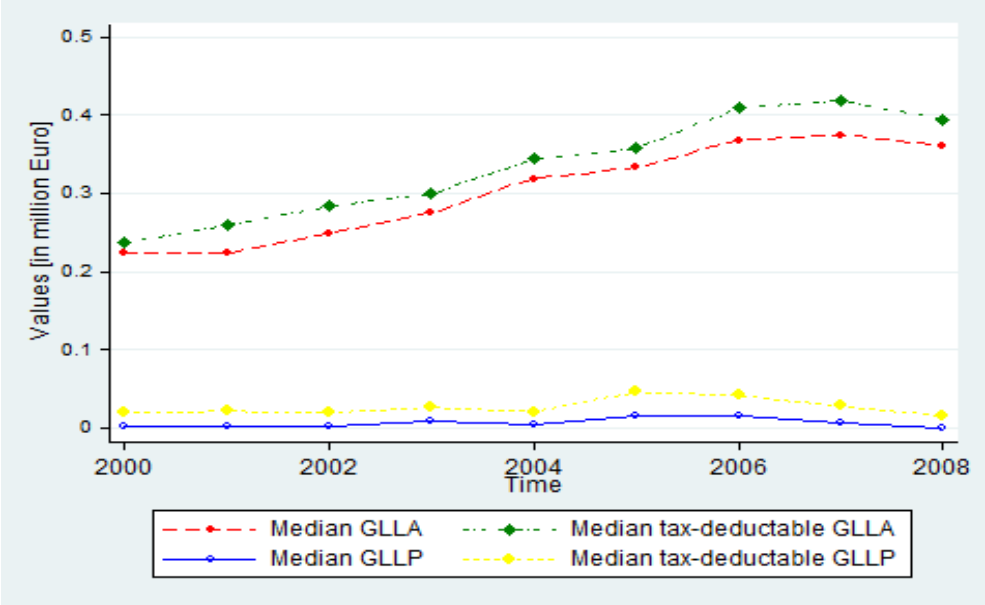

Figure 2: Actual GLLP vs. tax-deductible GLLP.

To sum up, the graphical illustrations do not yield conclusive evidence on pro- or countercyclical provisioning by German banks. Therefore, we turn to the multivariate

analysis which allows changes in the economic activity as well as different bank-specific characteristics to be considered at the same time.

5.3 Multivariate analysis

5.3.1 Specific LLP

Equation (2) illustrates the formal design of all regression models in Table 4:

$$\begin{aligned} SLLP_{i,t}^{TA} &= \beta_0 + \beta_1 \cdot RATIO_t/GDPGR_{i,t}/GAP_t + \beta_2 \cdot NDI_{i,t}^{TA} \\ &+ \beta_3 \cdot CHNPL_{i,t+1}^{TA} + \beta_4 \cdot CHNPL_{i,t}^{TA} + \beta_5 \cdot OL_{i,t-1}^{TA} \\ &+ \beta_6 \cdot TIER12_{i,t-1}^{RWA} + \beta_7 \cdot NDI_{i,t+1}^{TA} + \beta_8 \cdot D_{i,t+1}^{SIG} \cdot NDI_{i,t+1}^{TA} \\ &+ \beta_9 \cdot LNTA_{i,t}^{TA} + \beta_{10} \cdot SLLP_{i,t-1}^{TA} + \mu_i + \epsilon_{i,t} \end{aligned} \tag{2}$$

The empirical results on the association of macroeconomic conditions as well as different bank-specific characteristics with specific LLP in German banks are derived from a dynamic generalized method of moments (GMM) estimation technique ("two-step system GMM", Blundell and Bond (1998)) with Windmeijer (2005) correction for standard errors. 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)) in assuming that banks only gradually adjust their provisions over time. Hence we include the first lag of the dependent variable as a regressor. We also 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)) is applied to assess the validity of the instruments used. 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)). For reasons of consistency we use the same number of instruments in all regression models.

We estimate Equation (2) using all observations in the sample and present the estimated coefficients and standard errors (in brackets below the coefficients) in Table 4. As mentioned before, the same equation is estimated separately for each macro variable (columns A.1 - A.3).

The results presented in column A.1 show the coefficient of $RATIO_t$ to be positive ($\beta_1 = 0.001$) and significant. The same holds true for the macro variables in columns A.2 and A.3. Apparently, bank managers use the scope for discretion that they are endowed with via the principle of conservatism in the German Commercial Code to build higher specific LLP during times of economic expansion and decrease them during economic downturns, which is inherently countercyclical. We do not conceal that the coefficient is small and implies only an economically weak influence of the Credit-to-GDP ratio on the build-up or release of specific LLP. Acknowledging that our sample is rather specific, this first key finding is still in sharp contrast to those of Laeven and Majnoni (2003) and Bikker and Metzemakers (2005) who find procyclical effects of provisioning within international samples of banks, and Hoggarth and Pain (2002) who derive procyclical effects for a single country (UK). The positive and strongly significant coefficient for $NDI_{i,t}^{TA}$ confirms

		Dependent variable: $SLLP^{TA}_{i,t}$		
Independent variables	Exp.	A.1	A.2	A.3
$RATIO_t$	(+/-)	0.001**		
		(0.000)		
$GDPGR_{i,t}$	(+/-)		0.004***	
			(0.001)	
GAP_t	(+/-)			0.005***
				(0.001)
$NDI^{TA}_{i,t}$	(+)	0.227***	0.229***	0.227***
		(0.009)	(0.009)	(0.009)
$CHNPL^{TA}_{i,t+1}$	(+)	0.013***	0.012***	0.012***
		(0.004)	(0.004)	(0.003)
$CHNPL^{TA}_{i,t}$	(+)	0.077***	0.078***	0.075***
		(0.003)	(0.004)	(0.003)
$OL^{TA}_{i,t-1}$	(+)	0.003***	0.004***	0.003***
		(0.001)	(0.001)	(0.001)
$TIER12^{RWA}_{i,t-1}$	(+/-)	-0.015***	-0.016***	-0.016***
		(0.002)	(0.002)	(0.002)
$NDI^{TA}_{i,t+1}$	(+/-)	0.014*	0.019**	0.016*
		(0.009)	(0.008)	(0.008)
$SIG^{TA}_{i,t+1}$	(+)	-0.085***	-0.088***	-0.088***
		(0.013)	(0.012)	(0.011)
$LNTA^{TA}_{i,t}$	(+/-)	0.026***	0.029***	0.027***
		(0.004)	(0.004)	(0.004)
$SLLP^{TA}_{i,t-1}$	(+)	-0.097	-0.148	-0.117
		(0.126)	(0.117)	(0.115)
Observations		25,994	25,994	25,994
No. of banks		3,965	3,965	3,965
No. of instruments		12	12	12
AR(1) (p-value)		0.006	0.009	0.005
AR(2) (p-value)		0.310	0.128	0.171
Hansen (p-value)		0.903	0.958	0.967

Table 4: GMM estimations for specific LLP.

NB: Coefficient estimates stem from dynamic panel estimations with Windmeijer (2005) corrected standard errors (given in brackets below the coefficients). For comprehensive variable descriptions see Table 1. "Exp." reveals the sign we expect to prevail for each coefficient. *, ** and *** indicate significance at the 10%, 5% and 1% level.

earnings management to be highly relevant for managing specific LLP. As we pointed out a positive coefficient for earnings management has essentially countercyclical properties since earnings are usually at maximum in times of economic well-being. Moreover, bank managers anticipate future NPL to a certain extent and build specific LLP accordingly. This is implied by the positive coefficient of $CHNPL^{TA}_{i,t+1}$. Admittedly, the main focus of bank managers apparently lies on earnings management.

Our proxies for actual credit risk ($OL^{TA}_{i,t-1}$, $CHNPL^{TA}_{i,t}$) meet our expectation and exhibit positive and strongly significant influence on specific LLP. In this context it is not surprising that the impact of the change in NPL is higher than the impact of the overall loan volume of the previous period. With respect to regulatory capital management 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. The positive coefficient of $NDI^{TA}_{i,t+1}$ implies that banks with higher provisions in year t tend to achieve higher operative earnings in year $t+1$. However, this behavior reverses from 2007 onwards when banks became legally obliged to disclose information on specific and general LLP. This finding contradicts the hypothesis that banks use provisions as means for conveying information about future earnings. In terms of size, larger banks in our sample on average provision more which speaks in favor of the hypothesis that larger banks are typically monitored more intensively and that their diversification benefit does not outweigh the knowledge of the regional market that smaller banks usually possess. Unlike previous work, we do not find significant evidence that banks only gradually adjust their annual level of specific LLP over time. The p-value of the Hansen test of overidentifying restrictions indicates the instrument set to be valid. Moreover, and as expected in our dynamic panel data estimation, we cannot reject autocorrelation in first differences of $\epsilon_{i,t}$, but do reject second-order autocorrelation. We do not conceal that our finding on $SLLP^{TA}_{i,t-1}$ might be due to the fact that we have to resort to a comparatively deep lag structure to obtain valid instruments for the predetermined variable. However, taking earlier lags does not change the sign of any coefficient but the one of $SLLP^{TA}_{i,t-1}$. Since instrumenting is a difficult task in dynamic panel data models, we will address the issue of appropriate instrumenting in two robustness tests in Section 6.1 which essentially confirm our findings.

To sum up, our results point to countercyclical application of specific LLP in Germany which we attribute to a generous application of the principle of conservatism that is an essential part of German Commercial Code. The direct channel from the isolated macroeconomic effect, as measured by $RATIO_t$, $GDPGR_{i,t}$ and GAP_t, is only weakly pronounced but we clearly see the countercyclical properties of the earnings management component and future NPL in our results. We emphasize that all results are stable across different macro variables. Although the results we obtain might not be perfectly conferrable to other countries, it is still notable that German bank managers use their discretion in building specific LLP to account for the business environment.

5.3.2 General LLP

The investigation of the drivers of general LLP requires a second model. Equation (3) illustrates its formal design:

$$\begin{aligned} GLLP_{i,t}^{TA} &= \beta_0 + \beta_1 \cdot RATIO_t / GDPGR_{i,t} / GAP_t + \beta_2 \cdot NDI_{i,t}^{TA} \\ &+ \beta_3 \cdot CHNPL_{i,t+1}^{TA} + \beta_4 \cdot IBL_{i,t-1}^{TA} + \beta_5 \cdot TIER12_{i,t-1}^{RWA} \\ &+ \beta_6 \cdot NDI_{i,t+1}^{TA} + \beta_7 \cdot D_{i,t+1}^{SIG} \cdot NDI_{i,t+1}^{TA} + \beta_8 \cdot LNTA_{i,t}^{TA} \\ &+ \beta_9 \cdot GLLPTD_{i,t}^{TA} + \beta_{10} \cdot CH340f_{i,t}^{TA} + \beta_{11} \cdot DISCBL_{i,t}^{TA} \\ &+ \mu_i + \epsilon_{i,t} \end{aligned} \tag{3}$$

We obtain our results for this static panel model in Equation (3) using GMM to account for possible endogeneity of $CH340f_{i,t}^{TA}$. We use $CH340f_{i,t-1}^{TA}$ and $CH340f_{i,t-2}^{TA}$ as instruments for $CH340f_{i,t}^{TA}$ and apply the Hansen test of overidentifying restrictions again to assess the validity of the instruments used. We then test for endogeneity of $CH340f_{i,t}^{TA}$ by computing the difference of the Sargan-Hansen statistics of two equations, one treating the potentially endogenous regressor as exogenous and one assuming it to be endogenous (Baum, Schaffer, and Stillman (2003)). The null hypothesis assumes that the specified endogenous regressors can actually be treated as exogenous. One could assume the change in 340f-reserves to be endogenous due to the fact that both $GLLP_{i,t}^{TA}$ and $CH340f_{i,t}^{TA}$ are meant to cover latent risks in the loan portfolio and could hence be determined simultaneously. We consider this simultaneity concern unlikely because 340f-reserves are *not* tax-deductible, whereas general LLP are.[21] For this reason we test the robustness of our results with a plain fixed-effects OLS estimation with robust standard errors in Section 6.2.

The results presented in columns B.1 to B.3 of Table 5 confirm the first impression from Figure 1: General LLP do not react at all to changes in the economic activity which is surprising at first since general LLP are in fact meant to fluctuate with (or rather "against") the cycle. Only one of the variables we employ to measure cyclical effects is highly significant ($\beta_3 = -0.002$). Its negative sign is unexpected since it implies that German banks on average provision less for latent risks in periods preceding years with a positive change in NPL. In addition, there is some tentative evidence of earnings management that is essentially countercyclical. However, the banks' behavior becomes more comprehensible when we look at the coefficient of $GLLPTD_{i,t}^{TA}$ which is by far the most relevant driver of general LLP. Consequently the cyclical effects of general LLP depend largely on the application of specific LLP since they are primarily determined by past specific LLP. This result emphasizes that it is crucial to consider undesirable side effects in the design of local tax law. In short, the signs of the coefficients of the other control variables largely meet our expectation but none of them is significant at any conventional level. The high R^2 stems from $GLLPTD_{i,t}^{TA}$ and hardly changes if we add or omit different subsets of control variables. The validity of our results is confirmed by

[21] In Section 3 we mentioned that under the standardized approach to credit risk the allowance of general LLP is part of the regulatory capital up to 1.25% of risk-weighted assets. This threshold would be passed in only 14 observations and any potential "threshold effects" are consequently ignored in the following.

Independent variables	Exp.	**Dependent variable**: $GLLP_{i,t}^{TA}$		
		B.1	B.2	B.3
$RATIO_t$	(+)	0.000		
		(0.000)		
$GDPGR_{i,t}$	(+)		-0.000	
			(0.000)	
GAP_t	(+)			0.000*
				(0.000)
$NDI_{i,t}^{TA}$	(+)	0.007	0.008	0.007*
		(0.005)	(0.004)	(0.004)
$CHNPL_{i,t+1}^{TA}$	(+)	-0.002***	-0.002***	-0.002***
		(0.000)	(0.000)	(0.000)
$IBL_{i,t-1}^{TA}$	(+)	0.000	0.000	0.000
		(0.000)	(0.000)	(0.000)
$TIER12_{i,t-1}^{RWA}$	(+/-)	-0.000	-0.000	-0.000
		(0.000)	(0.000)	(0.000)
$NDI_{i,t+1}^{TA}$	(+/-)	-0.000	-0.000	-0.001
		(0.002)	(0.002)	(0.002)
$SIG_{i,t+1}^{TA}$	(+)	-0.000	-0.001	0.000
		(0.002)	(0.002)	(0.002)
$LNTA_{i,t}^{TA}$	(+/-)	-0.019	-0.020	-0.021
		(0.021)	(0.021)	(0.020)
$GLLPTD_{i,t}^{TA}$	(+)	0.729***	0.729***	0.728***
		(0.035)	(0.035)	(0.035)
$CH340f_{i,t}^{TA}$	(-)	-0.007	-0.007	-0.007
		(0.010)	(0.009)	(0.009)
$DISCBL_{i,t}^{TA}$	(-)	-0.006	-0.006	-0.006
		(0.006)	(0.005)	(0.005)
Observations		3,582	3,582	3,582
No. of banks		597	597	597
R^2		0.709	0.709	0.709
Hansen J stat. (p-value)		0.244	0.239	0.299
Diff. in Sargan-Hansen stat. (p-value)		0.851	0.805	0.810

Table 5: GMM estimations for general LLP.

NB: "Exp." reveals the sign we expect to prevail for each coefficient. *, ** and *** indicate significance at the 10%, 5% and 1% level. For comprehensive variable descriptions see Table 2.

the Hansen J statistic. Furthermore, we cannot reject the hypothesis that the variable $CH340f_{i,t}^{TA}$ is actually exogenous. Hence we resort to re-estimating Equation (3) using fixed-effects OLS as robustness test in Section 6.2.

We conclude that general LLP are mainly driven by tax considerations and not additionally by macroeconomic conditions. On the one hand, this finding interferes with their purpose of covering latent risks in the loan portfolio and is 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 possibility to build hidden 340f-reserves that were shown to be countercyclical by Bornemann, Kick, Memmel, and Pfingsten (2012).

6 Robustness

6.1 Specific LLP

Fixed-effects OLS The results in Section 5.3.1 were derived using GMM estimations. The use of such approaches requires to find instruments that are both valid and relevant which is a major challenge in our setting. The Hansen tests for all macro variables indicate our instrument set to be valid. However, as we mentioned we had to resort to deeper lags to obtain valid instruments. As a result, the coefficient of $SLLP_{i,t-1}^{TA}$ was surprisingly negative and not significant. Unfortunately, we are unable to test the relevance of the instruments. To address this concern we resort to re-estimating Equation (2) using a plain fixed-effects OLS technique as robustness check.

Including the lagged value of the dependent variable $SLLP_{i,t-1}^{TA}$ 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)). However, 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) as a robustness test in our setting.

Results from re-estimating Equation (2) using OLS with bank-fixed effects on the full sample for each macro variable are given in Table 6.

Most notably, we do not observe a sign change in any of the important variables over all three models (C.1 - C.3) which backs our results from Section 5.3.1. In fact, the results remain qualitatively the same. On the one hand the coefficient for $NDI_{i,t}^{TA}$ is slightly larger than in the GMM model, and on the other hand, the coefficient for $CHNPL_{i,t+1}^{TA}$ is slightly smaller. Furthermore, most control variables remain unchanged. The only sign changes we observe are for $LNTA_{i,t}^{TA}$ and $SLLP_{i,t-1}^{TA}$, the latter being highly significant. We attribute this to the rather weak relevance of the instruments in the GMM model supporting our initial assumption that banks only gradually adjust their provisioning level over time. To

		Dependent variable: $SLLP_{i,t}^{TA}$		
Independent variables	Exp.	C.1	C.2	C.3
$RATIO_t$	(+/-)	0.002***		
		(0.000)		
$GDPGR_{i,t}$	(+/-)		0.003***	
			(0.001)	
GAP_t	(+/-)			0.002*
				(0.001)
$NDI_{i,t}^{TA}$	(+)	0.219***	0.212***	0.211***
		(0.009)	(0.009)	(0.009)
$CHNPL_{i,t+1}^{TA}$	(+)	0.017***	0.016***	0.016***
		(0.002)	(0.002)	(0.002)
$CHNPL_{i,t}^{TA}$	(+)	0.082***	0.083***	0.081***
		(0.002)	(0.003)	(0.003)
$OL_{i,t-1}^{TA}$	(+)	0.004***	0.005***	0.005***
		(0.000)	(0.000)	(0.000)
$TIER12_{i,t-1}^{RWA}$	(+/-)	-0.007***	-0.007***	-0.008***
		(0.001)	(0.001)	(0.001)
$NDI_{i,t+1}^{TA}$	(+/-)	0.005	0.015***	0.014**
		(0.006)	(0.006)	(0.006)
$SIG_{i,t+1}^{TA}$	(+)	-0.053***	-0.073***	-0.075***
		(0.006)	(0.006)	(0.006)
$LNTA_{i,t}^{TA}$	(+/-)	-0.080***	-0.027	-0.028
		(0.022)	(0.021)	(0.021)
$SLLP_{i,t-1}^{TA}$	(+)	0.180***	0.178***	0.177***
		(0.010)	(0.010)	(0.010)
Observations		25,994	25,994	25,994
No. of banks		3,965	3,965	3,965
R_{within}^2		0.285	0.281	0.281

Table 6: Fixed-effects OLS estimations for specific LLP.

NB: Coefficient estimates stem from fixed-effects OLS estimations with standard errors that are robust to heteroscedasticity and autocorrelation. For comprehensive variable descriptions see Table 1. "Exp." reveals the sign we expect to prevail for each coefficient. *, ** and *** indicate significance at the 10%, 5% and 1% level.

sum up, the results in Table 6 are fully in line with the results we derived in Section 5.3.1 which affirms our assumption that the Nickell bias in our sample is indeed rather small.

Subsectors A second concern addresses the validity of our results for the different subsectors of the German banking sector. As emphasized in Section 5.1 our sample reflects the particularities of the German banking sector and is thus dominated by *Coops* and *Savings banks*. Consequently, we re-estimate Equation (2) for all three subsectors to assess the validity of our first model for the different subsectors (*Coops*, *Savings banks* and *Commercials*). Obtaining the same results for all subsectors would affirm our hypothesis that the main findings are not driven by any sector-specific characteristics. The results are presented in Table 7. For the sake of brevity, only the results for the estimation including $RATIO_t$ are discussed. However, the results for $GDPGR_{i,t}$ and GAP_t are also highly significant and qualitatively the same across all subsectors (available on request). The same holds true for the other variables of interest.

		Dependent variable: $SLLP^{TA}_{i,t}$			
Independent variables	Exp.	D.1 *(Full Sample)*	D.2 *(Coops)*	D.3 *(Savings banks)*	D.4 *(Commercials)*
$RATIO_t$	(+/-)	0.001**	0.001***	0.001**	0.002**
		(0.000)	(0.000)	(0.000)	(0.001)
$NDI^{TA}_{i,t}$	(+)	0.227***	0.197***	0.287***	0.270***
		(0.009)	(0.011)	(0.016)	(0.038)
$CHNPL^{TA}_{i,t+1}$	(+)	0.013***	0.022***	0.024***	0.015*
		(0.004)	(0.006)	(0.004)	(0.008)
$CHNPL^{TA}_{i,t}$	(+)	0.077***	0.084***	0.088***	0.062***
		(0.003)	(0.005)	(0.004)	(0.010)
$OL^{TA}_{i,t-1}$	(+)	0.003***	0.002*	-0.001	0.005***
		(0.001)	(0.001)	(0.001)	(0.001)
$TIER12^{RWA}_{i,t-1}$	(+/-)	-0.015***	-0.011***	-0.018***	-0.009**
		(0.002)	(0.004)	(0.002)	(0.003)
$NDI^{TA}_{i,t+1}$	(+/-)	0.014*	0.004	-0.064***	-0.033
		(0.009)	(0.012)	(0.013)	(0.026)
$SIG^{TA}_{i,t+1}$	(+)	-0.085***	-0.067***	0.012	-0.023
		(0.013)	(0.022)	(0.014)	(0.031)
$LNTA^{TA}_{i,t}$	(+/-)	0.026***	0.017**	0.006	-0.017
		(0.004)	(0.006)	(0.005)	(0.014)
$SLLP^{TA}_{i,t-1}$	(+)	-0.097	0.261	0.141*	0.247***
		(0.126)	(0.242)	(0.083)	(0.078)
Observations		25,994	18,094	6,799	1,101
No. of banks		3,965	3,051	737	177
No. of instruments		12	12	12	12
AR(1) (p-value)		0.006	0.007	0.000	0.000
AR(2) (p-value)		0.310	0.293	0.484	0.352
Hansen (p-value)		0.903	0.633	0.081	0.274

Table 7: GMM estimations for specific LLP across different subsectors.

NB: Coefficient estimates stem from dynamic panel estimations with Windmeijer (2005) corrected standard errors (given in brackets below the coefficients). For comprehensive variable descriptions see Table 1. "Exp." reveals the sign we expect to prevail for each coefficient. *, ** and *** indicate significance at the 10%, 5% and 1% level. For the sake of brevity, only the results for the estimation including $RATIO_t$ are presented in the table. However, the results for $GDPGR_{i,t}$, GAP_t are highly significant and qualitatively the same across all subsectors. The same holds true for the other variables of interest.

We observe that the results for the variables that measure to what extent banks account for losses through the cycle are stable across all subsectors. Still, earnings manage-

ment is the most pronounced motive and leads to countercyclical application of specific LLP. There is mixed evidence for signaling since we only retain the negative and significant coefficient for *Coops*. Moreover, our results imply that size effects, too, depend on the bank category. In the light of previous GMM results it does not come as a surprise that the coefficients we obtain for $SLLP^{TA}_{i,t-1}$ vary in terms of sign, size and significance. As before, this effect disappears if we estimate the model again using fixed-effects OLS (not reported, but available on request).

Discretionary backward-looking items Appendix A.1 outlines the different components of a compensatory account that banks can use to hide income and expenses from different positions. Among other things it is pointed out that the net profit or loss from securities of the liquidity reserve (NSL) and specific LLP (plus DWO) share the same characteristics in terms of P&L relevance, regulatory capital, tax-deductibility and disclosure, at least for banks that use the standardized approach to credit risk. Hence, it could be argued that these three components are managed together despite their quite different nature, i. e. that security losses are compensated with the release of specific LLP or vice versa. It should be noted that the amount of discretion that is associated with the valuation of NSL is fairly limited 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. Nonetheless, we account for this possibility in Equation (4).

$$\begin{aligned} DISCBL^{TA}_{i,t} &= \beta_0 + \beta_1 \cdot RATIO_t/GDPGR_{i,t}/GAP_t + \beta_2 \cdot NDI^{TA}_{i,t} \\ &+ \beta_3 \cdot CHNPL^{TA}_{i,t+1} + \beta_4 \cdot CHNPL^{TA}_{i,t} + \beta_5 \cdot OL^{TA}_{i,t-1} \\ &+ \beta_6 \cdot TIER12^{RWA}_{i,t-1} + \beta_7 \cdot NDI^{TA}_{i,t+1} + \beta_8 \cdot D^{SIG}_{i,t+1} \cdot NDI^{TA}_{i,t+1} \\ &+ \beta_9 \cdot LNTA^{TA}_{i,t} + \beta_{10} \cdot DISCBL^{TA}_{i,t-1} + \beta_{11} \cdot SECUR^{TA}_{i,t-1} \\ &+ \mu_i + \epsilon_{i,t} \end{aligned} \tag{4}$$

Like in Section 5.3.2, $DISCBL^{TA}_{i,t}$ denotes the sum of specific LLP, DWO and NSL of bank i in year t. In contrast to Equation (2), we include $SECUR^{TA}_{i,t-1}$ which is the first lag of the volume of securities bearing variable or fixed interest that are designated to be either held for trading or as a part of the liquidity reserve. This variable is intended to cover the non-discretionary fraction of NSL. The results for the GMM estimation are presented in Table 8.

The only major change we observe is the sign change of the coefficient for GAP_t. We are unable to find a final and conclusive explanation for this sign change. Conceivably bank managers manage specific LLP and NSL separately which distorts the results. Altogether, the core results remain the same.

Further model adjustments The model we set up in Equation (2) represents what we assume to be the key drivers of specific LLP. However, we test the robustness of our results for variations of our model specification (not reported, but available on request). First, we estimate the model without the signaling component ($NDI^{TA}_{i,t+1}$, $SIG^{TA}_{i,t+1}$) to account for the fact that banks did not have to report the amount of specific or general LLP before 2007 and might just not have recognized their potential as a signaling tool

		Dependent variable: $DISCBL_{i,t}^{TA}$		
Independent variables	Exp.	E.1	E.2	E.3
$RATIO_t$	(+/-)	0.000		
		(0.001)		
$GDPGR_{i,t}$	(+/-)		0.041***	
			(0.006)	
GAP_t	(+/-)			-0.032***
				(0.003)
$NDI_{i,t}^{TA}$	(+)	0.262***	0.279***	0.261***
		(0.010)	(0.011)	(0.010)
$CHNPL_{i,t+1}^{TA}$	(+)	0.030***	0.036***	0.032***
		(0.005)	(0.006)	(0.004)
$CHNPL_{i,t}^{TA}$	(+)	0.056***	0.076***	0.069***
		(0.003)	(0.005)	(0.003)
$OL_{i,t-1}^{TA}$	(+)	0.001	0.001	0.002**
		(0.001)	(0.001)	(0.001)
$TIER12_{i,t-1}^{RWA}$	(+/-)	-0.013***	-0.008***	-0.010***
		(0.003)	(0.003)	(0.002)
$NDI_{i,t+1}^{TA}$	(+/-)	-0.043***	-0.037***	-0.035***
		(0.009)	(0.008)	(0.008)
$SIG_{i,t+1}^{TA}$	(+)	-0.025	0.013	-0.040***
		(0.021)	(0.009)	(0.013)
$LNTA_{i,t}^{TA}$	(+/-)	0.015***	0.015***	0.017***
		(0.006)	(0.005)	(0.004)
$DISCBL_{i,t-1}^{TA}$	(+)	0.211	0.405*	0.193
		(0.274)	(0.235)	(0.186)
$SECUR_{i,t-1}^{TA}$	(+)	0.003***	0.005***	0.004***
		(0.001)	(0.001)	(0.001)
Observations		25,994	25,994	25,994
No. of banks		3,965	3,965	3,965
No. of instruments		13	13	13
AR(1) (p-value)		0.026	0.001	0.001
AR(2) (p-value)		0.455	0.121	0.226
Hansen (p-value)		0.973	0.424	0.290

Table 8: GMM estimations for the sum of discretionary backward-looking items.

NB: Coefficient estimates stem from dynamic panel estimations with Windmeijer (2005) corrected standard errors (given in brackets below the coefficients). For comprehensive variable descriptions see Table 1. "Exp." reveals the sign we expect to prevail for each coefficient. *, ** and *** indicate significance at the 10%, 5% and 1% level.

yet. Our results remain the same for all macro variables and subsectors, no matter if we use GMM or OLS.

In addition, the introduction of the new Basel II capital rules in 2007 might have changed the capital management behavior of German banks. However, in terms of LLP only IRB banks were affected by this change. The sample that we use is highly dominated by banks that use the standardized approach to credit risk. Nonetheless, we add $TIER12^{RWA}_{i,t-1} \cdot D^{TIER12}_{i,t+1}$ to Equation (2) where $D^{TIER12}_{i,t+1}$ is a dummy variable that takes the value 1 in the years 2007 to 2011 and 0 otherwise. The coefficient for this Basel II effect in the *Commercials* category that is essentially the only category containing IRB banks is close to zero and insignificant. Again, the results for the set of other regressors remain unchanged for all macro variables, subsectors and estimation methods.

Similarly, we re-estimate Equation (2) and replace $TIER12^{RWA}_{i,t-1}$ with $TIER2^{RWA}_{i,t-1}$ which is the amount of Tier 2 capital only. The reason for this replacement is that specific LLP are only part of Tier 2 capital. However, we deem it more likely that banks rather manage their regulatory capital as a whole and do not separately manage Tier 1 and Tier 2 capital. Again, we do not observe any changes.

Finally, we re-estimate Equation (2) without the first lag of the dependent variable which yields a static panel model. If banks did not base the amount of specific LLP that they build or release on the amount of the previous period, the static model would allow a consistent estimation. We conduct this robustness test due to the mixed evidence regarding $SLLP^{TA}_{i,t-1}$. The modification does not change the sign of any coefficient.

6.2 General LLP

Fixed effects In Section 5.3.2 we were unable reject the hypothesis that the variable $CH340f^{TA}_{i,t}$ is actually exogenous. Hence we will resort to re-estimating Equation (3) using fixed-effects OLS. The results are presented in Table 9.

Several findings are notable. First, there is a weak, but now highly significant coefficient on $NDI^{TA}_{i,t}$ which confirms the results from the GMM estimation. Second, we find a negative influence of $CH340f^{TA}_{i,t}$ implying that bank managers that have already built 340f-reserves for market risk tend to build less general LLP. The overall results are still dominated by $GLLPTD^{TA}_{i,t}$, which is additionally reflected in the high R^2 values. Concisely, none of the variables to measure cyclical effects of general LLP exhibits any economically significant influence on $GLLP^{TA}_{i,t}$. This is in line with our hypothesis that general LLP are for the most part used to exploit tax benefits. We outlined before that the related formula relies largely on past specific LLP and hence holds procyclical potential which is mitigated through the principle of conservatism in German Commercial Code.

Further model adjustments We conduct the same model adjustments as for specific LLP (no signaling, Basel II, Tier II capital). None of these adjustments changes the results. Further tests that leave out one or more control variables (except for $GLLPTD^{TA}_{i,t}$) do neither change the magnitude, nor do they the change sign of the coefficients or the overall quality of the regression, as measured by the R^2. For reasons of brevity, they are not presented here, but are available upon request.

Independent variables	Exp.	Dependent variable: $GLLP_{i,t}^{TA}$ F.1	F.2	F.3
$RATIO_t$	(+)	0.000		
		(0.000)		
$GDPGR_{i,t}$	(+)		0.000	
			(0.000)	
GAP_t	(+)			0.000
				(0.000)
$NDI_{i,t}^{TA}$	(+)	0.007***	0.007***	0.007***
		(0.002)	(0.002)	(0.002)
$CHNPL_{i,t+1}^{TA}$	(+)	-0.002***	-0.002***	-0.002***
		(0.000)	(0.000)	(0.000)
$IBL_{i,t-1}^{TA}$	(+)	0.000**	0.000**	0.000**
		(0.000)	(0.000)	(0.000)
$TIER12_{i,t-1}^{RWA}$	(+/-)	0.000	-0.000	-0.000
		(0.000)	(0.000)	(0.000)
$NDI_{i,t+1}^{TA}$	(+/-)	-0.001	-0.000	-0.001
		(0.001)	(0.001)	(0.001)
$SIG_{i,t+1}^{TA}$	(+)	-0.001	-0.002	-0.001
		(0.002)	(0.002)	(0.002)
$LNTA_{i,t}^{TA}$	(+/-)	-0.016	-0.018	-0.017
		(0.014)	(0.013)	(0.013)
$GLLPTD_{i,t}^{TA}$	(+)	0.677***	0.676***	0.677***
		(0.030)	(0.030)	(0.030)
$CH340f_{i,t}^{TA}$	(-)	-0.007***	-0.008***	-0.007***
		(0.003)	(0.003)	(0.003)
$DISCBL_{i,t}^{TA}$	(-)	-0.004	-0.004*	-0.004
		(0.003)	(0.003)	(0.003)
Observations		5,373	5,373	5,373
No. of banks		597	597	597
R_{within}^2		0.660	0.660	0.660

Table 9: Fixed-effects OLS estimations for general LLP.

NB: "Exp." reveals the sign we expect to prevail for each coefficient. *, ** and *** indicate significance at the 10%, 5% and 1% level. For comprehensive variable descriptions see Table 2.

7 Conclusions

Increased LLP during downturns may reduce banks' regulatory capital and 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 expected losses via forward-looking LLP can help to mitigate these effects. This was the starting point of this study.

Using a unique sample of 4,392 banks over the period 1994-2011 when German banks were subject to an accounting regime that allows expected losses to be considered in the build-up and release of specific and general LLP, we find significant countercyclical provisioning behavior for specific LLP and no explicit cyclical effects for general LLP to be prevalent in the data. This finding mainly stems from earnings management, to a lesser extent from prudent provisioning and is robust across different macro variables. Regulatory capital management seems to play a less important role. The build-up and release of general LLP predominantly follows tax considerations whereas earnings and regulatory capital management are of minor importance. Signaling is not an important issue in both parts of the empirical analysis. These findings are robust to various model specifications.

Essentially, 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 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 but it simultaneously increases managerial discretion that serves other purposes like earnings management. Altogether, we do not want to conceal that beyond prudential credit risk assessment, loan loss provisioning seems to be an instrument for earnings management. But even then, loan loss provisioning models which account for expected losses can contribute to more financial stability according to our results.

Our findings give some notable insights. First, generally endowing German banks with more discretion in the build-up and release of LLP comes along with countercyclical effects, which is desirable. Second, our findings with respect to earnings management show that German banks use their discretion for purposes that are not necessarily in line with a true and fair view of a bank's financial condition. In this regard, 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. Hence, decision-makers should be careful when it comes to the specific design of an expected loss model. Third, tax deductibility is an important driver of LLP in individual accounts, as we were able to show for general LLP. 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.

Certainly, the ultimate goal is to identify the effects of different provisioning rules on the lending behavior of banks. 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.

A Appendices

A.1 Reserves and cross compensation under German Commercial Code

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 (which still exists) expenses from building (income from releasing) specific LLP, general LLP, DWO and 340f-reserves (outlined below) may be offset against expenses from impairment (income from appreciation) of securities designated as the "liquidity reserve", which is a specific asset category for banks. In a nutshell, banks are allowed to present a single income *or* expense number in their income statement that combines success or failure from two very different lines of business of major importance. Detailed information on each single component were provided confidentially to auditors and supervisors only. Since 2007, however, banks are required to publish information on the development of both write-offs as well as specific and general LLP in a separate report ("Offenlegungsbericht") that complements a bank's financial statement (Bundesministerium der Finanzen (2006)).

In addition to specific and general LLP, German banks are allowed to create *hidden* 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 those assets that form a part of the compensatory account outlined above (i. e. customer and interbank loans, bonds, other fixed-income securities, shares and securities bearing variable interest that are designated as part of 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. Being part of the compensatory account, changes in 340f-reserves as well as their level do not need to be disclosed separately. Such information, again, has to be solely provided to auditors and supervisors who are responsible for monitoring the compliance with the limit of 4%. Economically, 340f-reserves are nothing less than hidden retained earnings. For this reason, they are not tax-deductible, but currently part of a bank's Tier 2 capital.

Next to the different positions listed above bank managers can build *visible* reserves according to Section 340g HGB. 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. Similar to 340f-reserves, these 340g-reserves economically are retained earnings. Hence, they are not tax-deductible either but fully count as Tier 1 capital or even core equity Tier 1 capital under the forthcoming Basel III framework because of their visibility on a bank's balance sheet. In contrast to 340f-reserves, the volume of

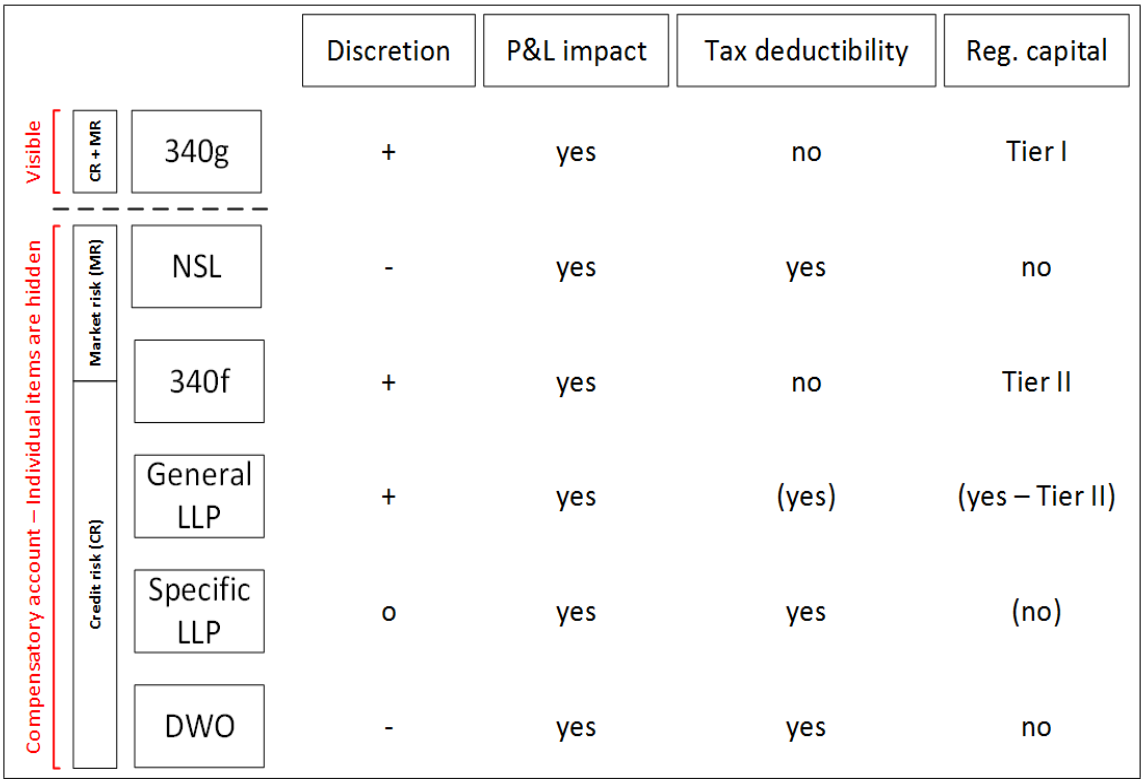

Table 10: Cross compensation under German Commercial Code.

340g-reserves is only limited by shareholder pressure.

Table 10 gives an overview of the compensatory account and the different characteristics of specific and general LLP, DWO, 340f-reserves, net security losses, and 340g-reserves.

A.2 The German banking sector

The German banking sector consists of three subsectors. The first one (*"Coops"*) 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 (*"Commercials"*) comprises large and internationally operating commercial banks as well as regionally operating institutions. Whilst the large commercial banks, many of them excluded due to their IFRS reporting, are listed companies, the regional banks 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 11 gives an overview on the number of banks observed in the panel and the split between bank categories per year.[22]

As it reflects the structure of the German banking sector the sample is dominated by *Coops* and *Savings banks*. *Savings banks*, which are the primary competitors of *Coops*, are averagely larger in terms of their customer loan volume and their total assets. Considering their plain numbers, *Commercials* are of less importance. It could be argued that the high number of *Coops* and *Savings banks* in our sample drives the estimation results. We address this issue by re-estimating our model for each subsector in a robustness test. The declining total number of observations during the sample period reflects the persistently high numbers of mergers (particularly between *Coops* and between *Savings banks*) in the German banking market.

	Coops		*Savings banks*		*Commercials*		*Total*	
Year	No.	Row %	No.	Row %	No.	Row %	No.	Col. %
1995	2,191	76.05%	571	19.82%	119	4.13%	2,881	9.44%
1996	2,132	75.71%	580	20.60%	104	3.69%	2,816	9.22%
1997	1,922	73.92%	587	22.58%	91	3.50%	2,600	8.52%
1998	1,642	71.21%	564	24.46%	100	4.34%	2,306	7.55%
1999	1,378	68.05%	539	26.62%	108	5.33%	2,025	6.63%
2000	1,245	66.65%	516	27.62%	107	5.73%	1,868	6.12%
2001	1,190	66.89%	493	27.71%	96	5.40%	1,779	5.83%
2002	1,157	68.14%	452	26.62%	89	5.24%	1,698	5.56%
2003	1,153	68.71%	444	26.46%	81	4.83%	1,678	5.50%
2004	1,154	69.14%	441	26.45%	74	4.43%	1,669	5.47%
2005	1,133	69.42%	429	26.29%	70	4.29%	1,632	5.34%
2006	1,133	70.24%	415	25.99%	65	4.03%	1,613	5.28%
2007	1,088	70.10%	401	25.84%	63	4.06%	1,552	5.08%
2008	1,016	69.12%	398	27.02%	56	3.81%	1,470	4.81%
2009	1,018	68.55%	406	27.34%	61	4.11%	1,485	4.86%
2010	1,038	71.00%	358	24.49%	66	4.51%	1,462	4.79%
Total	21,590	70.71%	7,594	24.87%	1,350	4.42%	30,534	100.00%

Table 11: 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.

[22]The total number of observations in Table 11 differs from the number of observations reported in the analysis because at this point, leads or lags of dependent variables are not yet included.

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