To Use or Not to Use - An Empirical Study of Visible Reserves in Bank Accounting in the Light of Regulatory Requirements and Informational Asymmetries*

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Abstract

The German Commercial Code ('HGB') allows banks to build visible reserves for general banking risks according to para. 340g HGB. Setting aside these 'GBR-reserves', in addition to their risk provisioning function, may also be used for enhancing capital endowment, internal financing or earnings management purposes. We analyze German banks' financial statements for the period from 1993 through 2005 to reveal bank type specific patterns in using GBR-reserves. Our empirical investigation is based on a large, unbalanced panel of German banks including 22,080 observations. We explain our findings by regulatory reasons and existing information asymmetries as well as by the legal status and the ownership structure of the banks. We see (1) the use of GBR-reserves increasing over time. Furthermore, we can say that GBR-reserves are primarily used by (2) large banks, (3) public banks, (4) banks reporting according to IAS/IFRS, and (5) banks with comparatively low regulatory capital endowment. Moreover, our results show that (6) predominantly banks which are not thrifts and cooperatives are making use of GBR-reserves, and (7) that GBR-reserves are used for earnings management purposes.

1 Introduction

Banks are considered to be rather opaque and intransparent institutions compared to many other industries.[1] Insight into and understanding of the banking business is not widespread within the public. Existing bank-specific accounting rules certainly add to this image to a great extent. These special norms and the emerging lack of transparency in banks' financial reporting are justified by the particular kinds and levels of risk banks are exposed to. Confidence into and stability of the banking sector are deemed to be vital for the well-being of the world's economies.

To achieve these objectives, on the one hand regulatory bodies impose certain restrictions on the amount of risky assets held by banks in relation to their capital resources.[2] On the other hand, legal bodies quite generally allow the building of reserves and loss provisions within the financial statements of banks. The German Commercial Code ('HGB') in particular contains two unique but very different instruments permitting banks to build reserves. Firstly, para. 340f HGB allows for deliberately undervaluing specified financial assets within certain limits. This is often referred to as creating *hidden reserves* (for simplicity henceforth called '340f-reserves'). Secondly, a bank may increase its visible, so called 'reserves for general banking risks' in accordance with para. 340g HGB (for simplicity henceforth called 'GBR-reserves'). Those two types of reserves differ strongly with respect to their visibility on the balance sheets. Thus, banks may be using them for very different reasons. GBR-reserves are the main focus of this paper.

340f-reserves certainly contribute to the perceived opaqueness of banks as they undermine the pre- and post-decision information functions of accounting regulations.[3] To some extent, this also holds for GBR-reserves. They are visible, but it is not obvious for external observers whether they represent existing risks or

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1 Cf. Morgan (2002), Flannery et al. (2004), or Ianotta (2006), for example.

2 In this context we refer to the rules of BCoBS (2006) (henceforth *Basel II*) which, for instance, are transformed into German law via the *German Solvency Regulation* since 2007/01/01.

3 For a closer look onto the information functions of accounting cf. Beaver/Demski (1979), pp. 43-45.

whether they were just being built as part of the bank's earnings management. Furthermore, they may also have been built for enhancing capital endowment and internal financing purposes. However, these aims can also be achieved by other means, for instance (hidden) 340f-reserves, retaining earnings, or raising new equity.

We examine which banks are using GBR-reserves and for what reason. Therefore, we analyze the evolution of this balance sheet item on the bank-level over time, controlling for the influence of variables such as the group the bank belongs to, the size of the bank, and other characteristics like legal background or regulatory capital endowment. Regulatory constraints as well as concepts such as the Pecking Order Theory focussing on information asymmetries help to provide explanations for our findings and enable us to identify key factors responsible for any occurring changes in the use of GBR-reserves.

Our empirical analysis is based on a large, unbalanced panel of German banks. Following the theoretical background introduced beforehand, we derive some hypotheses and test them with the help of descriptive analysis and various regression models. Our findings are to a noticeable extent consistent with the predictions implied by information asymmetry introduced before. We see (1) the use of GBR-reserves increasing over time. Furthermore we can say that GBR-reserves are primarily used by (2) large banks, (3) public banks, (4) banks reporting according to international financial reporting standards in addition to HGB, and (5) banks with comparatively low regulatory capital endowment. Moreover, our results show that (6) predominantly banks which are not thrifts or cooperatives are making use of GBR-reserves, and (7) that GBR-reserves are used for earnings management purposes.

The remainder of this paper is organized as follows: In Section 2 we review the related literature presenting theoretical aspects of risk provisioning and earnings management in general as well as GBR-reserves and 340f-reserves in particular. Section 3 introduces the legal background as well as motives for and alternatives to showing GBR-reserves. Moreover, particularly the informational perspective on the use of those reserves is evaluated. The section ends with the deduction of our hypotheses. Section 4 presents the data set and the results of our empirical analysis. Finally, Section 5 provides some concluding remarks.

2 Related Literature

To the best of our knowledge, there does not exist any empirical analysis of GBR-reserves from the perspective of the economics of information. However, risk provisioning in general as well as bank loan-loss accounting in particular have been widely discussed in the past.

On an **international level**, there are several papers taking an empirical perspective on loan-loss provisioning. Madura/McDaniel (1989) as well as Grammatikos/Saunders (1990) analyze the effects of Citicorp's and other U.S. money-center banks' announcements to increase loan-loss reserves for Third World loans on the stock prices of those banks. They find heterogeneous evidence among the banks. Docking et al. (1997) study differences in contagion effects of bank loan-loss reserve announcements between money-center and regional banks in the USA for the period from 1985 to 1990. Surprisingly and partly contrasting the former studies, they find negative and statistically significant announcement effects together with contagion effects between regional banks. Pinho (1997) analyzes the determinants of loan-loss provisions for the Portuguese banking market. He finds that public banks' risk provisions for doubtful loans on average exceed the level of other banks. Ahmed et al. (1999) find strong support for loan-loss provisions being used for capital management. However, they do not find earnings management to be an important determinant for loan-loss provisioning in banks. Wall/Koch (2000) review theoretical and empirical evidence on bank loan-loss accounting yet available at that time. To do so, they take very different perspectives on banking regulation and capital management. Finally, Laeven/Majnoni (2003) fathom the relationship between loan-loss provisioning and overall economic slowdowns.

Another important strand of literature mainly focuses on all kinds of *earnings management* and its ties to bank loan-loss provisioning. Scheiner (1981) uses data from 107 U.S. banks for the period from 1969 through 1976 but does not detect relations between provision allowances and proxies for good or bad years of a bank. Similarly, Greenawalt/Sinkey (1988) conducts regressions with provisions as dependent variable and bank income as well as macroeconomic data as independent variables. They find significant evidence for earnings management

among U.S. banks. More recently, Bhat (1996) by analyzing a panel of U.S. banks from 1981 through 1991 identifies low-growth banks with a high loans to deposits ratio and high leverage to be more likely to carry out income smoothing. Lobo/Yang (2001) analyze bank managers' decisions on discretionary loan loss provisions to smooth income and to manage capital requirements. Eventually, Kanagaretnam et al. (2004) investigate the relationship between signalling and earnings management through bank loan-loss provisions. They find bank managers to use loan-loss provisions as a means of communicating private information about the bank's future prospects. Furthermore, they find this propensity to be greater if a bank is performing badly and if it is undervalued.

Since para. 340f and 340g HGB are specific German rules, most of the existing papers dealing with them merely discuss theoretical aspects of the **German banking market** and the underlying accounting system. Shortly after their integration into German banking legislation in 1993, Waschbusch (1994) illustrates the main features of visible reserves. He argues that particularly internationally operating German banks will increasingly use GBR-reserves to improve their standing. Following up, Emmerich/Reus (1995) are the first to discuss visible and hidden reserves from a mainly informational perspective while also showing accounting implications for the bank's management in Germany. Besides commenting on the economic consequences for each single bank they also put the decision process into a macroeconomic context of accounting and regulation.

Regarding the German banking market, so far only Wagener et al. (1995) take an empirical perspective, but that was limited to the year 1993. They study 125 financial statements and 35 group financial statements. However, they do not put a special focus on the use of risk provisions but rather analyze all positions of the banks' balance sheets and profit and loss accounts. With respect to GBR-reserves, their scope is on describing how many banks already showed those reserves in 1993, the year of their first implementation. Wagener et al. (1995) do not try to explain any patterns by informational aspects as we do in the following.

Our paper contributes to the literature in several ways. Firstly, we analyze financial statements of a panel of 3,078 German banks, i.e. the largest sample examined so far. The analysis covers the period from 1993 (introduction of

GBR-reserves) through 2005, yielding a considerable time series of up to 13 accounting years for each bank. Most importantly, by relating our empirical results to accounting and regulatory properties as well as informational aspects of GBR-reserves, we are able to test a number of hypotheses which shed light on some serious agency issues.

3 Theoretical Background

3.1 Legal Framework

A closely related regulation to building visible reserves according to para. 340g HGB in Germany is para. 340f HGB which allows building hidden reserves.[4] These are formed by deliberately undervaluing certain securities designated as so called liquidity reserve according to HGB. 340f-reserves are referred to as hidden because their use is not apparent from the balance sheets or profit and loss accounts. The decision to undervalue those assets is in the hands of a bank's management alone. However, the amount of 340f-reserves is limited to 4% of the overall value of the financial assets before the undervaluation takes place. They have to be eliminated when filing the tax statement, hence they are not influencing the bank's tax payments. Under the leading international financial accounting regimes IAS/IFRS and US-GAAP[5] there is no corresponding rule, i.e. creating hidden reserves equivalently is not possible.[6]

The liability item called 'Reserves for General Banking risks' on the balance sheets of banks is a forthright consequence of the EC Bank Accounts Directive in 1986, integrated into German law in para. 340g HGB. According to Art. 38 of this directive, members of the EC who kept on allowing their banks to build hidden reserves (e.g. Germany by means of para. 340f HGB) had to enable dis-

[4] Though this kind of reserves is not the main focus of our paper, it is important to be aware of the major differences when compared to GBR-reserves for understanding the central arguments following in the next sections.

[5] Since the vast majority of banks in our sample uses IAS/IFRS, we will talk of 'IAS accounting' for short when referring to any international financial accounting regime.

[6] However, IAS 30.50 still being effective during the period of our analysis, allowed disclosing amounts for general banking risks.

closure of GBR-reserves as well.[7] The aim was to counterbalance the permission to create hidden reserves and thus to increase pressure on banks to turn away from a policy of minimum disclosure.[8]

Funding and release of GBR-reserves have to be shown in separate items of the income statement of banks. Since their variation within one year is visible in the balance sheets, the corresponding amount can be traced in the profit and loss account easily.[9] In line with para. 340g HGB the amount of reserves must be 'reasonable'. However, it is not restricted to any particular level as long as it does not end in net income being negative after raising GBR-reserves. Their funding does not influence tax payments. In a regulatory context they are acclaimed as tier 1 capital according to para. 10 Section II a, b of the German Banking Act ('KWG'), while, in contrast, 340f-reserves are merely acknowledged as tier 2 capital. The higher quality of regulatory capital assigned to visible reserves can be regarded as another incentive to increase corporate disclosure.[10]

The decision whether or not to fund or release GBR-reserves is fully in the hands of the bank's management. Approval by shareholders is not needed when building GBR-reserves. The reserves must not be dedicated to cover the risks of certain specified assets. Therefore GBR-reserves show key features of equity. However, from a purely legal point of view they have to be shown separately.

3.2 Motives for using GBR-reserves

As discussed above, GBR-reserves are most intuitively a means of risk provisioning to cover general banking risks. Accordingly, they are not to be set aside against any particular kind of risk as, for instance, credit default risk or market risk. However, given this **risk provisioning** and **internal capital accumulation** functions, there exist additional, very different major motives for using

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7 For details cf. European Commission (1986).

8 Cf. for example Bauer (1987), p. 864, and Krumnow et al. (2004), pp. 604f.

9 However, if a bank chooses to convert hidden reserves into visible ones, the conversion does not affect the profit and loss accounts. In this case, GBR-reserves increase on the balance sheet while the corresponding profit and loss account item remains unchanged.

10 Cf. Krumnow et al. (2004), p. 607.

those reserves. In this section, we will introduce four of them. The next two sections will briefly compare GBR-reserves with some alternatives with respect to these features (Section 3.3) and in the light of informational asymmetries (Section 3.4).

Firstly and most closely connected to risk provisioning is the need of a bank to enhance its **regulatory capital endowment**. According to Basel II and the German Solvency Regulation banks have to hold a certain amount of capital in relation to their risk weighted assets. GBR-reserves are acknowledged as tier 1 capital, so they can help eliminating regulatory capital shortages.

Secondly, increasing GBR-reserves can also be used as a way of **financing** and **cash flow management**. The level of earnings available for distribution to owners (dividends, say) is lowered by funding those reserves. Thus, free cash flow does not leave the bank but rather is at the management's disposal for financing new projects.[11]

Thirdly, building reserves can be considered as a type of **earnings management**. Bank managers often aim at assuring their stockholders a stable, maybe slightly growing annual dividend.[12] In economically bad periods, release of those reserves can help achieving stable net incomes and dividends, which is important to foster investors' confidence into the future prospects of a bank.

Lastly, another motive for using GBR-reserves is the obligation to disclose hidden 340f-reserves when a bank prepares its **financial statements according to IAS** in addition to HGB (we will henceforth simply call those banks 'IAS banks'). While building hidden reserves is explicitly approved in German accounting, IAS prohibit this. Consequently, if a German bank wishes or has to prepare its accounts according to IAS, it has to disclose its former 340f-reserves. It may then be interested in doing so within the financial statements according to

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[11] Cf. Christensen/Demski (2003), pp. 125-126 for the information content of cash flows and pp. 35-45 for their impact on a firm's value.

[12] An increase in the regular annual dividend is usually interpreted by investors as a sign of management's confidence in future earnings. Therefore, stock prices and the company's value are likely to rise following an increase in dividends. For further details, cf. the basic dividend model developed by Lintner (1956) and further research by Healy/Palepu (1988) as well as Benartzi et al. (1997).

HGB as well for two reasons: Hidden reserves are revealed within IAS accounts so they partly lose their latent characteristics anyway. Furthermore, getting rid of hidden reserves would make costly parallel book keeping redundant.

3.3 Alternatives to GBR-reserves

As indicated above, other instruments fulfilling the same functions differ from GBR-reserves with respect to the motives just introduced.

Risk provisioning and **internal capital accumulation** is also possible for German banks via *hidden 340f-reserves*. Deliberately undervaluing certain financial assets shows a lower than actual level of equity on the balance sheets. Risk provisioning can also be achieved by *retaining earnings* if the annual general meeting decides to leave the earnings in the bank. Retaining earnings does not diminish tax liabilities as it is part of the earnings distribution process. Raising new equity is a third alternative to cover unforeseeable risks. With respect to boosting a bank's **tier 1 capital endowment**, *retaining earnings* and *raising new equity* are equivalent alternatives to increasing GBR-reserves, too.[13] In this respect, 340f-reserves are not equivalent because they are acknowledged as tier 2 capital only. For **financing** and **cash flow management** purposes banks can also use *340f-reserves*, *retain earnings* for internal or *raise new equity* or *debt* for external finance. **Earnings management** can (besides using GBR-reserves) be achieved by hidden *340f-reserves*. Using retained earnings is not an alternative since this belongs to the sphere of profit distribution. Thus, it influences declared profits but does not affect net income. Raising new equity does not have any impact in this context at all.[14] In years of economic well-being profits will suffice to distribute stable or slightly growing dividends. At the same time, bank management may deliberately undervalue assets within the given limits (according to para. 340f HGB). These undervaluations can be

[13] A bank may also influence its regulatory capital endowment by reducing their risk weighted assets or influencing other determinants of tier 1 capital (for instance the valuation of intangible assets), of course. However, we ignore the former because it requires changes on the asset side and the latter because it is closely related to 340f-reserves.

[14] Again, other means which may be used for this purpose are neglected in the further discussion

released in economically bad periods to still achieve dividend stability. Lastly, if a bank implements **financial accounting according to IAS**, it may decide to disclose hidden reserves by putting these funds into *retained earnings* rather than increasing GBR-reserves.[15]

3.4 Evaluation of GBR-reserves in the light of information asymmetries

Since the aim of financial accounting is to provide information, we follow the information content approach in this paper.[16] Clearly, information given via financial statements can be useful in a pre- and a post-decision manner. On the one hand, disclosure of accounting information will help potential investors when coming to an investment decision (pre-decision information function), e.g. because managers know that they will be held responsible for the reported results. On the other hand, financial accounting helps mitigating agency problems between bank managers and existing investors (post-decision information function).

To understand why management may prefer to make use of GBR-reserves rather than using one of the presented alternatives, informational aspects play a leading role. Therefore, we will now analyze GBR-reserves and the other instruments fulfilling similar functions from an informational point of view. Since bank managers are the ones to choose, we will predominantly take their perspective as the basis for our evaluation. Doing so, some critical consequences of using GBR-reserves in general are not to be disregarded. Their building deprives owners of their right to decide about the appropriation of the bank's equity which may cause internal conflicts.

Serving **risk provisioning** and **internal capital accumulation** by using *340f-reserves* may (due to their hidden characteristics) help hiding a bad signalling

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[15] Showing these disclosed reserves as profits and distributing them to the owners of the bank is another option for the management. Since this distribution does neither serve financing nor risk provisioning purposes, it will not be regarded in further detail.

[16] Cf. Christensen/Demski (2003), pp. 3-6.

effect for potential investors.[17] Due to informational asymmetries between these investors and the bank's management, increasing visible GBR-reserves may be regarded as evidence for a risen risk level by the managers. In other words, building visible reserves may lead to a loss of confidence into the bank's economic prosperity. Hence, potential capital suppliers may refrain from investing in the company. However, this bad signalling effect is likely to vanish over time if more and more banks are using GBR-reserves.

In addition, it is important to note that this kind of bad signal is of different relevance for different types of institutions. Firstly, money-center banks are exposed to the signalling effect to the same extent as are smaller ones for the following reason: Economic well-being of large banks is assumed to have a huge impact on the stability of the whole financial system. Bankruptcy or illiquidity of such an institution may likely cause severe waves of uncertainty regarding the safety of bank deposits. Therefore, money-center banks are often held to be 'Too Big To Fail' (TBTF).[18] Governmental institutions are supposed to give support to periled banks to avoid financial instability. Hence, there is – probably – virtually no danger of insolvency for large, money-center banks.

Secondly, banks subject to public law (for simplicity henceforth called 'public banks'), e.g., thrifts as well as federal and state banks, may also not be exposed to this bad signal to the same extent as privately held banks. Maintenance obligation ('Anstaltslast') and guarantee obligation ('Gewaehrtraegerhaftung') formerly in place in Germany basically eliminated those banks' likelihood of bankruptcy or illiquidity.[19]

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[17] Putting aside all informational considerations for a moment, the cap of 4% of liquidity reserves on the amount of 340f-reserves may present a material drawback with respect to all functions. Confidential statements from practitioners, however, suggests that this limit is not really a binding restriction.

[18] TBTF policy firstly became famous in the U.S. in 1984, when the Federal Deposit Insurance Corporation (FDIC) decided to massively shore up Continental Illinois National Bank. This institution got into large financial disorder and repayment of a huge amount of deposits was endangered. For details cf. FDIC (1997), pp. 235-257.

[19] Maintenance and guarantee obligation have been an important characteristic of the German banking market for a long time. Since they did not comply with European competition regulations they had to be abolished in 2005. However, in our opinion the given consequences for the signalling effects are still prevalent. Moreover, our data set ends in 2005.

Retaining earnings serves the risk provisioning function as well. Regarding the decision process within the bank, managers may, however, prefer increasing GBR-reserves. Shareholders' or owners' approval is essential for retaining earnings and also for releasing them. Managers intending the earnings to cover general banking risks cannot be certain that these will not be distributed by the owners to themselves. Consequently, they may prefer to use their discretionary power to build GBR- or 340f-reserves instead. Since investors may anticipate this behavior, increasing GBR-reserves may comprise a bad signal stemming from informational asymmetries. Building reserves may indicate that bank managers are uncertain to get the shareholders' approval for retaining earnings. If shareholders believe the bank to be less profitable than an investment alternative at the same risk level, they will try to extract money by claiming a higher dividend. Due to their informational head start, the insiders' conceivable scepticism about the bank's prospects can be seen as a bad signal for outside investors, too. Based on the insiders' behavior, other capital market participants may be reluctant to invest money in the company. Nevertheless, this bad signal may disappear over time with an increasing use of GBR-reserves, too.

Like the one presented before, also this bad signal is much less relevant for some types of banks. The specific owner structure of public banks, which are generally held by cities and counties, makes them virtually independent of equity markets. There is no need to attract new shareholders and mechanisms of stock market valuation do not apply to this type of banks.

For *raising new equity* as a means of risk provisioning the main conclusions of the Pecking Order Theory developed by Myers (1984) and Myers/Majluf (1984) have to be taken into account. In short, companies prefer internal finance to debt and equity issuance. Once more, the basis for this theory are informational asymmetries between the management and potential investors of a company. If the managers believe a company to be undervalued, they will not raise new equity for financing purposes because investors will need to pay less than the company is worth. Vice versa, managers believing their company to be overvalued will likely issue stock since investors will pay above the company's value.

Thus, the attempt to sell stock shows that a company is typically overvalued.[20] Therefore issuing equity sends a worse signal about the managers' beliefs to capital markets than does raising funds internally. This may result in managers' preferring to increase GBR-reserves or to retain earnings rather than to issue equity.

Increasing a bank's **tier 1 capital endowment** can on the one hand be achieved by *retaining earnings*.[21] This avoids the bad signals described before arising from an increase in GBR-reserves. Another alternative is *raising new equity*. However, the line of argument concerning the Pecking Order Theory (as mentioned before) holds here as well.

For **cash flow management** and **financing purposes**, creating *340f-reserves* may be a wise alternative to GBR-reserves. As discussed before, management may prefer using these funds due to their hidden character. Doing so will not send a bad signal to the capital markets regarding the future prospects of the bank. Nevertheless, the quantitative limit on the amount of 340f-reserves has to be taken into account. *Retaining earnings* also avoids the bad signalling effect arising from GBR-reserves and the management's uncertainty about shareholders' approval for retaining earnings. However, in this context the decision process within the bank plays an important role again. Management cannot decide about the development of retained earnings and therefore has to convince shareholders to supply funds. Issuing new *debt* can also serve (external) financing purposes. However, it implies an increase in the financial distress costs a bank faces and with respect to Pecking Order Theory sends a worse signal to capital markets than does internal financing (GBR-reserves, say).

For the motive of **earnings management**, the only reasonable alternative to GBR-reserves is to use 340f-reserves. These can be released soundless in years with low surplus to achieve a stable net income. Again, the bad signal concerning the bank's future prospects may be avoided when using 340f- rather than GBR-reserves.

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[20] We concede to have simplified the results of the Pecking Order Theory for illustrative purposes quite a bit.

[21] Note that *340f-reserves* are not a meaningful alternative since they create tier 2 capital only.

Lastly, if a bank aims at implementing **financial accounting according to IAS** in addition to HGB, it may (besides converting hidden 340f- into GBR-reserves) also choose to leave 340f-reserves unchanged at least in their accounts according to HGB. Consequently, it will incur additional costs for maintaining these two accounting regimes. Moreover, 340f-reserves will lose the advantages being invisible since their level can (at least approximately) be estimated by looking at the IAS accounts.[22] Table 1 summarizes the most important results of our information-based considerations:

	GBR-reserves	**340f-reserves**	**retained earnings**	**new equity**
risk provisioning	visible	invisible	visible	visible
financing	no capital outflow	no capital outflow	no capital outflow	capital inflow
regulatory capital	Tier 1	Tier 2	Tier 1	Tier 1
earnings management	visible	invisible	n/a	n/a
switch to IAS	possible	n/a	possible	possible
decision-making	by management	by management	by shareholders	by shareholders
signals	bad signal from risk provisioning	none	none	bad signal from Pecking Order Theory

Table 1: Evaluation of GBR-reserves and its alternatives with respect to the analyzed motives

[22] Distribution of disclosed reserves to owners is another option. However, since this does not serve any of the described motives, we will not be looking at this alternative any closer.

3.5 Hypotheses

Starting from the theoretical considerations and the motives for using GBR-reserves discussed above, we arrive at the following hypotheses:

*H 1: The **size** of a bank has a positive impact on the management's decision of using GBR-reserves.*

This hypothesis refers to the fact that the bad signalling effect from using GBR-reserves for anticipating negative future prospects may not be as important for money-center banks as it is for smaller ones. Financial distress of a large bank makes intervention of governmental authorities very likely according to TBTF policy.

*H 2: Being a bank subject to **public** law has a positive impact on using GBR-reserves.*

The particular ownership structure of public banks makes them less vulnerable to any kind of bad signal caused by GBR-reserves, e.g. regarding an assumed increase in risk.

*H 3: The use of GBR-reserves increases over **time**.*

The more banks make use of visible reserves, the more the bad signalling effect will diminish. So we expect to see a continuous rise in the number of banks using GBR-reserves as well as in the aggregate size of GBR-reserves for all banks from the year of their implementation in 1993 through 2005.

*H 4: Banks that also prepare their company accounts according to **IAS** in addition to HGB ('IAS banks') are more likely to use GBR-reserves than other banks ('non-IAS banks').*

IAS accounting does not allow hidden reserves equivalent to para. 340f HGB. Banks that – in addition to German HGB accounting – also prepare their balance sheets according to international accounting standards would have to create two different annual statements. Since the one according to IAS reveals the amount

of hidden reserves anyway, we argue that those banks will convert hidden reserves into the visible alternative upfront. Hence, we expect to see a strong coherence between using GBR-reserves and preparing financial statements according to IAS.

H 5: Banks in need of ***regulatory capital*** *will make amplified use of GBR-reserves.*

Following KWG, GBR-reserves are acclaimed as tier 1 capital. Banks which are short of this core class of regulatory capital therefore may prefer building GBR-reserves rather than 340f-reserves. However, if they consider the signalling effect to have a negative impact on their bank, they may also decide to retain earnings or issue new equity. In combination with *H1* and *H2*, we expect to see amplified use of GBR-reserves particularly among large, public banks, and those short of tier 1 capital.

H 6: Banks use GBR-reserves as a means of ***earnings management****.*

Our last hypothesis refers to the fact that GBR-reserves allow (visible) earnings management. In years with higher-than-average net income, the bank's management may decide to raise GBR-reserves to set aside resources for years with substandard surplus. Then, GBR-reserves can be reduced to increase profits and thus ensure dividend stability for shareholders.

4 Empirical Analysis

4.1 Data and Variables

The basis for our analysis is annual bank-level data of 3,078 German banks[23] from the BankScope Database for the years 1993-2005.[24] We divide the German banking market into four different groups according to their legal status: savings banks (henceforth: *Thrifts*), cooperative banks (*Coops*), commercial credit banks (*Credits*), and other banks (*Others*) as a compound item, including 43 home loan banks, 45 mortgage banks, 21 federal or state banks, 9 cooperative central banks, and 42 other (mostly non-profit) banks.[25] Due to lack of data in BankScope and occurring mergers during the observed time period, the panel is unbalanced and consists of 22,067 bank/year observations.

Table 2 gives detailed information about the number of banks observed in our panel and the split between the bank groups over time.[26] The share of each bank group is quite constant over time, whereas the absolute number of banks rises until 1998 due to an increasing overall coverage (meaning the proportion of banks included in our database in relation to the overall number of banks in Germany) and decreases afterwards as a result of an ascending number of mergers. *Coops* are dominating our sample. Roughly speaking, they have a share of more than 50%, followed by *Thrifts* with a share of about 30%, *Credits* with about 8%, and *Others* with about 6%.

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[23] Due to our treatment of mergers this figure is (despite of a coverage below 100%) higher than the actual number of existing banks. In case of a merger of several banks we, technically speaking, created a new bank independent of the other ones, which started its activity in the year of the merger. We did not distinguish between mergers, takeovers, or any other kind of acquisition.

[24] We merely analyze the unconsolidated accounts according to HGB. The data collected contains more than 200 variables including all positions from balance sheets and income statements.

[25] For the vast majority of the banks we retain this classification from BankScope. However, a few banks had to be re-classified due to faulty insertion. After dividing the banks into separate groups, we excluded some banks since they are not conducting core banking business (lending and borrowing) but mainly clearing, stock trading or factoring. Furthermore we eliminated some foreign banks that did not show a stable business in Germany.

[26] The last row 'Total' refers to the overall number of observations by bank group.

	Thrifts		Coops		Credits		Others		Total	
Year	No.	col %	No.	col %	No.	col %	No.	col %	No.	col %
1993	497	38.9%	557	43.7%	133	10.4%	89	7.0%	1,276	100.0%
1994	559	34.9%	799	49.8%	148	9.2%	97	6.1%	1,603	100.0%
1995	574	32.2%	951	53.4%	152	8.5%	104	5.8%	1,781	100.0%
1996	582	31.1%	1,027	54.9%	157	8.4%	106	5.7%	1,872	100.0%
1997	578	31.2%	1,003	54.2%	162	8.7%	109	5.9%	1,852	100.0%
1998	581	28.6%	1,190	58.5%	156	7.7%	106	5.2%	2,033	100.0%
1999	565	28.3%	1,175	58.9%	147	7.4%	109	5.5%	1,996	100.0%
2000	549	29.3%	1,072	57.3%	144	7.7%	106	5.7%	1,871	100.0%
2001	520	29.7%	988	56.5%	139	7.9%	102	5.8%	1,749	100.0%
2002	496	30.6%	888	54.7%	137	8.4%	102	6.3%	1,623	100.0%
2003	473	31.3%	804	53.2%	130	8.6%	104	6.9%	1,511	100.0%
2004	465	31.3%	791	53.2%	126	8.5%	104	7.0%	1,486	100.0%
2005	439	31.0%	756	53.5%	120	8.5%	99	7.0%	1,414	100.0%
Total	6,878	31.2%	12,001	54.4%	1,851	8.4%	1,337	6.1%	22,067	100.0%

Table 2: Number of banks observed in the panel by bank groups over time.

	Thrifts	Coops	Credits	Others	Total
1993	71%	20%	41%	56%	32%
1999	98%	58%	51%	69%	65%
2005	95%	58%	48%	82%	66%

Table 3: Coverage by bank groups for selected years.

Noteworthy, the coverage within our sample differs between the bank groups and over time. Table 3 gives a brief description of the coverage in comparison to Deutsche Bundesbank data.[27] Whereas it is very high for *Thrifts* and quite high for *Others*, it is much lower for *Coops* and *Credits*.[28] This disparity in coverage between the bank groups is relative stable over time whereas the overall coverage in the database rises, particularly from 1993 through 1999.

We are utilizing the following variables to measure the use of **GBR-reserves**: $GBR_{i,t}$ is the absolute amount of GBR-reserves as shown on the balance sheet of bank i in year t. $\Delta_{i,t}^{GBR} = (GBR_{i,t}) - (GBR_{i,t-1})$ is the absolute change of the amount of GBR-reserves of bank i from year $(t-1)$ to t. The binary variable $\Gamma_{i,t}^{GBR}$ is 1 if bank i shows a positive amount of GBR-reserves in year t (thus $GBR_{i,t} > 0$) and 0 otherwise. Noteworthy, $\Gamma_{i,t}^{GBR}$ can vary over time.

[27] Cf. Deutsche Bundesbank (2008).

[28] As a general rule, with exceptions, of course, BankScope tends to be biased towards larger banks which introduces a weak selection bias at the expense of small cooperative banks.

Group	Number of banks	Size in 1,000 EUR	PUBLIC	IAS	TIER 1	INCOME in 1,000 EUR
Thrifts	719	1,616,178	0.9891	0.0000	0.0437	3,644
Coops	1,980	442,175	0.0000	0.0000	0.0534	1,086
Credits	222	12,490,263	0.0000	0.0616	0.1273	20,145
Others	157	27,279,748	0.3642	0.0509	0.1553	25,005
Total	3,078	3,444,742	0.3304	0.0082	0.0628	4,932

Table 4: Number of banks observed in the panel and means of all observations in the different bank groups.

Regarding *H1*, we use $SIZE_{i,t}$ as a proxy for the **size** of the bank, which is the sum of total assets (in 1,000 EUR) of bank i in year t.[29] With respect to *H2*, $PUBLIC_i$ as a time-invariant dummy takes the value 1 if bank i is subject to **public** law and 0 otherwise.[30] Furthermore regarding *H4*, the dummy $IAS_{i,t}$ is used, which takes the value 1 if bank i in year t prepares its financial statements according to any **international accounting** regime in addition to HGB and 0 otherwise.[31] To analyze the endowment with regulatory capital (cf. *H5*), we approximate the **tier 1 capital ratio** by adjusting the accounting data and making some assumptions according to para. 10 Section II a, b KWG.[32] The corresponding variable is named $TIER1_{i,t}$ and its change from $(t-1)$ to t is $\Delta_{i,t}^{TIER1}$. Furthermore, the **net income** (in 1,000 EUR), as the bottom line of the annual profit and loss accounts of bank i in year t, is used as the variable $INCOME_{i,t}$ with respect to *H6*.

To provide some feeling for the variables just described, Table 4 collects the number of banks per group and group averages, respectively averages across all banks included. Note that, since the table shows the means of observations and not the means of banks, those banks with many observations in the panel have a higher weight than banks which contribute only a few observations.

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[29] We acknowledge that the sum of total assets is an arguable, but at least frequently used proxy for bank size since it does not include off balance sheet items, contingent liabilities, and credit letters.

[30] $PUBLIC_i$ is constant over time, because changes in legal status did not occur.

[31] Banks with $IAS_{i,t} = 1$ are henceforth named 'IAS banks' for short and 'non-IAS banks' if $IAS_{i,t} = 0$. Note that $IAS_{i,t}$ is time-variant because we observed a lot of banks which changed their status from 'non-IAS' to 'IAS' (but not the other way around) during the period of our analysis.

[32] A detailed description of this approach is given in Appendix A.

4.2 Results

4.2.1 Descriptive Statistics

First of all, we describe the evolution of the dummy variable ΓGBR, which is the **share of banks using GBR-reserves** by bank group over time. Figure 1 shows that the share of *Thrifts* and *Coops* using GBR-reserves is slowly increasing until 2001, followed by a rapid step-up over the last years (reaching 30% in 2005). The initially hesitant use of GBR-reserves within these bank groups, which primarily consist of rather small banks, can be seen as a confirmation for *H1*. At the same time, our findings for the early years contradict *H2* since nearly all *Thrifts* are public banks. The share of *Credits* showing GBR-reserves is slightly increasing for the years from 1993 through 2000 and fairly constant at about 16% since then. The *Others* lead in using GBR-reserves. Federal or state banks, which are large and public, as well as large cooperative central banks are included in this compound group. Therefore, these findings are in line with hypotheses *H1* and *H2*. Starting at 16.8%, the proportion within the *Others* is increasing quickly. Since 1998 it is staggering comparatively strong between 30% and 42%. Due to the prevalence of *Thrifts* and *Coops* the share of banks using GBR-reserves within the banking sector as a whole rises steadily from 1.6% in 1993 to 31.2% in 2005. This fact confirms *H3*.[33]

To gain deeper insight into the use of GBR-reserves, we counted the number of observations for which the level of these increased or decreased over time (cf. Table 5). Furthermore, we distinguished between a first-time implementation (*Implement*), an increase (*Raise*), a decrease to a still positive level (*Reduce*), and a termination (*Terminate*) of the whole balance sheet item. The column *Hold* shows the number of observations for which a positive level did not change.[34] The column *Total Activities* describes the total number of decisions regarding GBR-reserves, including the terminations.[35] Apparently, an existing level is

[33] Data referring to Figure 1 and the 'Total' are shown in Table 9 (cf. Appendix B).

[34] A bank showing a positive level of GBR-reserves in the first year it is part of the observations, is assigned to the category 'hold' as well. This is due to the fact that we are not able to verify whether it increased or firstly introduced these reserves.

[35] Since *Terminate* is included, *Total Activities* exceed $\sum_i \Gamma_{i,t}^{GBR}$ (or a corresponding sum over groups), which only counts positive amounts of GBR-reserves.

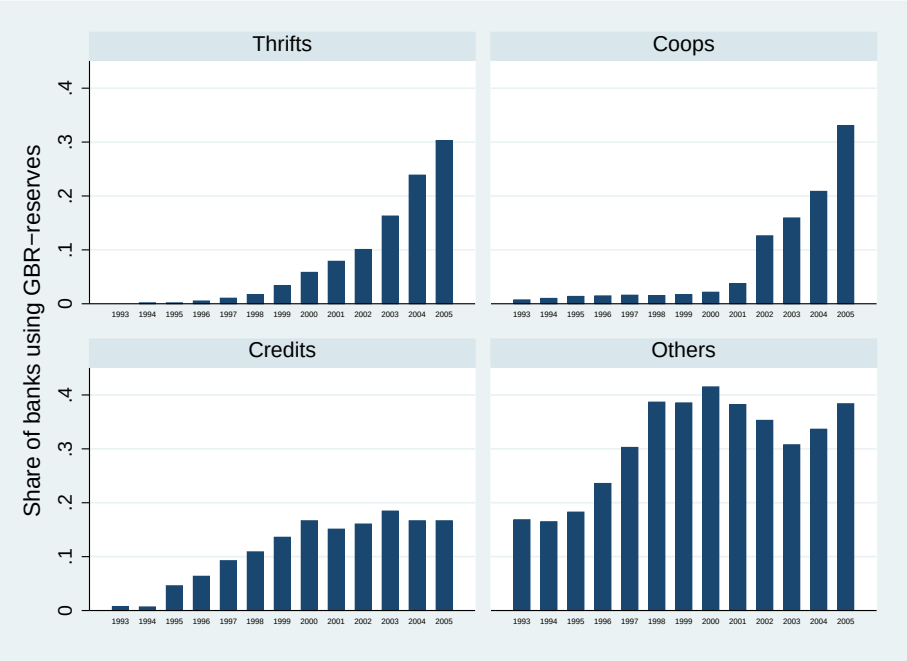

Figure 1: Share of banks using GBR-reserves per bank group over time.

much more often increased than decreased. Matching this, we observed substantially more implementations than terminations. Supporting *H3*, the number of implementations clearly increases over time including a sudden rise in 2002.

Figure 2 shows the change in the share of IAS banks per bank group over time.[36] Certainly due to their regional focus and common lack of international business, none of the *Thrifts* and *Coops* prepares its financial statement according to IAS. The proportion of *Credits* doing so is constantly increasing up to a level of 17% today, while *Others* show a low growth rate followed by a strong increase since 2004 (up to roughly 16% today).

Supporting *H4*, the positive coherence between using GBR-reserves and following international accounting standards is salient when separating $\Gamma_{i,t}^{GBR}$ not by

[36] Relative and absolute figures can be found in Tables 10 and 11 (cf. Appendix B).

	Implement	Raise	Hold	Reduce	Terminate	Total Activities
Bank Group						
Thrifts	138	211	131	4	5	489
Coops	263	287	249	10	20	829
Credits	37	34	127	5	8	211
Others	42	143	215	15	13	428
Total	480	675	722	34	46	1,957
Year						
1993	0	0	20	0	0	20
1994	5	12	9	0	1	27
1995	12	16	12	0	0	40
1996	12	13	28	0	0	53
1997	20	21	29	0	3	73
1998	21	28	36	1	2	88
1999	24	35	38	4	6	107
2000	28	28	62	5	9	132
2001	23	49	64	2	4	142
2002	87	51	76	6	5	225
2003	61	84	114	2	8	269
2004	75	137	112	8	6	338
2005	112	201	122	6	2	443
Total	480	675	722	34	46	1,957

Table 5: Number of activities regarding GBR-reserves.

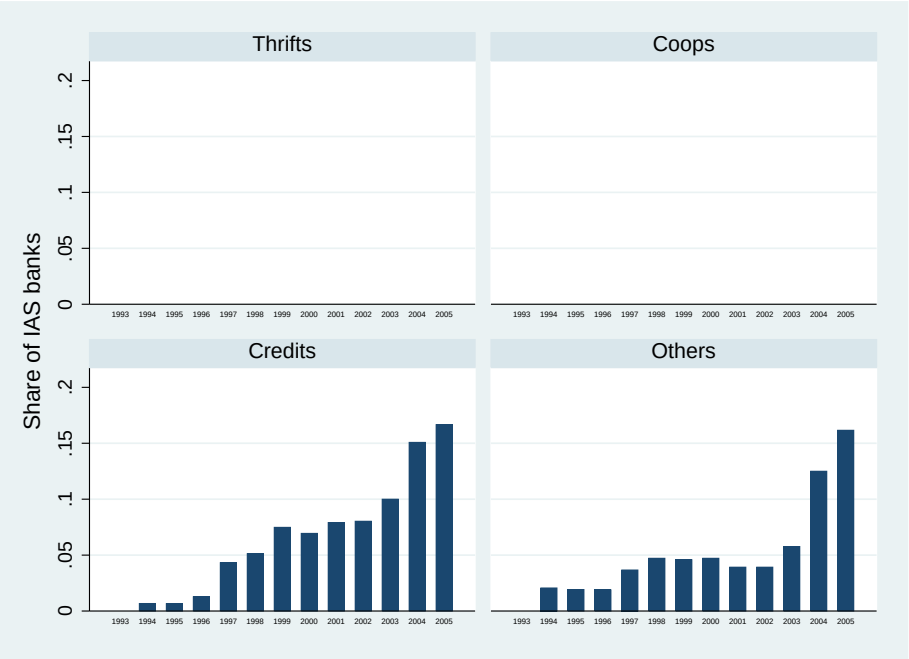

Figure 2: Share of IAS banks by bank group over time.

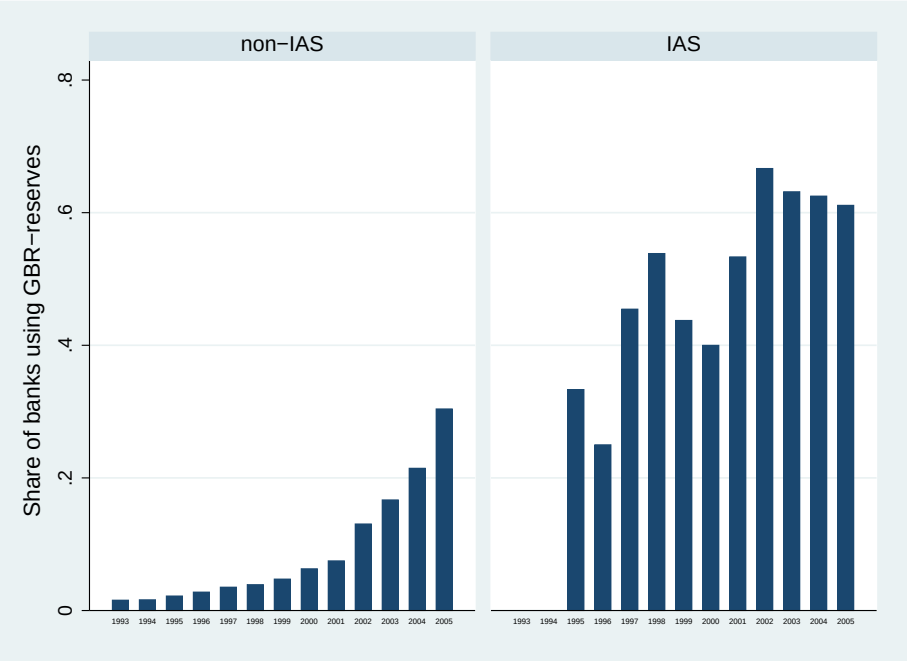

Figure 3: Shares of IAS and non-IAS banks showing GBR-reserves over time.

bank groups (as shown in Figure 1) but by IAS and non-IAS banks as done in Figure 3.[37]

The share of banks using GBR-reserves is much higher within the group of IAS banks (shown on the right-hand side) than within the other group (as given on the left-hand side). Although the share of GBR banks within the group of non-IAS banks rises steadily, it never reaches the level the IAS banks hold since 1997. Due to the fact that the overall number of IAS banks is small, the sizes of changes on the right-hand side may also be the result of a bigger impact of individual decisions, particularly during the first years.[38]

[37] Data referring to this Figure 3 is shown in Table 12 (cf. Appendix B).

[38] The impact of $IAS_{i,t}$ should not yet be overstated at this point of our analysis. Key factors like time and bank group (according to Figures 1 and 3) affect $IAS_{i,t}$ as well as $GBR_{i,t}$. Generally, a separation of the influence of factors like international accounting on the level of GBR-reserves is difficult. For example, size and other key factors also play a prominent role for the decision to prepare financial statements according to IAS.

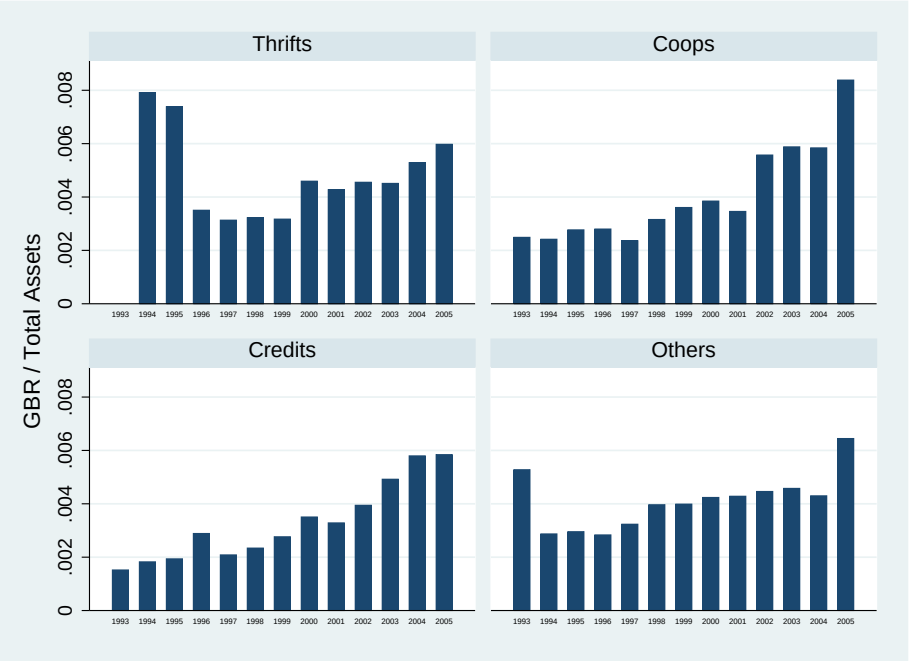

Figure 4: $\frac{GBR}{TotalAssets}$ by bank group over time.

Up to now, all descriptive statistics referred to the whole data set. From now on, we will exclusively focus on those observations where banks are using GBR-reserves and the question which amounts those banks hold as GBR-reserves.[39] To eliminate size effects we use the ratio of GBR-reserves to total assets. Figures 4 and 5 show how this ratio has developed over time, separated by bank groups as well as by IAS and non-IAS banks.[40]

Figure 4 reveals startling results for *Thrifts* and *Others*. The ratio of GBR-reserves to total assets is remarkably high at the beginning. When interpreting these findings, the small number of banks showing these reserves has to be considered. Thus the results are driven by very few institutions. One is tempted to say that those institutions that used GBR-reserves first did so to a certain extent in order to get a sufficient compensation for the negative signal incurred. Considering the first years as outliers, afterwards all groups show a moderate

[39] Technically speaking, we are neglecting all observations with $\Gamma_{i,t}^{GBR} = 0$, i.e. we take a bank into account only in those years in which its level of GBR-reserves was positive.

[40] Data referring to the Figures 4 and 5 are shown in Table 13 and 14 (cf. Appendix B).

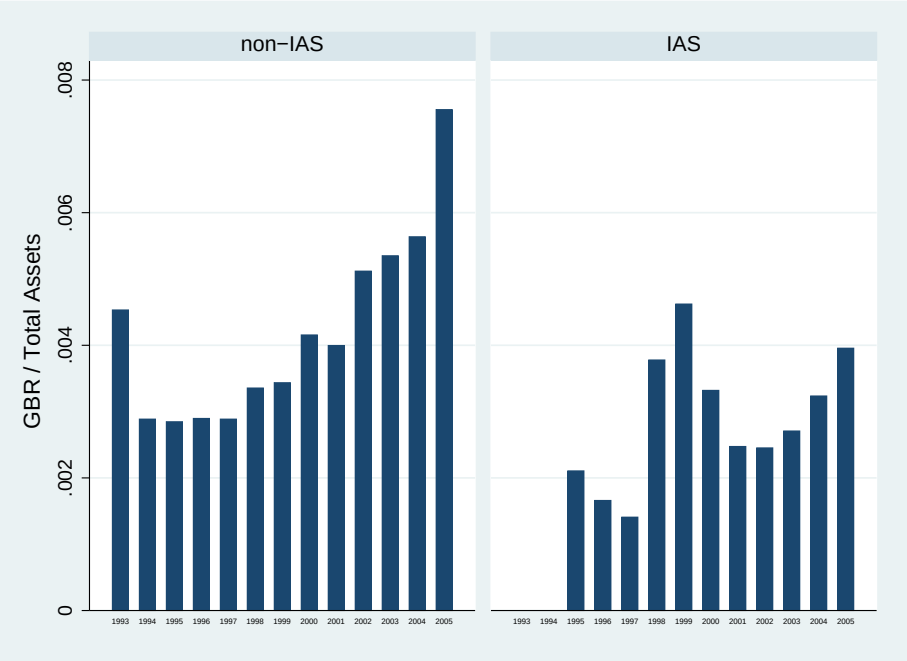

Figure 5: $\frac{GBR}{TotalAssets}$ by IAS and non-IAS banks over time.

growth starting between 0.2% and 0.3% and rising to roughly 0.6%. Again, this observation supports *H3*. Noteworthy, there is a jump for *Coops* (*Others*) to more than 0.8% (0.6%) in 2005.

For IAS banks, shown on the right-hand side of Figure 5, our findings are rather heterogeneous. However, it can be stated that the ratio of GBR-reserves to total assets is lower for IAS banks than for non-IAS banks (except for the years 1998 and 1999). This may on the one hand be due to the fact that these banks have to disclose hidden reserves when switching to international accounting standards. Thus, they may not be willing to show a high reserves level immediately. On the other hand the original level of 340f-reserves may have been lower than the one of GBR-reserves in banks which fund this item completely unsolicited. However, we have to concede that we cannot give a concluding explanation for this finding now.

To gain a deeper insight into the relation between GBR-reserves and the other variables, Table 6 collects some selective correlation coefficients. The correspond-

Variables	ΓGBR	GBR	SIZE	TIER1	IAS
SIZE	0.190	0.541	1		
	(0.000)	(0.000)			
TIER1	-0.006	-0.007	-0.012	1	
	(0.379)	(0.296)	(0.086)		
IAS	0.148	0.196	0.382	-0.005	1
	(0.000)	(0.000)	(0.000)	(0.506)	
PUBLIC	0.029	0.014	0.022	-0.006	-0.054
	(0.000)	(0.043)	(0.001)	(0.389)	(0.000)
Year	0.263	0.057	0.043	0.019	0.069
	(0.000)	(0.000)	(0.000)	(0.009)	(0.000)

Table 6: Pairwise correlations 1 (p-values in brackets).

Variables	$\Delta TIER1$	INCOME	Year
ΔGBR	-0.001	0.344	0.026
	(0.941)	(0.000)	(0.053)

Table 7: Pairwise correlations 2 (p-values in brackets).

ing p-values are given in brackets to exhibit the level of significance. A highly significant positive coherence between using GBR-reserves (ΓGBR) and (1) the size of a bank, (2) being a public bank, (3) being an IAS bank, and (4) time is observable. Hence, we find confirmation for hypotheses *H1* to *H4* as expected. Concerning *H2*, we have to acknowledge that the correlation is significantly positive, but rather weak. This may be due to the high number of *Thrifts*, which are public banks but show GBR-reserves rarely. The GBR-column, representing the size of the GBR-reserves, basically confirms our findings although the correlation to $PUBLIC$ is less significant. However, the remaining columns show that there is a significant coherence between most of the other variables, too. So we have to control for these effects as we do in the regression models within the next sections. The only exception to the generally high significance concerning both, ΓGBR and GBR, is the proxy variable $TIER1$, representing the tier 1 capital ratio. Moreover, it is only weakly related to $SIZE$ and strongly related to $YEAR$; apparently it is smaller for large banks and increases over time, but has no significant correlation with (the use of) GBR-reserves and other variables. So far, we cannot confirm *H5*.

Table 7 shows the results of our analysis regarding the change in the absolute value of GBR-reserves, ΔGBR. We do not find any coherence between a change in the tier 1 capital ratio and a change in GBR-reserves, but a highly significant positive one between net income and ΔGBR. Years in which those reserves

are funded to a larger extent are predominantly those with a high net income (although this is diminished by funding GBR-reserves). Supporting *H6*, this may be a first hint for earnings management.

To further investigate this relationship, we partition our sample into 'GBR banks' and 'non-GBR banks'. The latter are banks which never used GBR *any time* in the observed time period. For each single GBR bank, we create the (standardized) standard deviation (SD) over time for the variable $INCOME$ and additionally the SD over time for the variable *INCOME BEFORE GBR*. This new variable is ($INCOME + \Delta_{i,t}^{GBR}$) and hence the net income before GBR-reserves are funded or reduced.[41] If banks are using GBR-reserves for earnings management purposes successfully, we expect to see SD(INCOME BEFORE GBR) exceeding SD(INCOME). Furthermore, we calculate SD(INCOME) for each non-GBR bank and compare it to the previous ones. We create the distribution of each of the three variables across all banks and show the corresponding boxplot in Figure 6. For GBR banks our findings show clearly that the income variation is much higher when looking at net income before GBR-reserves are funded than after this is done. This can be interpreted as another sign for banks using these reserves as a means of earnings management. Furthermore, the SD(INCOME), after funding/reducing GBR-reserves is generally still(somewhat) higher for banks showing GBR-reserves than for the non-GBR banks. Consequently, banks with a high variation in net income are the ones to use GBR-reserves as a means of earnings management.[42]

4.2.2 Regression Models

To study in more detail which factors drive a bank's use of GBR-reserves, we use the plain-vanilla logit ***Model A1*** with ΓGBR as dependent variable. We examine the influence of the independent variables $SIZE$, $PUBLIC$, IAS, $TIER1$, and $INCOME$. Moreover, we control for bank groups and time dummies to find time-fixed effects. Since we do not control for bank-fixed effects in a first

[41] In fact, we do not use $\Delta_{i,t}^{GBR}$, but rather the corresponding item of the profit and loss account. Doing so, we account for differences between $\Delta_{i,t}^{GBR}$ and the corresponding item of the income statement (cf. footnote 9).

[42] Since we are using the standardized SD, size effects are eliminated.

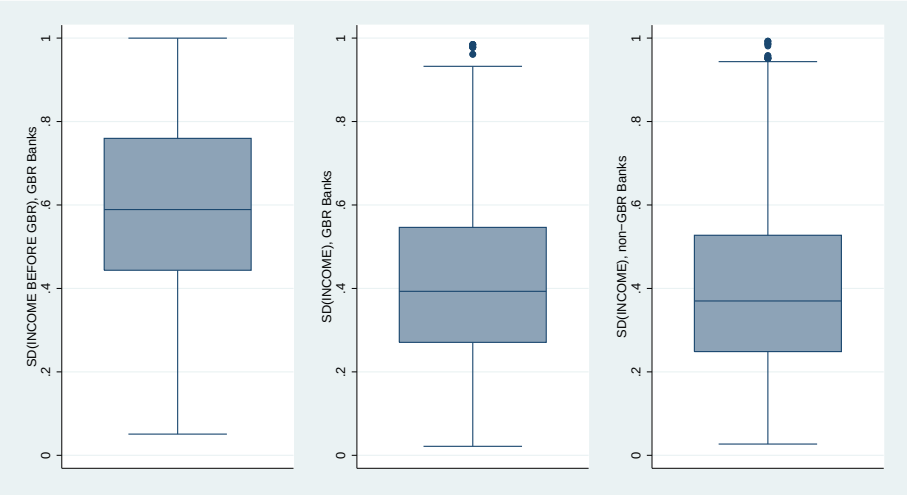

Figure 6: Boxplot of SD(*INCOME BEFORE GBR*) and SD(*INCOME*) for GBR banks and SD(*INCOME*) for non-GBR banks.

step, it is just a simple pooled time-fixed effects estimation. The group *Others* and the year 2005 as our basis are not part of equation (1), which shows the formal design of our model, using τ_{year} for the time dummies:[43]

$$P(\Gamma_{i,t}^{GBR} = 1) = \frac{e^{L_{i,t}}}{1 + e^{L_{i,t}}} \quad \text{where}$$

$$\begin{aligned} L_{i,t} = {} & \beta_0 + \beta_1 \cdot SIZE_{i,t} + \beta_2 \cdot PUBLIC_i + \beta_3 \cdot IAS_{i,t} + \\ & \beta_4 \cdot TIER1_{i,t} + \beta_6 \cdot INCOME_{i,t} + \\ & \beta_7 \cdot THRIFTS_i + \beta_8 \cdot COOPS_i + \beta_9 \cdot CREDITS_i + \\ & \sum_{t=1}^{11} [\beta_{(9+t)} \cdot \tau_{(1993+t)}] + \epsilon_{i,t}. \end{aligned} \tag{1}$$

The estimated coefficients and the corresponding p-values of the t-tests (in brackets) are shown in the second column of Table 8. Additionally, $\bar{R}^2_{pseudo}$ as well as the p-value of the F-test assessing the goodness of fit of the overall model are given at the bottom. In order to test whether an independent variable

[43] The coefficient β_5 is skipped in the numbering because it is reserved for $\Delta TIER1$ in Models C1 and C2 (cf. Table 8). Since the year 1993 was dropped due to collinearity in all our models, it is excluded from equation (1), (2), and (3).

has positive impact on ΓGBR, i.e. the corresponding β is positive, we should be able to reject the null hypothesis of $\beta = 0$ on a preferably high level of significance coming along with a low corresponding p-value.[44]

As expected, we find a strongly significant positive influence of the variable $SIZE$, i.e. $\beta_1 > 0$, which means that large rather than small banks tend to show GBR-reserves. Thus, our (economic) hypothesis *H1* cannot be rejected.

A strongly significant positive influence of the variable $PUBLIC$ is also apparent because of $\beta_2 > 0$. Public banks (explicitly meaning those which are subject to public law) are more inclined to use GBR-reserves than other banks. Therefore, *H2* cannot be rejected, too. Note that also the dummies for the bank groups show significant coefficients, indicating that *Thrifts*, although being public banks, are least likely to use GBR-reserves followed by *Coops*, *Credits*, and *Others*.[45]

As expected, we find a strongly significant positive influence of the variable IAS, i.e. $\beta_3 > 0$, too. IAS banks are more likely to show GBR-reserves than non-IAS banks. Hence, *H4* cannot be rejected, too.

Once more as expected, we find a strongly significant negative influence of the variable $TIER1$, i.e. $\beta_4 < 0$. Thus, banks with low capital buffers rather than ones with sufficient capital endowment are prone to show GBR-reserves. Consequently, *H5* cannot be rejected either.[46]

Furthermore, we find a relative strongly significant positive influence of the variable $INCOME$, i.e. $\beta_4 > 0$ (still significant at a 1% confidence level). Therefore, observations with a high net income are predominantly those in which

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[44] In the following, we say for short that the independent variable has a *significantly positive impact* on the dependent variable, meaning that the corresponding coefficient has a positive prefix and significantly differs from 0 according to the t-test.

[45] Since all groups show negative coefficients and *Others* is our basis, the first groups show lower preferences for using these reserves. The higher the absolute value of the coefficient, the higher is the objection for using GBR-reserves compared to *Others*.

[46] In contrast to our findings in the previous section, which (except regarding $TIER1$) all point in the same direction as our observations here, it has now even been controlled for size, bank group, and time-fixed effects.

Model	**A1**	**A2**	**B1**	**B2**	**C1**	**C2**
	time-fixed effects	random effects	time-fixed effects	time-and bank-fixed effects	time-fixed effects	time- and bank-fixed efeffects
	Logit		OLS		OLS	
	ΓGBR		$\frac{GBR}{TotalAssets}$		ΔGBR	
β_1	6.66e-09	9.36e-09	-1.14e-11	-9.38e-12	.0003977	.002537
(SIZE)	(0.000)	(0.000)	(0.000)	(0.143)	(0.000)	(0.000)
β_2	1.419293	2.164188	.0011075		-5443.226	
(PUBLIC)	(0.000)	(0.000)	(0.026)		(0.001)	
β_3	1.129842	.9697612	-.0005425	-.0016704	-17242.33	-26400.41
(IAS)	(0.000)	(0.021)	(0.381)	(0.002)	(0.000)	(0.000)
β_4	-2.88952	-3.669037	.0075932	.0099545		
(TIER1)	(0.000)	(0.001)	(0.000)	(0.000)		
β_5					14.75698	38.92096
($\Delta TIER1$)					(0.976)	(0.926)
β_6	6.57e-07	1.16e-06	7.04e-10	3.20e-11	.0864741	.093318
(INCOME)	(0.011)	(0.003)	(0.240)	(0.931)	(0.000)	(0.000)
β_7	-2.656098	-4.380069	-.0014026		10850.25	
(Thrifts)	(0.000)	(0.000)	(0.001)		(0.000)	
β_8	-1.267708	-2.363152	.0006908		6047.71	
(Coops)	(0.000)	(0.000)	(0.116)		(0.000)	
β_9	-.8539114	-1.589515	.0000598		4123.945	
(Credits)	(0.000)	(0.000)	(0.907)		(0.001)	
β_{11}	-3.422811	-6.516182	-.0049235	-.0057666	dropped	dropped
(1994)	(0.000)	(0.000)	(0.000)	(0.000)		
β_{12}	-3.155157	-5.881207	-.0046641	-.0053724	-2467.156	2999.006
(1995)	(0.000)	(0.000)	(0.000)	(0.000)	(0.021)	(0.002)
β_{13}	-2.886667	-5.378029	-.0043461	-.005505	-2861.418	1501.622
(1996)	(0.000)	(0.000)	(0.000)	(0.000)	(0.005)	(0.097)
β_{14}	-2.59248	-4.84383	-.004433	-.0051132	-3163.148	313.7632
(1997)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.724)
β_{15}	-2.393202	-4.359	-.0036942	-.0042718	-2286.733	1053.513
(1998)	(0.000)	(0.000)	(0.000)	(0.000)	(0.021)	(0.231)
β_{16}	-2.262133	-4.011128	-.0034804	-.0043457	-2945.414	-341.5578
(1999)	(0.000)	(0.000)	(0.000)	(0.000)	(0.003)	(0.697)
β_{17}	-1.994528	-3.624317	-.0028994	-.0045231	-3359.339	-1861.867
(2000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.031)
β_{18}	-1.787522	-3.251112	-.003154	-.0043415	-3669.055	-2307.027
(2001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.007)
β_{19}	-1.113741	-2.088587	-.0023469	-.0033966	-2927.208	-1162.716
(2002)	(0.000)	(0.000)	(0.000)	(0.000)	(0.004)	(0.177)
β_{20}	-.8200629	-1.516695	-.0020276	-.0026203	-2230.157	-647.8539
(2003)	(0.000)	(0.000)	(0.000)	(0.000)	(0.030)	(0.452)
β_{21}	-.4957152	-.9086189	-.0018701	-.0017223	-3410.687	-2364.377
(2004)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.006)
β_0	.4219571	.9312243	.0067253	.0075099	-3456.609	-9013.784
(constant)	(0.001)	(0.001)	(0.000)	(0.000)	(0.006)	(0.000)
N	19652	19652	1868	1868	17248	17248
p	0.000	0.000	0.000	0.000	0.000	0
$\bar{R}^2_{pseudo}$	0.1930					
$\bar{R}^2_{adj}$			0.1139		0.2043	
$\bar{R}^2_{within}$				0.2666		0.3738

Table 8: Coefficients of regression models (p-values in brackets).

GBR-reserves have positive amount. Supporting *H6*, this is another hint for earnings management.

The significantly negative coefficients for the time dummies reveal that the preference for funding GBR-reserves is lower compared to our basis, the year 2005. The strong monotonic increase of the coefficients implies a steady rise in the tendency to use these reserves over time. As expected, *H3* cannot be rejected as well.

To reproduce bank-individual effects in our panel data set, we use a random effects estimator in our ***Model A2***.[47] The key findings of this model are shown in column 3 of table 8. With one minor exception, there are no fundamental changes of the results. Merely hypothesis *H4*, concerning IAS banks, is not significant at a 1% confidence level (with a corresponding p-value of 1.5%) any longer.

In a second step, we use a plain-vanilla OLS-model (***Model B1***), with $\frac{GBR}{TotalAssets}$ as dependent variable (limited to the bank/year observations with positive GBR-reserves) to further examine which factors influence this ratio. We analyze the influence of the same independent variables as before and control for bank group and time. Again, we pool the data and do not control for bank-fixed effects in a first step. Equation (2) gives the formal design of our model, the results are shown in column 4 of Table 8.

$$\begin{aligned}\frac{GBR_{i,t}}{TotalAssets_{i,t}} &= \beta_0 + \beta_1 \cdot SIZE_{i,t} + \beta_2 \cdot PUBLIC_i + \beta_3 \cdot IAS_{i,t} + \\ &\quad \beta_4 \cdot TIER1_{i,t} + \beta_6 \cdot INCOME_{i,t} + \\ &\quad \beta_7 \cdot THRIFTS_i + \beta_8 \cdot COOPS_i + \beta_9 \cdot CREDITS_i + \\ &\quad \sum_{t=1}^{11}[\beta_{(9+t)} \cdot \tau_{(1993+t)}] + \epsilon_{i,t} \qquad \forall GBR_{i,t} > 0. \end{aligned} \tag{2}$$

We find that within the group of banks with positive GBR-reserves the larger ones are generally showing a smaller proportion of GBR-reserves in relation to their total assets ($\beta_1 < 0$). This finding may be explained by the existence of a threshold amount for implementing these reserves regardless of a bank's

[47] Due to the very low variance of Γ^{GBR} on a bank-individual level, a bank-fixed effects estimator does not yield reasonable results.

size. Nevertheless, it is contradictory to our previous results. Supporting *H2*, not only more public banks show GBR-reserves but also to a higher extent ($\beta_2 > 0$). However, this result is not significant at a 1% confidence level (with a corresponding p-value of 2.6%). Furthermore, we find $\beta_4 > 0$ and hence banks with a weak regulatory capital endowment using less GBR-reserves in relation to their total assets. Although it seems contradictory to previous results, it is compatible with the assumption that insufficiently capitalized banks are less profitable and therefore cannot increase GBR-reserves. Supporting *H3*, the time-dummies have a basically increasing (but not strictly monotonic) trend over time again. Hence, the ratio of GBR-reserves to total assets is increasing over time. Furthermore, we find IAS, $INCOME$, and $Coops$ as well as $Credits$ have no significant impact on $\frac{GBR}{TotalAssets}$.

Model B2 (stated in column 5 of Table 8) is a bank- and time-fixed effects estimator and is therefore not able to take time-invariant variables into account. Hence $PUBLIC$ and the bank group dummies are dropped. The size effect within this model is not significant any more, IAS meanwhile is significant and negative. Hence, we find that IAS banks show lower ratios than non-IAS banks. One could try to argue that banks which are forced to use GBR-reserves for disclosing hidden 340f-reserves show less than banks which use this balance sheet item optionally. All other results are in line with *Model B1*.[48]

In a third step, we examine factors influencing the change in GBR-reserves for all banks with the help of a plain-vanilla OLS-model ***Model C1*** with ΔGBR as dependent variable. We assess the influence of the same independent variables as

[48] The stated $\bar{R}^2_{within}$ (cf. column 5 and 7 of Table 8) is defined following Hamilton (2006), page 195.

before, but substitute $\Delta TIER1$ for $TIER1$. Our findings are shown in column 6 of Table 8 and equation (3) gives the formal design of our model:[49]

$$\begin{aligned}\Delta_{i,t}^{GBR} &= \beta_0 + \beta_1 \cdot SIZE_{i,t} + \beta_2 \cdot PUBLIC_i + \beta_3 \cdot IAS_{i,t} + \\ &\quad \beta_5 \cdot \Delta_{i,t}^{TIER1} + \beta_6 \cdot INCOME_{i,t} + \\ &\quad \beta_7 \cdot THRIFTS_i + \beta_8 \cdot COOPS_i + \beta_9 \cdot CREDITS_i + \\ &\quad \sum_{t=1}^{10} [\beta_{(9+t)} \cdot \tau_{(1994+t)}] + \epsilon_{i,t}. \end{aligned} \tag{3}$$

We find $SIZE$ with significantly positive, and IAS and $PUBLIC$ with significantly negative impact on ΔGBR. Furthermore, we find that changes in tier 1 capital ratio do not have any influence on the level of GBR-reserves. Supporting *H6*, $INCOME$ has a significantly positive impact on ΔGBR. The corresponding bank-fixed effects estimator in ***Model C2*** confirms all results (except for PUBLIC and the bank group dummies, which are again dropped due to their time-invariance).

When $TIER1$ (or $\Delta TIER1$) is used in any of the models, the panel reduces to 19,652 (respectively 17,248) observations since we are not able to calculate the proxy for all observations.[50] As a robustness check, we recurred all analyses without these variables using the whole panel and we found all results remaining basically stable.

[49] The time dummy of the year 1994 is also dropped due to collinearity.

[50] This results from the lack of data due to the inability to calculate $\Delta_{i,t}^{GBR}$ as part of $TIER1_{i,t}$ for the first year each bank is contained in our panel. Moreover, some entries within the balance sheets of the banks in the sample are missing.

5 Conclusions

Banks with a profitable business have several instruments at their disposal to set aside money for covering their general risks and also to keep money in the bank for funding further investments. Apart from earnings retention, German banks may deliberately undervalue certain assets to create hidden 340f-reserves or declare visible reserves, i.e. GBR-reserves according to para. 340g HGB. From an information and agency perspective, the management's choice should take into account the following:

- Hidden reserves are the preferable alternative because managers gain some discretion for earnings management. However, such reserves are not allowed under IAS accounting. Moreover, unlike the two alternatives, 340f-reserves are merely tier 2, but not tier 1 regulatory capital. Therefore, weakly capitalized banks should be more likely to use GBR-reserves as should be IAS banks.

- In that sense, using GBR-reserves is a bad signal. This is particularly true because it also indicates a risky business. In addition, the use of these reserves may be a consequence of management's fear that owners will not supply capital for future investments, because without management's decision to increase GBR-reserves it would be at the owners' discretion to retain earnings for future investments or to distribute them, as dividends say. The negative signal is less relevant for banks which have some other way to demonstrate their good standing, respectively a very small probability of default. Therefore, banks subject to public law are more likely to make use of GBR-reserves due to their public guarantees. The same holds for large institutions if the TBTF presumption is effective.

- The negative signal becomes less relevant the more banks send it out. Therefore we should expect the number of institutions using GBR-reserves to rise over time.

Our empirical analysis with up to 22,067 bank/year observations for German banks from 1993 through 2005 apart from some interesting descriptive statistics, confirming e.g., the increasing use of GBR-reserves over time, reveals the following statistically significant results:

- Relatively weakly capitalized banks indeed use GBR-reserves more often, but if they do so to a lesser extent. Presumably, their profits are too low to enable further increases in GBR-reserves or they are reluctant to indicate more risk.
- Banks reporting according to IAS are actually more likely to use GBR-reserves. The extent of their usage is still inconclusive.
- Again as expected, public banks make use of GBR-reserves more often and also have higher levels of these reserves.
- Larger banks are also more likely to use GBR-reserves. Results on levels and changes are somewhat ambiguous.
- From basically all models it is obvious that the use of GBR-reserves as well as their ratio to total assets increase, almost strictly monotonically, over time even when controlling for other facts.

Agency issues are still sometimes seen as a rather theoretical concept. The present study is another contribution demonstrating, however, that they may yield highly relevant predictions. Their robustness deserves further attention. Among others, the definition of tier 1 capital could be varied because so far it is just a rough proxy for a variable which is not available to us. Extending the time period is no option because GBR-reserves did not exist before 1993 and government guarantees for savings banks (*Thrifts*) and state banks (part of *Others*) ceased to hold in 2005 so that there would be a structural break for these banks.

6 Appendix

6.1 Appendix A: Estimation of tier 1 capital ratio

The proxy TIER1 is calculated as follows. The expressions in brackets refer to the corresponding identifiers in the German 'Statutory Order on Banks' and Financial Services Institutions' Accounts' ('RechKredV'):

$$
\begin{aligned}
TIER1_{i,t} &= \frac{Capital_{i,t}}{Assets_{i,t}^{risk}} \qquad\qquad where \\
Capital_{i,t} &= Equity(P12)_{i,t} + GBR(P11)_{i,t} \\
&\quad - IntangibleAssets(A11)_{i,t} - OwnShares(A14)_{i,t} \\
&\quad - 0.5 \cdot Participations(A7)_{i,t} - Holdings(A8)_{i,t} - \Delta_{i,t}^{GBR} \\
Assets_{i,t}^{risk} &= 0.1 \cdot Claims_{i,t}^{State}(A2) + 0.5 \cdot Claims_{i,t}^{Bank}(A3) + Claims_{i,t}^{Cust.}(A4) \\
&\quad + Bonds(A5)_{i,t} + Shares(A6)_{i,t} + 0.5 \cdot Participations(A7)_{i,t}.
\end{aligned}
$$

The weighting factors used when calculating the risk weighted assets are slightly arbitrary. However, they are derived from those used within the 'Grundsatz I' and the standard approach promoted by Basel II. Robustness checks with alternative weights yielded similar results.

6.2 Appendix B: Figures and Tables

Year	Thrifts	Coops	Credits	Others	Total
1993	0.0000	0.0072	0.0075	0.1685	0.0157
1994	0.0018	0.0100	0.0068	0.1649	0.0162
1995	0.0017	0.0137	0.0461	0.1827	0.0225
1996	0.0052	0.0146	0.0637	0.2358	0.0283
1997	0.0104	0.0160	0.0926	0.3028	0.0378
1998	0.0172	0.0151	0.1090	0.3868	0.0423
1999	0.0336	0.0170	0.1361	0.3853	0.0506
2000	0.0583	0.0215	0.1667	0.4151	0.0657
2001	0.0788	0.0374	0.1511	0.3824	0.0789
2002	0.1008	0.1261	0.1606	0.3529	0.1356
2003	0.1628	0.1592	0.1846	0.3077	0.1727
2004	0.2387	0.2086	0.1667	0.3365	0.2234
2005	0.3030	0.3307	0.1667	0.3838	0.3119
Total	0.0704	0.0674	0.1097	0.3104	0.0866

Table 9: Share of banks showing GBR-reserves by groups over time.

Year	Thrifts	Coops	Credits	Others	Total
1993	0.0000	0.0000	0.0000	0.0000	0.0000
1994	0.0000	0.0000	0.0068	0.0206	0.0019
1995	0.0000	0.0000	0.0066	0.0192	0.0017
1996	0.0000	0.0000	0.0127	0.0189	0.0021
1997	0.0000	0.0000	0.0432	0.0367	0.0059
1998	0.0000	0.0000	0.0513	0.0472	0.0064
1999	0.0000	0.0000	0.0748	0.0459	0.0080
2000	0.0000	0.0000	0.0694	0.0472	0.0080
2001	0.0000	0.0000	0.0791	0.0392	0.0086
2002	0.0000	0.0000	0.0803	0.0392	0.0092
2003	0.0000	0.0000	0.1000	0.0577	0.0126
2004	0.0000	0.0000	0.1508	0.1250	0.0215
2005	0.0000	0.0000	0.1667	0.1616	0.0255
Total	0.0000	0.0000	0.0616	0.0509	0.0082

Table 10: Share of IAS-banks by bank group over time.

Year	Thrifts	Coops	Credits	Others	Total
1993	0	0	0	0	0
1994	0	0	1	2	3
1995	0	0	1	2	3
1996	0	0	2	2	4
1997	0	0	7	4	11
1998	0	0	8	5	13
1999	0	0	11	5	16
2000	0	0	10	5	15
2001	0	0	11	4	15
2002	0	0	11	4	15
2003	0	0	13	6	19
2004	0	0	19	13	32
2005	0	0	20	16	36
Total	0	0	114	68	182

Table 11: Number of IAS-banks by bank group over time.

Year	non-IAS banks	IAS banks	Total
1993	0.0157	0.0000	0.0157
1994	0.0163	0.0000	0.0162
1995	0.0219	0.3333	0.0225
1996	0.0278	0.2500	0.0283
1997	0.0353	0.4545	0.0378
1998	0.0391	0.5385	0.0423
1999	0.0475	0.4375	0.0506
2000	0.0630	0.4000	0.0657
2001	0.0750	0.5333	0.0789
2002	0.1306	0.6667	0.1356
2003	0.1669	0.6316	0.1727
2004	0.2146	0.6250	0.2234
2005	0.3041	0.6111	0.3119
Total	0.0828	0.5440	0.0866

Table 12: Share of non-IAS and IAS banks showing GBR-reserves over time.

Year	Thrifts	Coops	Credits	Others	Total
1993	0.0000	0.0025	0.0015	0.0053	0.0045
1994	0.0079	0.0024	0.0018	0.0029	0.0029
1995	0.0074	0.0028	0.0019	0.0030	0.0028
1996	0.0035	0.0028	0.0029	0.0028	0.0029
1997	0.0031	0.0024	0.0021	0.0032	0.0028
1998	0.0032	0.0032	0.0023	0.0040	0.0034
1999	0.0032	0.0036	0.0028	0.0040	0.0035
2000	0.0046	0.0038	0.0035	0.0042	0.0041
2001	0.0043	0.0035	0.0033	0.0043	0.0039
2002	0.0046	0.0056	0.0039	0.0045	0.0050
2003	0.0045	0.0059	0.0049	0.0046	0.0052
2004	0.0053	0.0058	0.0058	0.0043	0.0055
2005	0.0060	0.0084	0.0058	0.0064	0.0074
Total	0.0050	0.0061	0.0038	0.0042	0.0052

Table 13: $\frac{GBR}{TotalAssets}$ by bank group over time.

Year	non-IAS Banks	IAS Banks	Total
1993	0.0045	0.0000	0.0045
1994	0.0029	0.0000	0.0029
1995	0.0028	0.0021	0.0028
1996	0.0029	0.0017	0.0029
1997	0.0029	0.0014	0.0028
1998	0.0034	0.0038	0.0034
1999	0.0034	0.0046	0.0035
2000	0.0042	0.0033	0.0041
2001	0.0040	0.0025	0.0039
2002	0.0051	0.0025	0.0050
2003	0.0054	0.0027	0.0052
2004	0.0056	0.0032	0.0055
2005	0.0076	0.0040	0.0074
Total	0.0053	0.0032	0.0052

Table 14: $\frac{GBR}{TotalAssets}$ for IAS and non-IAS banks over time.

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